

3-11-2011

The Quality of Real Assets, Liquidation Value and Debt Capacity

Peng Liu Ph.D.

Cornell University, pl333@cornell.edu

Crocker H. Liu Ph.D.

Cornell University, chl62@cornell.edu

Follow this and additional works at: <http://scholarship.sha.cornell.edu/crefwp>



Part of the [Real Estate Commons](#)

Recommended Citation

Liu, P., & Liu, C. H. (2011). The quality of real assets, liquidation value and debt capacity [*Electronic article*]. *The Center for Real Estate and Finance Working Paper Series*, 2010-009, 1-43.

This Article is brought to you for free and open access by the Center for Real Estate and Finance (CREF) at The Scholarly Commons. It has been accepted for inclusion in CREF Working Papers by an authorized administrator of The Scholarly Commons. For more information, please contact hlmdigital@cornell.edu.

The Quality of Real Assets, Liquidation Value and Debt Capacity

Abstract

We use real estate firms to examine how asset liquidation values influence a firm's debt capacity, since the productivity and quality of each asset is observable and potential measures of an asset's liquidation value are easier to ascertain ex-ante. We show that compared to firms that issue equity, firms that issue debt have higher asset quality. The effect of their expected asset liquidation value is significant, even after we control for other factors that influence financing decisions. For firms whose assets' quality is not easily observable, we find that firms' financing choices depend heavily on conditions in the overall real asset market. (JEL: G3, R0, G33)

Keywords

Cornell, asset liquidation, real estate investment trusts (REITs), reduced-form mode

Disciplines

Real Estate

Comments

Required Publisher Statement

© [Cornell University](http://www.cornell.edu). This report may not be reproduced or distributed without the express permission of the publisher.

The Center for Real Estate and Finance

 Hospitality Leadership Through Learning

WORKING PAPER SERIES

WORKING PAPER 2010-009

The Quality of Real Assets, Liquidation Value and Debt Capacity

Peng (Peter) Liu, Crocker Liu

March 11, 2011

This working paper is preliminary in nature. Please do not quote or cite without the expression of the lead author.



Cornell University
School of Hotel Administration

The Quality of Real Assets, Liquidation Value and Debt Capacity

Abstract

We use real estate firms to examine how asset liquidation values influence a firm's debt capacity, since the productivity and quality of each asset is observable and potential measures of an asset's liquidation value are easier to ascertain ex-ante. We show that compared to firms that issue equity, firms that issue debt have higher asset quality. The effect of their expected asset liquidation value is significant, even after we control for other factors that influence financing decisions. For firms whose assets' quality is not easily observable, we find that firms' financing choices depend heavily on conditions in the overall real asset market. (*JEL*: G3, R0, G33)

The illiquidity of corporate assets poses a significant private cost to firms that choose to finance with debt. When a firm is in financial distress and has to liquidate its assets, potential industry buyers, e.g., peers within the same industry, are also likely to be financially constrained or experiencing similar business difficulties, thus they cannot pay full value for the assets. Shleifer and Vishny (1992), who explore the effect of liquidation values on corporate debt capacity, predict that firms with relatively more illiquid assets will prefer equity financing to debt, *ex ante*. In this paper, we test the Shleifer and Vishny hypothesis that asset liquidation values influence firms financing choices. We do so by examining the incremental financing decisions of real estate firms, the real estate investment trusts (REITs).

We choose to focus on real estate firms rather than ordinary corporations to analyze the role that asset liquidation values play in determining a firm's financial contracts. We do so for several reasons. First, prior studies have used commercial real estate to test the Shleifer and Vishny (1992) hypothesis. As Benmelech, Garmaise, and Moskowitz (2005) note, the real estate market is a natural candidate for testing financial contracting, given its high levels of debt coupled with potential measures of an asset's liquidation value, which is usually difficult to ascertain *ex ante*. In addition, relative to most industries, REITs are more homogeneous and offer greater transparency (see, e.g., Capozza and Seguin, 1999) with respect to their operations and assets. In contrast to other types of corporations, the comparative advantage of using REITs is that the productivity, asset quality, and other asset characteristics, all essential features in determining an asset's liquidation value and optimal financing of a project are observable for each asset (property). Further, real estate constitutes a nontrivial portion of the assets held on the balance sheet of corporations. According to Chaney, Sraer, and Thesmar (2010), 58 percent of U.S. public firms in 1993 reported at least some real estate ownership, with real estate accounting for 19 percent of these firms' total market value. Thus, our analysis may provide new insights on the redeployability of assets and liquidation value for other industries with tangible fixed assets (property, plant, and

equipment, PP&E). Furthermore, as Campello and Giambona (2010) point out, among the various categories of tangible assets, the real estate component of PP&E (land and buildings) has the most explanatory power over leverage.

Market participants have long recognized the importance of asset quality in the price formation process in addition to the role that tenant quality and the diversity of different types of industries in a given location known as the economic base have as important determinants of asset quality. The actions of Bill Ackman, the CEO of hedge fund Pershing Square Capital Management LP, represent one example that market participants do recognize the quality-price relationship. In an October 6, 2009 presentation of Realty Income (ticker symbol O) entitled “O’ No!”, Ackman announced that he is shorting the real estate investment trust (REIT) because he believes that Realty Income Corp has issues with tenant quality. As evidence of poor tenant quality/credit ratings, his presentation notes that not only is there a high concentration of discretionary, regional retail tenants (casual dining restaurants, movie theaters, day care centers, etc. . .) that have been hard hit in the recession but there are also some of the largest tenants have junk or unrated credits with high leverage (bankruptcy potential). In addition to this, the report goes on to say that

“unlike many other REITs, Realty Income does not disclose its tenants¹. There is limited transparency as to: names of tenants, credit of tenants, average credit rating of total tenant pool, and individual tenant contribution to revenue. Analysts and investors have asked for more tenant disclosure, but the Company has refused. Question: Why? Answer: We believe that O’s tenant quality is poor and the company is concerned about the impact of transparency on its stock price”

This suggests to him that the dividend will probably get cut and investors will be hurt².

Asset quality is not only important in predicting future REIT performance but it is also

¹For comparison purposes, Ackman notes that “Simon Property Group, for example, discloses tenants representing as little as 0.2% of its minimum rental income”.

²Once word of his presentation got out, shares were down over 7% at one point on Wednesday.

a critical factor in the asset liquidation process. The key objective of the FDIC resolution process is to identify and to implement the disposition of the failed financial institution's assets that is least costly to the deposit insurance fund. According to Schiffman (2009), the FDIC recognizes asset quality as a determinant in setting the reserve price since this is one of the factors used in grouping assets into pools. The reserve price (minimum bid) is then assigned based on the value of the underlying collateral of each pool to achieve the maximum recovery in liquidation. Besides this, in an April 12, 2007 report entitled "INDUS (ECLIPSE 2007-1) plc", the bond rating agency DBRS³ was of the opinion that

"property quality grades of above average or excellent . . . are more capable of retaining and attracting tenants and thus more liquid in a stressed market. . . . The highest-quality properties within a market have lower probabilities of default because they are more likely to be viable and attractive to new tenants, increasing cash flow stability. To evaluate property quality, DBRS considers the location, the functional utility of the asset . . ."

The recent bankruptcy of mall operator General Growth Properties (GGP) provides further evidence of the impact that asset quality has on the value of real estate. Faced with dwindling options for managing its \$25+ billion in short-term mortgage debt coming due within a year, GGP filed for bankruptcy on April 16, 2009. It was the largest real estate bankruptcy since 1980. In commenting on GGP's bankruptcy, the New York Times noted that "Few analysts dispute the quality of General Growth's malls, which include the Ala Moana Center in Honolulu, Water Tower Place in Chicago and the Grand Canal Shoppes at the Venetian in Las Vegas. But its undoing was the mounting pile of short-term mortgages the operator used to expand." GGP's high quality assets resulting from high quality tenants and prime locations resulted in a bidding war between Simon Property Group and Brookfield Asset Management with the former suitor raising its price three times in their unsuccessful

³DBRS is a rating agency that rates companies and single-purpose vehicles that issue commercial paper, term debt and preferred shares in the global capital markets. For further information, please visit <http://www.dbrs.com/about>.

bid. Given its asset quality, GGP was able to negotiate one large equity commitment instead of trying to sell off assets piecemeal during its reorganization. According to Chris Macke, senior real estate strategist with the CoStar Group, “Trying to sell the malls one by one would likely have taken much longer than a year and might have forced the company to accept deep discounts on its assets”. This is consistent with Shleifer and Vishny’s (1992) liquidation value concept; with good assets, its competitors want the assets. Debt capacity is also higher, which is why GGP was in trouble. Due to good asset quality, GGP left bankruptcy on Nov. 8, 2010 splitting itself into two independent and publicly traded companies. Its namesake, a REIT (the New GGP) comprised of 170 core regional malls and 65 additional properties (strip centers and offices that will be sold) and Howard Hughes Corp., (NYSE:HHC), an operating company focusing on the development of master planned communities and shopping centers.

Using prior research⁴ as our starting point, we examine the variation in debt capacity relative to the determinants of liquidation value by focusing on asset quality. The potential quality of a firm’s asset includes an analysis of both tenant quality and the sustainability of the cash flows associated with the asset over the business cycle rather than the potential buyers of such assets. The reason goes to the issue of value in best use, since the asset (in this case, real estate) consists of a bundle of existing and future lease contracts. Consequently, the tenant quality and the economic base of the local real estate market affect whether asset sales are at prices below the value in best use. Since real estate is fixed in its location, the health of the local economy influences the cash flow of the tenant and hence its decision to remain in its contract. Therefore, potential buyers face a decision on assessing the value in best use, given the quality of the asset in question relative to the desirability of the local region. This emphasis is the distinguishing feature of our study. We theoretically prove and

⁴Our work builds on earlier research that empirically tests the effect of liquidation value on a firm’s capital structure choices. For example, Benmelech and Bergman (2008), who study the U.S. airline industry and Benmelech (2009), who examines the 19th century American railroad industry, find that firms with more saleable real assets and redeployable collateral tend to have lower costs of external financing and longer maturities associated with debt financing.

empirically test the notion that asset quality, which we measure by tenant financial stability, together with the industry concentration structure of the local real estate market, determines the liquidation value of real estate and a firm's financing choices. Our fundamental measures of asset liquidation value include the industry concentration of local markets, which captures the long-term zoning flexibility notion of Benmelech, Garmaise, and Moskowitz (2005) and a measure of tenant financial stability, which reflects the short-run or intermediate-term asset quality.

Our model also predicts a set of market indicators that should influence asset liquidation value. In equilibrium, capital market participants should observe the fundamental information of asset qualities and react to them accordingly. We propose two such market indicators: the realized loss severity from real estate loans (the historical measure) and the capitalization rate (a forward-looking measure). We note that the capitalization rate (cap rate), which is analogous to the inverse of the EBITDA multiple (earnings before interest, taxes, depreciation and amortization divided by enterprise value), is one of the most important market indicators in real estate (see Plazzi, Torous, and Valkanov, 2010).

Another distinguishing feature of our study is that we use the choice of a firm's security issuance as the dependent variable rather than using leverage ratios. By focusing on a firm's incremental financing decisions, our approach deals with the persistence problem of using leverage ratios (see, e.g., Lemmon, Roberts, and Zender, 2006), which may yield misleading coefficients (Strebulaev, 2007).

The paper is organized as follows. In Section 1 we provide a reduced-form model of firm liquidation value. The model helps us disentangle the intrinsic asset characteristics from the market proxy for liquidation value, which guides the empirical tests. In Section 2, we discuss four measures of asset liquidation value. In Section 3 we describe our sample and in Section 4 we test the Shleifer and Vishny (1992) hypothesis. Section 5 concludes.

1 A Model of Firm Liquidation Value

A real estate firm (REIT) operates a portfolio of commercial real estate assets, which generates a constant cash flow⁵ of I per unit of time until default. A default event occurs according to a Poisson process with an exogenous hazard intensity of λ .

Federal regulations require that REITs must hold at least 75% of its assets in real estate. Therefore, we assume that the firm's value equals the total value of the assets it holds. We further assume that due to private information, geographical expertise, and reputation developed in operating the portfolio of real assets, the current firm is the first-best owner, in the sense that the real assets under current REIT management generate the highest cash flows until the event of default.

In fact, the informal arguments that link the firm's liquidation value to the best use of assets are often maintained as the following quotation from Shleifer and Vishny (1992) indicate:

“Because of credit constraints and government regulation of industry buyers, assets would have to be sold to industry outsiders who don't know how to manage them well, face agency costs of hiring specialists to run these assets properly. When industry buyers cannot buy the assets and industry outsiders face significant costs of acquiring and managing the assets, assets in liquidation fetch prices below value in best use, which is the value when managed by specialists.”

Formally, if it defaults, the REIT liquidates its portfolio of real assets as a whole to homogeneous second-best owners in the competitive secondary market. Over time, the new owners gradually obtain private information, develop expertise, and rebuild the reputation by managing the assets. Hence, over time, the cash flow reverts to the pre-default level. We assume that the cash flow generated under the management of the second-best owner is

⁵In reality, net operating income, which is rental income net of operating expenses, may not be a constant. We provide an alternative cash flow specification in the Appendix. The major result remains the same.

$(1 - \beta e^{-\kappa t}) I$, where $\beta \in (0, 1)$ captures the instant discount of the cash flow at liquidation; κ measures the speed of cash flow recovery to its pre-default level, and t is the length of time after default.

All market participants are risk-neutral and discount future cash flows by the constant risk-free rate, r . The market value of the firm is the sum of the present value of its cash flow until default and the present value of the liquidation value upon default:

$$V_0 = E_0 \left[\int_0^{\tau_\lambda} e^{-rs} I ds + e^{-r\tau_\lambda} V_1 \right], \quad (1)$$

where we assume the current time is zero and denote τ_λ as the time of default. $E_0(\cdot)$ is the expectation taken at time 0. V_1 is the market value of the liquidating real assets at τ_λ . V_1 is the sum of the present value of the cash flows under a new REIT until the next default and the present value of the liquidation value upon the next default:

$$V_1 = E_0 \left[\int_0^{\tau'_\lambda} e^{-rt} (1 - \beta e^{-\kappa t}) I dt + e^{-r\tau'_\lambda} V_1 \right], \quad (2)$$

where τ'_λ denotes the time between the first and the second defaults. The terminal value is also V_1 because upon the second default, the homogeneous and competitive second-best owners are facing exactly the same situation as the REIT faces at the first default. Solving Equation (2), we get the firm's liquidation value as:

$$V_1 = \frac{I}{r} \left(1 - \beta \frac{r + \lambda}{r + \lambda + \kappa} \right). \quad (3)$$

To make the firm's liquidation value scalable, we normalize the terminal liquidation value V_1 by its current market value V_0 . From Equation (1), we can write the current market value as

$$V_0 = \frac{1}{r + \lambda} (I + \lambda V_1) \quad (4)$$

Therefore the normalized liquidation value is

$$L \equiv \frac{V_1}{V_0} = \frac{(r + \lambda) V_1}{(I + \lambda V_1)}. \quad (5)$$

When we examine the determinants that affect this normalized liquidation value, we find that the bigger the normalized liquidation value, L , the more likely the real estate firm is to finance with debt than equity ex ante, according to Shleifer and Vishny (1992).

2 The Measures of Firm's Liquidation Value and Predictions of Debt Capacity

The objective in our study is straightforward: testing Shleifer and Vishny's (1992) hypothesis on impact of asset liquidation value to firm's debt capacity, which summarize in the following overarching hypothesis.

The Overarching Hypothesis: Asset liquidation value increases firm's debt capacity.

To document such linkage in our sample, it is essential to measure a firm's liquidation value correctly. Our model presented in the previous section not only gives a theoretical foundation for the determinants of REIT liquidation value, but also provides a framework to analyze the relation between the firm's liquidation value and various market proxies. The model implies that asset quality and fire-sale discount can serve as the fundamental measures of the firm's liquidation value. Furthermore, if there is an information feedback loop in the capital market, then the prior liquidations from similar assets and some market indicators of cash flow valuation will also predict the firm's liquidation value. Therefore, we have developed four working hypotheses linking each measure of asset liquidation to the likelihood of debt issuance.

2.1 Asset Quality

A higher quality of real assets implies more stable long-term cash flows. In the framework of our model, the new owner will be able to recover more quickly to the optimal level (I) of cash flows (larger κ). Asset quality, which is intrinsic to firm liquidation value, determines the speed of cash flow recovery κ . It follows from Equations (3) and (5) that

$$\frac{\partial L}{\partial \kappa} = \frac{\beta I^2 (r + \lambda)^2}{r (I + \lambda V_1)^2 (r + \lambda + \kappa)^2} > 0. \quad (6)$$

Therefore, the Equation (6) predicts that asset quality has a positive effect on the normalized liquidation value.

There are several ways to measure asset quality. Tax regulation requires that at least 95% of REIT gross income must come from rental income or other passive investment such as Treasuries. Property value is defined as capitalized future rents, which are contracted in the properties' leases. Therefore, one way to measure cash flow stability is by its lease maturities. For example, a firm's real assets with long-term leases should have higher quality, because future cash flows are more stable for the asset owner over a long time period. However, in reality, the lease term tells only one side of the story.

Giambona, Harding, and Sirmans (2008) adapt the lease maturity structure as a measure of firm liquidation value. Using a sample of equity REITs, they find that shorter leases are likely to have higher liquidation values because the option value of re-leasing and modifying the property at more favorable conditions to a favorable tenants. However, the lease maturity is result of bargaining between lessor and lessee and reflects a balance between the cash flow stability and option value. Therefore, the lease expiration structure suffers from an endogeneity problem as a proxy for liquidation value.

Since the lease maturity is endogenously determined, it is not an ideal proxy for asset liquidation value. We argue that tenant quality is the main driver of asset liquidation value.

Our reasoning is that there are also costs associated with long-term leases. When the long-term rent is higher than the market rent, the owner may experience lease defaults. When the long-term rent is lower than the market rent, the owner does not have the option to adjust the rent accordingly. Therefore, short-term leases give the property owner more control over property improvement, restructuring, and refinancing flexibility. Furthermore, the lease term and base lease are often bundled with lease escalation, percentage rent, and lease options (lease renewal, cancellation option, expansion option, etc.). Without other contract terms such as escalation and the options mentioned above, the lease maturity itself cannot capture the whole value of lease contract. The argument in Giambona, et al. 2008 holds only in an up market, but not necessarily in a down market because of the difficulty of re-leasing the space.

Most asset managers believe that the property is only as strong as the tenant (Smith, 2009). The tenant quality was highlighted during the 2007-2009 financial crisis. In the case of lease contracts, often referred to as the engines of property values, lease counterparty risk arises when a tenant with low creditworthiness may not be able to make rental payments. Therefore, the quality of lease contracts depends on the credit quality of the tenants. A tenant with better financial stability implies less counterparty risk, which means higher asset quality. We measure asset quality with the revenue-weighted Altman Z-score, which we construct using the historical performance of assets, liabilities, and earnings to predict a firm's probability of default.

To construct such a measure, we focus on the major tenants that provide top 60 percent of the landlord firm's revenue in aggregate and match all publicly traded tenants to Compustat. We calculate an average tenant Altman Z-score weighted by the percentage contribution of revenue of each tenant for every REIT firm in our sample.

Thus, our first hypothesis is as follows:

Working Hypothesis I: A REIT with higher average tenant Z-scores has higher asset

quality and higher liquidation value. Therefore, a REIT with higher average tenant Z-scores tends to finance with debt.

2.2 Firesale Discount

One key problem with illiquid assets like real estate is that a hasty liquidation may cause significant private costs to the owner. When a financially constrained real estate firm wants to sell a property in a highly concentrated real estate market, it is likely that potential buyers are in similar financial distress. Consistent with this argument, real estate appraisers typically assume that a rapid sale of real estate leads to a liquidation discount (or fire-sale discount), since redeployment of the firm’s assets is difficult. Shleifer and Vishny (1992) find that the liquidation discount is about 15 to 25 percent relative to an orderly sale. Kaplan (1989) cites Merrill Lynch estimates that the distressed sale of the Campeau retail empire would bring about 68 percent of what an orderly sale would bring.

In our model, we capture such a liquidation discount by β , which represents an immediate drop in the generated cash flows at the time of liquidation. Based on Equations (3) and (5), we get

$$\frac{\partial L}{\partial \beta} = -\frac{I^2 (r + \lambda)^2}{r (I + \lambda V_1)^2 (r + \lambda + \kappa)} < 0. \quad (7)$$

Therefore, our model predicts a negative effect of the liquidation discount on the normalized liquidation value.

Real estate assets are immobile and location quality is an important component of the asset quality. In our analysis, we measure the firesale discount using an average ratio of the industry concentration of a REIT’s top markets. Each local market is defined as a Metropolitan Statistical Area (MSA). The United States Office of Management and Budget (OMB) defines an MSA as one or more adjacent counties or county equivalents that have at least one urban core area of at least 50,000 population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties.

The OMB has defined 366 MSAs in the U.S. For example, the New York metropolitan area (the New York-Northern New Jersey-Long Island MSA), which is the largest MSA in the U.S., includes ten counties in New York State, twelve counties in Northern and Central New Jersey, and one county in northeastern Pennsylvania. The idea is that REITs that invest in areas with a high industry concentration (less diversified mix of industries in a given locale) may have to offer a deeper discount to sell their assets, because the potential buyers may be suffering the same financial difficulty. For example, the redeployability of real estate assets in Detroit is much lower than in other areas, as most businesses in Detroit are associated with the auto industry.

Using commercial property zoning flexibility as a proxy for liquidation values, Benmelech, Garmaise, and Moskowitz (2005) find that higher liquidation values are associated with longer term loans, a smaller number of creditors, higher loan-to-value ratios, and lower interest rates. Although the flexibility in zoning designation that governs permitted uses of a property, is associated with the potential level of property redeployability, such effects might tend to influence the liquidation value in the long run. In fact, the flexibility option alluded to in Benmelech et al. (2005) is typically out of the money except when the age of the building is such that the building is in need of rehabilitation or can be torn down. Due to the long-term durability of real estate asset, when facing financing choices firms may be more interested in the determinants of liquidation value at short or intermediate horizons. In the short or intermediate term, there is a greater emphasis around asset quality such as the quality of tenants in a space. In a long-run market equilibrium, the zoning restriction and the local economic base should be integrated in a region that provides a unique industry structure. Therefore the industry concentration structure captures the long-run attractiveness of a market.

To construct a proxy of location quality, we first obtain the top ten markets for each REIT. Following Hirschman (1964), for each MSA we calculate a Herfindahl-Hirschman Index

(*HHI*), $HHI = \frac{\sum_{i=1}^N E_i^2}{(\sum E_i)^2}$, where E_i is the number of employees in each industry category of a particular MSA. A higher *HHI* means a higher industry concentration. Doing so makes it possible for us to measure the extent of local real estate market diversification and industry concentration. If the labor force is wholly concentrated in a single industry, then the index is one. With the revenue-weighted average of the local market *HHI* as a proxy for fire-sale discount, we have our second hypothesis.

Working Hypothesis II: A higher industry concentration for a REIT’s property markets is associated with higher firesale discount upon liquidation. Therefore, firms with lower average industry concentration ratios are more likely to finance with debt.

If the market is more or less efficient, some of the information about asset quality and attractiveness of real estate markets should be priced in realized liquidations. We also test our hypotheses by using the realized loss severity rate on securitized commercial mortgages.

2.3 Loss Severity Rate

We can also infer the asset liquidation value from realized foreclosures. Assuming that the historical liquidations indicate future performance, we use the realized loss severity rate⁶ of publicly traded commercial mortgage backed security (CMBS) as a proxy of REITs’ asset liquidation value.

We note that there may be some difference in liquidation values between properties collateralized in portfolio loans compared to those securitized in CMBS deals. However, the loss severity rates extracted in CMBS deals still provide a useful market measure for liquidation value across property types and over time. Thus, as a measure of loss severity, we exploit the average loss severity by property type from foreclosed real assets in securitized CMBS deals, provided by the U.S. structured products research of LehmanLive⁷. We build

⁶The loss severity rate of a defaulted CMBS is defined as the present value of its lifetime losses (both interest and principal losses) as a percentage of principal balance, measured at either the origination date or the default date.

⁷LehmanLive becomes Barclays Capital Live after the Lehman Brothers was liquidated and acquired by

a realized CMBS loss severity indicator for each REIT according to its real asset exposure to test our third hypothesis.

Working Hypothesis III: A lower realized CMBS loss severity rate of a REIT indicates higher asset liquidation value. Therefore, firms with lower realized CMBS loss severity are more likely to finance with debt ex-ante.

3 Sample Data and Descriptive Analysis

The variable of interest is the choice of incremental financing, i.e., debt or equity. The data on REITs' incremental financing decisions are from SNL Real Estate, which covers all equity REITs' public security offerings from January 2000 through December 2009. SNL Real Estate provides detailed information on REIT investments, firm financial characteristics, as well as information on geographical distribution of properties and tenant exposures; most of this information is not available on Compustat.

There are 2,150 new issues, including 921 bond issues and 1,229 equity issues from 183 REITs during the 2000–2009 period. We derive accounting information, such as total book assets, total debt, and returns on average assets, from Compustat, complemented when necessary by SNL Real Estate. Among the four ingredients of our liquidation value measures, the key factor is tenant quality. However, since some properties (e.g., hotels and apartments) do not have corporate tenants whose stock is publicly traded, the final sample contains 1,043 new offerings, which consist of 484 bond issues and 559 equity issues from 102 REITs. On average, there is one issue per firm per year. For properties that are run by an operating company,⁸ or are mixed use, we use the operator's quality to represent the tenant quality. We believe that for hotels, apartments, and other property types with transient tenants,

Barclay Capital in 2009. We also use a similar index from Standard and Poor's CMBS Quarterly Insights. The results are essentially the same. We thank John Harding for providing Standard and Poor's CMBS quarterly data of loan defaults and losses.

⁸For example some hotel properties of Hospitality Properties Trust (HPT) are run by Hyatt Hotel Corp., or Intercontinental Hotels Group.

a property managed by a more efficient operator should have higher asset quality. In the robustness checks, the historical loss severity rate is used, which has 1,300 observations.

[Put Table1 here]

Table 1 reports the descriptive statistics of security issuances by equity REITs between January 2000 and December 2009. Panel A reports the number of issuances and the number of firms that issue securities by REIT property type. SNL Real Estate defines eight property types: retail (including shopping centers, regional malls, and other retail outlets), office, industrial, apartment, lodging, health care, diversified, and other special property types. Since most REITs invest in one type of real estate, the industry often classifies REITs by the property type on which they focus. Panel B reports the number of issuances and the number of firms that issue securities by issuing year. Total issuance of public offerings is clustered in offices and shopping centers. There is also an apparent time variation in the average number of security issues per firm. The average peaks in 2004 with 179 total issues.

[Put Table 2 here]

Table 2 presents the distribution of new security issues by REIT property focus (panel A) and by issuing year (panel B). REITs that choose to issue bonds are larger in size than REITs that issue equity. This phenomenon is consistent with the general notion that large firms are more likely to have access to the bond markets than small firms. The apartment sector, which has special access to the debt market through government-sponsored enterprises (GSEs), and the office and retail sectors, have the most debt offerings per firm. The health care⁹ and apartment sectors, which normally do not have long-term tenants, have the most equity offerings per firm. The sample for the 2004-2005 period had the highest issuing intensity in debt with three bond offerings per firm. Over the 2006 to 2008 period, there were more equity issues per firm (almost two issues per firm) than debt issues.

⁹Health care sector include senior housing and assisted-living facilities.

[Put Table 3 here]

The four panels in Table 3 report the summary statistics of measures of asset liquidation value by property type (panels A and B) and by issuing year (C and D). Panels A and C describe the fundamental measures of asset liquidation value of a REIT. For the fundamental measures of liquidation value, the industry concentration ratios are stable over time, since those equilibrium industry structures tend to take effect over the long run. Diversified REITs have the highest concentration ratios (on average, 9.67%) indicating that firms operating in markets in which industries are more concentrated tend to diversify their property types. The tenant quality declines over the period from 2000 to 2008, and then increases slightly in 2009. The health care sector has the lowest tenant Z-score (1.3) while the retail sector has the highest tenant Z-score (5-6). Panels B and D describe the market measures of asset liquidation value of a REIT. Cap rates decline over the 2000 to 2005 period and then rise from 2006 onwards, showing that the cap rate is forward-looking. For the market measures of liquidation value, the hotel sector has the highest cap rate and highest loss severity. It is consistent with the industry consensus that hotels are the riskiest asset class due to the lack of long-term tenants (e.g., many rent rooms for just one night). Apartments appear to have the lowest cap rate and loss severity.

4 Empirical Analysis

Based on the model of REIT liquidation value presented in Section 1 and empirical specifications of liquidation measures presented in Section 2, we test our four hypotheses by using multivariate logit regressions. Furthermore, we control for the common determinants of capital structure.

4.1 Controlling Competitive Explanations

To conduct our formal regression analysis, we control for determinants of financing choice that are commonly used in the capital structure literature: the effects of the trade-off theory (leverage ratio), the pecking order theory (profitability, growth opportunity), the market timing theory (market-to-book ratio), and signaling (dilution). Fixed costs associated with a new debt issue are lower for large firms, which makes debt financing more appealing to them. Therefore, we control for variables such as firm size, measured as the logarithm of a firm's book assets. We also consider alternative measures of these control variables for our robustness checks.

4.1.1 Trade-off theory

The trade-off theory, first proposed by Kraus and Litzenberger (1973), hypothesizes that firms weigh the benefits (e.g., tax savings) against the costs (e.g., deadweight bankruptcy costs) of debt, i.e., firms design each incremental financing activity to adjust their overall leverage ratios towards optimal target levels. Hence, they can gradually eliminate the deviations from the target. A firm in need of external finance should issue equity if its leverage ratio is above the target and issue debt if it is below. Thus, we control for the targeting behavior of corporate financing choice by using the leverage ratio of the firm. (For example, Flannery and Rangan, 2006, and Lewellen, 2006).

4.1.2 Pecking order theory

Myers and Majluf's (1984) pecking order theory states that when facing financing needs, firms prioritize their sources of financing. Internal funds are used first, and when those funds are depleted, the firm issues debt. When the debt capacity is reached, the firm issues equity.

Because profitable firms have a financial surplus, the pecking order theory predicts an

inverse relation between profitability and leverage (Titman and Wessels, 1988; Fama and French, 2002). Profitable firms mainly use internal financing when necessary; hence their use of external sources of financing is low. The negative association between profitability and leverage that supports the pecking order theory has been empirically documented by Myers (1984), Baskin (1989), Friend and Lang (1988) and Rajan and Zingales (1995).

To control for the inverse relation between the profitability and leverage ratio, we include a measure of profitability, the return on average assets (ROAA). We also control for a firm's growth, which we measure as the growth rate of funds from operations (FFO). The FFO is a measure of REITs' operating performance that is calculated by adding depreciation and amortization expenses to earnings. FFO gives us a clearer idea of a REIT's cash performance, which is a better measure of the REIT's performance than is earnings.

4.1.3 Market timing theory

Baker and Wurgler (2002) explore the managers' practice of timing the equity market, and find evidence for this policy. They demonstrate that market timing implies that not only does the market-to-book ratio affect capital structure through equity issues, but also that the negative effect is persistent and helps to explain the cross-sectional variation in leverage. These effects cannot be explained by capital structure theories. We include the market-to-book ratio to control for the market timing effect.

4.1.4 Signaling

In the pecking order model, good-quality firms use internal funds to avoid the adverse selection problem and the loss of value. However, these firms are not able to signal their quality by using capital structure. Another strand of capital structure theory proposed by Ross (1977) posits that capital structure serves as a signal of private information. Ross's argument is that equity issuance signals that the stock is overpriced. To avoid such a signaling effect, companies with major financing needs tend to prefer debt.

To control for the signaling effect, we include dilution as a control variable. We compute dilution as the total amount of new issues divided by total market cap one quarter prior to the security offering (Asquith and Mullins, 1986).

Table 4 summarizes the predicted effects on the firm's financing decisions.

[Put Table 4 here]

4.2 The Results

We use a univariate analysis to investigate the effect of liquidation value on financing choice. Table 5 summarizes the descriptive statistics of our measures of firms' liquidation values and the explanatory variables used in the multivariate analysis.

[Put Table 5 here]

The Pearson correlation matrix reported in Table 6 show that the correlations between these explanatory variables is moderate at best; most of the correlations are low for our primary variables of interests, especially tenant quality. For example, the correlations between tenant quality and the controls for alternative capital structure theories (leverage, profitability, market-to-book, dilution, FFO growth, and size) are within $\pm 8\%$. The evidence supports our claim that tenant quality is a better proxy for liquidation value. The correlation between MSA industry concentration and tenant quality is -0.08, which supports our empirical method of jointly testing short- and long-run measures of asset liquidation value. The correlation between tenant quality and the cap rate and loss severity are -0.20 and -0.13, respectively. This result is not surprising, since the capital market captures some of information conveyed from fundamental measures of asset quality.

[Put Table 6 here]

In Table 7, we compare the distributions of asset liquidation value measures and other explanatory variables and test for significant differences between debt offerings and equity offerings. The results suggest that on average, relative to REITs that issue equity, REITs that raise funds by issuing bonds have a larger market capitalization, lower current market leverage ratios, lower FFO growth, smaller offering amounts relative to the value of book assets, and higher market-to-book ratios.

[Put Table 7 here]

4.2.1 Multivariate Logit Analysis

We use multivariate logit regression analysis as our primary tool to study the choice of new security issuance. We set the dependent variable to one for bond issues and zero for equity issues. We measure the liquidation value with four different variables: the average tenant Z-scores, the industry concentration of top markets in which the REIT operates, the firm's capitalization rate, and the firm's loss severity from historical CMBS liquidation. According to our theoretical model, we expect a positive loading on the tenant quality and negative loadings on the other three measures.

Our control variables include the current market leverage ratio (Leverage), the return on average assets (Profitability), the market-to-book ratio, the offering amount divided by the market cap (Dilution), the growth rate of funds from operations (FFO growth), and logarithm of firm's book asset (firm size). Our empirical evidence, which is consistent across all four measures of liquidation value, supports the Shleifer and Vishny (1992) hypothesis. Firms that issue bonds not only have higher quality tenants (Z-scores) but also hold assets in real estate markets that tend to have a more diverse mix of industries in a location relative to the industry concentration associated with equity-offering firms. The relation is reversed for the capitalization rate and the historical loss severity. These results suggest that higher expected liquidation values are associated with a higher likelihood of bond issues relative to

equity issues. The effect is significant from both statistical and economic perspectives. A one-standard-deviation increase in the tenant quality is associated with a 5% to 7% higher probability of issuing debt. The probability increases are about 5% and 3% for a one-standard-deviation decrease in the cap rate and the loss severity rate, respectively.

[Put Table 8 here]

Table 8 presents the multivariate logit regression results with fundamental measures of asset liquidation value. Model 1 tests the effects of asset liquidation value using MSA industry concentration and tenant quality, but does so without controlling proxies for other capital structure theories. The two fundamental measures are positively associated with a REIT's decision to issue debt. The higher the asset liquidation value (lower industry concentration and higher tenant quality), the greater the likelihood of debt issuance. The results are statistically significant at the 1% level.

The column "Change in Prob" in model 1, which computes the change in probability of issuing debt for a one-standard-deviation increase in a corresponding variable, also shows the economic significance. A one-standard-deviation increase (decrease) in the tenant average Z-score (industry concentration ratio of REIT's top markets) is associated with a 5% (6%) higher probability that a firm will issue debt. In addition, the firm's characteristics also play an important role in its financing decisions. Larger firms are more likely to issue debt.

In Model 2 we include the average lease maturity as an additional control. Given tenant quality, the lease maturity has no effect on a firm's financing choice, which verifies our hypothesis that lease maturity is endogenously determined.

Model 3 further controls for alternative capital structure theories. Our results are consistent with the trade-off, pecking order, and signaling theories of capital structure. The market leverage prior to a new security issue has a significant negative impact on the use of bonds. This finding is consistent with the trade-off theory. Our estimates suggest that given

a one-standard-deviation increase in market leverage, on average a firm is 15% less likely to issue bonds. Consistent with the pecking order theory, there is a negative relation between debt financing and the FFO growth or profitability ratio. Our estimates are also consistent with the signaling hypothesis, under which the firm's likelihood of issuing debt increases by 5% if the dilution measure increases by one standard deviation. Conditional on these four theories, our proxies for asset liquidation value remain significant on both a statistical and economical basis.

[Put Table 9 here]

Using the firm-level cap rate and loss severity rate as explanatory variables, in models 4 and 5 in Table 9 we test the effects of financing choice by using each of the two market measures of liquidation value separately. Given proxies for trade-off, pecking order, market timing, and signaling theory, the firm's market measures of asset liquidation value remain significant. A one-standard-deviation increase in the firm's cap rate (loss severity rate) is associated with a 5% (3%) decrease in the probability of issuing debt.

4.2.2 Robustness Checks

To check if tenant quality is a main driver of asset liquidation value, which in turn determines a firm's financing choice, we perform several robustness tests. We first check the model specifications 1, 2, and 3 with a tighter sample under sample selection criterion 1. Table 10 shows that the results are consistent with those in Table 8. Tenant quality remains a significant driver of a firm's financing choice in this sample, which comprises 863 observations. Other control variables have similar results, except for the dilution factor, which becomes nonsignificant. The overall fit improves for model 3. Although the sample size is reduced by 17%, with the same number of regressors the pseudo R^2 increases from 19.7% (Table 8 Model 3) to 21.1% (Table 10 Model 3).

[Put Table 10 here]

In Table 11 we examine the model specifications 4 and 5 with a larger sample under selection criterion 3. The sample, which comprises 1,448 (1,300) observations, contains all security offerings, in which we can compute both the cap rate (loss severity) and other control variables. The two samples are much larger than those in the baseline regression (Table 9, models 4 and 5), but the results are consistent with the baseline results. A one-standard-deviation decrease in the cap rate (loss severity rate) is associated with a 4% (5%) increase in the probability of issuing debt. The results become statistically significant at the 1% level.

[Put table 11 here]

In Table 12 we explore the financing decision of firms such as hotels, apartments, self-storage, etc. that do not have long-term tenants. Without tenant information, an fundamental measure of asset liquidation value is not possible. We compare the financing effects of market measures of liquidation value derived from the cap rate and the loss severity rate. Model 4 in Table 12 shows that the cap rate is significant and negatively associated with the probability of issuing debt. A one-standard-deviation decrease in the cap rate implies a 9% higher probability of issuing debt. This sensitivity is almost twice as large as the magnitude in the baseline sample.

Model 5 in the Table 12 shows that a one-standard deviation decrease in the loss severity measure is associated with a 16% higher probability of issuing debt. This sensitivity is more than five times as large as the magnitude in the baseline regression.

The results in the Table 12 indicate that when we cannot directly observe the fundamental measures of asset quality, the firm's financing choice relies more heavily on market indicators. If we interpret the magnitude of the coefficient of the cap rate (or loss severity rate) as the sensitivity of the firm's financing choice to market indicators, then the sensitivities are two

to five times as large as those that have an fundamental (or direct) measure of the firm’s asset liquidation value.

[Put Table 12 here]

To test whether the tenant quality and location quality are good measures of asset liquidation value, we further control for cash flow volatility and REIT bond ratings. CF Vol is the standard deviation of FFO over the past three years. Rating Dummy is a dummy variable that takes a value of 1 if the firm has either a bond rating or a commercial paper rating and zero otherwise (MacKay and Phillips, 2005, Lemmon, Roberts, and Zender, 2008). Model 6 and model 7 in Table 13 are compared with model 3 originally presented in Table 8. Overall, Table 13 indicates that the model with additional controls does not change the results.

[Put Table 13 here]

The results in Table 8 to Table 13 show that, overall, our results are robust to model specifications. Both fundamental and market measures of liquidation value have a significant impact on a firm’s debt capacity.

5 Conclusion

To test the Shleifer and Vishny (1992) hypothesis that the asset liquidation value influences a firm’s debt capacity, we focus on asset quality. The real estate industry provides an ideal setting to test the cross-sectional patterns of firms’ financing choices, since the value of real assets is relatively easier to identify and measure. In this setting, asset quality not only encompasses the quality of the tenants who occupy the building, but also the location quality of an area. To determine location quality we use its economic base (mixture of various industries) as a proxy, since real estate is fixed in location and the health of the local economy influences the cash flow of the tenants. Our tenant quality measure reflects the asset quality

from a shorter-term perspective. Since our metric of industry concentration (economic base) within local markets captures the long-term redeployability notion of Benmelech, Garmaise, and Moskowitz (2005), we essentially control for such long-term equilibrium vis-à-vis the industry concentration.

We construct a valuation model to determine the factors that should influence liquidation value and debt capacity. We then test whether our model predicts the observed choices that firms make in terms of their choice to issue debt or equity. We find that as predicted, firms with low asset liquidation values are less likely to issue debt to raise additional funds. When controlling for traditional factors that explain firm financing decision, we still find significant evidence that supports Shleifer and Vishny's hypothesis. Asset quality is an important determinant of both liquidation value and debt capacity. Firms that issue debt not only have higher quality tenants, but also hold assets in geographical markets that have a more diverse mix of industries relative to firms that issue equity. For firms such as hotels, apartments and self-storage, whose assets are not occupied by long-term tenants we cannot easily observe the fundamental measures of asset quality. The firm's financing choices rely more heavily on the overall real asset market conditions in these situations.

References

- [1] Altman, E. 1968, Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy, *Journal of Finance*, September 1968;
- [2] Altman, Edward I. 2002. Revisiting Credit Scoring Models in a Basel II Environment. Prepared for "Credit Rating: Methodologies, Rationale, and Default Risk", London Risk Books 2002.
- [3] Asquith, Paul and David W. Mullins, Jr., 1986, Equity Issues and Offering Dilution, *Journal of Financial Economics* 15, 61-89.

- [4] Baker, M. and Wurgler, J., (2002), Market Timing and Capital Structure, *The Journal of Finance* 62, 1-32.
- [5] Baskin J., (1989), An Empirical Investigation Of The Pecking Order Hypothesis, *Financial Management*, vol. 18, pp. 26-35.
- [6] Benmelech, E, (2009), Asset Salability and Debt Maturity: Evidence from Nineteenth-Century American Railroads, *Review of Financial Studies* 22(4):1545-1584.
- [7] Benmelech, E., and Nittai K. Bergman, (2008), Liquidation Values and the Credibility of Financial Contract Renegotiation: Evidence from U.S. Airlines, *Quarterly Journal of Economics*, 123(4) 1635-1677.
- [8] Benmelech, E., M.J. Garmaise, and T.J. Moskowitz, (2005), Do Liquidation Values Affect Financial Contract? Evidence from Commercial Loan Contracts and Zoning Regulation. *Quarterly Journal of Economics*. 120, 1121-1154.
- [9] Capozza, D. R., and P. Seguin. (1998b). Focus Transparency and Value, *Real Estate Economics* 27(4), 587-619.
- [10] Chaney, T. , D. Sraer, and D. Thesmar, 2010, The Collateral Channel: How Real Estate Shocks affect Corporate Investment, National Bureau of Economic Research Working Paper 16060.
- [11] Campello, M., and Giambona, E., 2010, The Capital Structure and Redeployability of Tangible Assets, University of Illinois Working Paper.
- [12] Fama E.F., and K.R. French, (2002), Testing Tradeoff and Pecking Order Predictions About Dividends and Debt, *Review of Financial Studies*, Vol. 15, Iss. 1, pp. 1-43.
- [13] Flannery, M.J., and Rangan, K.P., (2006), Partial Adjustment Toward Target Capital Structures, *Journal of Financial Economics*, Vol. 79, Iss. 3, pp. 469-506.

- [14] Friend I., and Lang, L.H.P., (1988), An Empirical Test of the Impact of Managerial Self-interest on Corporate Capital Structure, *Journal of Finance*, Vol. 43, pp. 271-281.
- [15] Giambona, E., Harding, J.P., and Sirmans, C.F., (2008), Explaining the Variation in REIT Capital Structure: The Role of Asset Liquidation Value, *Real Estate Economics*, vol. 36, iss. 1, pp111–137.
- [16] Hirschman, A. O. (1964), The Paternity of an Index, *The American Economic Review* 54 (5): 761.
- [17] Hou K., (2007), Industry Information Diffusion and the Lead-Lag Effect in Stock Returns. *Review of Financial Studies*, Vol. 20, pp. 1113–1138.
- [18] Kaplan, S.N., (1989), Campeau’s Acquisition of Federated: Value Destroyed or Value Added? *Journal of Financial Economics* 25, pp. 191-212.
- [19] Kraus, A., and Litzenberger, R.H., (1973), A State-Preference Model of Optimal Financial Leverage, *The Journal of Finance*, Vol. 28, pp. 911-922.
- [20] Lemmon, M.L. and Roberts, M.R. and Zender, J.F., (2008), Back to the Beginning: Persistence and the Cross-section of Corporate Capital Structure, *The Journal of Finance*, Vol. 63, pp. 1575–1608.
- [21] Lewellen, J., (2006), Financing Decisions when Managers are Risk Averse, *Journal of Financial Economics*, Vol. 82, Iss. 3, pp. 551-589.
- [22] MacKay, P., and G. Phillips, (2005), “How Does Industry Affect Firm Financial Structure?” *Review of Financial Studies* 18, 1433-1466.
- [23] Myers, Stewart C., (1984), The Capital Structure Puzzle, *Journal of Finance* 39, 575-592.

- [24] Myers, Stewart C. and Majluf, Nicholas S., (1984), Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have, *Journal of Financial Economics* 13, pp.187–222.
- [25] Plazzi, A., Torous, W. and Valkanov, R. (2010), Expected Returns and the Expected Growth in Rents in Commercial Real Estate, *Review of Financial Studies* Vol 23, Issue 9, pp. 3469–3519.
- [26] Rajan R.G., and Zingales, L., (1995), What Do We Know About Capital Structure? Some Evidence from International Data, *The Journal of Finance*, Vol. 50, pp. 1421–1460.
- [27] Schiffman D., (2009), FDIC Resolution And Receivership Of Failed Banks: Pitfalls And Opportunities For Landlords And Real Estate Investors, *Real Estate Finance Journal* 44-49.
- [28] Shleifer, A., and Vishny, R., (1992), Liquidation Values and Debt Capacity: A Market Equilibrium Approach, *The Journal of Finance*, Vol. 47, iss. 4, pp. 1343-1366.
- [29] Smith, Gavin, (2009), Commercial Real Estate: Scoring the Risk of Office, Retail, and Industrial tenants, *The RMA Journal* Dec. 2009 - Jan. 2010 pp.50-60.
- [30] Sibilkov, Valeriy, Oct 2009. “Asset Liquidity and Capital Structure” *Journal of Financial and Quantitative Analysis* 44(05): 1173-1196.
- [31] Strebulaev, I.A., (2007), Do Tests of Capital Structure Theory Mean What They Say? *The Journal of Finance*, vol. 62, pp.1747–1787.
- [32] Titman, S., (1983), The Effect of Capital Structure on a Firm’s Liquidation Decision, *Journal of Financial Economics* Vol 13, Issue 1, pp. 137-151.
- [33] Titman, S., Wessels, R., (1988), The Determinants of Capital Structure. *Journal of Finance* Vol 43, pp. 1–19.

Appendix: Model with Cash Flow Growth

In Section 1, we assume that the firm generates a constant cash flow. We extend the basic model by introducing cash flow growth. Assuming the firm's cash flow grows at a constant rate g , then Equations (1) and (2) become

$$V_0 = E_0 \left[\int_0^{\tau_\lambda} e^{-rt} e^{gt} I dt + e^{-r\tau_\lambda} V_1 \right], \quad (8)$$

and

$$V_1 = E_0 \left[\int_0^{\tau'_\lambda} e^{-rt} (1 - \beta e^{-\kappa t}) e^{gt} I dt + e^{-r\tau'_\lambda} V_1 \right], \quad (9)$$

which lead Equations (3) and (4) to

$$V_1 = \frac{I}{r} (r + \lambda) \left(\frac{1}{r - g + \lambda} - \beta \frac{1}{r - g + \lambda + \kappa} \right), \quad (10)$$

and

$$V_0 = \frac{I}{r - g + \lambda} + \frac{\lambda}{r + \lambda} V_1. \quad (11)$$

Taking the partial derivatives of liquidation value V_1 in respect to asset quality κ and firesale discount β , we have the following:

$$\frac{\partial V_1}{\partial \kappa} = \frac{\beta I (r + \lambda)}{r (r - g + \lambda - \kappa)^2} > 0 \quad (12)$$

$$\frac{\partial V_1}{\partial \beta} = -\frac{I (r + \lambda)}{r (r - g + \lambda - \kappa)} < 0 \quad (13)$$

Therefore under the assumptions of cash flow growth, we can still obtain the fundamental relationships stated in Section 2.1 and Section 2.2.

Table 1: **Firm and Issue Characteristics**

This table reports descriptive statistics of security issuances by equity REITs during the period January 2000 to December 2009. Panel A reports number of issuances and number of firms issuing securities by REIT investment types. Panel B reports number of issuances and number of firms issuing securities by issuing years.

Panel A: Firm and issue characteristics by property type		Panel B: Firm and issue characteristics by issuing year											
Property Type	Total			Debt Offerings			Equity Offerings			Total			
	# of Issues	# of Issuers	# of Issues	# of Issuers	# of Issues	# of Issuers	# of Issues	# of Issuers	# of Issues	# of Issuers	# of Issues	# of Issuers	
Retail													
Shopping Center	206	19	97	12	109	18	2000	46	20	37	14	9	8
Regional Mall	89	9	43	4	46	9	2001	87	48	40	21	47	34
Other Retail	14	3	3	1	11	3	2002	118	53	56	31	62	39
Office	251	21	155	14	96	19	2003	150	59	56	23	94	53
Industrial	81	9	40	7	41	9	2004	179	59	99	30	80	45
Apartment	61	3	38	3	23	3	2005	123	46	79	28	44	27
Hotel/Motel	119	15	46	5	73	14	2006	122	50	59	33	63	34
Health Care	116	8	35	6	81	8	2007	66	35	28	20	38	22
Diversified	72	10	18	4	54	10	2008	54	28	9	6	45	25
Others	34	5	9	4	25	4	2009	98	50	21	15	77	48
Total	1043	102	484	60	559	97	Total	1043	448	484	221	559	335

Table 2: **Summary Statistics on New Issues of REITs**

This table reports descriptive statistics of security issuances by equity REITs during the period January 2000 to December 2009. Panel A reports average number of issuances per firm and summary statistics for issuance size by REIT investment types. Panel B reports average number of issuances per firm and summary statistics for issuance size by issuing years.

Panel A: Summary statistics of REIT new issues by property type

Property Type	Debt Offerings						Equity Offerings						
	# of Issues		Size (\$million)		S.D.	# of Issues per Firm	# of Issues		Size (\$million)		S.D.		
	per Firm	Mean	Median	Mean			Median	per Firm	Mean	Median			
Retail													
Shopping Center	8.08	116.63	100.00	110.09		6.06	95.53	60.00	114.94				
Regional Mall	10.75	458.13	400.00	256.33		5.11	188.21	100.36	231.45				
Other Retail	3.00	160.00	130.00	79.37		3.67	62.61	50.00	38.61				
Office	11.07	168.77	113.00	215.34		5.05	138.65	88.86	132.14				
Industrial	5.71	128.27	87.50	149.21		4.56	76.19	46.25	161.31				
Apartment	12.67	131.05	100.00	101.36		7.67	74.34	71.75	51.40				
Hotel/Motel	9.20	323.15	300.00	199.70		5.21	117.70	80.64	115.67				
Health Care	5.83	217.77	200.00	139.53		10.13	128.35	90.00	134.49				
Diversified	4.50	332.35	250.00	349.84		5.40	95.63	52.75	171.47				
Others	2.25	147.28	100.00	169.06		6.25	100.55	80.00	66.56				

Panel B: Summary statistics of REIT new issues by issuing year

Year	Debt Offerings						Equity Offerings					
	# of Issues		Size (\$million)		S.D.	# of Issues per Firm	# of Issues		Size (\$million)		S.D.	
	per Firm	Mean	Median	Mean			Median	Mean	Median			
2000	2.64	110.57	30.00	151.40	1.13	99.30	41.13	184.72				
2001	1.90	224.18	200.00	207.33	1.38	93.75	60.80	95.00				
2002	1.81	152.77	137.50	145.77	1.59	64.92	38.02	75.73				
2003	2.43	167.72	137.50	168.50	1.77	80.16	60.00	75.22				
2004	3.30	126.24	100.00	141.36	1.78	111.78	75.00	123.26				
2005	2.82	161.18	120.00	181.80	1.63	98.81	73.84	123.03				
2006	1.79	324.15	275.00	247.16	1.85	171.36	110.30	206.05				
2007	1.40	409.93	300.00	350.12	1.73	143.95	143.71	111.35				
2008	1.50	412.00	500.00	305.73	1.80	135.17	90.95	141.90				
2009	1.40	333.81	260.00	196.07	1.60	156.77	89.25	202.43				

Table 3: Measures of Asset Liquidation Value

This table reports the summary statistics of REIT measures of asset liquidation value by property type (Panel A) and by issuing year (Panel B)

Panel A: Summary Statistics of REIT Measures of Asset Liquidation Value by Property Type

Property Type	# of Issues	Firesale Discount			Asset Quality			Loss Severity (%)					
		Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Retail													
Shopping Center	206	9.47	0.78	8.07	11.81	5.8	1.4	2.0	12.9	31.7	5.6	9.3	38.9
Regional Mall	89	8.47	0.44	8.10	9.56	4.5	1.7	2.8	16.8	31.6	4.6	20.2	38.8
Retail: Other	14	9.50	0.43	9.14	10.49	6.0	1.2	3.8	7.4	31.5	4.6	20.3	39.0
Office	251	8.49	0.34	8.08	9.14	3.2	1.4	-3.9	10.7	31.2	6.3	10.3	42.0
Industrial	81	8.66	0.32	8.26	9.17	3.9	3.2	-3.2	14.2	27.0	10.9	0.0	46.3
Apartment	61	8.42	0.31	8.13	8.81	5.0	1.3	3.9	9.9	23.1	5.2	12.0	33.0
Hotel/Motel	119	8.52	0.28	8.20	9.23	3.0	1.0	1.1	5.9	43.5	9.6	0.0	64.5
Health Care	116	9.17	0.64	8.41	9.92	1.3	1.3	-2.3	4.5	25.2	12.5	10.8	53.6
Diversified	72	9.67	0.55	8.13	10.64	4.4	1.7	2.1	14.0	28.7	6.4	3.6	41.6
Others	34	8.45	0.40	7.96	9.07	3.0	2.2	0.3	6.3	27.7	10.6	12.0	53.6

Panel B: Summary Statistics of REIT Measures of Asset Liquidation Value by Year

Year	# of Issues	Firesale Discount			Asset Quality			Loss Severity (%)					
		Mean	S.D.	Max	Mean	S.D.	Max	Mean	S.D.	Max			
		Tenant Z-score											
		Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
2000	46	8.69	0.61	8.07	10.23	6.2	3.4	2.3	14.2	11.5	8.4	0.0	33.4
2001	87	8.82	0.62	8.08	10.25	4.6	2.8	-1.3	14.0	29.8	12.2	10.3	53.6
2002	118	9.00	0.60	8.08	10.25	4.4	2.8	-2.3	16.8	36.0	11.9	12.0	64.5
2003	150	8.87	0.60	8.08	10.49	3.9	1.5	0.5	6.2	33.6	8.5	12.0	49.9
2004	179	8.72	0.60	8.08	10.25	3.9	1.3	-3.9	6.2	32.5	6.7	10.8	49.3
2005	123	8.78	0.84	8.08	11.81	3.7	1.5	-0.6	7.4	31.2	5.4	19.2	44.9
2006	122	8.88	0.70	7.96	11.81	3.6	1.6	-0.8	7.4	31.2	7.9	20.0	46.2
2007	66	8.93	0.65	7.96	10.25	2.9	2.0	-3.2	8.1	29.3	6.9	21.0	42.4
2008	54	9.06	0.74	7.96	10.64	2.6	2.1	-1.5	7.6	26.8	5.9	19.5	41.3
2009	98	9.00	0.84	7.96	11.81	3.2	1.5	-1.2	7.4	31.4	5.7	20.4	42.1

Table 4: **Empirical Implication of Capital Structure Theories**

This table summarizes the major empirical implications of the five theories of capital structure and presents the predicted effects of various factors on the probability of new debt issues.

Proxy	Asset Liquidation Value Theory	Trade Off Theory	Pecking Order Theory	Market Timing Theory	Signaling Theory
Asset Quality	Increase likelihood of issuing debt				
Firesale Discount	Decrease likelihood of issuing debt				
Lease Maturity	-				
Loss Severity	Decrease likelihood of issuing debt				
Leverage		Decrease likelihood of issuing debt			
Profitability			Decrease likelihood of issuing debt		
Market-to-book				Decrease likelihood of issuing debt	
Dilution					Increase likelihood of issuing debt
FFO Growth			Decrease likelihood of issuing debt		
Rating Dummy	Increase likelihood of issuing debt	Increase likelihood of issuing debt	Increase likelihood of issuing debt	Increase likelihood of issuing debt	Increase likelihood of issuing debt

Table 5: **Descriptive Statistics**

This table reports the summary statistics of the independent variables of REIT security issuance decisions for the sample of 1,043 observations.

Variable	Observation	Mean	S.D.	Min	Max
Asset Quality (Tenant Z-score)	1043	3.87	2.12	-3.87	16.81
Firesale Discount (%)	1043	8.86	0.69	7.96	11.81
Lease Maturity (years)	1043	3.88	1.69	0.00	5.56
Loss Severity (%)	1043	30.99	9.48	0.00	64.53
Leverage Ratio	1043	0.48	0.13	0.09	0.97
Profitability (%)	1043	3.50	4.36	-8.11	76.57
Market-to-book	1043	1.14	0.24	0.56	1.78
Dilution	1043	0.10	0.16	0.00	3.09
FFO Growth (%)	1043	9.87	32.98	-96.57	185.92
Earning Volatility (%)	1043	0.30	0.18	0.01	10.09
Size	1043	14.91	1.14	9.55	17.20

Table 6: **Correlation Matrix**

This table reports Pearson correlations between variables used in the regressions for the sample of 1,043 observations over the period 2000 - 2009.

	Asset Quality	Firesale Discount	Lease Maturity	Loss Severity	Leverage	Profitability	Market-to-book	Dilution	FFO Growth	Earning Vol.	Size
Asset Quality	1										
Firesale Discount	-0.08	1									
Lease Maturity	0.14	-0.28	1								
Loss Severity	-0.13	0.01	-0.30	1							
Leverage	0.01	0.01	-0.10	0.10	1						
Profitability	0.04	-0.11	0.09	-0.06	-0.34	1					
Market-to-book	0.05	-0.11	0.14	-0.13	-0.64	0.29	1				
Dilution	-0.06	-0.05	-0.11	0.13	0.33	-0.07	-0.29	1			
FFO Growth	0.08	-0.18	0.07	-0.09	-0.20	0.19	0.24	-0.02	1		
Earning Vol.	-0.15	0.23	-0.46	0.27	0.23	-0.13	-0.15	0.18	-0.20	1	
Size	-0.04	0.38	0.05	-0.01	0.04	-0.09	0.01	-0.28	-0.17	0.07	1

Table 7: **Difference in Means**

This table presents the sample means and sample standard errors of the dependent and independent variables in our regression analysis of REITs' new debt and equity offerings. Our sample comprises 1,043 observations over the period January 2000 to December 2009. We report t-statistics and their significance levels on difference in means. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% levels, respectively.

	Debt Offerings		Equity Offerings		t-stat	
	Mean	S.E.	Mean	S.E.		
Measures of Liquidation Value						
Asset Quality	4.01	2.01	3.75	2.20	1.92	*
Firesale Discount	8.68	0.60	9.02	0.72	-8.31	***
Loss Severity	30.46	9.56	31.45	9.40	-1.70	*
Control Variables						
Lease Maturity	3.90	1.61	3.86	1.76	0.47	
Leverage	0.47	0.11	0.50	0.15	-4.09	***
Profitability	3.30	2.90	3.67	5.31	-1.39	
Market-to-book	1.16	0.24	1.13	0.23	1.83	*
Dilution	0.08	0.10	0.12	0.20	-3.78	***
FFO Growth	5.11	31.21	13.99	33.92	-4.37	***
Earning Volatility	0.31	0.18	0.29	0.17	1.23	
Size	15.43	0.99	14.46	1.08	15.10	***

Table 8: Logit Regression with Asset Quality as Firm's Liquidation Value

This table presents the multivariate logit regression results we obtain for REITs' incremental financing decisions using a sample of 1,043 observations. The dependent variable is set to one for a new bond issue, and zero for an equity issue. We measure liquidation value by the industry concentration ratio of REIT top markets and the revenue-weighted average Altman Z-score of major tenants. Leverage is the ratio of total debt to total market assets, where we define market assets as the total book assets plus the difference between the market value of equity and the book value of equity. The growth rate of funds from operations (FFO Growth) is the annual percentage change in such funds. Dilution is the total amount of offering divided by the market cap prior to the new issue. We measure profitability by the return on average assets (ROAA). Market-to-book is the total book assets divided by the total market value of assets. Earning Volatility is the standard deviation of FFO over the past three years. Rating Dummy is a dummy variable that takes a value of 1 if the firm has either a bond rating or a commercial paper rating and zero otherwise. Z-statistics are shown in the line below the coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. For any independent variable that is statistically significant at 10% and above, we provide economic significance with Change in Probability showing the change in probability of issuing debt when the independent variable changes one standard deviation.

	Model 1		Model 2		Model 3	
	Coefficient	Change in Prob.	Coefficient	Change in Prob.	Coefficient	Change in Prob.
Asset Quality	0.074*** 2.226	3.9%	0.071** 2.086	3.7%	0.092*** 2.636	4.7%
Firesale Discount	-0.560*** -4.491	-9.1%	-0.606*** -4.497	-9.8%	-0.512*** -3.599	-8.3%
Lease Maturity			0.043 0.926		0.030 0.567	
Leverage					-3.514*** -4.050	1.2%
Profitability					-0.036 -1.403	
Market-to-book					-0.167 -0.398	
Dilution					1.129** 2.240	1.2%
FFO Growth					-0.005* -1.687	-7.6%
Earning Volatility					4.152 0.083	
Rating Dummy	1.771*** 8.103		1.783*** 8.125		1.537*** 6.642	
Size	0.479*** 5.004	13.6%	0.463*** 4.751	13.2%	0.622*** 5.701	17.5%
Intercept	-4.001** -1.956		-3.512* -1.661		-4.667** -2.085	
Pseudo R^2	0.214		0.215		0.231	
Log Likelihood	-566.0		-565.6		-553.8	
Observations	1043		1043		1043	

Table 9: Robustness Check - Regression Results with Historical Loss Severity Rates as Firm's Liquidation Value

This table presents the multivariate logit regression results of REITs' incremental financing decisions. Model 4 uses 1,300 observations with the firm-level loss severity rate we construct using historical loss severity rates across different property types. Model 5 tests the role of firm-level loss severity index in REITs' financing choice for a sample of firms that do not have tenant information (363 observations). Model 6 jointly tests the role of loss severity in addition to asset quality and firesale discount in explaining REITs' financing choice (1043 observations). It shows that when asset quality and firesale discount are in place, the explanatory power of historical loss severity is significantly reduced. The dependent variable is set to one for a new bond issue, and zero for an equity issue. Leverage is the ratio of total debt to total market assets, where we define market assets as the total book assets plus the difference between the market value of equity and the book value of equity. Funds from operations (FFO) growth is the annual percentage change in such funds. Dilution is the total amount of offering divided by the market cap prior to the new issue. We measure profitability by the return on average assets (ROAA). Market-to-book is the total book assets divided by the total market value of assets. Earning Volatility is the standard deviation of FFO over the past three years. Rating Dummy is a dummy variable that takes a value of 1 if the firm has either a bond rating or a commercial paper rating and zero otherwise. Z-statistics are shown in the line below the coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. For any independent variable that is statistically significant at 10% showing the change in probability of issuing debt when the independent variable changes one standard deviation.

	Model 4		Model 5		Model 6	
	Coefficient	Change in Prob.	Coefficient	Change in Prob.	Coefficient	Change in Prob.
Loss Severity	-0.017*** -2.713	-3.9%	-0.069*** -4.910	-12.0%	-0.005 -0.657	
Asset Quality					0.087*** 2.493	4.4%
Firesale Discount					-0.531*** -3.665	-8.1%
Leverage	-2.389*** -3.471	-7.2%	-1.848 -1.587	-4.9%	-3.577*** -4.199	-10.1%
Profitability	-0.051** -2.032	-5.3%	-0.053 -1.118		-0.039 -1.629	
Market-to-book	-0.023 -0.069		0.590 0.947		-0.158 -0.377	
Dilution	1.142** 2.430	4.5%	1.935*** 2.770	7.0%	1.076** 2.094	4.2%
FFO Growth	-0.005** -1.964	-3.9%	0.005 1.216		-0.004 -1.520	
Earning Volatility	20.99 1.469		232.00*** 4.037	9.4%	24.86 1.325	
Rating Dummy	1.678*** 8.148		2.797*** 4.967		1.551*** 6.629	
Size	0.665*** 7.848	18.8%	0.713*** 3.291	19.3%	0.611*** 5.569	17.2%
Intercept	-9.695*** -7.504		-11.80*** -3.833		-4.254* -1.890	
Pseudo R^2	0.219		0.343		0.233	
Log Likelihood	-698.4		-163.8		-552.8	
Observations	1300		363		1043	