

Property Dispositions and REIT Credit Ratings

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Abstract

This paper investigates whether and how property dispositions affect credit ratings of real estate investment trusts (REITs). We use an instrument variable to control the potential endogeneity problem associated with firm's decision to divest assets and find that property dispositions have a positive effect on REIT corporate credit ratings. We further investigate the underlying channels for this positive effect on credit ratings and test hypotheses related to three potential mechanisms: (i) utilization of proceeds, (ii) efficient asset allocation, and (iii) property focus. These mechanisms link the outcome of real estate asset divestitures to the component of REIT credit rating criteria, namely, business position assessment and financial risk profile. Our results show that the positive disposition effect on credit ratings is mainly due to the increase in geographic focus level of REIT property portfolio after the dispositions. Overall, our study provides new evidence on the wealth effects of asset transactions from creditors' perspective.

Keywords: Credit rating; geographic focus; property disposition; REITs

JEL-Classification: G24, G32

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1 Introduction

Credit ratings play a pivotal role for corporate financing and investment decisions. Scholars and practitioners have largely addressed their importance in pricing corporate credit risk and supporting investment choices. Since credit rating directly determines the cost of debt financing, it is important for corporate managers to know how their investment strategies affect its credit rating (see, e.g., Kisgen 2006). Across different business entity types, real estate investment trusts (REITs) is among the most sensitive to credit ratings. Due to their pass-through legal requirements, REITs have to payout almost all of their income and rely on external funds especially debt to finance their investments (e.g., Ooi, Ong, and Li, 2010; Ong, Ooi, and Kawaguichi, 2011). REITs are thus more determined to pursue high rating levels when implementing their investment strategies than other standard corporate entities. Therefore, REITs provide an interesting laboratory for researchers to gain more insights into the relation between investment decisions and credit ratings.

In this paper, we study how REIT investment decisions, in particular property dispositions, affect corporate credit ratings. Most of existing research that investigates property transactions focuses on the effects of real estate transactions from shareholders' perspective (e.g., Glascock, Davidson, and Sirmans, 1991; McIntosh, Ott, and Liang, 1995; Campbell, Petrova, and Sirmans, 2003, 2006; Ooi, Ong, and Neo, 2011). The effects of asset transactions on creditors' benefits, however, have been mostly neglected.

The ultimate goal for every public firm is to maximize shareholder value. A REIT is required by federal law to invest at least 75% of its total assets in real estate, and to distribute at least 90% of its taxable income as shareholder dividends. REIT managers make their property disposition decision for the best interests of shareholders. For instance, Mr. Charles R. Elliott, CFO of Roberts Realty Investors, Inc. (Amex: RPI), stated: "The best way to create

value for our shareholders is to periodically sell our apartment communities in order to make distributions to our shareholders from the sales proceeds.”

The unique payout requirements make REITs highly rely on debt to finance their asset investments. For this reason, there may exist agency conflicts between debt and equity holders in the case of property transactions (e.g., Jensen and Meckling 1976; Myers 1977). Due to the potential conflict of interests, the effect of property transactions on debt holders can be quite different from the effect on equity holders. While existing literature shows that REIT property dispositions benefit shareholders (e.g., Campbell, Petrova, and Sirmans, 2006), it is not clear whether property dispositions have a similar positive effect on debt holders or they are at the expense of debt holders’ wealth. To fill up this gap, we use credit rating as a general proxy for debt holders’ value and examine the effects of property disposition on the corporate credit ratings of REITs.

Datta and Iskandar-Datta (1996) and Datta, Iskandar-Datta, and Raman (2003) examine the wealth implications for bondholders and the net valuation effect to the firm as a whole. Using cumulative bond excess return and cumulative stock return at the announcements of divestiture transactions as a proxy for bondholders’ and shareholders’ wealth respectively, they find that divestitures are generally value enhancing to both stockholders and bondholders of the selling firm. However, these studies only look at public debt while neglecting all other types of public or private debt financing such as loans and commercial papers. For firms with borrowings other than public debt, it remains unclear whether property transactions improve creditors’ wealth or not. Furthermore, with the event study method, these studies can only capture the short-term announcements effects of divestiture transactions, while the long-term economic effects on debt holders’ wealth remain unexplored. To answer these remaining questions, in this paper we analyze whether property dispositions affect REIT credit rating levels, and, if so, what are the underlying economic mechanism(s).

Debt holders can estimate firms' ability to repay debt obligations from public information such as financial statements. Issuer credit rating by a third party rating agency, however, may serve as a better measure to evaluate the likelihood of firm default. The reason is that rating agencies have access to private information about the rated entities, which could be essential to evaluate entities' credit risk and long-term firm value. Thus, credit rating conveys important information about the firm's distress risk for debt holders, especially after important investment decisions such as property dispositions in the case of REITs. In our study, we view credit rating as a general measure for firm's credit risk as well as a wealth proxy for all debt stakeholders, which allows us to test the long-term economic effects of asset divestitures.

Our sample consists of 371 firm-year observations over the sample period from 2000 to 2012 and it covers of 57 unique REITs. To measure property disposition of a REIT, we aggregate all contractual gross sales price of properties sold over one fiscal year as percentage of total assets. We convert credit rating to numerical credit score and use it as dependent variable. In our empirical tests, we control for standard credit rating determinant factors following the credit rating criteria of REITs proposed by Standard & Poor's.

To identify the effects of dispositions on credit ratings and alleviate endogeneity concerns, we use effective property tax rate (EPTR) as the instrument variable for property dispositions. Property tax rate is related to property management decisions but is unlikely to have direct effect on REIT credit ratings. With the instrumental variable estimation approach, we found that property dispositions have significant positive effects on the subsequent REIT credit rating level. This positive effect on REIT credit rating is also economically large. For instance, a 1% point increase in the cumulated value of property sell-off as percentage of total asset will improve the possibility of getting a BBB- rating rather than lower ratings by 0.73%.

In the second part of our study, we investigate the underlying economic channels for the

positive effect of dispositions on credit rating. Motivated by corporate asset transaction literature and press releases on REIT property sales, we propose three potential mechanisms through which dispositions affect REIT credit ratings. First, the *Utilization of Proceeds Hypothesis* suggests that REITs can use sell-off proceeds to reduce debt and/or finance new investments such as property acquisitions, which can have an indirect effect on credit quality. Second, the *Efficient Asset Allocation Hypothesis* refers to the idea that managers retain assets for which they have a comparative advantage and sell properties to other parties who can manage them more efficiently. Lastly, the *Property Focus Hypothesis* suggests that the geographic concentration of REITs' property portfolio could be improved when certain real estate assets are sold. And this increase in REIT property focus can enhance its credit rating level.

We test the above three hypotheses to see which underlying economic mechanism(s) account for the positive effect on credit rating. To test *Utilization of Proceeds Hypothesis*, we examine REIT debt value changes and property acquisition as a percentage of total assets to see whether REITs use disposition proceeds to reduce debt and/or to carry out more acquisitions. To test *Efficient Asset Allocation Hypothesis*, we look at whether the selling of assets that they cannot manage efficiently can improve their return on assets or net operating income. To test *Property Focus Hypothesis*, we first calculate Herfindahl–Hirschman Index (HHI) to measure the geographic focus level of firms' property portfolio. This index is a standard measure of diversification and is a sum of weighted average ratios as suggested by Capozza and Seguin (1999). Our focus hypothesis predicts that REIT property divestitures can increase the level of its property geographic concentration.

Our empirical results show that REIT property geographic focus increases after property divestitures. More importantly, we find that it is this increase in property focus that accounts for our finding that property disposition improves credit rating, using effective

property tax rate (EPTR) as the instrument variable. In contrast, we find that neither the variables associated with proceed utilization nor the one related to efficient asset allocation are related to REIT property dispositions. This evidence suggests that these two mechanisms are not the underlying reasons for the positive effect on credit ratings.

Our study contributes to the literature in several dimensions. First, to our best knowledge, we are the first to look at the effects of property transactions from the perspective of creditors using credit rating as a wealth proxy. The existing literature has looked at the wealth effect of public bondholders after asset divestitures using cumulative bond excess returns at announcements (Datta and Iskandar-Datta, 1996; Datta et al., 2003). Our paper complements these studies by examining the wealth effect on all creditors. Using cumulated disposition data over one year as independent variable, we capture the aggregate economic effect of property sell-off on firm credit risk over a longer time period.

Second, our study adds new evidence to the literature by studying the underlying channels of the wealth effect of asset divestitures. We test three possible economic mechanisms and uncover the main channel, namely property focus, through which property dispositions improve corporate credit ratings. Lastly, our paper also adds the literature related to diversification discount. Using REITs as a special laboratory, we capture the effects of portfolio geographic diversification, compared to the business/industry diversification in corporate finance literature (e.g., John and Ofek, 1995). Our evidence suggests that property geographic diversification is inversely related to firm credit risk.

The rest of this paper proceeds as follows. In Section 2, we review the literature on credit rating and asset divestitures. Based on the existing literature, we propose in Section 3 three possible mechanisms that link REIT property dispositions to the criteria of credit ratings. Section 4 describes the data and presents the empirical results. Section 5 concludes.

2 Literature Review

Our study relates two strands of literature: credit rating literature and asset disposition literature.

2.1 Credit rating literature

Previous research on how rating agencies use public information when setting credit ratings tend to regress ordinal numbers of ratings on accounting and other types of variables. Horrigan (1966) finds that accounting data and financial ratios such as total assets, long-term solvency ratio, long-term and short-term capital turnover ratios, and profit-margin ratio, plus a legal status dummy are sufficient to correctly predict over half of corporate bond ratings in his sample. Later studies, such as Pinches and Mingo (1973), use discriminant analysis approach rather than regression analyses. Kaplan and Urwitz (1979) find publicly available data predict with a fair degree of accuracy actual quality ratings.

Using ordered probit model, Blume, Lim and MacKinlay (1998) examine the time trend in credit rating behavior over time period 1978 to 1995. They document that credit ratings have, on average, become worse over time, conditional on a set of variables that control the financial and business risks of the rated firm. Amato and Furfine (2004) investigate the cyclical patterns of rating changes. Rating agencies claim that their ratings should generally be stable through credit cycles. They find that ratings do not generally exhibit excess sensitivity to the business cycle. However, they do find evidence of procyclicality when restricting their sample to investment grade firms or to initial ratings and rating changes only. Altman and Rijken (2004) point out that for prior research predicting rating changes, panel regression estimates of rating determinants implicitly assume that ratings adjust instantaneously to new information. However, the truth is rating agencies do not follow these “point-in-time” rating practices. Agency ratings are intended to measure the default risk over long investment horizons. As a result, the information embedded in credit

rating change reflects change in firm's fundamentals.

Although there are lots of research that studies rating agencies' methodology and credit rating determinants, not much research has been done to examine how firm management and corporate decisions impact credit rating. In the other direction, Kisgen (2006) proposes a credit rating-capital structure theory, and investigates the effects of credit rating on firm's financing decisions by empirically testing the equity and debt issuances when firms are close to rating change. He finds that firms near rating change (identified by firms with plus or minus rating notch) tend to issue less debt relative to equity to increase the chance of upgrade or prevent from being downgrade. Li et al. (2013) further extend Kisgen (2006)'s work by looking at REIT capital structure and crediting ratings while controlling the endogeneity effects. By using credit rating outlook as a more accurate measure of the proximity to rating change, the authors find that REITs with the prospect of rating downgrade tend to issue about 11% less debt net of equity than others.

All these studies imply that credit rating does matter when firm make financing decisions. Similarly, it is also possible for REITs to rearrange their property portfolio according to their credit rating level. The decision for REITs to sell a property or not may not be exogenous. Consequently, we need to control for the potential endogeneity problem when testing property disposition effects on credit rating.

2.2 Asset disposition literature

While most of the literature on asset disposition focuses on its effects on overall firm market value or shareholders' wealth, only a few papers are in the area of relating asset dispositions to debt stakeholders. Datta and Iskandar-Datta (1996) and Datta et al. (2003) examine the wealth implications for bondholders and the net valuation effect to the firm as a whole. Using cumulative bond excess return and cumulative stock return after the divestiture

transactions as proxy for bondholders' and shareholders' wealth respectively, they find that divestitures are generally value enhancing to both stockholders and bondholders of the selling firm. However, these researches only look at one branch of debt—public traded bonds; while other forms of debt (e.g., loan and commercial papers) have been neglected. Therefore, what remains unclear to researchers is the effect of property transactions on the wealth of all the debt stakeholders.

Our hypotheses on the effect of asset dispositions on debt holders' wealth are motivated by theory on how asset divestitures affect firm's stock return. In Table 1, we summarize the literature on asset sell-offs by the reasons for disposition. We classify the literature in three categories based on firm as well as asset types: corporate asset sell-offs by conventional firms, real estate asset sell-offs by conventional firms, and real estate asset sell-offs by REITs (property disposition of REITs). Of all the three categories, the consensus in the literature is that asset/property divestitures tend to benefit sellers' shareholders.

[Insert Table 1 here]

For corporate asset sell-offs, the shareholders' wealth gains are mainly from three mechanisms: efficient asset allocation, increase in focus, and sell-off proceeds utilizations. Efficient asset allocation indicates that the asset has a better fit and is worth more as part of the buyer's organization than it is as part of the seller's. The reason for buyer's better organization to have effects on seller's wealth is that some of the value gains by buyer will be passed on to the seller through the premiums in the selling price. And this benefit is reflected in the seller's abnormal return on the announcement of the divestiture (John and Ofek, 1995). Studies on corporate asset sell-offs find that the abnormal returns, ranging from 0.5% to 1.66%, are attributed primarily to efficient reallocation of assets to higher valued uses (Alexander et al., 1984; Hite et al., 1987; Jain, 1985). As for property and geographic focus, John and Ofek (1995) emphasize on business rather than geographical concentration.

They suggest that selling the unrelated asset leads to an increase in focus and more efficient operation of the core business.

Literature on corporate asset divestitures also suggests that sales proceeds represent a cheaper source of funding for firms subject to high agency costs of debt. In particular, Lang et al. (1995) argue that given managers' reluctance to sell assets, which is due to their willingness to maintain firm size and control interests, managers may choose to sell assets because they view alternative sources of needed capital as not feasible or too expensive. They find significant and positive abnormal returns for the pay-out subsample, but insignificant negative returns for the sample of firms that retain sales proceeds.

Another stream of studies on asset divestitures of conventional firms specifically examines real estate assets sell-offs. Different from the case for conventional firms selling other kinds of assets, scholars have focused on tax benefits and asset undervaluation in explaining abnormal returns (Glascock et al., 1992; Owers and Rogers, 1986; Ambrose, 1990; Ball et al., 1993). The tax argument relates abnormal returns to the value of the depreciation tax shelter, since sale of heavily-depreciated property re-sets the depreciation schedule for the real estate. The undervaluation of real estate assets is due to the difference between book values and market value. Investors and analysts may underestimate the value of real property and the contribution of real estate to the firm's total value. Thus the selling price when property is sold may often constitute a positive announcement surprise.

The effects of property disposition on REITs have not been examined much. Because of the special features of REITs, neither tax benefits nor undervaluation is suitable to explain the abnormal return for property sellers (Campbell, Petrova, and Sirmans, 2006). McIntosh et al. (1995) find that a subgroup of REIT sellers who declare a one-time increase in dividends in order to comply with the income distribution rule experience a price increase reflecting this one-time dividend. A more recent research by Campbell, Petrova, and Sirmans (2006) find

similar results as conventional firm asset sell-offs. They attribute the abnormal shareholder returns of REIT sellers to asset allocation efficiencies.

3 Hypotheses

3.1 Why do REITs Dispose Property?

The first reason is **to utilize the proceeds from disposition into reduce debt and/or to fund new investments**. Studies on non-real estate assets sell-off by conventional firms have examined the importance of debt retirement as a motivation for the sale. They find that management's decision to use sale proceeds to retire debt is unrelated to shareholders. Lang et al. (1995) show that those firms selling assets tend to be poor performers and have high leverage. Many REIT disposition announcements mention that one function of the proceeds is to pay down debt and/or to make new acquisitions. For example, on October 27 2005, in the report of Associated Estates Realty Corporation regarding the third quarter results, it mentioned:

“In August, the Company completed the sale of The Triangle Apartments, a 279-unit apartment community in Cleveland, OH, to nearby Case Western Reserve University (CWRU). The Company continues to manage the property for CWRU. The Company also completed the sale of Windsor at Metrowest, a 460-unit community in Orlando, on October 24. Proceeds from the sales of properties are currently being used to pay down debt, repurchase shares of the Company's stock, and to acquire or develop properties.”

Another reason for disposition is to increase the **focus** of property type and/or geographical location. John and Ofek (1995) emphasize focus as an important motive for divestitures of corporate assets. Bhagat, Shleifer, and Vishny (1990), Lang and Stulz (1990), Comment and Jarrell (1995), and Berger and Ofek (1995) all suggest that increases in focus result in increases in market value. To reduce geographic exposure is one of the important

motivation for REITs to sell off their properties. As shown in the American Campus Communities Incorporated Third Quarter 2006 Earnings Conference Call on November 2 2006:

*“On our last call, we announced that we were in the process of marketing The Village on University in Tempe, Arizona for sale. This strategic disposition gives us an opportunity to accretively recycle capital into the acquisition opportunities Bill previously discussed as well as to the pipeline development projects. This disposition also **mitigated market exposure in Tempe as we bring newer, better-located product on line in the ASU market.**”*

In addition to the two main motivations for selling property, REIT may disposes real estate for the consideration of its overall operating strategy. For example, to enhance overall asset quality, REITs may sell the assets with relatively low performance. This motivation is related to **efficient asset allocation.**

3.2 The mechanisms of disposition affecting credit ratings

Corporate credit ratings are determined by rating agencies' assessments of the probability distribution of future cash flows to debt holders. As the mean of the firm's future cash flow distribution shifts downward or the variance of the future cash flow increases, the possibility of default increases and the firm's credit rating will be subject to decline. According to S&P's rating criteria for U.S. REITs and REOCs, there are two major components of a REIT ratings analysis. The first is business position assessment, which involves assessment and benchmarking of the company along the key categories: market position, asset quality, diversification & stability of operations, and operating strategy & management review. The second assessment is financial risk profile, which refers to the four elements: financial policy, profitability, cash flow protection, and capital structure & financial flexibility.

[Insert Figure 1 here]

The economic rationale for property disposition to have effects on credit ratings is exhibited in Figure 1. We combine the three classic theories on corporate asset divestitures (Hite et al. 1987; Lang et al. 1995; John and Ofek 1995) and the reasons for REITs to sell properties to provide possible linkages to the two main determinants of corporate credit ratings (business risk and financial risk).

First, *Utilization of Proceeds Hypothesis* suggests that REITs may use the proceeds from property dispositions to pay down debt or finance new investments. Proceed utilization may have positive effects on firm's financial profile, since debt repayment reduce the leverage ratio and profitable investment may increase future cash flow. However, on the other hand, managers may undertake risky investment to push up the stock price in a short term at the cost of debt holders. In the long run, this risk-shifting opportunistic behavior will deteriorate creditors' value, increase firm's credit risk, and lower firm value eventually. Credit rating agencies intend to measure default risk over long investment horizons and hence may be able to detect those value-decreasing investment decisions even they create temporary prosperity. For these reasons, the impact of disposition proceeds on credit rating can be mixed.

Second, *Efficient Asset Allocation Hypothesis* is mainly about the improvement of the real estate asset quality after REIT property dispositions. REITs can improve the overall quality of property portfolio by disposing the properties with poor performance, which can enhance firm's business position.

The last mechanism is through the *property focus* channel. Firms can increase the level of business focus by selling the non-core properties. Reducing property diversification can increase the operation efficiency and positively affect business position of firm, which in turn improves credit ratings. In this study, we hand-collect the geography data of REIT property

and then test whether the level of REIT property geographic focus is affected after property dispositions.

4 Empirical Design and Results

Our empirical tests are carried out in three main steps. Firstly, we test whether property dispositions affect REIT credit rating levels. Secondly, we test the three hypotheses regarding to the underlying mechanisms of the effect of property dispositions on credit rating. Specifically, we regress the proxies related to the three channels on REIT property dispositions. Finally, we test the effect of disposition on credit rating and the underlying channel simultaneously.

4.1 Data

Our credit ratings data and most of the financial data are from SNL Financial database. This database provides end-of-year credit ratings assigned by three rating agencies: S&P's, Moody, and Fitch. We use the long-term credit rating of S&P's in this research because very few REITs have ratings of the other two agencies. The property transaction data from SNL Financial is the aggregate contractual gross sales price of properties purchased/sold by the end of each fiscal period. We construct our sample from all the listed, operating equity REITs of U.S. from 2000 to 2012. After dropping missing values for frequently used variables, we have 371 observations of 57 individual REITs. Other property-level data used to calculate the Herfindahl index are hand-collected from 10-k fillings forms of each individual REIT.

[Insert Table 2 here]

In Table 2, we summarize the mean value of frequently used variables by each credit rating levels. We group firms into rating categories from A to B- as assigned by the rating agency. Due to the small sample of REITs that have a credit rating, our sample does not

exhaust all ratings categories from AAA to D. 73.6% of the observations concentrate on the broad rating of BBB (from BBB+ to BBB-). Table 3 displays the correlation matrix of all the variables in our empirical tests.

[Insert Table 3 here]

4.2 Test the effects of property dispositions on credit ratings

To test the determinants of credit rating levels, we follow Blume, Lim, and MacKinlay (1998) and Amato and Furfine (2004) and use an ordered probit model. The set of observed explanatory variables is related to the discrete-valued indicators of creditworthiness through an unobserved continuous linking variable. For our dependent variable *Rating*, we assign discrete numbers from 1 to 11 to each rating level from A to B-, with higher numbers indicating lower rating levels and thus higher credit risk.

Our key explanatory variable $Disp/TA_{t-1}$ is the aggregate contractual gross sales price of properties sold in the whole fiscal year divided by the total assets value at the year $t-1$.⁴ Taking one year lag for the disposition variable is to take into the consideration that credit rating agencies may not adjust instantaneously to new information such as property disposition. Also, using lag disposition variable facilitates the understanding of the three mechanisms that we test in the next section.

Our selection of control variables are based on a survey of credit ratings research on all firm types (e.g. Amato and Furfine (2004), Altman and Rijken (2004)) as well as the REIT credit rating criteria as suggest by Standard and Poor's (2004). There are two major components for a corporate credit rating: business position and financial risk. For business position assessment, we control firm size, firm age, and systematic risk. Firm size value is the log form of total assets: $Ln(TA)$. Since larger firms naturally face lower risk, $Ln(TA)$ is expected to have positive effects on credit ratings. REITs with longer history may have

⁴ Our empirical results do not change when we use disposition variable of year t .

established a better position in capital market than younger REITs, and thus are expected to have lower credit risk. Larger systematic risk implies larger equity risk, which suggests that a firm would be less able to service its debt. Hence we expect *Beta* to have negative effects on ratings.

With respect to financial risk, we employ five measures (*DPS*, *FFO/TA*, *Intcov*, *Leverage*, *CLD*) to control REIT financial profile related to the following aspects respectively: financial policy, profitability, cash flow protection, capital structure, and financial flexibility. *DPS* refers to dividend per share. Firms that pay high dividend tend to have higher expectation of its future cash flow and superior ability to meet debt obligation. Therefore, we predict that *DPS* is positively related to credit rating levels. *FFO/TA*, defined as funds from operations divided by total assets, captures REITs profitability. High earnings are indicative of a firm's ability to generate cash flow as well as the quality of firm's assets. We expect *FFO/TA* to be positively related to credit rating levels. Further, we also expect interest coverage ratio (*Intcov*) to have positive effect ratings. Leverage is a direct measure of the magnitude of debt obligations. An increase in leverage should lead to high credit risk and thus a lower credit rating level. Credit line drawn divided by available credit line (*CLD*) is negatively related to firm's financial flexibility. As firms draw down on their credit line, their ability to meet short term debt obligations will be constrained. Thus, we expect it to have a negative impact on credit rating.

Besides these above control variables, we also include REIT property type: *Office*, *Industrial*, *Residential*, *Retail*, *Diversified*, and *others*. Time fixed effects are included in all empirical tests. Moreover, we add market index return (*Index_ret*) as one of the control variables to see whether general market environment affects ratings and whether rating agencies can really "see through cycle". A more detailed description of all variables can be found in Appendix.

As discussed in Literature Review section, there is a potential endogeneity problem associated with the property disposition variable. The decision to sell a property or not may be influenced by a firm's credit rating level. To alleviate this endogeneity concern and get unbiased estimates, we employ an instrument variable (IV) approach and simultaneously estimate the first stage OLS regression and the second stage ordered probit model together using Simultaneous Equation Model (SEM).⁵

The IV we use is efficient property tax rate (*EPTR*), calculated as taxes expense on real estate assets divided by net real estate investment. It reflects the marginal tax cost for REIT maintaining its property portfolio. This rate is unrelated to firm characteristics since the tax rate is determined by location rather than quality of properties. Therefore, *EPTR* is unlikely to have a direct effect on REIT credit rating levels. On the other hand, *EPTR* is related to the decision to divest properties, as high tax rate means high cost on property maintenance. These attributes of *EPTR* make it a valid instrument variable for property disposition.

Table 4 reports the SEM estimation results of disposition effects on credit rating levels. Model 1 shows the results of the first stage OLS regression using *EPTR* as the instrument variable. Consistent with our expectation, the coefficient of *EPTR* is significantly positive, which implies that high property tax rate increase the divestiture of real estate assets.

In model 2, the coefficient of *Disp/TA* is negative with a statistical significance at the 1% level. The negative coefficient reflects a positive effect of dispositions on credit rating as our dependent variable is a measure of credit risk. The economic significance of the disposition variable is also sizable. Take BBB- as an example, a one-percentage point increase in the cumulated value of property sell-off will improve the possibility of getting a minimum investment-grade rating (i.e. BBB-) rather than lower ratings by 0.73%. This evidence suggests that property disposition has a positive effect on the subsequent credit rating level of

⁵ We adopt the conditional mixed process (CMP) estimator to simultaneously estimate the two equations together. This estimator is suitable for estimating multiple equations involving different types of dependent and independent variables. It can fit many Seemingly Unrelated Regressions (SUR), simultaneous equations, and IV models (Roodman, 2009).

REITs.

Most of the coefficient of the control variables are highly significant and has the expected sign ($\ln(TA)$, $Leverage$, Age , FFO/TA , $Beta$, DPS). The significant rho parameter ($atanhrho_{12}$) indicates that the correlation between the error terms in the two equations is significant. Therefore, it is necessary to use the IV approach to control for the endogeneity problem.

[Insert Table 4 here]

4.3 Test the underlying mechanism(s) of disposition's effect on credit rating

As discussed in earlier sections, we propose three possible mechanisms through which disposition can affect REIT credit ratings. Before examining how these three channels affect credit ratings, we first test whether selling real estate assets matters for REITs or not in these three aspects: proceeds use, efficient asset allocation, and property focus. We regress the variables ($Debt_ratio$, Acq/TA , $ROAA$, NOI/TA , HHI) related to one of the three channels on the lag disposition variable ($Disp/TA_{t-1}$) and other control variables ($\ln(TA)$, $Leverage$, Age , FFO/TA). For all these regressions, we control the omitted variables endogeneity problem using the two-stage least squares (2SLS) regression. Again, we use $EPTR$ as the instrument variable since it is correlated with the disposition variable $Disp/TA_{t-1}$, and is not correlated with other firm characteristics.

To test the *Proceeds Hypothesis*, we assume that there is one year lag of utilization of the disposition proceeds. The proceeds will be reflected in the next year's acquisition or debt retirement. For this reason, we take one year lag of disposition variable. $Debt_ratio$ is measure by current year book value of debt divided by debt value in the previous year. Acq/TA is the aggregate contractual gross sales price of properties purchased divided by total assets by the end of current fiscal year. *Proceeds Hypothesis* predicts that disposition variable

has a negative coefficient with *Debt_ratio* as the dependent variable and a positive coefficient with *Acq/TA* as the dependent variable.

Return from average assets (*ROAA*) and net operating income (*NOI/TA*) are measures of property quality and firm profitability. If the properties sold are the ones that cannot be efficiently managed or the ones that underperformed, the overall quality of property portfolio will be improved after disposition. Therefore, a positive coefficient of disposition with *ROAA* or *NOI/TA* as the dependant variable would support the *Efficient Asset Allocation hypothesis*.

In order to test the *Property Focus Hypothesis*, we calculate Herfindahl–Hirschman Index (*HHI*) to measure the focus level of firms’ property portfolio. This index is a standard measure of diversification and is a sum of weighted average ratios as suggested by Capozza and Seguin (1999). We only focus on the geographic index while do not calculate property-type level index because of the extremely small number of diversified REITs (only four) in our sample.

The geographic Herfindahl–Hirschman index is calculated as below:

$$HHI = \sum_1^{10} S_i^2, \quad (1)$$

where S_i is the proportion of the portfolio invested in the region i . We classify the regions into 10 divisions according to US Census Bureau: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, Pacific, and Foreign. The weight we used to calculate the index is the amount of money invested in each of the ten regions. If this investment information is not available, we use the area of properties (in square foot) or number of rooms/apartments as the second choice. However, if all the above information cannot be found in firm’s 10-k filling forms, we use the number of properties as the last choice of weight. Values of *HHI* range from 0 to 1. High value of this index indicates high level of focus. *Property Focus Hypothesis* indicates that property divestiture can lower the level of geographic diversification and thus have a

positive coefficient with *HHI* as the dependent variable.

[Insert Table 5 here]

Table 5 reports our estimation results of the underlying mechanisms. We find that, consistent with the *Property Focus Hypothesis*, the coefficient on disposition in Model 3 is positive, significant at the 5% level. This evidence suggests that property dispositions improve the property geographic focus of REITs. In contrast, the coefficient of the disposition variable is not significant all the remaining models. This finding implies that the change in geographic focus of the overall property portfolio after property divestiture is the only channel out of the three to explain the positive effects of disposition on credit ratings.

4.4 Test disposition effect and the underlying channel simultaneously

In this section, we test the full chain of underlying mechanism that links property disposition to credit rating. We only test the channel that our earlier analyses show that disposition has an impact on, namely the property focus channel. We cannot simply regress credit rating on the intermediate geographic focus variable *HHI* to get a correct estimate of disposition's effect on ratings. The challenging question is that we need to identify precisely the effect of disposition on crediting rating through a specific channel, rather than the overall effect of disposition on ratings. The first method is to test the intermediate and disposition effects simultaneously in a mixed process model. We employ a three-level hierarchical mixed process model with IV approach to get the estimated coefficient of the specific channel through which disposition affecting credit ratings. This estimation is conducted by Simultaneous Equation Model (SEM) using conditional mixed process (CMP) estimator.

The other way to tackle the problem is to first use disposition to predict the value of the intermediate variable, geographic focus *HHI* in our case, and then use the predicted value of *HHI* to get an estimate of disposition's effect on credit ratings. Specifically, we first conduct

the same test as in Table 5, that is, to regress HHI on property sell-off variable ($Disp/TA_{t-1}$) and other firm characteristic variables using $EPTR$ as the IV. Then, based on that estimation results, we obtain the predicted values of HHI , which captures the effects of property disposition and other firm characteristics on REIT property focus. In the next step, we replace the disposition variable with this predicted HHI variable in the ordered probit model which we elaborate in the first part of our empirical design in Table 4.

[Insert Table 6 here]

Table 6 displays the SEM results using the first method to test the property focus mechanism and disposition effects simultaneously. As shown in the order probit estimation column, HHI has a negative coefficient, significant at the 1% level. For a one unit (from 0 to 1) increase in the geographic focus as measure by Herfindahl–Hirschman index, it will increase the possibility of getting a BBB- rating rather than lower rating by 6%. This result confirms that disposition improves credit rating through the property focus channel.

Using the other method, we also find similar results as reported in Table 7. Consistent with our expectation, the predicted focus variable ($Focus_predicted_t$) in model 2 has a significantly negative coefficient in the ordered probit model. This demonstrates that property dispositions positive affect REIT credit ratings through reducing the geographic diversification of its property portfolio.

5 Conclusion

This paper investigates the effects of property dispositions on REIT credit ratings. We use REIT efficient property tax rate ($EPTR$) as an instrument variable for disposition to control the potential endogeneity problem associated with firm's decision to divest assets. We find that property dispositions have a positive effect on REIT corporate credit ratings. We further examine three possible underlying channels for this positive effect on credit ratings:

proceeds utilization, efficient asset allocation, and property focus. Our results show that the positive disposition effect on credit ratings is mainly due to the increase in geographic focus level of REIT property portfolio after the dispositions.

Our research contributes to the literature in several aspects. First, we are the first to look at the effects of property transactions from the perspective of creditors using credit rating as wealth proxy. While the existing literature has looked at the wealth effect of public bondholders after asset divestiture transactions, our paper complements these studies by examining the wealth effect of dispositions on all creditors, studying the economic effects of property sell-off on firm credit risk over a longer time period, and testing the underlying channels of the wealth effect of asset divestitures. Lastly, our paper sheds lights on the diversification discount issues. Our analyses capture the effects of portfolio diversity in geographic dimension, and find that property geographic diversification is inversely related to firm credit risk.

Taken together, the evidence in our paper indicates that the agency conflicts between debt and equity holders at property dispositions may not be a major concern for REITs. We leave to future research on this area to investigate the potential reasons that alleviate this agency conflict.

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Appendix: variable definitions

<i>Variable</i>	<i>Definition</i>
Acq/TA_t	Aggregate contractual gross sales price of properties purchased by the end of each fiscal period divided by total assets within year t
Age_t	Firm age at year t
$Beta_t$	Daily beta over a 250-trading-day holding period
CLD_t	Credit line drawn/Available (%)
$Debt_ratio_t$	Debt at year t/debt at year t-1
$Disp/TA_{t-1}$	Aggregate contractual gross sales price of properties sold by the end of each fiscal period divided by total assets within year t-1
DPS_t	Dividends per share at end of year t
$EPTR_{t-1}$	Effective property tax rate: taxes expense on real estate assets/net real estate investment at year t-1
FFO/TA_t	Funds from operations/total assets at year t
HHI_t	Herfindahl–Hirschman index calculated using property-level geographic data at year t
$Index_ret_t$	End of period SNL broad base index value of year t
$Intcov_t$	Interest coverage ratio: EBITDA/Interest Expense at year t
$Leverage_t$	Debt as a percent of total market capitalization at year t (%)
$LN(TA)_t$	The natural logarithm of total assets of year t
NOI/TA_t	Net operation income/total assets of year t
$Rating_t$	Long-term credit rating of Standard & Poor's at the end of year t
$ROAA_t$	Return on average assets of year t

Table 1 Literature review of reasons for dispositions affecting firm's value (stock return)

Reasons	Corporate asset sell-offs	Real estate sell-offs by conventional firms	Real estate sell-offs by REIT
<i>Efficient Asset Allocation</i>	Alexander et al. (1984); Jain (1985); Hite et al. (1987); John & Ofek (1995)		Campbell, Petrova and Sirmans (2006)
<i>Focus</i>	John & Ofek (1995)		
<i>Proceeds Utilization (Debt, Dividend)</i>	Lang et al. (1995) Datta and Iskandar-Datta(1996) Shin (2008)		McIntosh et al. (1995)
<i>Undervaluation of Assets</i>		Owers & Rogers(1986); Ambrose (1990); Ball et al. (1993)	
<i>Tax Benefits</i>		Glascoock, Davidson and Sirmans(1991)	

Table 2 Sample Summary by Rating Levels

<i>Rating</i>	<i>Score</i>	<i>N</i>	<i>Disp/TA_{t-1}</i>	<i>Ln(TA)</i>	<i>Leverage</i> %	<i>Age</i>	<i>Intcov</i>	<i>FFO/TA</i>	<i>Beta</i>	<i>DPS</i>	<i>CLD</i> %
A	1	2	0.0146	15.4153	23.7448	29.6000	3.1702	0.0980	0.9050	2.6060	34.1405
A-	2	21	0.0486	15.9641	30.7951	21.3478	6.9817	0.0717	0.8866	2.4426	19.3671
BBB+	3	59	0.0410	15.7719	35.3104	21.0882	3.7561	0.0563	0.8994	2.3724	22.3129
BBB	4	125	0.0525	15.2152	36.9787	22.8013	4.2490	0.0553	0.8507	1.9526	28.8287
BBB-	5	89	0.0440	14.9568	39.3370	20.4298	3.1961	0.0486	0.9269	1.7776	29.8093
BB+	6	24	0.0549	15.2695	46.1269	17.5882	2.6779	0.0455	0.8726	1.3094	28.7411
BB	7	19	0.0305	15.0126	41.5286	14.4783	3.2234	0.0555	1.0542	1.1234	34.9358
BB-	8	13	0.0364	14.8445	38.2913	13.3125	2.9795	0.0500	1.1976	0.5264	18.4331
B+	9	13	0.0264	14.1698	56.5416	15.0588	1.9951	0.0365	1.0870	0.5056	34.1729
B	10	4	0.0613	14.1352	59.6787	16.5000	1.0856	-0.0004	1.3571	0.4517	9.0400
B-	11	2	0.0502	14.6881	62.8979	19.0000	0.8409	-0.0026	1.7412	0.0000	12.4444
Total		371	0.0455	15.2001	38.9664	20.4338	3.6807	0.0524	0.9279	1.7691	27.5006

Notes: this table summarize the number of observation, mean statistics of our key variable *Disp/TA*, and other frequently used control variables by credit rating levels. Definitions of these variables are shown in Appendix. All these control variables are at year t except disposition is accumulated value within year t-1.

Table 3 Correlation matrix

	<i>Disp/TA_{t-1}</i>	<i>EPTR_{t-1}</i>	<i>Ln(TA)</i>	<i>Leverage</i>	<i>Age</i>	<i>Intcov</i>	<i>FFO/TA</i>	<i>Index_ret</i>	<i>Beta</i>	<i>DPS</i>	<i>CLD</i>
<i>Disp/TA_{t-1}</i>	1										
<i>EPTR_{t-1}</i>	0.1512	1									
<i>Ln(TA)</i>	0.1437	0.0431	1								
<i>Leverage</i>	0.2077	-0.0641	0.1134	1							
<i>Age</i>	0.1472	0.0176	0.0191	0.2175	1						
<i>Intcov</i>	-0.1835	-0.0735	-0.1567	-0.6153	-0.3129	1					
<i>FFO/TA</i>	-0.0826	0.0752	-0.1592	-0.5561	-0.0989	0.6322	1				
<i>Index_ret</i>	-0.1263	0.0701	0.0141	-0.3022	-0.0132	0.0025	-0.0549	1			
<i>Beta</i>	0.2215	-0.1866	-0.1663	0.3227	-0.0734	-0.2929	-0.3368	-0.0494	1		
<i>DPS</i>	0.0821	0.1048	0.1604	-0.1736	-0.055	0.2532	0.2504	-0.2158	-0.2887	1	
<i>CLD</i>	0.1763	0.172	-0.201	0.287	0.1945	-0.049	-0.0175	-0.2159	0.0654	-0.0264	1

Table 4 Test disposition effects on REIT credit rating using Simultaneous Equation Model

	Model 2 ordered probit <i>Rating_t</i>	Model 1 OLS <i>Disp/TA_{t-1}</i>
<i>EPTR_{t-1}</i>		1.9975*** (0.5171)
<i>Disp/TA_{t-1}</i>	-7.7078*** (1.6383)	
<i>Ln(TA)_t</i>	-0.8058*** (0.0878)	0.0212*** (0.0053)
<i>Leverage_t</i>	0.0463*** (0.0070)	-0.0000 (0.0004)
<i>Age_t</i>	-0.0359*** (0.0097)	0.0012 (0.0007)
<i>Intcov_t</i>	0.0336*** (0.0112)	-0.0009 (0.0051)
<i>FFO/TA_t</i>	-19.4788*** (4.5668)	0.0641 (0.2855)
<i>Index_ret_t</i>	2.4284* (1.4565)	0.0609 (0.0701)
<i>Beta_t</i>	2.3105*** (0.3337)	0.0785*** (0.0200)
<i>DPS_t</i>	-0.3202*** (0.0626)	0.0002 (0.0034)
<i>CLD_t</i>	0.0010 (0.0026)	0.0001 (0.0002)
<i>Constant</i>		-0.4196*** (0.0938)
<i>year</i>	Y	Y
<i>property type</i>	Y	Y
Observations	371	371
<i>atanhrho_12</i>		0.5371*** (0.1410)

Notes: This table shows the SEM estimation results for property disposition effects on credit rating. The dependent variables are *Rating* and *Disp/TA_{t-1}* in Model 2 and 1 respectively. Definitions of the variables are shown in Appendix. We control time fixed effects and property type fixed effects by including year dummies and property type dummies. Arc-hyperbolic tangent correlations between the error terms of the two equations in the SEM are reported below the main results. The robust standard errors are shown in the brackets. These errors are clustered by firm and are robust to both heteroskedasticity and within-firm correlation. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 5 Disposition and three mechanisms

	Efficient Asset Allocation		Focus	Proceeds Utilization	
	Model 1 <i>ROAA_t</i>	Model 2 <i>NOI/TA_t</i>	Model 3 <i>HHI_t</i>	Model 4 <i>Debt_ratio_t</i>	Model 5 <i>Acq/TA_t</i>
<i>Disp/TA_{t-1}</i>	24.1905 (18.7897)	0.0822 (0.1807)	6.0009** (2.6207)	-0.3886 (1.8575)	-0.0895 (0.5971)
<i>Ln(TA)_t</i>	0.3675* (0.2178)	-0.0134*** (0.0021)	-0.0802 (0.0503)	-0.0062 (0.0252)	0.0177 (0.0127)
<i>Leverage_t</i>	-0.0861*** (0.0189)	0.0001 (0.0002)	-0.0005 (0.0029)	0.0009 (0.0013)	-0.0010 (0.0008)
<i>Age_t</i>	0.0269 (0.0380)	-0.0002 (0.0002)	-0.0060 (0.0079)	-0.0039 (0.0034)	0.0014 (0.0012)
<i>FFO/TA_t</i>	68.9104*** (12.6709)	0.5663*** (0.1805)	4.5929 (3.3155)	0.9608 (1.2217)	0.2850 (0.5668)
<i>Constant</i>	-5.2279 (3.2687)	0.2601*** (0.0352)	1.3472 (0.8340)	1.2075*** (0.4088)	-0.1698 (0.1908)
<i>Observations</i>	232	199	156	227	220
<i>R-squared</i>	0.4418	0.4603	.	0.1208	0.1239

Notes: this table summarizes the results of 2SLS regressions testing disposition effects on the three potential mechanisms that may link disposition to REIT credit rating criteria. *EPTR_{t-1}* is the IV for disposition variable in all of the five models. Definitions of the variables are shown in Appendix. The difference in number of observations across the five models is because of the missing values in the five dependent variables and the instrument variable. We control time fixed effects and property type fixed effects by including year dummies and property type dummies. The robust standard errors are shown in the brackets. These errors are clustered by firm and are robust to both heteroskedasticity and within-firm correlation. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 6 Disposition effects on REIT credit rating through the "Focus" mechanism using Simultaneous Equation Model

	ordered probit <i>Rating_t</i>	OLS <i>HHI_t</i>	OLS <i>Disp/TA_{t-1}</i>
<i>HHI_t</i>	-4.5738*** (0.3127)		
<i>Disp/TA_{t-1}</i>		1.0589** (0.4566)	
<i>EPTR_{t-1}</i>			2.6834*** (0.5721)
<i>Ln(TA)_t</i>	-0.4493*** (0.1232)		
<i>Leverage_t</i>	0.0190*** (0.0057)		
<i>Age_t</i>	-0.0217*** (0.0081)		
<i>Intcov_t</i>	0.0094* (0.0050)		
<i>FFO/TA_t</i>	-8.0872*** (2.5207)		
<i>Index_ret_t</i>	-1.6487 (2.3280)		
<i>Beta_t</i>	0.6650*** (0.2126)		
<i>DPS_t</i>	-0.1207*** (0.0401)		
<i>CLD_t</i>	0.0015 (0.0013)		
<i>Constant</i>		0.2889*** (0.0373)	0.0055 (0.0101)
<i>year</i>	Y	Y	Y
<i>property type</i>	Y	Y	Y
<i>Observations</i>	371	371	371
<i>atanhrho_12</i>		1.4113*** (0.3154)	
<i>atanhrho_13</i>		-0.0287 (0.0691)	
<i>atanhrho_23</i>		-0.3970*** (0.1205)	

Notes: this table shows the SEM estimation results that property disposition affects credit rating through the *Focus* mechanism. The dependent variables are *Rating*, *HHI* and *Disp/TA_{t-1}*, respectively. Definitions of the variables are shown in Appendix. We control time fixed effects and property type fixed effects by including year dummies and property type dummies. Arc-hyperbolic tangent correlations between the error terms of the two equations in the SEM are reported below the main results. The robust standard errors are shown in the brackets. These errors are clustered by firm and

are robust to both heteroskedasticity and within-firm correlation. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 7 Disposition effects on REIT credit rating through the "Focus" mechanism using predicted value

	Model 1	Model 2
	Ordered probit	2SLS
	<i>Rating_t</i>	<i>HHI_t</i>
<i>Disp/TA_{t-1}</i>		6.0009** (2.6207)
<i>Focus_predicted_t</i>	-0.5531*** (0.1707)	
<i>Ln(TA)_t</i>	-0.9019*** (0.0860)	-0.0802 (0.0503)
<i>Leverage_t</i>	0.0436*** (0.0071)	-0.0005 (0.0029)
<i>Age_t</i>	-0.0391*** (0.0100)	-0.0060 (0.0079)
<i>Intcov_t</i>	0.0319*** (0.0110)	
<i>FFO/TA_t</i>	-14.7725*** (4.1523)	4.5929 (3.3155)
<i>Index_ret_t</i>	1.9391 (1.4812)	
<i>Beta_t</i>	2.3020*** (0.3457)	
<i>DPS_t</i>	-0.3335*** (0.0609)	
<i>CLD_t</i>	-0.0012 (0.0024)	
<i>Constant</i>		1.3472 (0.8340)
<i>year</i>	Y	Y
<i>property type</i>	Y	Y
<i>Observations</i>	371	156
<i>Pseudo R-squared</i>	0.277	

Notes: This table shows the results using predicted value that test property disposition affecting credit rating through the *Focus* mechanism. The dependent variables are *Rating* and *HHI*, respectively. *Focus_predicted_t* is the out-of-sample prediction from the fitted Model 2. The result of Model 2 is the 2nd stage result of the 2SLS model using *EPTR_{t-1}* as instrument variable for *Disp/TA_{t-1}*. First stage result of Model 2 is omitted in this table. Definitions of the other variables are shown in Appendix. We control time fixed effects and property type fixed effects by including year dummies and property type dummies. The robust standard errors are shown in the brackets. These errors are clustered by firm and are robust to both heteroskedasticity and within-firm correlation. ***, **, and * denote significance at the 1%, 5% and 10% levels, respectively.

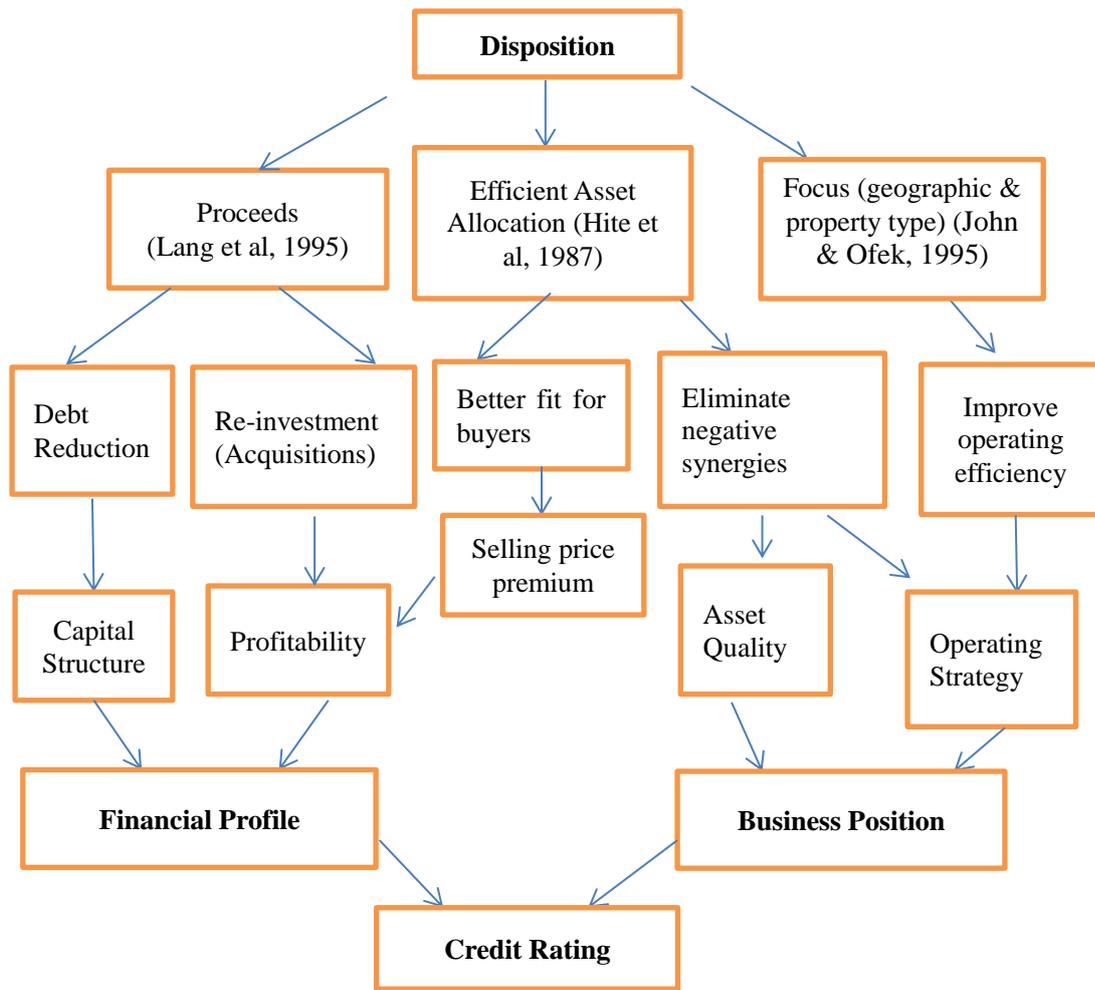


Figure 1 Mechanisms of Disposition Affecting REIT Credit Ratings