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The Effect of Access to the Public Debt Market on Corporate Financing Decisions: The Case of REITs

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Abstract: We examined the effects of access to public debt on the corporate financing decisions in real estate investment trusts (REITs) using a difference-in-differences approach and a propensity score approach. The introduction of credit ratings by S&P and Moody's has allowed REITs to access the public debt market. To investigate the impacts of the introduction of credit ratings, we compared the financing policies in REITs with initial credit ratings before and after the introduction of credit ratings with REITs that had not obtained a credit rating between 1980 and 2016. After obtaining credit ratings, REITs have significantly increased the corporate leverage ratios and the use of long term debt, which suggest that REITs were constrained from debt financing, in particular long term debt financing, in the past until they could gain access to the public debt market after the introduction of credit ratings. Access to the public debt market has also significantly reduced both equity issuances and cash holdings. Our empirical results suggest that the introduction of credit ratings can reduce information asymmetry, and affect REITs' capital structure decisions and the level of cash holdings.

Keywords: credit rating; corporate leverage; debt maturity; equity financing; cash holdings

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1. Introduction

Infrastructure and real estate provides essential services to society, such as energy, water, transport, and protection from natural hazards, which contributes to the achievement of sustainable development goals (Mouzughi, Bryde, and Al-Shaer [1]; Thacker et al. [2]). The world had spent around $9.5 trillion on infrastructure in 2015, including $2.5 trillion in economic infrastructure and $4.8 trillion in real estate, which accounted for 14% of total GDP (Woetzel et al. [3]). However, to achieve the sustainable development goals set by the United Nations, an investment of $3.7 trillion in economic infrastructure is needed through per year through 2035. Financing for infrastructure is not sufficient, especially in the developing countries (United Nations [4]). Poon and Shen [5] showed that in more than 26,000 projects (including power, transport, mining, oil and gas, real estate, etc.) in the global market from 1971 to 2018, around 53% were financed by syndicated loans, 16% by bilateral loans, 7% by multilateral agency direct loans, and 9% from equity. Bond financing is relatively rare. Financing for Development Office of United Nations advocated a development of long-term bond markets to meet infrastructure financing needs and channel resources from the private sector (United Nations [4]).

This study explored how the access to bond market affects financing in the real estate sector. We focused on Real Estate Investment Trusts (REITs), which are relatively small-sized and heavily rely on external financing. REITs are required to pay over 90% of their earnings as dividends to investors. With low earnings retention, REITs rely on external debt and new equity capital to finance investments (Gau and Wang [6]; Brown and Riddiough [7]; Ott, Riddiough and Yi [8]). Traditionally, REITs rely on bank loans to invest in real estate; and only a few REITs were able to issue bonds. REITs provide unique features and settings to study the importance of bond market in financing infrastructure and real estate.

This paper investigated whether access to the public debt market affects the corporate financing decisions of REITs, given that external debt is an important source of capital in real estate investment. Recent literature (e.g., Faulkender and Petersen [9]) in capital structure theory shows that apart from the traditional theories, e.g., trade-off theory, pecking order theory and market timing theory, which explain the capital structure decisions from the demand side of a firm, the supply of external capital and market frictions to obtaining external capital also determine corporate financing decisions (see summary in Graham and Leary [10]). For instance, Sufi [11] finds that obtaining bank loan ratings from Moody's or S&P reduces certification costs and allows the borrowers to access the public debt market and increase their debt financing. Following these studies, we investigated the impacts of the introduction of credit ratings from S&P or Moody's on REITs' capital structure decisions. Besides the lack of empirical study on how supply side factors affect the capital structure of REITs, focusing on a relatively homogeneous group of companies allowed us to use fewer independent variables in the empirical analysis, which would reduce the risk of model misspecification.

The introduction of credit ratings had a significant impact on the capital structure decisions of investors. Credit ratings provide valuable information on borrowers' credit quality and reduce information asymmetry in the credit market and certification costs of lenders (Faulkender and Petersen [9]; Sufi [11]; Tang [12]). Obtaining a credit rating from a nationally recognized statistical rating organization (NRSRO) such as S&P, Moody's, and Fitch allows firms to enter bond markets and facilitates bond issuance in the rated firms (Frost [13]). According to the U.S. Securities and Exchange Commission regulations, an issuer needs to obtain credit ratings from NRSROs before issuing bonds. Essentially, by allowing access to the public debt market, credit ratings have opened a new debt market to borrowers (Faulkender and Petersen [9]). Brown and Riddiough [7] found that the capital structure decisions are different between REITs that primarily use secured debt (banks and mortgages) and those that can issue public debt. They also found that REITs would not issue public debt if they could not access the public debt market, which might have been off limits to REITs without credit ratings. Yet the effect of credit ratings on REITs' capital structure has not been fully studied.

This study examined two questions related to the introduction of credit ratings and their impact on REITs' financing decisions. First, we explored whether after obtaining credit ratings, REITs would increase corporate leverage (quantity) and use more long term debt (maturity). Second, we further investigated the effect of credit rating on the substitution between equity financing/cash accumulations and debt financing. Overall, we aimed to understand how relaxation of constraints from access to the public debt markets though obtaining credit ratings can affect corporate financing decisions in REITs where there is no tax incentive for debt financing.

We adopted a difference-in-differences approach by examining the changes in the debt ratio, debt maturity, equity issuance, and cash holdings before and after the introduction of credit ratings in the REITs with credit ratings (treated observations) between 1980 and 2016 and compared them with those that have not obtained credit during the same observation period. There may be an endogeneity issue, since the decision to obtain a credit rating was not exogenous to the capital structure decisions. The factors that affect the decision to obtain rating might also affect capital structure. To address this issue, we used a propensity matching approach (Ashenfelter [14]; Rosenbaum and Rubin [15]; Abadie and Imbens [16]; Shen, Pretorius and Li [17]) by constructing a sample of matched pairs of treat and control observations with similar probability of obtaining credit rating.

The remainder of this paper is structured as follows. Section 2 presents the literature review and hypotheses. Section 3 describes research design and empirical data. The empirical results are presented in Section 4. The final section is the conclusion.

2. Literature Review and Hypotheses

Apart from the classic capital theories, e.g., tradeoff theory, pecking order theory, etc., recent studies argued that managers' preference for smooth payout affects corporate investment and financing decisions and capital supply affects corporate financing and investment decisions. Lambrecht and Myers [18,19] theoretically showed that managers smooth dividends payout to smooth their compensations and modify debt and investment policies to achieve the objective. The arguments were tested and confirmed in Hoang and Hoxha [20,21]. The availability of external capital as well as market friction also may affect a firm's investment and financing decisions. Faulkender and Petersen [9] found that firms with access to the public debt market, measured by the presence of credit rating, had leverage ratios that were 35% higher than those without credit ratings. This is because rating reduces the transaction cost of using debt capital due to information asymmetry and monitoring. Subsequent studies show that other means of reducing transaction cost of using debt financing such as bank loan ratings (Sufi [11]), credit rating format refinements (Tang [12]), and CDS contract trades (Saretto and Tooke [22]), also increase firms' usage of debt financing.

Previous studies (e.g., Faulkender and Petersen [9]) examined if a firm's credit rating determined its access to the public debt market. There are at least two roles that credit ratings play in the capital market. First, it provides credit quality information to market participants, which reduces the information asymmetry and information acquisition cost for lenders. Second, it facilitates the contracting of bond issues and decreases the certification costs to borrowers. Faulkender and Petersen [9] studied the differences in capital structure decisions between those firms with credit ratings and those without. Kisgen [23,24] found that the changes in credit rating level (i.e., downgrades) affected capital structure activities and the use of debt financing. A similar study by Li, Chow and Ong [25] confirmed that downgrading also influences the leverage ratio in REITs. These studies focused on the impacts of having credit ratings or changes to credit rating levels, but did not examine the effect of the introduction of credit ratings, especially in the context of REITs.

We developed four hypotheses related to the effects of the introduction of credit ratings on REITs' corporate financing decision. Following the arguments in the supply side's effect (e.g., Sufi [11]; Leary [26]; Lemmon and Roberts [27]), the introduction of credit ratings makes public debt capital accessible to REITs, and gives benefits to the borrowers (see the discussions in previous paragraphs). In a credit rating-capital structure framework, Kisgen [24] showed that similarly to the benefits and costs of debt (i.e., tax shield, financial distress cost and others) in traditional static tradeoff theory, the discrete cost (benefit) associated with the change in credit rating can affect the optimal capital structure decisions. For instance, if a firm has a credit rating near to downgrade, the optimal leverage ratio becomes smaller than that implied by tradeoff theory after considering the extra cost related to the possible downgrade. Following the credit rating-capital structure framework, the introduction of credit ratings on a firm gives extra benefits (e.g., reducing information asymmetry) and hence increases the optimal leverage ratio. The firm can raise the debt ratio after obtaining a credit rating because the cost of debt capital is reduced and the optimal debt ratio is higher than that before the rating. It is expected that the use of debt financing and leverage ratios would increase when REITs obtain credit ratings from major credit rating agencies such as S&P and Moody's. After the introduction of credit ratings, the firm may issue bonds to raise debt capital subsequently. The bond financing would change the use of debt capital. However, if the benefit of obtaining a credit rating is immaterial, the firm has the same optimal leverage ratio as before; and thus to maintain the optimal debt ratio, the firm may have to decrease other debt financings after issuing bonds. In other words, if an increase in the firm's leverage ratio in the long run is observed, the consequence should be attributed to the impact of the introduction of credit ratings instead of the bond issuance. The first hypothesis is given as:

Hypothesis 1 (H1). *REITs significantly increased their leverage ratios after the introduction of credit ratings.*

The introduction of credit ratings can also affect the debt maturity structure in REITs through different channels. First, the sources of debt capital may influence the choice of debt maturity. If a REIT can access the public debt market, it can choose to use longer term debt from bond issuance, which can match the nature of asset maturity in the real estate industry (Stohs and Mauer [28]). Second, the studies (e.g., Barclay and Smith [29]) argued that firms with more information asymmetry tend to use short term debt because the information cost on long term debt is large. Saretto and Tookes [22] found that a decrease in debt market friction not only affected the quantity of debt financing (higher leverage ratio), but also the longer debt maturity. A reduction in market friction and information asymmetry causes REITs to choose long debt maturity periods (Flannery [30]; Deng, Hu, and Srinivasan [31]). Following these studies, debt maturity is expected to increase after the introduction of credit ratings to REITs. The second hypothesis is given as follows:

Hypothesis 2 (H2). *REITs significantly increased the debt maturity periods after the introduction of credit ratings.*

The third and fourth hypotheses concerned the substitutions between debt financing and capital in other forms (Leary [26]; Erel, Julio, Kim, and Weisbach [32]). If a firm faces constraints in the debt market, it may have to rely on equity financing (Faulkender and Peterson [9]). When the external debt capital is available, firms may choose to use less equity financing because the equity capital is costly (Tang [12]; Leary [26]). In the REIT market, Ott, Riddiough and Yi [8] found that the growth and firm-level investment are primarily financed by equity and long term debt. The access to the public debt market increases the availability of debt financing and leads to substitute debt for equity. The third hypothesis is:

Hypothesis 3 (H3). *REITs significantly reduced their equity financing after the introduction of credit ratings.*

The last hypothesis investigated the impacts of the access to the public debt market on cash holdings. The literature of cash holdings (i.e., Opler et al. [33]) indicated that firms have two major motives to hold cash: transaction cost motive and precautionary motive. Holding liquid assets saves the transaction cost to liquidate real assets or raise external funds. Information asymmetry increases the costs of outside capital and limits the access to the capital market. Opler et al. [33] found that firms with credit ratings hold less cash because they can access the public debt market. Almeida, Campello, and Weisbach [34] found that firms with restricted access to capital markets accumulate more cash, so as to capture potential investment opportunities. Hardin et al. [35] showed that REITs with lines of credit have fewer cash holdings than those without, which indicates the availability of external capital affect the cash holdings decision. Given that the introduction of credit ratings opens the public market and reduces information asymmetry, it is expected that with access to the public debt market, REITs can use more debt capital and hold less cash. The fourth hypothesis is:

Hypothesis 4 (H4). *REITs significantly reduced their cash holdings after the introduction of credit ratings.*

3. Materials and Methods

The listed U.S. REITs were identified by SIC Code 6798 from Compustat. The annual firm data for these REITs were obtained for the period 1980 to 2016. The REIT and property types were gathered from the CRSP/Ziman real estate database (Glascock and Lu-Andrews [36]; Ling and Naranjo [37]; Shen [38]; Shen, Hui and Fan [39]; Shen, Hui

and Fan [40]). The sample contained 523 REITs in total including 391 equity, 98 mortgage, and 34 hybrid REITs. The property categories were healthcare, industrial/office, lodging/resorts, residential, retail, self-storage, mortgage, mortgage-backed securities, diversified, and unclassified.

The credit rating data were derived from the Compustat Ratings and Moody's databases. The Compustat Ratings database provides monthly updates on S&P long term issuers' credit ratings, subordinated debt ratings, and short term issuer credit ratings. Following previous studies (e.g., Faulkender and Petersen [9]), the long term issuer ratings were used as a proxy for access to the public debt market. Moody's credit ratings on the REITs were collected from Moody's Default and Recovery Database. The ratings data were matched with the REIT samples in this study, which identified the first rating months/dates and rating levels for those REITs that were rated during the sample period. If a REIT was rated by both S&P and Moody's, the earlier rating was used. Among all REITs in the sample, 123 received their initial credit ratings, 50 had been rated all the time, and 360 did not have credit ratings. Figure 1 shows the number of REITs that received credit ratings for the first time in each year from 1980 to 2016. The credit rating introductions were concentrated in the 1990s. Figure 2 shows the distribution of rating levels for the initial REIT ratings. Similar to the findings by Brown and Riddiough [7], the first ratings clustered around the minimum investment grade of BBB− and 69.91% of the ratings graded between BBB− and BBB+. Note that 30 REITs obtained initial ratings that were below BBB−.

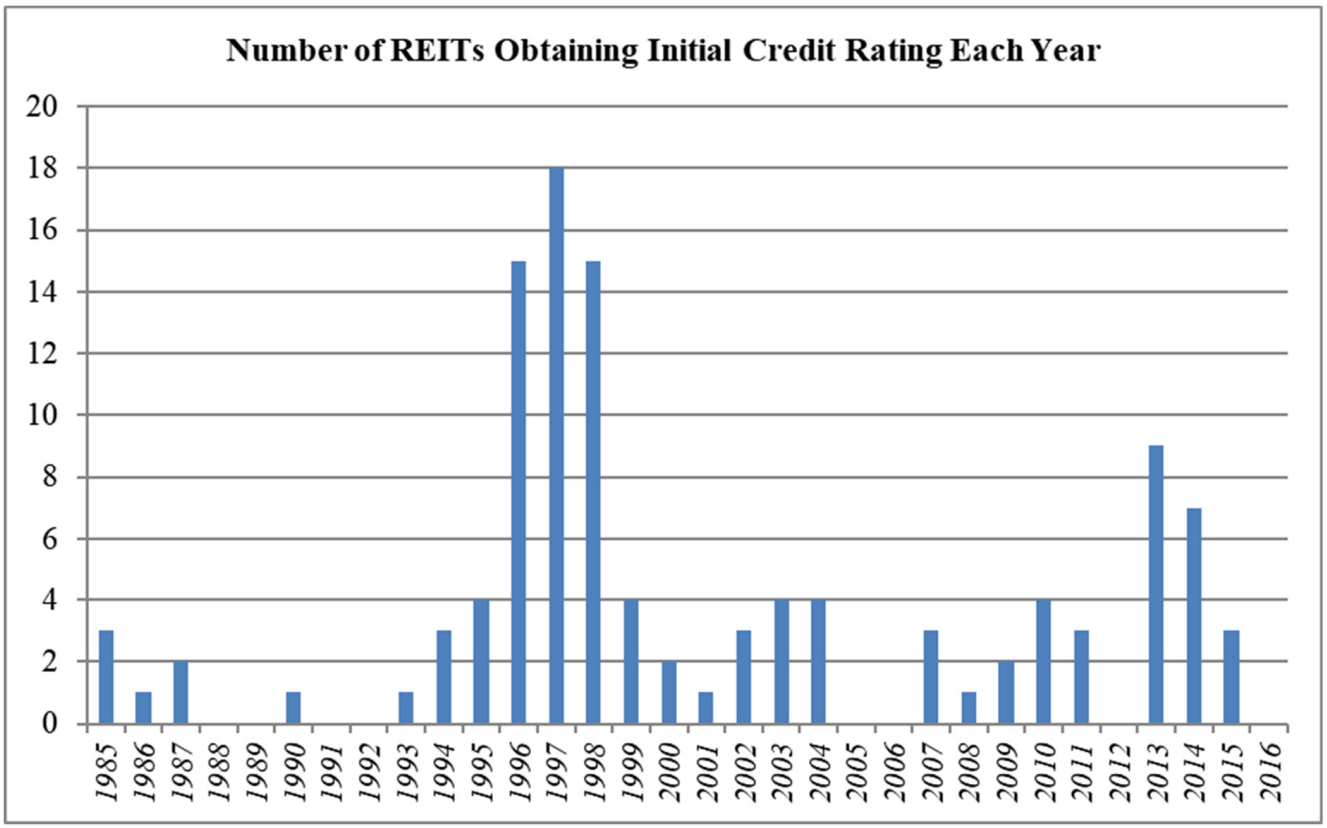

Figure 1. Distributions of REITs Obtaining Initial Credit Rating by Year.

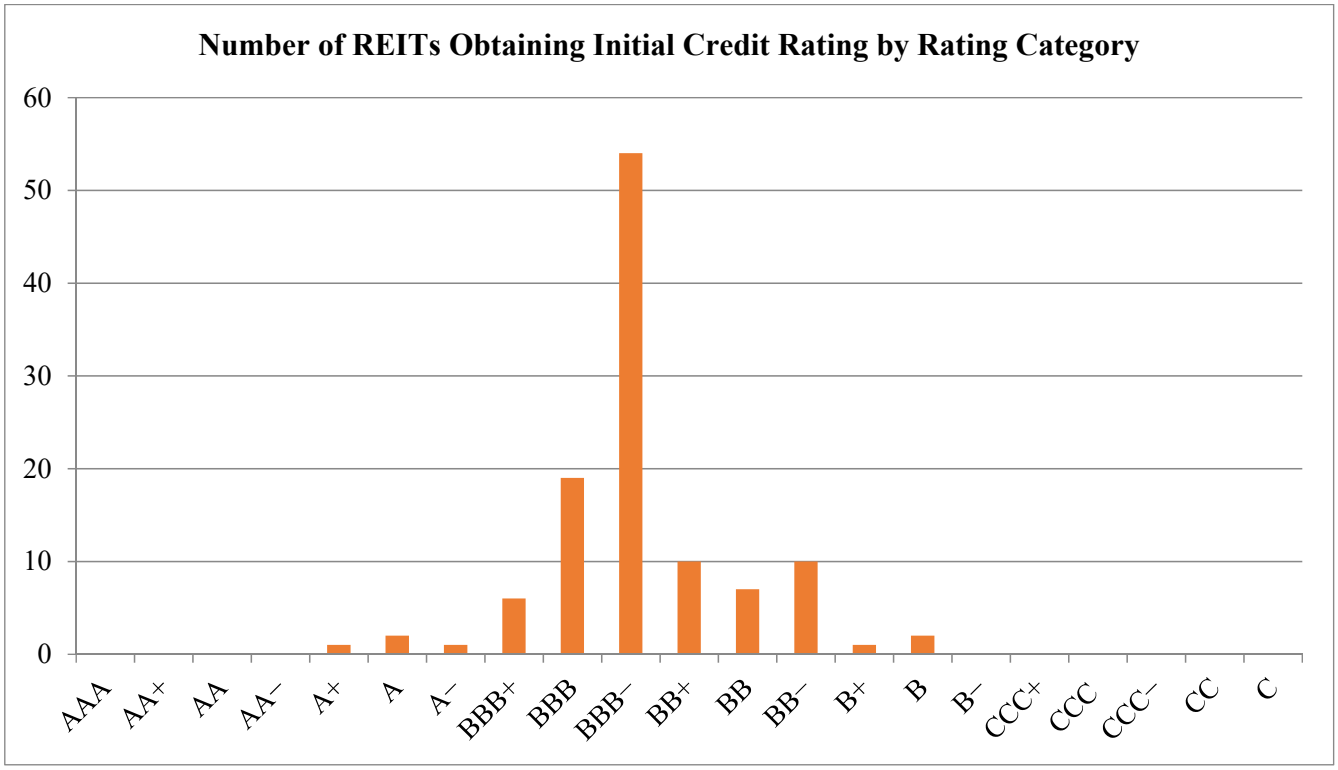

Figure 2. Distributions of REITs Obtaining Initial Credit Rating by Rating Category.

The dependent variables in this study are the leverage ratio (LEVERAGE), debt maturity (MATURITY), equity financing (EQUITY), and cash holdings (CASH). LEVERAGE is the total book debt over total assets (Sufi [11]; Frank and Goyal [41]). The results of this study remained robust if the market leverage ratio is used (Wojewodzki, Poon and Shen [42]). Debt maturity is the ratio of long term debt (debt due in more than three years) to total debt (Barclay, Marx and Smith [43]; Alcock and Steiner [44]). Equity financing is measured by the net equity issuance, which is the sale of common and preferred stocks minus the stock purchases scaled by the total assets in the previous year (Kisgen [24]; Tang [12]; Li, Chow and Ong [25]). Cash holdings are measured by the amount of cash and cash equivalents divided by total assets (Hardin et al. [35]). The key independent variable is the introduction of credit ratings (INTRO), which is a dummy variable equal to 1 for a REIT in the years after the first rating by S&P or Moody's. The variable measures the changes in corporate financing decisions before and after the introduction of credit ratings. The variable RATED is an indicator variable equal to 1 if a REIT had a credit rating during the sample period (Ashcraft and Santos [45]; Saretto and Tookes [22]). This variable captures the differences in time-invariant unobservable characteristics between REITs with credit ratings and those without.

Following the empirical capital structure literature (Frank and Goyal [41]), we constructed several control variables to measure the demand side factors including market-to-book ratio, cash flow, profitability ratio, asset tangibility, firm size, and firm age. Market-to-book ratio (MTB) is the market value of a firm divided by its book value. Cash flow (CF) is the sum of net income and depreciation scaled by lagged total assets. Profitability ratio (PROFIT) is the EBITDA to total assets. Asset tangibility (PPE) is the ratio of fixed assets (net property, plants, and equipment) to total assets. Firm age (LNAGE) is the natural logarithm of one plus the years since the IPO. All firm level variables except the dummy variables were winsorized at 1% and 99%. The effects of the introduction of credit ratings are investigated using the following models:

$$LEVERAGE_{i,t} = \alpha_0 + \alpha_1 INTRO_{i,t} + \alpha_2 MTB_{i,t-1} + \alpha_3 CF_{i,t-1} + \alpha_4 PROFIT_{i,t-1} + \alpha_4 PPE_{i,t-1} + \alpha_6 LNAGE_{i,t-1} + Firm\ F.E. + Year\ F.E. + \varepsilon_{i,t} \quad (1)$$

$$MATURITY_{i,t} = \beta_0 + \beta_1 INTRO_{i,t} + \beta_2 LEVERAGE_{i,t-1} + \beta_3 MTB_{i,t-1} + \beta_4 CF_{i,t-1} + \beta_5 PROFIT_{i,t-1} + \beta_6 PPE_{i,t-1} + \beta_7 LNAGE_{i,t-1} + + Firm\ F.E. + Year\ F.E. + \varepsilon_{i,t} \quad (2)$$

$$EQUITY_{i,t} = \beta_0 + \beta_1 INTRO_{i,t} + \beta_2 LEVERAGE_{i,t-1} + \beta_3 MTB_{i,t-1} + \beta_4 CF_{i,t-1} + \beta_5 PROFIT_{i,t-1} + \beta_6 PPE_{i,t-1} + \beta_7 LNAGE_{i,t-1} + + Firm\ F.E. + Year\ F.E. + \varepsilon_{i,t} \quad (3)$$

$$CASH_{i,t} = \beta_0 + \beta_1 INTRO_{i,t} + \beta_2 LEVERAGE_{i,t-1} + \beta_3 MTB_{i,t-1} + \beta_4 CF_{i,t-1} + \beta_5 PROFIT_{i,t-1} + \beta_6 PPE_{i,t-1} + \beta_7 LNAGE_{i,t-1} + Firm\ F.E. + Year\ F.E. + \varepsilon_{i,t} \quad (4)$$

Equation (1) estimated the effects of the introduction of credit ratings on leverage ratios. Equations (2)–(4) were used to estimate the effect of credit rating on debt maturity, equity financing, and cash holdings. The lagged leverage ratio was included in the models because it affects corporate decisions (Kisgen [24]; Hardin et al. [35]; Saretto and Tookes [22]). The firm fixed effect was included in the models to control for the time-invariant omitted variables, following Sufi [11]. The variable RATED is subsumed in the firm fixed effect models. The year fixed effect is also included to control for the time-variant factors such as the state of the overall REIT market. We had included firm age because firm age is strongly correlated with corporate financing decisions (Frank and Goyal [41]).

One potential problem in the models above is that credit ratings were not randomly assigned to REITs and, thus, the introduction of credit ratings was not exogenous to capital structure decisions. REITs with relatively strong credit worthiness may choose to obtain credit ratings (Brown and Riddiough [7]). Firm characteristics such as size and leverage are also related to decisions to obtain credit ratings. Thus, the factors that affect credit rating decisions may also determine the outcomes of subsequent corporate financing decisions. To mitigate the endogeneity issue, we adopted a matching approach (Lemmon and Roberts [27]; Ashcraft and Santos [45]; Saretto and Tookes [22]; Kahle and Stulz [46]) to ensure that REITs in the control group (those that never had credit ratings) to have similar covariates to those in the treated group.

The propensity score was estimated and used in the matching procedure (Ashenfelter [14]; Rosenbaum and Rubin [15]; Abadie and Imbens [16]; Shen, Pretorius and Li [17]). We first ran a logistic regression model to predict the probability of a REIT to obtain a credit rating. The independent variables are LNTA (the natural logarithm of the total assets), PROFIT, LEVERAGE, interest coverage (INTCOV) and the ratio of short term debt to total debt (STDTD) over the previous year. The firm size, profitability ratio, and leverage ratio were defined above. Interest coverage is the EBITDA to interest expense (Harrison, Panasian, and Seiler [47]). The ratio of short term debt to total debt is the portion of the debt due in one year out of the total debt. These independent variables were chosen because they are used by credit rating agencies to assess the credit worthiness of REITs. Based on the propensity score, for each rated REIT, we chose one nonrated REIT from the control group with the closest score in the same year to form a matched pair sample for empirical analysis. There were altogether 123 matched pairs in our sample. Table A1 showed the differences of the covariates between treated REITs and matched REITs, which were not significant before the introduction of credit ratings. The parallel trend assumption was satisfied in the matching procedure. We then conducted a difference-in-difference analysis to compare the changes in the capital structure of treated REITs and matched REITs around the time credit ratings were introduced using Equations (1) and (2).

In summary, there were two data samples in this study. The full sample contained all firm-year observations of REITs including those that never had credit ratings, obtained their initial credit ratings, and always had credit ratings throughout the sample period. The second sample was the matched sample, which consisted of the observations of treated REITs (those that obtained their first credit ratings) and their matched REITs five years before and after the introduction of credit ratings (Sufi [11]; Saretto and Tookes [22]). The

results did not essentially change if the matched sample covered the three-year period before and after the introduction of credit ratings.

In the robustness tests, we also applied another matching method, namely the entropy balancing approach, following Hainmueller [48] and Peng, Shen, Fung, Hui and Fan [49]. One limitation of the propensity score matching approach is that the sample size is reduced substantially after the matching. The matching by the entropy approach was conducted by assigning weights to the unrated REITs on a continuous scale and achieving almost identical covariate balance between rated REITs and weighted unrated REITs. This matching process preserved the full sample. A difference-in-differences model was employed to test the hypotheses based on the treated group and reweighted control group (Hainmueller [48]).

4. Empirical Results

4.1. Summary Statistics

Table 1 reports the descriptive statistics for the full sample of this paper. LEVERAGE is the book leverage ratio measured as total debts over total assets. MATURITY is the debt maturity calculated as long term debt over total debt. EQUITY is the net equity issuance, which is the sale of common and preferred stocks minus the purchases of the stocks scaled by the lagged total assets. CASH is the cash holdings measured as cash and cash equivalents divided by total assets. INTRO is a dummy variable equal to 1 for a REIT in the years after the first rating by S&P or Moody's. RATED is a dummy variable equal to 1 if a REIT has maintained a credit rating throughout the sample period. MTB is the market-to-book ratio, which was calculated by dividing the market value of a REIT by its book value. Cash flow (CF) is the sum of net income and depreciation scaled by lagged total assets. Profitability ratio (PROFIT) is the EBITDA to total assets. Asset tangibility (PPE) is the ratio of fixed assets (net property, plants, and equipment) to total assets. TA is total assets adjusted by CPI. LNTA is the natural logarithm of TA (adjusted by CPI). AGE is the number of years since the IPO. LNAGE is the natural logarithm of one plus the years since the IPO. The average book leverage ratio was 48%, which was similar to the debt ratio found in Harrison, Panasian and Seiler [47] and Alcock and Steiner [44]. On average, 66% of REIT total debt is long term debt due in after three years. The net equity financing is 9% and cash holdings are 5% of total assets, respectively. The statistics of the control variables were also reported.

Table 1. Summary Statistics.

Variable	Observation	Mean	Std. Dev.	Min	Max
LEVERAGE	6488	0.48	0.25	0	1
MATURITY	6003	0.66	0.31	0	1
EQUITY	5967	0.09	0.28	−0.08	2.05
CASH	6479	0.05	0.10	0	0.65
INTRO	6774	0.19	0.39	0	1
RATED	6774	0.45	0.50	0	1
MTB	5712	1.14	0.39	0.35	2.62
CF	5967	0.03	0.06	−0.20	0.26
PROFIT	6488	0.06	0.05	−0.13	0.19
PPE	6774	0.44	0.23	0.00	0.96
TA	6489	2341.09	6063.68	0	133,452.30
LNTA	6488	6.24	1.82	1.14	9.82
AGE	6774	11.10	10.41	0	66
LNAGE	6774	2.10	0.97	0	4.20

Table 2 presents the summary statistics for three groups: REITs that never had credit ratings, REITs that obtained credit ratings (including the periods before and after the introduction of credit ratings), and REITs that always had credit ratings throughout the sample period. The numbers of REITs in three groups are 360, 113, and 50, respectively. On average, the leverage and debt maturity ratios for the REITs that obtained or already

had credit ratings were higher than the ratios of those that never had credit ratings. In contrast, the cash holdings ratios were much lower in the groups with credit ratings. The net equity financing ratios were similar in those REITs that always or never had credit ratings. Consistent with the findings by Hardin and Wu [50], those REITs with credit ratings were larger and older than those without. The growth opportunity, measured by the market-to-book value, also differed among the groups.

Table 2. The Comparisons across REITs with and without Credit Ratings.

	REITs	**REITs**	**REITs**
	Without Ratings	**Obtaining Ratings**	**With Ratings**
LEVERAGE	0.47	0.48	0.49
MATURITY	0.61	0.71	0.76
EQUITY	0.09	0.10	0.09
CASH	0.07	0.04	0.03
LNTA	5.47	7.06	7.39
LNAGE	1.90	2.34	2.31
MTB	1.04	1.24	1.29

Table 3 reports the changes in the capital structure before and after the introduction of credit ratings in treated REITs. Panel A shows the average value of corporate financing outcomes before and after the introduction of credit ratings to the whole sample period. After the introduction of credit ratings, the average leverage ratio increased from 45.25% to 50.48%. This implied that the introduction of credit ratings led to a significant increase of around 10% in the book leverage ratio (and an increase of 5.23% in the mean leverage ratio of 48%). The debt maturity ratio increased by 2.39%, which was also statistically significant. The decrease in equity financing after the introduction of credit ratings was as high as 14.95%. The net equity issuance was only 4.36% of total assets after the introduction, which was significantly less than before the introduction (19.31%) or the average ratio in the sample (9%). The ratio of cash holdings also significantly decreased after the REITs obtained credit ratings for the first time. Panel B reports the results for the five-year period before and after the introduction of credit ratings. The changes in the leverage ratio, debt maturity, equity financing, and cash holdings were significant during this time. In summary, Table 3 gives preliminary evidence of the effects of the introduction of credit ratings.

Table 3. Corporate Financing Decisions before and after the Introduction of Credit Ratings.

Panel A: All Periods				
	Pre	Post	Post–Pre	t-statistics
Book leverage	45.25%	50.48%	5.23%	5.88
Debt maturity	69.81%	72.20%	2.39%	2.18
Equity issuance	19.31%	4.36%	−14.95%	12.31
Cash holdings	6.13%	3.08%	−3.05%	8.51
Panel B: Periods around the Introduction of Credit Ratings				
	Pre	Post	Post–Pre	t-statistics
Book leverage	45.60%	49.81%	4.45%	2.72
Debt maturity	68.60%	73.99%	5.39%	3.59
Equity issuance	21.88%	5.74%	−16.13%	8.66
Cash holdings	4.93%	2.55%	−2.37%	5.30

4.2. The Effects of the Introduction of Credit Ratings on Leverage and Debt Maturity

Table 4 reports the results of the effects of obtaining credit ratings on the leverage ratio using Equation (1) over the period 1980–2016. The dependent variable is the book leverage ratio, which is the ratio of total debts to total assets. The key independent variable, INTRO,

is a dummy variable that equals 1 for a REIT in the years after the first rating by S&P or Moody's. The full sample contains firm-year observations of all REITs for the sample period between 1980 and 2016. The matched sample only consists of the observations of the treated REITs (those that obtained credit ratings) and their matched REITs (those that never had credit ratings) five years before and after the introduction of credit ratings. Columns (1) and (2) present the results of the full sample and Columns (3) and (4) present those of the matched sample. The firm fixed effect was included in each regression (Sufi [11]). The year fixed effect was included in Columns (2) and (4). The coefficients were estimated by the robust standard errors. The robust standard errors are presented in parentheses.

Table 4. The Effects of Obtaining Credit Ratings on the Leverage Ratio.

	Full Sample		**Matched Sample**	
	(1)	**(2)**	**(3)**	**(4)**
INTRO	0.0269 ***	0.0203 **	0.0216 **	0.0220 **
	(0.0097)	(0.0098)	(0.0095)	(0.0098)
MTB	0.0128	0.0239 **	−0.0402 ***	−0.0401 **
	(0.0092)	(0.0104)	(0.0150)	(0.0187)
CF	−0.8460 ***	−0.8584 ***	−0.8227 ***	−0.8058 ***
	(0.0866)	(0.0865)	(0.1303)	(0.1392)
PROFIT	0.4975 ***	0.4269 ***	0.5111 ***	0.6052 ***
	(0.1185)	(0.1242)	(0.1748)	(0.2018)
PPE	0.0010	0.0478 *	−0.0798 **	−0.0443
	(0.0235)	(0.0254)	(0.0319)	(0.0331)
LNAGE	0.0502 ***	0.0297 ***	0.0267 **	−0.0314
	(0.0060)	(0.0094)	(0.0109)	(0.0192)
Constant	0.3501 ***	0.4341 ***	0.4943 ***	0.3409 ***
	(0.0223)	(0.0477)	(0.0357)	(0.0594)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	Yes	No	Yes
N of observations	4985	4985	1492	1492
R-squared	0.6441	0.6530	0.6639	0.6701

*** 1%, ** 5% and * 10%.

The results indicated that the coefficients of INTRO were positive and significant in all the regressions. The coefficients can be interpreted as changes in the leverage ratio before and after the introduction of credit ratings for those REITs that obtained credit ratings (Sufi [11]; Saretto and Tookes [22]). The coefficients were also economically significant. The leverage ratios increased by 2.03% in the full sample and 2.20% in the matched sample after controlling for other characteristics and firm/year fixed effects. The magnitudes were smaller than the estimation of 5.23% in Table 3, as the inclusion of the fixed effect reduced the coefficient magnitudes (Lemmon, Roberts, and Zender [51]). The first hypothesis was confirmed by the findings. Our results indicate that in addition to the changes in credit rating level (Kisgen [23,24]; Li, Chow, and Ong [25]), the introduction of credit ratings can also affect capital structure in REITs. The findings are also broadly consistent with the literature of the supply side argument in capital structure theory (e.g., Faulkender and Petersen [9]; Sufi [11]) that external capital supply affects corporate financing and investment decisions.

The coefficients of the control variables in the full sample were consistent with the capital structure literature. REITs with high growth opportunity (MTB) are associated with higher leverage (Feng, Ghosh and Sirmans [52]). If more internal cash flow is available, REITs can choose to take on less debt. The coefficient of the profitability ratio was significantly positive, which was consistent with the agency cost theory according to Jensen [53], who wrote that profitable firms increase leverage to mitigate the free cash flow problem. Those REITs with more asset tangibility and longer existences had more debt (Frank and Goyal [41]). The coefficients of growth opportunity turned negative in the matched sample when only 113 treated REITs and their matched REITs were included in the regressions.

Table 5 reports the effect the introduction of credit ratings had on debt maturity using Equation (2) over the period 1980–2016. The dependent variable is the debt maturity ratio, which is the portion of long term debts to total debts. The key independent variable, INTRO, is a dummy variable equal to 1 for a REIT during the years after the first rating by S&P or Moody's. The firm fixed effect was included in all regressions. Columns (2) and (4) include both firm and year fixed effects. The full sample contains firm-year observations of all REITs for the 1980–2016 sample period. The matched sample only consists of the observations of the treated REITs (those that obtained credit ratings) and their matched REITs (those that never had credit ratings) five years before and after the introduction of credit ratings. The robust standard errors are presented in parentheses.

Table 5. The Effects of Obtaining Credit Ratings on Debt Maturity.

	Full Sample		**Matched Sample**	
	(1)	**(2)**	**(3)**	**(4)**
INTRO	0.0368 **	0.0365 **	0.0674 ***	0.0618 ***
	(0.0153)	(0.0154)	(0.0179)	(0.0183)
LEVERAGE	0.0376	0.0470 *	0.1199 **	0.2218 ***
	(0.0276)	(0.0279)	(0.0532)	(0.0540)
MTB	0.0126	0.0052	0.0471 *	0.0248
	(0.0150)	(0.0158)	(0.0278)	(0.0304)
CF	−0.0609	−0.0607	0.4510 **	0.5699 ***
	(0.1045)	(0.1054)	(0.1973)	(0.2006)
PROFIT	0.5174 ***	0.4010 ***	0.2046	0.2789
	(0.1368)	(0.1423)	(0.2705)	(0.2830)
PPE	−0.0151	−0.0101	−0.2054 ***	−0.1529 **
	(0.0318)	(0.0343)	(0.0618)	(0.0671)
LNAGE	−0.0252 ***	0.0023	−0.0528 ***	−0.0437
	(0.0084)	(0.0136)	(0.0181)	(0.0300)
Constant	0.6674 ***	0.5399 ***	0.7397 ***	0.8636 ***
	(0.0351)	(0.0790)	(0.0727)	(0.2247)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	Yes	No	Yes
N of firms	474	474	178	178
N of observations	4720	4720	1470	1470
R-squared	0.4735	0.4845	0.4610	0.4991

*** 1%, ** 5% and * 10%.

The coefficients of INTRO are positive and significant in all four regressions with full and matched samples, which support the second hypothesis. The ratio of long term debt to total debt increases by 3.65% and 6.18% in Columns (2) and (4), respectively. These results indicate that the introduction of credit ratings affected both the quantity and maturity of the available debt capital, which is consistent with the findings by Saretto and Tookes [22]. Saretto and Tookes [22] showed that the introduction of credit default swap increases debt maturity; and while our study found that the introduction of credit ratings also lengthens debt maturity. The reduction in the market fraction by the introduction of credit ratings resulted in a greater reliance on long term debt (Barclay and Smith [29]; Flannery [30]). Brown and Riddiough [7] found that the improved credit ratings in REITs increased debt maturity. Our findings suggest that the REITs' initial credit ratings also allowed them to take on longer maturity debt.

The coefficients of lagged leverage are generally positive in the models. The coefficients on the cash flow ratio are insignificant in the models by full sample and significantly positive in the regressions from matched sample. The coefficients on profitability are generally positive but only significant in the full sample, indicating that REITs with higher profitability can use debt with longer maturity. The coefficients on fixed asset ratio are generally negative but only significant in the matched sample. The differences of the

significances of coefficients between models from the full sample and matched sample are caused by the sizes of the two samples.

Overall, these empirical results confirmed the first and second hypotheses of this paper. The introduction of credit ratings has had a real effect on the capital structure decisions of REITs. Those REITs that obtained credit ratings significantly increased their reliance on debt and the maturity of their debt. Such changes remain significant for the sample were restricted to the treated REITs and their matched REITs five years before and after the credit rating introductions. We found strong evidence which suggests that access to the public debt market affects a REIT's capital structure. These findings are new to the REIT capital structure literature as existing studies, e.g., Brown and Riddiough [7] and Li, Chow, and Ong [25], only explored the impacts of credit rating level on financing policies in the REITs.

4.3. The Effects of the Introduction of Credit Ratings on Equity Financing and Cash Holdings

We continued to investigate the effects of obtaining credit ratings by examining the substitutions between the debt financing and capital in other REIT forms. Leary [26] found that after shocks hit the external credit supply, firms with capital constraints substitute debt financing with internal fund and equity issuance. Yet, Lemmon and Roberts [27] showed that the substitutions between credit and alternative sources of capital were limited after the reductions in the external credit supply. It is worth exploring the substitutions for different sources of capital in REITs when they are able to raise capital from new markets and may rely less on existing capital financing source and internal funds (Gupta [54]).

Table 6 reports the effect of obtaining credit ratings on the equity financing using Equation (3) over the period 1980–2016. The dependent variable is the net equity issuance, which is the sale of common and preferred stocks minus the purchases of the stocks, scaled by lagged total assets. The key independent variable, INTRO, is a dummy variable equal to one for a REIT in the years after the first rating by S&P or Moody's. The control variables include LEVERAGE, MTB, CF, PROFIT, PPE, and LNAGE. The coefficients of INTRO are negative and significant. The firm fixed effect was included in all regressions. Columns (2) and (4) include both firm and year fixed effects. The full sample contains firm-year observations of all REITs during the 1980–2016 sample period. The matched sample only consists of the observations of the treated REITs (those that obtained credit ratings) and their matched REITs (those that never had credit ratings) five years before and after the introduction of credit ratings. The robust standard errors are presented in parentheses.

The coefficients of INTRO are all negative and highly significant in the regressions. Columns (2) and (4) show that the decreases in net equity issuance are 5.72% and 5.42% of the lagged total assets after the REITs obtained credit ratings in the full and matched samples, respectively. The magnitudes are economically significant. These results imply that the introduction of credit ratings resulted in reduced equity financing of over 50% (from a mean of 10%). The results are consistent with the findings by Tang [12], who concluded that after credit ratings were refined, better credit market access led to more debt and less equity issuance. Boudry, Kallberg, and Liu [55] found that the equity issuance of REITs could be explained by the market timing theory, which argues that REITs choose to issue equity when equity prices increase. Our findings indicate that in addition to the demand side factors, the supply side factors and access to the public debt market also influence REITs' equity issuance decisions. The third hypothesis was confirmed by the results.

Table 7 presents the effect of the introduction of credit ratings on cash holdings using Equation (4) over the period 1980–2016. The dependent variable is the cash holdings measured by the cash and cash equivalents divided by total assets. The key independent variable, INTRO, is a dummy variable equal to one for a REIT in the years after the first rating by S&P or Moody's. The control variables include LEVERAGE, MTB, CF, PROFIT, PPE, and LNAGE. The firm fixed effect was included in all regressions. Columns (2) and (4) include both firm and year fixed effects. The full sample contains firm-year observations of all REITs during the 1980–2016 sample period. The matched sample only consists of the observations of the treated REITs (those that obtained credit ratings) and their matched

REITs (those that never had credit ratings) five years before and after the introduction of credit ratings. The robust standard errors are presented in parentheses.

Table 6. The Effects of Obtaining Credit Ratings on Equity Issuance.

	Full Sample		Matched Sample	
	(1)	(2)	(3)	(4)
INTRO	−0.0594 ***	−0.0572 ***	−0.0445 **	−0.0542 ***
	(0.0154)	(0.0149)	(0.0182)	(0.0193)
LEVERAGE	0.0056	0.0139	0.0261	0.0563
	(0.0253)	(0.0252)	(0.0565)	(0.0570)
MTB	0.1156 ***	0.1061 ***	0.1874 ***	0.1408 ***
	(0.0187)	(0.0204)	(0.0376)	(0.0399)
CF	0.0198	0.0442	0.0869	0.1740
	(0.1097)	(0.1091)	(0.2418)	(0.2471)
PROFIT	−0.3091 ***	−0.1677	−0.7264 ***	−0.5317 **
	(0.1156)	(0.1206)	(0.2420)	(0.2563)
PPE	0.0674 **	0.0391	0.2344 ***	0.1980 ***
	(0.0323)	(0.0355)	(0.0660)	(0.0632)
LNAGE	−0.0412 ***	−0.0651 ***	−0.0585 ***	−0.0581 *
	(0.0069)	(0.0111)	(0.0148)	(0.0336)
Constant	0.0247	0.0061	−0.0545	−0.1016
	(0.0312)	(0.0332)	(0.0774)	(0.0973)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	Yes	No	Yes
N of observations	4993	4720	1495	1495
R-squared	0.1814	0.2309	0.2103	0.2632

*** 1%, ** 5% and * 10%.

Table 7. The Effects of Obtaining Credit Ratings on Cash Holdings.

	Full Sample		Matched Sample	
	(1)	(2)	(3)	(4)
INTRO	−0.0336 ***	−0.0305 ***	−0.0117 **	−0.0020
	(0.0051)	(0.0050)	(0.0051)	(0.0051)
LEVERAGE	−0.0950 ***	−0.0988 ***	−0.0613 ***	−0.0861 ***
	(0.0136)	(0.0137)	(0.0232)	(0.0247)
MTB	0.0040	0.0081	−0.0046	−0.0097
	(0.0068)	(0.0073)	(0.0125)	(0.0132)
CF	0.0569	0.0573	−0.0258	−0.0236
	(0.0560)	(0.0576)	(0.0685)	(0.0711)
PROFIT	−0.1358 *	−0.1771 **	0.2112 *	0.0881
	(0.0773)	(0.0824)	(0.1207)	(0.1268)
PPE	−0.0167	−0.0111	−0.0273	−0.0676 ***
	(0.0113)	(0.0123)	(0.0183)	(0.0187)
LNAGE	0.0026	0.0134 ***	−0.0137 **	0.0189 *
	(0.0031)	(0.0051)	(0.0054)	(0.0112)
Constant	0.1033 ***	0.0682 *	0.1032 ***	0.2712 ***
	(0.0136)	(0.0366)	(0.0318)	(0.0410)
Firm fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	Yes	No	Yes
N of observations	4982	4982	1491	1491
R-squared	0.3670	0.3803	0.3784	0.4607

*** 1%, ** 5% and * 10%.

The coefficients of INTRO are all negative and significant except those in Column (4). The results indicate that after obtaining credit ratings, REITs accumulated less cash, as external public debt financing was available. Such results are consistent with the findings by Almeida, Campello, and Weisbach [34] and Tang [12], who stressed that access to the

capital market affects firms' decisions on whether or not to hold more cash. In the REIT literature, Hardin et al. [35] found that REITs with credit line access had fewer cash holdings because their use of private bank debt reduced information asymmetry and removed the restrictions on raising funds through capital markets. Our results provide similar evidence of the impact of access to the public debt market on REITs' cash holdings.

In summary, the empirical results in this section confirmed the third and fourth hypothesis of this study. Once REITs obtained credit ratings, they used more debt financing, issued less equity, and accumulated less cash. These findings are consistent with previous studies in the REIT literature that credit rating can affect financing decisions in the REITs (Li, Chow, and Ong [25]) and REITs may use less internal funds when external capital is available (Hardin et al. [35]; Gupta [54]). This study is the first to explore the effect of the introduction of credit ratings in the REIT literature.

5. Further Discussion and Robustness Tests

In this paper, we assessed the impacts of obtaining credit ratings on corporate financing decisions of REITs. The paper focuses on the changes in the corporate financing decisions of a REIT before and after the introduction of credit ratings, which is different from previous papers on the factors that determines whether a REIT has credit rating (Faulkender and Petersen [9]) or changes in the rating level of a rated REIT (Kisgen [24]). Since REITs heavily rely on external financing, it is important to understand the impacts of the introduction of credit ratings and access to new capital markets on their financing decisions. The results indicated that access to the public debt market not only expands the debt capacity in REITs, but also affects their equity financing and cash holding decisions. The positive impacts of obtaining a credit rating on the leverage ratio can be explained by credit rating-capital structure hypothesis (Kisgen [24]) that the rating-related benefits increase optimal leverage ratio implied by the static tradeoff theory. REITs sharply decreased their equity issues after obtaining credit ratings. To some extent, this finding is consistent with the prediction in the pecking order theory, which states that firms prefer debt over equity issues.

The effects of access to capital markets have been studied in the REIT literature. Hardin et al. [35] found a negative relationship between cash holdings and credit line access. In this paper, we found similar results of access to the public debt market. Harrison, Panasian, and Seiler [47] showed that the coefficient of the rating dummy (if a REIT has an S&P issuer rating) was significantly negative in the regression of leverage on its determinants. Their finding contradicted those of Faulkender and Petersen [9] and our results. Table 2 shows that on average, those REITs with credit ratings had higher leverage than those without. We notice that Harrison, Panasian, and Seiler [47] have included the total assets and credit ratings dummies in their regressions. These two variables are highly-correlated as total assets are an important determinant of whether or not a REIT has a credit rating. Leary [26] directly uses firm size to measure bond market access and obtained different results. Therefore, a negative correlation between leverage and the credit rating dummies found in Harrison, Panasian, and Seiler [47] could be caused by the presence of both total assets and rating dummies in the regressions.

The main argument in this study is that after obtaining credit ratings, information asymmetry was reduced in the REITs market. This is because extra information of credit quality can be revealed via credit ratings (Sufi [11]; Tang [12]). The information is valuable to market participants, even though REITs are relatively transparent (Tidwell, Ziobrowski, Gallimore and Ro [56]). We examined whether information asymmetry was reduced after the introduction of credit ratings in the rated REITs and presented the results in Table 8. Four measures of information asymmetry were constructed, including bid-ask spread, zero-return days, idiosyncratic volatility and illiquidity. Bid-ask spread is calculated by the average ratio of the difference of daily ask price and daily bid price over the mid-price in a REIT in a year (Bonsall, Koharki and Neamtiu [57]). The percentage of zero-return days is the ratio of the number of days with zero return over total trading days in a REIT in a year (Lesmond, Ogden and Trzcinka [58]). Idiosyncratic volatility is the standard deviation of

residuals from the Fama-French three-factor model based on daily stock returns in a REIT in a year (Li, Rajgopal and Venkatachalam [59]). Illiquidity is the average ratio of the absolute daily stock return over daily dollar volume (multiple by 1000 for analytical purpose) in a REIT in a year (Amihud [60]). Table 8 shows that all four measures of information asymmetry were significantly reduced in the rated REITs after they obtained credit ratings. The reductions were also economically significant; e.g., the illiquidity measure was reduced from 0.58% in the period before obtaining credit rating to only 0.03% after the introduction of credit ratings. The findings supported our argument that obtaining a credit rating significantly reduced information asymmetry in the REITs, causing REITs to use more debt capital, increase debt maturity, substitute equity capital by debt capital and hold less cash.

Table 8. Information Asymmetry before and after the Introduction of Credit Ratings.

	Pre	Post	Post–Pre	t-Statistics
Bid-ask spread	2.42%	2.28%	−0.14%	−1.83
Zero-return days	18.07%	5.53%	−12.54%	−24.00
Idiosyncratic volatility	1.69%	1.40%	−0.29%	−6.21
Illiquidity measure	0.43%	0.03%	−0.40%	−11.81

We ran several robustness tests. As mentioned above, one limitation to use the propensity score approach is the small sample size after matching. We applied an entropy balancing approach (Hainmueller [48]; Peng, Shen, Fung, Hui and Fan [49]) by matching rated REITs to weighted unrated REITs on a continuous scale. The results from the entropy balancing approach also indicated that after the introduction of credit ratings, REITs significantly increased debt ratio and debt maturity and reduced equity financing and cash holdings. We also explored whether the benefits of obtaining credit ratings differed in the REITs with initial investment grade and REITs with initial non-investment grade. REITs that obtained credit ratings during the sample period were divided into two groups according to initial rating grades. The changes in leverage ratio, debt maturity, equity issuance and cash holdings after the introduction of credit ratings were separately examined in the REITs with initial investment grade and REITs with initial non-investment grade. The results indicated that REITs with initial investment grade and initial non-investment grade both significantly increased leverage ratio and reduced equity financing after the introduction of credit ratings. REITs with initial investment grade significantly increased debt maturity and held less cash; and while the changes of debt maturity and cash holdings were insignificant in the REITs with initial non-investment grade. Overall, the results indicated that obtaining a credit rating opened a new debt market to REITs, and the benefit could be larger for those with initial investment grade as they could get cheaper debt capital from the bond market.

Lastly, we also explored whether the effects of obtaining credit ratings on corporate financing policies differed in the REITs before and after the Modernization Act of 2001. The Act lowered the mandatory dividend payout ratio from 95% to 90%, which increased the internal funds in the REITs and reduced the reliance on external capital (Gupta [54]). We divided the REITs that obtained credit ratings in the sample period into two groups: those with the introduction of credit ratings before the Act and those with initial ratings after the Act. We found that after obtaining credit ratings, REITs significantly increased the leverage ratio and decreased equity financing and cash holdings in both groups; however, the benefits of obtaining credit ratings became smaller after the Modernization Act. These findings are consistent with the results in Gupta [54], which argued that REITs relied less on external capital after they could keep more internal funds. The results of robustness tests were not reported to conserve space but are available upon request.

6. Conclusions

We investigated the effects of the introduction of credit ratings on REITs' corporate financing decisions between 1980 and 2016. The bond market access for REITs after they obtained credit ratings had a direct influence on their capital structures. The findings of

this paper can be summarized as follows. First, the introduction of credit ratings increased the leverage ratio by 5.23%. Second, the ratio of long term debt (debt due after three years, following Barclay, Marx and Smith [43]; Alcock and Steiner [44]) to total debt increased by 4.52% in REITs. The increases in the debt ratio and debt maturity were significant larger in those REITs that obtained credit ratings than those matched REITs that did not. Second, the introduction of credit ratings significantly decreased the REITs' equity financing and cash holdings, which indicated that those firms with access to the public debt market substituted more debt for equity financing. The decrease in equity financing was as much as 14.95% of total assets. The results suggest that the REITs will increase the use of debt financing if they can have access to the public debt market even without any tax benefits.

The results of this study are consistent with the findings on the supply side's effect on the capital structure decisions in public companies (Faulkender and Petersen [9]; Sufi [11]; Shen, Firth and Poon [61] and others). This paper also shed light on the relationship between credit ratings and leverage ratios in REITs. Unlike the previous studies on REITs (e.g., Harrison, Panasian, and Seiler [47]), we found that having a credit rating has a positive effect on corporate leverage in REITs. Our findings are consistent with the mainstream finance literature (e.g., Faulkender and Petersen, [9]).

This paper contributed to both the capital structure decisions and REIT literature. It supported the argument that an external capital supply affects a firm's capital structure decisions (Faulkender and Petersen [9]; Leary [26]; Sufi [11]; Lemmon and Roberts [27]; Shen and Yin [62] and others). Faulkender and Petersen [9] compared the leverage between rated and unrated firms and found that those firms with credit ratings had higher debt usage as the market friction and associated monitoring cost were reduced, but they did not study the impact of the introduction of credit ratings on other aspects of capital structure. Sufi [11] explored the real effects of the introduction of bank loan ratings instead of issuer/recipient credit ratings in debt usage and corporate investment. To the best of our knowledge, this is the first study that examined the introduction of credit ratings on the capital structure in REITs. The traditional capital theories—tradeoff theory, pecking order theory, and market timing theory—had been tested with REITs (e.g., Feng, Ghosh, and Sirmans [52]; Harrison, Panasian, and Seiler [47]). This study presented further evidence on how credit ratings affect the capital structure of REITs, given that they do not have a tax benefit by using debt financing.

Although this study focuses on the REITs in the US, the analysis can be extended to REITs in the global market and other companies (e.g., construction and development firms) in the real estate sector. REITs are also mandated to pay out most profits as dividends in non-US markets. They are also generally small and medium-sized companies, which may have limited access to the public debt market. Access to the bond market should allow them to source more debt financing. An important policy implication from this research is that the development of bond markets is important for firms in the infrastructure and real estate sectors to obtain long-term capital. International funds from the public debt markets can be channeled to fund infrastructure deficit regions all over the world. To make the bond market accessible to infrastructure projects, it is necessary to promote transparency and reduce information asymmetry of the projects through the certifications from a third-party (e.g., credit rating agencies).

One possible future direction is to examine the substitutions between different types of debt after a new debt market opens (Sufi [11]; Leary [26]). The impacts of the shocks in the external capital market (Lemmon and Roberts [27]; Shen, Firth and Poon [61]; Shen and Yin [62]) and financial crises (Almeida et al. [63]; Kahle and Stulz [46]) have had on REITs' corporate financing and investment decisions are also worth examining. Future studies can also explore how the access to the public debt market can help finance infrastructure, especially in less developed countries.

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Appendix A

Table A1. Comparisons between Treated and Matched Firms.

	Treated	Matched	Difference	t-Statistics
LNTA	6.57	6.52	0.05	0.40
PROFIT	0.06	0.06	0.00	0.79
LEVERAGE	0.46	0.46	−0.01	0.24
INTCOV	4.01	3.72	0.29	0.32
SDTTD	0.11	0.12	−0.01	0.41

This table gives the comparisons of the covariates between treated REITs and matched REITs before the introduction of credit ratings. Treated REITs are those that obtained credit ratings between 1980 and 2016. The matched REITs were chosen from a control group in which no REIT had a credit rating during the sample period. One matched REIT was selected for one treated REIT based on the closest propensity score to be rated, year, and property type. This table shows that the firm characteristics between treated and matched REITs were not significantly different before the introduction of credit ratings. LNTA is the natural logarithm of total assets (adjusted by CPI). PROFIT is the profitability ratio. LEVERAGE is the book leverage ratio. INTCOV is the interest coverage ratio, which is EBITDA to interest expense. SDTTD is the short term debts to total debts ratio. The t-statistics from two-tailed tests on the differences of these covariates between treated and matched REITs are reported.

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