Cross Block Ownership of Traded Commercial Real Estate Portfolios:
The Funding Optionality Value of Being Part of an Index

Jocelyn Evans and Timothy Jones
College of Charleston and Xavier University

ABSTRACT

The financial crisis revealed that neglecting illiquidity in the commercial real estate industry has negative consequences, and that factors that increase equity funding optionality should be a part of the arsenal of macroprudential measures. In this study, we show that addition to an index cross increases secondary equity offerings (SEO) optionality in a way that contains the damage to the financial system and the economy. These insights derive from a case study of publicly traded REIT experiences. The likelihood of accelerated SEOs is positively related to index membership. Moreover, the share price reaction to announcement is less (more) negative when index and real estate firm (bank and actively managed funds) cross block ownership is highest. A shareholder-to-shareholder agency conflict exists, however, because active single blockholders sell their shares after announcement when the largest cross blockholder is an index.

The magnitude of economic instability caused by the real estate sector highlights the need for identifying factors that either buffer or exacerbate illiquidity, which could lead to rapid contagion globally (Bouchouicha and Ftiti, 2010). Declining economic and market conditions present companies owning substantial real estate holdings with operational challenges and financial instability partially due to reductions in cash flow, high leverage and an inability to obtain additional funding from debt and equity from the credit or capital markets (Hanley and Hoberg, 2019; Tuzel, 2010). Given that many corporations are cash constrained during recessions, it is important to understand when management has access to external equity funding when new debt is not available – funding optionality. Funding optionality is a major concern for central banks since many illiquid firms must sell real estate assets at fire sale prices, which reduces the collateral value underpinning secured bank loans (Kanagaretnam, Zhang and Zhang, 2016; Ling, Naranjo, and Scheick, 2016; Bessler and Kurmann, 2014). It is, thus, crucial for central banks, investors and management to

identify firms with greater resilience as defined by external equity funding optionality when debt funding constraints exist during the 2008 financial crisis. What is rarely evaluated in the literature is what differentiates cash constrained firms with equity funding optionality from those that do not have it (Ramcharan, 2019; Bouchouicha and Ftiti, 2012; Allen and Carletti, 2010).

 In our analysis, optionality refers to the capability of accessing capital markets by issuing accelerated secondary equity offerings that have limited investment bank certification via connections to index investors.[1] To examine this issue, we evaluate this issue for REITs whose access to capital dried up during the recession more than firms in any other asset classes.[2] It is well known that those firms with little debt, healthy cash flows and a substantial amount of cash are more resilient with respect to external equity funding optionality, but the relationship between financial probity and cross blockholders with at least five percent stock ownership in multiple firms' shares within a cash constrained industry such as REITS is less understood. For example, the December 7, 2013 Economist suggests that large, index investors such as BlackRock might help other firms withstand macroeconomic shocks and help stabilize capital markets. The article, however, does not actually show that being part of an index increases equity funding optionality during periods of declining stock prices.

 We test the Economist' logic for a sample of cash constrained, illiquid small cap stock – REITs - and find that the emergence of index cross block ownership is indeed beneficial because it stabilizes the market by providing management with the option of issuing accelerated secondary equity offerings (SEO) during the most recent financial crisis. Since cash-strapped, highly leveraged REITs are exogenously constrained by regulation from building up internal cash flow[3], a greater understanding of equity funding optionality leading

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[1] Ott, Riddiough, and Yi (2005) report that 93 percent of REIT investments are funded through external equity sources relative to only 30 percent of the industrial firms.

[2] https://seekingalpha.com/article/1271381-just-how-risky-are-reits

[3] Existing studies theoretically predict that financially constrained firms hold more liquid cash assets and retain earnings during a crisis period as a precaution against default and costly equity issuance (Iyer, 2016; Bolton and Chen and Wang 2013).

up to and during the most recent financial crisis is needed (see, for example, Cheung, Chung and Fung, 2015, Crowe et al., 2013; Devos et al., 2013; Erkens, Hung, and Matos, 2012; Campbell et al., 2011).

Using both multinomial logit and biprobit models, the results are consistent with industry-focused cross block investors with index strategies providing equity funding stability for REIT stocks primarily through accelerated SEO issuances. REITs with substantial index cross block ownership are better able to issue accelerated and fully marketed SEOs during the 2008 financial crises, a period when credit and bond markets are tight, which is surprising since they are often perceived negatively by the capital market (Howton, Howton, and Scheick, 2018; Lin and Wu, 2013). The empirical identification strategy uses difference-in-difference and bi-probit models with time and property sector-time fixed effects to account for unobserved heterogeneity and possible sector shocks. The announcement of initial membership in an index (an increase in both the demand and supply for equity shares) as well as the recent financial crisis (which sharply reduced the supply of funding from banks, nonbanks and capital markets) are plausibly exogenous sources of variation in the management's decision to issue any type of SEO. We also assume that the assignment of a REIT into an index is mostly random.[4]

Our empirical analysis identifies interesting patterns. First, index cross blockholders appear to make publicly traded REITs that invest in commercial real estate asset markets more resilient during periods of economic distress because of greater optionality. Provided that the underlying quality of the commercial real estate assets are solid enough, being in an index such as the S&P 500 or MSCI allows management and the firm itself to get easier access to new equity during economic downturns, which most likely enables them to

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[4] Consistent with Azar, Schmalz, and Tecu's (2018) analysis of the airline industry, index membership is a valid instrument because it is commonly observed and rigid, which means that it is plausibly exogenous to a REIT's equity issuance decisions and should not create herding in the sense that index investors do not imitate other firms' trades. The selection of a stock is mostly random for the S&P 500/MSCI because it is not an investment recommendation. http://www.indexologyblog.com/2013/07/09/inside-the-sp-500-selecting-stocks/

avoid costly fire sales. Specifically, optionality partially stems from index REITs' greater ability to issue accelerated SEOs when other non-index REITs could not. Moreover, an index optionality premium is reflected in the less negative SEO announcement stock price for those entities with a high percentage of index or bank cross block ownership.

Second, we document pronounced firm variation in single non-index block ownership surrounding equity issuances. Single active block positions fall after the SEO announcement and fall for those REITs in an index more so than otherwise (e.g., owner-to-owner agency problem). Even so, the average share price response to SEO announcements is much less negative when index investors have a dominant ownership position, a minimally discussed positive externality associated with passive cross-block ownership. These systemically important index cross-blockholders that own large positions in almost every large, publicly traded REIT appear to buffer the negative share price reaction to active blockholder sales surrounding the announcement of a SEO, which mitigates downward price pressure.

Third, our study uniquely disaggregates cross block ownership into index, bank, real estate firm and actively managed categories (Alvarez, Jara and Pombo, 2018; Marcato, 2017; Kasch and Sarkar, 2011). Summary statistics reveal that almost forty percent of all shares traded at publicly traded REITs are owned by cross blockholders as compared to less than ten percent at nonfinancial firms as reported by Azar, Schmalz, and Tecu (2018). Index cross block holders own approximately thirty six percent, on average, whereas non-index cross owners only own less than five percent of all outstanding shares. The remaining sixty percent are either single REIT blockholders (less than two percent) or atomistic institutional investors. This large proportion of index cross blockholders in REITs' ownership structure makes the analysis of equity funding optionality in publicly traded commercial real estate capital markets important and relevant from a policy perspective, particularly since index blockholders manage assets for corporations and ordinary citizens in a fiduciary manner.

The combined results reveal heterogeneity in how different institutional investors respond to SEOs when stock prices are declining. Even though stock prices declined during the crisis, index cross blockholders like BlackRock increase the likelihood of accelerated SEOs at a time that management had to respond to an unexpected macroeconomic shock. More active single blockholders that do not have to pre-commit to mimicking an index tend to trade more when REITs have large index cross ownership. Index cross ownership, however, buffets the value decreasing effect of single blockholder sales surrounding the SEO – front running in anticipation of an SEO, less negative share price reactions to the announcements. Likewise, bank and commercial real estate non-index cross blockholders also are associated with less negative share price reactions to SEOs. In fact, prior to the SEO, non-index cross owner accumulates larger stakes when index cross block ownership rises. Hence, other cross owners strategically take the level of index cross block ownership into account ex-ante when making portfolio allocation decisions by rebalancing toward stocks experiencing a large increase in ownership concentration. The findings have normative implications in that some other investors and central banks should recognize that index cross owners decrease systemic risk and condition their actions accordingly. Essentially, index cross block ownership fosters financial stability in the REIT industry sector.

We also contribute to the literature on the role of concentrated, cross block ownership by examining the relationship between ownership structure and new funding through accelerated SEOs surrounding macroeconomic crises. The hypothesis is that the pre-commitment to mimic an index (moderator) and the long term buy-and-hold orientation (mediator) provides positive new equity funding optionality to REITs that are typically considered to be low risk structures that pay high dividends until times of macro-economic distress, when illiquid commercial property can only be sold at a substantial discount partly because external funding becomes scarce. During periods of economic and financial distress, the value of optionality becomes significant: Sun, Titman and Twite (2015) report that "those REITs that were saddled with excessive debt

coming due at the height of the crisis — with many companies having in excess of 50 percent of total debt due in 2008 and 2009 — were often forced to sell property at unattractive prices[5] and issue equity at a lower value in order to meet the terms of their loans." Hence, since the 2008 financial crisis, inadequate funding in the commercial real estate market remains a key issue for both management, investors and regulators (Duca, Muellbauer and Murphy, 2010; Brunnermeier, 2009).

Brush (2017) discusses the ongoing debate between academics and asset managers regarding the negative effect of asset managers' growing ownership in many firms in a single industry and across the entire capital market. BlackRock questions the methodology and conclusions of existing academic work and calls for more research before regulators and government officials make policy recommendations to label cross block owners systemically important from a financial fragility perspective. Two major criticisms are that index investors typically only represents ten percent or less of a firm's ownership and therefore does not have undue influence within the capital markets and existing studies do not adequately recognize the heterogeneity of cross block ownership. To account for heterogeneity of cross block owners in a REIT's capital structure, we collect data from proxy statements that provide ownership for the specific index or mutual fund and then manually verify the allocation strategy.

Dividend restrictions coupled with limited access to bank lending and bond issuances during the most recent credit crunch and financial crisis makes the relationship between REITs' access to equity financing and the heterogeneity of cross blockholders both relevant and interesting. Hence, a more robust academic dialogue is desirable since these entities' values are a derivative of commercial real estate fundamentals, the world's largest global asset class that is more valuable than all publicly traded securitized debt and stocks combined.[6] Given that the government (i.e., taxpayer) plays an oversized role in backstopping commercial real estate, either explicitly or implicitly, the inherent financial instability risks of in the post-crisis period may be largely

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[5] The NAREIT index dropped by 60 percent from September 2008 to February 2009.
[6] https://sp.hsbc.com.my/liquid/6642.html

understated. Eric Rosengren, president of the Federal Reserve Bank of Boston, states that more than half of commercial real estate mortgages are held by regulated banks.[7] He also states that two of the last three U.S. recessions (1990 and 2008) are, "characterized by financial stability impairment due to declining real estate values—with CRE (commercial real estate) performing as poorly as, or even worse than, residential real estate … Despite tightened regulatory oversight in recent years…" REITs, however, were one of the few industries that did not have severe vulnerabilities to financial instability in 2008. This omission is surprising given that cash strapped funds REITs are typically one of the most illiquid asset classes and an important part of the macroeconomy (Ling, Naranjo and Scheick, 2016). We conjecture that the relationship between the size of index cross block ownership and new equity funding in the REIT industry is a partial explanation.

Our rational is consistent with Acharay and Pederson' (2005) supposition that understanding the source of ownership commonality should be an important part of financial stabilization policies intended to prevent illiquidity in both the capital markets and cash constrained firms. Brunnermeier and Pederson (2009) also suggest that insufficient funding buffers in the equity capital markets during the recent financial crisis caused significant disruptions in the overall economy, making liquidity supervision an important regulatory issue and important for managers of cash strapped firms in other industries that have a large percentage of index cross owners. During the global financial crisis, almost all firms had liquidity concerns due to banks' unwillingness to honor their lines of credit or offer new loans while capital market transactions decreased precipitously (Banti and Phylaktis, 2019; Giambona, Golec, and Schwienbacher, 2014; Financial Stability Board, 2013; Ivashina and Scharfstein, 2010; Damodaran, 2005).

The remainder of the paper is organized as follows. Section 2 reviews the existing nonoverlapping literatures on cross-ownership and REIT equity issuances. Section 3 motivates the hypotheses for parallel rising trends in accelerated SEOs and cross-block ownership in the REIT industry. Section 4 describes the data

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[7] A presentation on March 22nd titled "Financial Stability: The Role of Real Estate Values" highlighting some of these risks.

sources, outlines the sample selection criteria, describes the identification variables, and explains the

methodology. Section 5 provides additional summary statistics and discusses the main empirical findings.

Section 6 concludes.

1.   **Cross Block Ownership and Equity Funding Optionality**

A fundamental change in the structure of publicly traded firms' ownership structure has occurred over

the last decade (Fichtner, Heemskerk, and Garcia-Bernardo, 2017; Bogle, 2016).[8] In the S&P 500, they are the

largest single shareholders in approximately ninety percent of S&P 500 firms, but He and Huang (2017) report

that indirect cross ownership of same industry non-financial firms for most stocks index investors only

represent 6.4% percentage of the ownership structure, on average, in Table 1. In contrast, we report that by

2014 these same cross blockholders own almost 40% of publicly traded REITs. Most of these investors with

cross ownership follow index funds. Hence, for REITs, the influence of actively managed funds and

unconstrained institutional investors that have the economic incentive to fight secondary equity offerings is a

recent phenomenon.[9] Instead, non-index institutional investors that do not have block positions will simply

sell or redeem their shares, which will affect the underlying liquidity of index funds that own the investment

but not the REIT issuing new shares.

This new paradigm for common ownership of many publicly traded corporations should be of interest

to investors and policy makers (Braun, Briones and Islas, 2018). Rossetto and Stagliano (2017) report that 74

percent of publicly listed firms in the U.S. have more than one blockholder with ownership greater that 5

percent. Existing research, however, is still nascent with conflicting results. Some studies show that these

index funds cross blockholders pursue value increasing corporate governance (see, for example, Anton et al.,

2018, Harford, Kecskes, and Mansi, 2018, He and Huang, 2017, Appel, Gormley and Keim, 2016a, b, Crane,

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[8] https://www.businessinsider.com/american-corporation-big-three-firms-2017-5
[9] https://therealdeal.com/issues_articles/the-latest-target-for-activist-investors-reits/

Michenaud, and Weston, 2016, and Derrien, Kecskes and Thesmar, 2013). Alternatively, other articles provide evidence of negative externalities (Azar, Schmalz and Tecu, 2018, Brooks, Chen and Zeng, 2018, Schmidt and Fahlenbrach, 2017, Anton et al., 2016, Anton and Polk, 2014, and Harford, Jenter, and Li, 2011). It is well established that institutional ownership percentage, in general, is a significant predictor of firms' access to financing (see, for example, Mertzanis, 2017), but not index cross block ownership.

Lambert and Sykuta (2018) and O'Brien and Waehrer (2017) argue for a deeper examination of the arguments within the preliminary research on cross block ownership. O'Brien and Waehrer (2017) note that most studies inappropriately use data filed for the purposes of regulatory reporting of shareholders to identify cross block owners. The argument is that overreliance on easily-available but limited EDGAR Section 13 of the Exchange Act data source on substantial shareholdings of listed companies (usually above a threshold of about 5%) leads to fundamental misconceptions about ownership and thereby misinforms the recent debate. Moreover, although some research predicts that ownership commonality at nonfinancial corporations increases systemic liquidity risk due to a herding effect that leads to common buying or selling pressures (Koch, Ruenzi and Starks, 20168), index funds cannot sell their shares in response to negative news or financial distress. Even though non-index institutions tend to follow their own lagged quarterly trades as well as the lagged trades of other investors in different REIT stocks in the same property type (Lantushenko and Nelling, 2017), this is not possible for funds that buy and sell REITs based solely on index membership (Gordon and Pennacchi, 1993). When other investors sell or buy their shares due to bad or good news, index funds maintain a buy and hold strategy and, therefore, could possibly decrease the informativeness of stock price returns (Harford and Kaul, 2005). Hence, commonality in liquidity in the equity capital markets is a timely topic, particularly since it plays an important role during financial crises.

Existing research has not focused on specific industries, even though financing constraints and funding gaps arising from imperfections in capital markets varies by industry sectors and country. As discussed earlier, the existing of cross blockholders that own approximately forty percent of outstanding shares is economically

significant. Hence, the REIT sector provides an excellent example for discussing equity funding optionality (capital market choice theory). Within the REIT capital market, BlackRock and other index investors do not merely allocate other individuals' and institutions' money with no repercussions to financial stability. Even though BlackRock indirectly invests on behalf of customers, its precommitment to mimic an index for most of its funds has a stabilizing effect. Although the relative scale of index investing is small in non-financial firms, we show that it comprises over 40 percent of U.S. REITs' ownership structure in the billion-dollar global REIT market (also see Figures 1 and 2 as well as Table 1). Hence, the size of assets managed by ETF, index funds and other cross blockholders is large relative to the market value of REITs. Cross block ownership is rising in other illiquid stock (Brunnermeier and Pedersen, 2009; Amihud, 2002), which may close the gap in magnitude and prevalence with the REIT industry.

2. Theory and Hypotheses

The gap in the literature is explored with the following questions: (i) is the likelihood and share price reaction of a REIT issuing accelerated secondary equity issuances (SEO) related to the identity and investment strategy (index versus active) of the largest block investors?; or (ii) are either instead solely related to its leverage or past firm performance?; and (iii) is there an agency conflict between index cross-blockholders and more active blockholders that only have shares in a few REITs as measured by the direction of trading surrounding the announcement of an SEO when the capital structure is dominated by index and ETF funds?

Shleifer and Vishny (1992) theorize that when short-term debt financing is revoked during financial crises, firms are often placed into immediate financial distress, which causes them to respond by selling assets at steep discounts to their fundamental values. Similarly, Mitchell and Pulvino (2012) also find that the loss of access to debt capital is a problem when hedge funds cannot access new equity capital because of the possibility of an unorderly liquidation of real assets that harms both lenders and investors. In 2008, many firms experienced a sudden rescission of debt capital, making it difficult for management to raise equity

capital. This is exactly what happened to REITs in 2008 that responded to debt credit rationing by selling commercial real estate properties at significant discounts to fundamental values when they could not issue equity (Sun, Titman and Twite, 2015). As such, a large presence of index investors at REITs is predicted to be beneficial because it increases equity funding optionality with less reduction to firm value.

Since REITs cannot manage liquidity risk through real asset portfolio diversification on their balance sheets or retaining cash, meeting debt repayment and other cash flow needs by issuing new equity may be a long-term value adding proposition for long-term investors. If so, newly announced membership plausibly exogenously increases both the supply and demand for a firm's shares within a short period of time, even though Sun, Titman and Twite, (2015) report that REIT stock prices declined by approximately sixty percent during the crisis. Meeks (2008) reports that ominous parallels existing between the residential and commercial real estate markets during the financial crisis. He states that, "Investment in all types of commercial structures has slowed after years of rapid growth. Prices of office and retail properties, two large commercial categories, have fallen from last year's peaks … and funding for projects has dried up because these markets (asset-backed securities) are now all but closed." Consequently, optionality is measured as the likelihood of an SEO and the share price response to the SEO as follows.

H1: Addition to an index and index cross-block ownership are positively related to both the likelihood and form of REIT equity offering, especially during periods of debt credit contraction, e.g. financial crisis (liquidity enhancement).

The share price reaction measures the net effect from trading or not by heterogeneous investors. There seems to be at least two dimensions to the risk of undertaking an SEO during a crisis. The first is the risk of diluting the value of existing shares, and the second is the risk of having to lose money in a fire sale of commercial real estate assets or missing out on profitable investment opportunities. Consider the fact that the maximum potential loss from undertaking an SEO is effectively the amount the stock is overvalued, while the potential loss from not undertaking it could be unlimited. The share price reaction to an SEO announcement,

conditional on the REIT having or not having passive blockholders, tests the net effect. Therefore, a less negative share price reaction for REITs with a large percentage of index cross owners is consistent with the second risk being most important.

H2: The share price reaction to an SEO announcement is less negative for REITs in an index than those that are not members (less wealth transfer).

Yet, issuing diluting SEOs creates a possible stockholder-to-stockholder agency problem. If more actively managed funds and institutions know that index funds and ETFs are compelled to buy stock in mass at a predictable time, they may have incentive to sell before or afterward. More frequent trading by non-index single blockholders around SEO announcements is consistent with a "horizontal agency" conflict representing an index cross block shareholder-to-non-index single block shareholder agency problem (Pagano and Roell, 1998). To gain further insight the following hypotheses are tested:

H3: Non-passive (more actively managed) single block ownership increases prior to and then declines after an SEO announcement when the largest investors are passive index and ETF funds (horizontal agency conflict).

To explain why cross block ownership by index investors acts as a buffer to liquidity shocks for REITs during turbulent economic times through the SEO transmission mechanism, the index investing process is described briefly. For index investors, the asset allocation decision is a fixed precommitment to mimic an index's stock selection based on market value weight allocation. This pre-commitment strategy means that index institutional investors will not sell shares that are part of an index, even when they are performing poorly. Instead, they pursue a long term buy-and-hold strategy that minimizes tracking error results in low transaction costs. This is a transparent fiduciary duty to closely follow indices such as the S&P 500 REIT or the MSCI REIT indices, which sometimes requires institutional investors to change the number of shares owned for an individual REIT based on adjustments such as stock splits or stock issuances if either affect the relative market value weight within the index.

We will next explain how cross block ownership by index investors and passive funds provides liquidity to REITs during periods of macroeconomic distress through the equity capital market. The first important fact is that index investors do not trade based on commercial real estate property sector fundamentals once the stock is part of an index (precommitment mediator). Only when the market value of REITs' shares declines more slowly than the market value of other stock in the same indices (higher market value weight), like in 2008, are index investors required to buy more shares and vice versa. The basic theoretical paradigm is that index cross blockholders mechanically respond by buying additional equity capital at a time that active investors redeem their equity capital following negative performance. When the reverse happens, however, the decision to buy additional shares is discretionary. Either way, their actions act as a buffer by preventing excessive selling and, thereby, preventing a cycle of excessively declining prices in the equity capital market for cash-strapped, highly leverage REITs that are required to pay 90% of the earnings in dividends and invest at least 75% of their assets in illiquid, immovable commercial real estate.

Let's take the example of a REIT being added to an index such as the S&P 500.[10] Since at least 50 percent of outstanding shares must be available for trading at a reasonable price for retail investors, increases in index cross block ownership eventually necessitates the need for an SEO. For example, if a REIT has only 1 billion of supply of outstanding shares in the secondary market and from brokers or dealers, but it now needs $3 billion due to the exogenous increase in demand from addition to an index, new shares will have to be issued by management. Thus, even when a REIT is added to an index during a recession, index institutional investors will buy the stock in large amounts from an SEO if the amount in the secondary market is insufficient to meet the demand.

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[10] Less than one-fifth of the original stocks of the S& P 500 index from March 4, 1957 are members today. https://www.benzinga.com/general/education/17/03/9164714/how-a-stock-gets-added-to-the-s-p-500. Index investing tracks, rather than attempting to bear, a benchmark index. Consequently, ETFs and passive funds simply rebalanced periodically their portfolios in response to the market value changes of the stocks they track relative to the universe of funds.

Likewise, when a stock that is already part of an index experiences a smaller decline in value relative to other members, its relative market value weight increases, which would trigger purchases, and vice versa. Yet, this mechanical reason for facilitating SEOs at index REITs is not supported by historical stock price performance. NAREIT index REITs' share price for all publicly traded entities declined from a peak on February 2007 ($84.38) to trough on February 2009 ($21.10) by 70.58% (abnormal net outflow), whereas stock in the S&P 500 only fell by 53.29% from $1899.54 on October 2007 to $887.35 on February 2009.[11] In contrast, all publicly traded REITs (FTSE NAREIT all REITs) fell by 53.53% from $198.53 in 2006 to $92.02 in 2008. The decrease in the relative weight of an index REIT due to a steep fall in price during the most recent financial crisis makes management's ability to issue SEOs at a very undesirable time mysterious. Index investors were not compelled to facilitate During the recent crisis and Figure 3 shows that index REITs that issued SEOs persistently underperform non-index REITs, on average.

Two compatible explanations exist explanation for why a $21.10 SEO price at a 70 percent discount is a positive signal to other noise traders. First, it is rational for index investors to purchase shares at a low price if they anticipate a significant increase post-crisis when the amount purchased does not substantially change the relative market share within its portfolio. Second, Sun, Titman and Twite's (2015) findings that REITs that cannot issue stock have to sell commercial property at substantial discounts. Based on their results, temporary dilutive stock issuances may be a blessing in disguise if it is less of an evil than the unobservable alternative greater loss from commercial real estate property fire sales that deplete the balance sheets of the REIT itself and lending institutions, further aggravating the fragility of the financial system. Stated differently, consequences for the real economy are tied to equity funding optionality in the commercial real estate sector because a downward spiral in collateral value makes funding conditions worsen. Meier and Servaes (2019) and Meeks (2008) suggest that these problems are magnified when commercial real estate assets have low

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[11] https://www.macrotrends.net/2324/sp-500-historical-chart-data. https://www.reit.com/data-research

collateral value.[12] Apparently, new equity becomes the least-cost marginal source of financing for REITs with large index cross block ownership when the marginal cost of debt is sufficiently high.

This be viewed as a case study of how a sample of financially constrained firms respond to substantial uncertainties about external financial funding conditions, which may be applicable to illiquid stocks in other industries or foreign firms (Bolton, Chen, and Wang, 2013; Campello, Graham and Harvey, 2010 Attig et al., 2009; Laeven and Levine, 2008; Maury and Pajuste, 2005). Internationally, the presence of large blockholders within a firm's capital structure is common (Faccio and Lang, 2002; Barca and Becht, 2001), but empirical evidence on the effect of different types of cross blockholders on SEOs is limited. Most studies focus on the presence of multiple large shareholders rather than the characteristics of the largest blockholder (Chen, Qingyuan and Ng, 2018).

3. Data, Sample Selection and Methodology

3.1 Sample selection

Since the objective of this study is to examine how cross-block ownership due to index membership affects equity issuance decisions, we focus on an initial sample consists of 1,793 REIT SEOs covering the period January 2000-December 2013 obtained from the Securities Data Company (SDC) U.S. New Issues database using SIC code 6798. Following convention, rights offerings, unit offerings, warrants, and private placements are excluded. To be included in the final sample, firms must also satisfy the following criteria: (1) be listed on the NYSE, AMEX, or NASDAQ; (2) have offer prices between $3 and $400; (3) have information on stock prices and quarterly financials available from the Center for Research in Security Prices (CRSP) and Compustat, respectively; and (4) include some fraction of primary shares. Applying these restrictions, the final sample consists of 760 SEOs that issued either fully marketed or accelerated offerings.

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[12] He states, "For the economy, two key risks loom in a downturn of the commercial real estate market. First, a steep and prolonged decline in construction spending would place another burden on growth in an economy already reeling from falling housing prices and financial turmoil. Second, a fall in property values could result in losses for the banking sector. Such losses could impair banks and the financial sector, posing added risks to the economy from a reduced willingness to lend."

The SDC data is supplemented with financial data from COMPUSTAT and stock price data from the Center for Research in Security Prices (CRSP). CRSP monthly file provides the price of each REIT share and the number of shares. From these prices, we calculate several independent variables such as cumulative size-adjusted abnormal returns. Market capitalization is the price times the number of outstanding shares. The market model beta is estimated from up to 36 months ending in month 12 prior to the SEO. Compustat has accounting data (industry, full coverage, and research files): historical book values and other control variables.

Several variables are included in the regressions to control for the impacts from both the demand and supply side. Control variables include market capitalization size measured as the log of price times number of shares, firm age is measured as the years since a listed firm has been trading defined as time listed on CRSP tape in years, the log of average monthly trading volume divided by shares outstanding over the prior year, return on assets equal to net income divided by total assets, leverage measured as long term debt to assets, dividend pay-out ratio defined as dividends divided by net income, a dichotomous variable equal to one if the REIT issued new publicly traded bonds in the same year, a 180 day cumulative stock return run-up momentum variable, volatility is the standard deviation of the daily returns in a year, market-to-book value of equity, and cash divided by total assets. All continuous variables are winsorized at the 1 and 99% levels and variance inflation factors (VIF) are computed to test for multicollinearity among the variables. A VIF of 1 indicates no multicollinearity, and a VIF more than 10 reveals severity (Kennedy, 1992).

For announcement returns, the estimation period for the parameters is from 255 to 46 days prior to the announcement date, where the announcement date equals the "launch date" reported by SDC. To assess the accuracy of the reported announcement date, we compare the launch date from SDC to the filing date from Securities and Exchange Commission (SEC) Edgar. In unreported results, we find that both dates are similar for most of our sample observations giving us confidence in the announcement date. Bortolotti, Megginson, and Smart (2008) similarly find that the SDC launch date accurately captures the SEO announcement date.

They compare the SDC launch date with Lexis/Nexis reports for a random subsample of deals and find that the dates on Lexis/Nexis almost always fall within one or two days of the SDC launch date.[13]

Given that our analysis only focuses on cross block ownership, the empirical analysis focuses on two measures: 1) a dichotomous variable identifying addition to an index, and 2) the degree of ownership concentration by all common blockholders. Data from proxy statements on all publicly traded REITs in the U.S. and their block owners is used to construct a "modified Herfindahl-Hirschman index" (HHI) of common ownership concentration), which considers the network of institutional ownership between rival firms. The construction of the HHI is further explained in the Appendix. Table 2 shows that the parallel increase in index cross block and non-index ownership reduces the proportion of institutional and individual liquidity noise trades.

3.2   Methodology

We determine which REITs are and are not a member of the S&P 500, MSCI or any other index by using propensity score matching based on asset size, year, property sector classification, and other firm characteristics such as profitability. The date of the initial membership announcement and, hence, the addition of the REIT's float-adjusted market capitalization is identified to estimate the date of the quasi exogenous shock on SEO decisions.[14] Although not perfect, existing studies suggest that the announcement of an initial index membership creates a degree of exogenous variation in demand for firms' shares. To control for front

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[13] The announcement and offer dates are obtained from SDC. However, several studies (e.g., Safieddine and Wilhelm (1996)) note that a large proportion of the offer dates on SDC are incorrect since they do not account for offers taking place after the close of trading. Following Safieddine and Wilhelm (1996), we use a volume-based offer date correction to adjust the SDC offer date. Specifically, if the trading volume on the reported SDC offer date is (1) more than twice the trading volume on the SDC offer date and (2) more than twice the average daily trading volume over the previous 250 trading days, then the trading day following the SDC offer date is designated as the actual offer date. This correction applies to nearly 45 percent of the sample.

[14] The first equity REIT joined the S&P 500 of MSCI in 2001 in their own stand-alone sector. Previously, they were included in the financial sector index along with banks and other financial conglomerates (mortgage REITs remain in the broader financial index). 22 total: 7 retail, 5 residential, 1 office, 3 industrial, 3 hotel motel, 3 health care facilities, 0 diversified, 0 retail services.

running, however, we include stock price momentum prior to the announcement in the regression to control for possible index front running by actively managed funds. Actively managed funds are purported to buy stocks before they are added to indexes that passively managed funds are designed to track. [15] In a similar way, actively managed funds with no business relationships have an opportunity to sell stocks included within indexes that passively managed funds are designed to track when overvalued SEOs are issued, especially during a financial crisis. It is also well known that the 2007 credit crunch/recession period was an exogenous shock that in general reduced the supply and demand for new equity in the capital market.

We first attempt to minimize issues related to reverse causality, endogeneity, or omitted time varying variables concerns by comparing REITs that issued SEOs with a carefully constructed control sample of REITs that did not, using propensity score matching to better answer whether index additions increase SEOs, especially during the most recent financial crisis. Exploiting each inclusion firm's behavior pre and post inclusion due to index membership relative to the matched control firm results in a difference-in-difference (DID) multinomial logistic regression setting that eliminates time varying effects common to both groups as well as any inclusion effect common to all inclusion firms and time-specific REIT fixed effects. Different specifications for matching procedures are used for robustness (Rosenbaum and Rubin, 1983 and Dehejia and Wahba, 2002). Although the results from using nearest neighbor and common support methods with random draw and replacement are included in the study, untabulated results from kernel matching and Mahalanobis Distance (approximately fully blocked randomization) matching provide similar results to complete randomization approaches according to Imai, King and Nall (2009).

Then, we study the effects of being included in an index on the likelihood of an accelerated SEO relative to the alternatives of a fully marketed SEO or the decision not to go to the equity capital market within a specific year. If correctly specified, the simultaneous equation model affords a powerful test of the

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[15] Changes to index constituents are usually announced one to five days in advance and securities are often added to an index after the market has closed. If some informed investors know that all the passively managed funds are compelled to buy at a predictable time, informed investors will buy in advance. To control for this, we include the 180-day momentum in stock price prior to the SEO announcement in the regression. We thoroughly examine REITs' websites to verify the index being followed. One REIT is excluded because it was admitted into an index prior to 2000. We chose not to use the discontinuity method due to the concerns presented by Young (2018).

hypothesis that addition to an index increases the likelihood of an accelerated or fully marketed SEO because passive ownership by industry-focused investors decreases managers' sensitivity to strategic blockholder equity exits. Initial addition to an index is an instrumental variable that create an exogenously liquidity shock from an individual firm perspective that shifts the demand conditions for new equity shares without simultaneously affecting the supply conditions. Index membership impacts managements' access to equity funding solely through its effect on cross-block ownership due to the mechanical nature of the trading strategy that required the purchase of stock after an SEO because the index typically changes its ownership in response.

To initially examine this issue while at the same time accounting for endogeneity, we use lagged independent variables with robust standard error and firm clustering (Peterson, 2009). The sample period is split into pre-expansion and post-crunch credit market periods. More formally, the multinomial logit estimation for predicting the incidence and type of SEO is as follows:

$$Y_{i,t} = \beta_0 + \beta_1 Treated_1 \, u_{i,t \, (S\&P500/MSCI)} + \beta_2 Treated_2 \, _{(other \, indices)} + \beta_3 Momentum + \beta_4 HHI + \beta_5 Post + \beta_6(Treated_1 \times Post) + \beta_7(Treated_2 \times Post) + \beta_8 Non\text{-}Passive \, Block + \beta_9 Non\text{-}Passive \, Block \times Post + \beta_{10 \, 2} \times Firm \, Characteristics_{i,t} + \beta_{13} \times Issuance \, Characteristics_{i,t} + \gamma_i + \epsilon_{i,t} \tag{1}$$

where $Y_{i,t}$ is the outcome defined by SEO decision (no SEO (2), fully marketed SEO (1), or accelerated SEO (0)), and $Post$ (restricted debt credit period) is 1 if the quarter after the third quarter in 2006 and is 0 if otherwise (2003Q1-2007Q3).[16] The two instrumental variables, Treated$_1$ and Treated$_2$, measure the elasticities "curve shifters-discontinuity" of demand that affect the supply of equity issuances through passive cross blockholder channel. Given that passive investing attempts to track the performance of an index as closely as possible, if equity issuances cause indexes to increase the market capitalization of a REIT, those funds and index that mimic it will also increase their holdings for that firm by buying stock and possibly

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[16] http://news.bbc.co.uk/2/hi/business/7521250.stm The quarters from 2006Q31to 2009 Q4 represent the most intense periods of the housing, credit and financial crises (Duchin et al., 2010).

selling others in the industry.[17] This assumption is consistent with the observed behavior of firms and

investors in the economic and legal environments in which they operate.

A negative coefficient for β_1 and β_2 is consistent with Treated firms being more likely to issue

accelerated SEOs after selection into an index, which is consistent with quickly accessible funding from the

equity markets. The interaction terms β_6 and β_7 for the two treated cohorts is an interesting part of the

analysis. The interaction variables that account for the post-illiquid environment accounts for a discontinuity

due to a negative exogenous macroeconomic and credit supply shock alters on the relationship between SEO

issuance and initial index membership. Because of favorable liquidity effects, it is anticipated that the

likelihood of an SEO (supply of funds from the equity capital market) will increase with the Treated_1 and

Treated_2 groups relative to a matched control sample of REITs that are not a part of an index in a specific

period.

An additional concern arises if non-passive common owners induce REIT managers to issue

accelerated SEOs when the firm is profitable, has leverage, etc. Other plausible factors include changes in

firm specific variables such as debt issuances in an individual year (SDO), total leverage, WSKI[18], ROA,

firm size, firm age, volatility of stock returns, M/B equity, cash/TA, dividend yield, trading turnover volume,

and a cross blockholder that also has a seat on the board. *WKSI* is an indicator variable equal to one if a firm

either has a market capitalization of at least $700 million in the year preceding the offering or has issued

more than $1 billion in non-convertible securities over the three years preceding the offering, and zero

otherwise.[19] Furthermore, determinants such as underwriter Rank, ln(Proceeds), and the inelasticity of shares

that have shown to predict SEOs are also included in the regression. The variable γ_i represents property

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[17] The Standard & Poor's U.S. REIT Indices and the Morgan Stanley Capital International US REIT are two of the most popular single country/regional indexes in the U.S.

[18] For a more detailed discussion of the SOR refer to Securities Offering Reform, Release No. 33-8591, July 19, 2005. Available at http://www.sec.gov/rules/final/33-8591.pdf

[19] Shroff et al. (2013) also use market capitalization to identify WKSIs. They note that, in identifying WKSIs, the SEC also uses market capitalization to proxy for public float. Furthermore, the SEC states that "…very few issuers that…did not meet the $700 million threshold would meet the $1 billion non-convertible securities requirement" (SEC [2005], p.30).

sector-time and time fixed effects. Several property dummies are also included as fixed effects in the empirical model: Industrial, Retail, Healthcare, Hospitality/Lodging, Office, Malls, Residential, and Other. The sector classification is provided by SNL Financial. The matching process and fixed effect variables should hopefully remove most of the bias from possible firm-specific time-invariant unobservable variable.

We further study factors influencing the joint outcome of being included in the S&P 500 or MSCI index and the likelihood that a firm will issue an accelerated SEO using the biprobit regression in Stata with no linear constraints, SE/Robust cluster by bootstrap, a confidence interval set to 95, fit partial observability model (difficult), keep collinear variables, and time series varlist (Lokshin and Sajaja, 2011 and De Luca, 2008). The biprobit estimation is an appropriate model for our analysis due to the binary nature of outcomes and treatment variables based on the Wald test of endogeneity. If Wald test is significantly different from zero, the biprobit should be estimated due to the presence of endogeneity. We are interested in estimating effect of treatment, a REIT being added to an index for the first time, on the outcome, probability of an accelerated or fully marketed secondary equity offering. Thus, a problem of self-selection may exist if the matching process did not eliminate the differences between sampled REITs in the treatment groups and those firms that are not part of an index in unobservable ways which are also simultaneously correlated with outcome. To address the self-selection, we use simultaneous equation regression that tackles the endogeneity by specifying and estimating a joint model of the treatment, added to an index, and outcome, issuing any type of SEO. Since both treatment and outcome variable in our case are binomial, we use a simultaneous equation bivariate probit model.

The model consists of a first and a main equation. In the first equation, a dummy treatment variable is regressed on all control variables and one or more instruments based on factors identified by the S&P 500 selection committee. In the main equation, a dummy outcome variable is regressed on all control variables and the value of the treatment variable estimated in the first stage. Importantly, the instruments are excluded from the main equation. After biprobit was estimated, the average treatment effect (ATE) and the average

treatment effect on the treated (ATT) is computed. The value of the ATE indicates the expected mean effect of the treatment for a REIT drawn at random from the population. By contrast, the value of ATT indicates the expected mean effect of the treatment for a REIT that is part of an index fund. ATT permits us to evaluate the effect on the subpopulation of REITs in the treatment groups (see Greene, 2000 and Wooldridge, 2002).

Models 1 and 2 estimate whether a REIT is in the S&P 500 or MSCI index and whether management is more likely to issue an SEO based on the other covariates with Treated1 as the endogenous variable. Because the outcomes (SEO: accelerated/traditional) and potentially endogenous variables (Treated: S&P500/MSCI or other index) are binary, a seemingly unrelated bivariate probit model (biprobit command in Stata) is used. Our interpretation of the documentation is that biprobit can be used as an instrumental variable approach when both the outcome and endogenous regressor are binary. The two models below are jointly estimated. The first model produces an inverse Mills ratio, which is used to correct for possible sample selection issues and control for unobservable factors.

$$Treated^{20}_{1\ (S\&P500/MSCI)} = \beta_0 + \beta_1 Treated_{2\ (other\ indices)} + \beta_2 Momentum + \beta_3\ HHI + \beta_4 Size + \beta_5 Trading\ Volume + \beta_6 Profitability + \beta_7 Firm\ Age\ + \beta_7 Property\ Sector + \beta_7 Year\ Fixed\ Effect + u_{i,t}$$
$$(1)$$

$$Y_{i,t} = \beta_0 + \beta_1 Invest\ Mills\ Ratio\ u_{i,t\ (S\&P500/MSCI)} + \beta_3 Momentum + \beta_4 HHI + \beta_5 Post + \beta_6 Non\text{-}Passive\ Block\ + \beta_7 Non\text{-}Passive\ Block \times Post + \beta_8 \times Firm\ Characteristics_{i,t} + \beta_9 \times Issuance\ Characteristics_{i,t} + \gamma_i + \epsilon_{i,t}$$
$$(2)$$

Both analyses recognize that common-ownership incentives are important. If the penalty cost associated with being disciplined from issuing overvalued securities dominates, then we expect REIT managers under the control of a dominant common blockholders to pursue SEOs less often. But, alternatively, if the potential cost associated with a possible loss of market position from not having external equity capital

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[20] A committee bases the eligibility of a new addition on the company's merit using eight primary criteria: market capitalization, liquidity, domicile, public float, sector classification, financial viability, and length of time publicly traded and stock exchange. https://www.investopedia.com/terms/s/sp500.asp

dominates then managers under the control of common blockholders are expected to pursue accelerated SEOs more frequently. The share price reaction to the SEO announcement is our measure of the valuation effect.

We further use the difference-in-difference (DID) t-test analysis to identify the change in actively managed strategic block ownership surrounding an accelerated SEO issuance in the year that a REIT is added to an index. In this way, the DID t-test design uses the first year of index membership instead as a supplement to the regression approach that focuses on longitudinal data comparing the treatment groups to the control groups to obtain a counterfactual to estimate a causal effect. In this case DID is used to estimate the effect of index membership. Short-term horizon, non-passive blockholders and cross-blockholders may sell their shares in response to accelerated SEOs even if it is the most optimal long-term solution due to the absence of a legally binding rigidity constraint. The difference in change in non-passive block surrounding an SEO issuance for REITs in the treatment group minus the control group is **BLOCK.** The annual DID in non-passive block ownership surrounding SEO issuances before and after index addition is Δ**BLOCK.** We analyze whether non-passive block ownership declines after an SEO a larger percentage for firms that have a high percentage of passive investors as categorized by being added to an index. The DID is expected to be more negative for those REITs in an index indicating that non-passive blockholders sell more shares when the demand curve is less elastic due to a large percentage of long-term, passive index and ETF investors. The careful matching of the treated and control groups helps us assume that most of the change is driven by the SEO.

4. RESULTS

4.1 The changing identity of cross-blockholders in the REIT industry

Figures 1 and 2 documents that the dramatic rise in total that cross-block ownership parallels the increase in accelerated SEOs over the last two decades in the REIT industry. Between 1990 and 2002, fully marketed offerings dominated the SEO market, whereas accelerated offerings accounted for less than 7 percent of total offerings (Figure 1). More recently between 2003 and 2013, accelerated offerings now account for nearly 80 percent of issuances. Figure 2 graphically shows that the percentage of publicly-traded REITs

with at least one single (red) or common (blue) blockholder with cross-holdings existing at 90% of the publicly REITs, a statistic much higher than the 60% at industrial firms across multiple industries reported by He and Huang (2017). [21] Part of the reason for this increase in cross-holdings can be attributed to REIT additions to several indexes, which then induces passive index investors to buy large dollar amounts of shares. Notice that in 2002, once index funds started investing in REITs, the percentage of cross block ownership rose appreciably annually unlike the incidence of single block positions that remained constant.

[Insert Figure 1 and Figure 2]

To further examine the effect of cross-blockholders, we provide statistics and identify the most influential institutions that have cross-block positions in Tables 1 through 3. The first two rows in Table 1 are ownership structure statistics for 2000 (the year prior to S&P 500 and MSCI REIT index formation) and 2014. In 2000, the mean and median cross block percentages are 13.65% and 0%, respectively. The maximum percentage is 30.09%. In contrast, in 2014, investors that own stock in multiple entities showed a substantial increase. The mean and median percentage of collective cross-block ownership are 35.19% and 34.65%, respectively. Hence, cross block owners are dominant investors in the REIT capital market.

In 2014, the prevalence of these long-term investors becomes apparent when the mean cross block ownership of 35.21% is compared to the mean total institutional ownership of 74.16% - 47.5% of all institutional shares are owned by, on average, only 5 firms. Five firms controlling oversized positions in multiple REITs is surprising given that the mean number of total institutions is 299, a potential systemic risk factor that has become more important over time. In 2000, most REITs had no cross-block owners (median), with a mean of 2 institutions controlling an average of 13.65% of all total outstanding shares. The rise in total institutional ownership at REITs is also partially due to the substantial increase in non-index mutual fund single block ownership from a mean of 0% in 2000 to 9.18% in 2014.

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[21] Comparatively, He and Huang (2017) report that the percentage of blockholders that have cross-held positions in industrial industries varies from 20 to 30 percent over a 30-year period.

[Insert Table 1]

Table 2 shows the trend in cross block holdings and modified HHI from 2000 to 2014 by institution type and average concentration.[22] The most interesting trends are the decline in individual and real estate corporate investors paralleled with greater index, actively managed funds, and banks with actual or potential underwriting and advisory relationships ownership.

[Insert Table 2]

4.2 Propensity matched sampling procedure (PSM)

A matched sample of similar REITs is created to determine if index ownership is causally related to SEOs. The first step is to estimate the propensity score using a binary treatment variable in a probit model, which will generate probabilities using covariates (independent variables) based on previous research in the literature (see Leuven and Sianesi, 2003). The final subsamples consist of paired treated and control firms with similar propensity scores (Dehejia and Wahba, 2002 and Rosenbaum and Rubin, 1983) that are as similar as possible in pre-index membership characteristics (covariates). Matching ensures that two REIT with the same asset size and other characteristics have a positive probability of being in the treated and untreated subsamples. The estimation initially uses all REITs in an index for a specific quarter and every other publicly listed one that is not from the same property sectors.

[Insert Table 3]

The propensity score used to construct the control group of shares not in an index at the time is estimated with four matching algorithms, but only two are reported in the text due to the similarity of the results in Table 3. The control group provides counterfactual outcomes on what would have happened to the REITs in an index (treated) if they had not had any index investors. Prior to matching (Panel A), the

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[22] After reviewing each institutions' website, we categorize them into actively-managed, passive index, real estate operating company, and investment bank investors from the company's website.

intercepts (-1.876) shows that most REITs, on average, are not part of an index. Those that are in an index have higher return on assets (0.159), larger total assets (1.017), more cash as a percentage of total assets (0.14), and longer time as a listed firm (age-0.594). After the matching process (Panel B), the mean values between the treated and control samples are no longer statistically significant.

4.3 Multinomial logit estimation of SEO issuance

Table 4 provides results from a multinomial logit model that predicts both the likelihood and form SEO surrounding addition to an index. The dependent variables compare the incidence of an accelerated SEO (0) to the probability of a fully marketed offer (1) or a REITs decision to not seek additional equity capital in a year (2).

[INSERT TABLE 4]

The intercepts of 1.26 and -4.17 reveal that an individual REIT is more likely to not seek equity capital than issue an accelerated SEO, but management on average is more likely to issue an accelerated SEO than a fully marketed offering when it seeks external funding. The tendency to not seek equity capital is higher for firms that issued debt in the same or prior quarter (2.24) and are not added to the S&P500 or MSCI index (-2.12). both prior to and outside of a financial crisis. The initial addition to the S&P 500 or MSCI index does not change the likelihood of REIT management not issuing equity in post crisis periods relative to pre-crisis periods (0.33). The tendency to issue accelerated SEOs rather than fully marketed offerings, however, increases (-0.14). Interestingly, being a part of another index such as the S&P 400 or 600 is unrelated to the likelihood of an accelerated SEO relative to not seeking capital prior to the crisis (0.16), but it increases the chance of accelerated SEOs (-0.40). In the post-recession period, however, being added to another index increases both the likelihood of an accelerated SEO relative to no offering (-1.02) and fully marketed offers (-0.59). These results are surprising given that accelerated SEOs typically have negative share price responses upon announcement due to less certification from investment bankers (Bortolotti, Megginson and Smart,

2008). For U.S. index REITs, accelerated shelf registered offers are announced and completed very quickly, typically within 48 hours, both within and outside of recessions, when index cross block ownership is high (H1).

Given that institutional investor heterogeneity implies that differences in valuation estimates, the next empirical tests examine the net share price reaction to and the change in non-index single block owners surrounding the SEO announcement. Based on Ferreira and Matos's (2008) analysis, the net response to SEO announcements should be a function of the actual or potential business relations that grey investors (e.g., commercial, banks, investment banks, and commercial real estate corporations) have with REITS where they have shareholdings and the incentive to monitor management's decisions. Independent blockholders (e.g., actively managed investment funds and advisors) are more prone to cause more negative share price reactions due to selling surrounding the announcement, whereas grey investors may hold shares and not react to SEO issuances.

Table 5 reports the share price reaction to equity offering for REITs with and without cross block ownership. The results show that the capital market responds much less negatively to SEOs for those REITs with high total cross block ownership relative to those shares not in an index (H2). REITs with index and those relationship-oriented investors such as CBRE have less negative short-term share price reactions of -1.19% and -1.18%, respectively. Surprisingly, when commercial and investment banks are the largest cross blockholder, the negative share price reaction of -2.53% mirrors the reaction by REITs with large actively managed mutual funds/advisors of -2.74%.

[INSERT TABLE 5]

When ownership is concentrated in the presence of a small number of large shareholders, the identity of the largest institutional blockholder is important when considering reduction in external equity capital market financial constraints for a sample of firms that cannot accumulate internal resources. Specifically, significant index cross block ownership appears to be a direct or indirect fundamental driver of capital

formation necessary to complete large commercial real estate projects that are integrally tied to the macro economy, but so is non-index single block ownership to a lesser extent (-0.31).

For robustness, we also consider whether the logarithm of investors' total concentration of the level of cross block ownership (HHI) or whether any cross-block institution has an executive that is a member of the REIT's board is an important determinant of SEO decision making. Total concentration of cross block ownership is statistically insignificant in Table 4 and, therefore, does not affect either the incidence or type of SEO. If a cross blockholder has a board of director member, it does not affect the likelihood of an SEO issuance (-1.22). It does, however, influence the decision to issue accelerated SEOs (-2.67).

The negative share price reaction to SEOs can create agency problems among those shareholders that do not own a substantial amount of block positions in many REITs, especially since the likelihood of an accelerated SEO is positively related to both joining an index and the percentage of non-index single block ownership. Index cross blockholders may facilitate new stock issuances to avoid even greater unobservable losses from an action not taken, but single blockholders may focus on the short term, dilutive impact on stock value. In this instance, non-index single block holders will express their dissent by selling shares after the SEO announcement. Panel A in Table 6 shows that non-index single block investors trade most around SEO issuances at firms with large passive cross-block ownership.

[INSERT TABLE 6]

BLOCK is the difference between non-index single block percentage at the beginning and end of the year for REITs that are part of the S&P 500 or MSCI and other indices relative to subsamples of comparable REITs that are not in any index. For the S&P 500/MSCI subsample, non-index single blockholders sell their shares following SEO announcements by more than 1.9% of the comparable non-index sample. One plausible reason large index cross block ownership makes stock prices less elastic. The tendency of non-index blockholders to sell after an SEO is even more extreme for REITs in other indices relative to a comparable non-index sample. To see whether the change is abnormally large, we test for difference in differences

ΔBLOCK as measured by the change in non-index single block ownership from two year prior (e.g., 2006) to the year prior (e.g., 2007) the SEO and the change between the end of year (e.g., 2008) and the following year (e.g., 2009). The differences in BLOCK after the SEO is much more negative than the differences in the earlier period for S&P 500/MSCI REITs (-1.7%) and other indices (-2.2%). Hence, a large block to cross block shareholder agency problem seems to exist, which expands the small literature on multiple large shareholders and complex ownership structures by showing that the identity matters (e.g., Boehmer, 2010; Attig, Ghoul and Guehami, 2009; Laeven and Levine, 2008; Claessens et al., 2002). The evidence corroborates Maury and Pajuste' s (2005) findings that the relationship between valuations and the presence of multiple large shareholders depends on the relative sizes of these dominant shareholders.

4.4 Biprobit model estimation of any type of SEO

Coles, Lemmon, and Meschke (2006) emphasize that studies on the relationship between ownership and firm value need to use an instrumental variables methodology to isolate different types of investors' incentives, quantify the economic significance of a specific ownership incentive mechanism, and minimize endogeneity and causation problems that commonly plaque empirical studies. The main concern is that most empirical models are incorrectly specified because not all the relevant economic determinants of firm value or managements' corporate governance decisions are included. Different cross blockholders' incentives are a different dimension often omitted in an empirical context, possibly causing regressions to be misspecified.

Specifically, the complexity of multiple cross and single blockholders in a REIT's ownership structure makes identification difficult. For example, an appropriate optimizing model should jointly estimate how addition to an index effects the likelihood of an SEO, conditional on the firm specific characteristics predicting that a REIT will be added to an index. Demsetz and Lehn (1985) discuss the need to jointly-determine endogenous variables. Therefore, researchers need to carefully specify and estimate structural models that capture intricacies in ownership structure to avoid detecting spurious relationships. Coles,

Lemmon, and Meschke (2006) report that standard estimation techniques such as fixed effect and 2SLS simultaneous equations does not adequately resolve endogeneity problems.

Our objectives are more modest. We use a bivariate probit model that controls for correlation or simultaneity to show that plausibly exogenous fluctuations in ownership structure due to addition to an index and the existence of multiple blockholders with different incentives, a distinct corporate governance characteristic, cause alterations in SEO issuance decisions and valuations. A standard bivariate probit estimation is a dynamic panel procedure that reduces concerns regarding potential omitted variable bias and endogeneity (Wilde, 2000). Regarding the empirical methodology, we construct a bi-probit model to estimate the probability of being added to the S&P 500 or MSCI index conditioned to the probability of SEO issuance of any form (endogenous latent variables). This framework enables us to quantify the effect of addition to the S&P 500 or MSCI index on the probability of any type of SEO issuance using quasi experimental evaluation of nonrandomized data within a cross-sectional analysis conditioned on the concentration of total cross block ownership (HHI). In our study, external funding enhancement is defined as an increase in the likelihood of an SEO due to addition to the S&P 500 or MSCI. We expect that REITs will increase their external equity financing from the capital market after joining an index (Howton, Howton, and Scheik, 2018).

The estimation model estimates two probit models jointly to consider interdependences. This methodology accounts for unobserved factors not included in the model that may influence both decisions. The first model in table 7 provides evidence on the effect of the membership in other indices instrument on the probability of being added to the S&P 500 or MSCI. The second model estimates the inverse predicted probability of being in the S&P 500 or MSCI index and the Mills Ratio that captures unobserved factors on the likelihood that any type of SEO issuance, accelerated or fully marketed.

[INSERT TABLE 7]

Notice that the instrument in the first equation is excluded from the second equation. Other control variables identified in the literature are also included to mitigate the problems of issuing firms being

intrinsically different from those that do not decide to obtain new public equity funding. To date, the incidence

of being admitted into a major index (buy-and-hold cross blockholders) has been an unobserved characteristic

in models estimating the likelihood of external equity funding. In bi-probit estimation, however, the

probability of issuing an SEO depends both on the REIT's decision to extend an offering and the

predominance of index investors in the ownership structure.

Table 7 provides the details of bivariate probit estimates of the determinants of S&P 500 or MSCI

addition (First Equation) and SEO issuance (Second Equation) for the treatment and control samples. Results

from the first equation in table 7 show that being part of a lesser index increases the probability of a REIT

being added to the S&P 500 or MSCI (0.875), as expected. These index REITs once chosen had higher

profitability as measured by ROA (0.251), longevity (0.011), and more positive stock price momentum

(0.023). The concentration of total cross block concentration had no effect on the REIT being chosen (0.042).

Results from the second equation are consistent with a high predicted probability of being admitted to

a major index increasing the likely of an SEO issuance as seen by the statistically significant coefficient of

1.29, unless they issued an SDO in the year (1.003).[23] The likelihood of an SEO rises as the amount of

external funds needed as measured by proceeds gets larger (0.026). The complexity of the ownership structure

appears to be an important determinant. Independent of addition to a major index, the annual change in total

cross block concentration (HHI) is positively related to the probability of an SEO for publicly traded REITs.

The coefficient of 0.122 is statistically significant at the 0.05 level. Interestingly, the percentage of single,

non-index block ownership is unrelated to the incidence of an SEO (-0.110).

Other characteristics are important also. REITs with greater leverage (0.088), less cash larger offer

sizes (0.026), and higher market-to-book value of equity (0.019) are more likely to issue SEOs. Higher

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[23] There appears to be no correlation between unobservable factors that predict addition to a major index and the likelihood of a SEO issuance by publicly traded REITs. The coefficient of 0.029 is not statistically significant.

market-to-book value is consistent with some degree of market timing: Ooi, Ong and Li (2010) find that

REITs time the SEO market within a general targeted debt ratio.

ATE and ATT are reported in the last two rows of the table below biprobit estimations.[24] ATE suggests

that being added to the S&P 500 or MSCI index improves the chances of a REIT manager issuing an SEO for

a firm randomly drawn from the population by approximately 12%. In comparison, ATT suggests that already

being a member of the S&P 500 or MSCI index increases the probability of an SEO for a REIT by about 34%.

These results show that index membership decreases financial constraints. Taken together, the results show

that being part of a major index membership and having cross blockholders are valuable intangibles for equity

REITs.

5.   SUMMARY AND CONCLUSIONS

According to a 2017 Ernst and Young report[25], consistent and reliable access to common equity has

become much more challenging for managers in the REIT industry after the onset of the financial crisis. The

accounting firm states, "Access to capital remains a critical business priority for all REITs. However, recent

years have seen REITs raise less equity capital (US$37b in 2016 vs. US$58b in 2013) … meaning the

opportunity to raise public equity capital is currently not as reliable as it has been historically…" Are findings

corroborate Gilo, Moshe and Spiegel's (2006) theory that an increase in cross holdings increases stability.

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[24] The sample average treatment effect (ATE) is the mean of the difference between the probabilities of an SEO for the two different subsamples. Limiting our sample to one industry and attempting to match up similar firms based on observable characteristics (nearest-neighbor matching) helps eliminate problems associate with causal inference (Wooldridge, 2002). The assumption is that after conditioning on covariates the treatment is essentially randomly assigned – conditional mean independence. Separate regressions predicting the probability of an SEO for those REITs in and not in an index are estimated to get the conditional ATE for each subgroup. The value of the ATE represents the expected mean effect of the treatment for both being in the S&P 500 or MSCI index and the Mills ratio representing unobservable factors drawn at random from the population. ATT is the average treatment effect on the treated subsample, which is the expected mean effect of the treatment for a REIT that is added to the S&P 500 or MSCI.

[25] https://www.ey.com/Publication/vwLUAssets/EY-opportunities-and-challenges-facing-the-US-REIT-industry/%24FILE/EY-opportunities-and-challenges-facing-the-US-REIT-industry.pdf

Shareholders like BlackRock, Vanguard and State Street –the 'Big Three[26]' – are major drivers within the capital market that facilitate liquidity, both within and outside of recessions. The results are, therefore, consistent with index fund investors intentionally or unintentionally stabilizing the commercial real estate sector, financial system and macro economy (e.g., Cao and Petrasek, 2014; Ferreira, 2008; Rubin, 2007).

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[26] Given that these firms have oligopoly ownership positions in several different industries, examining their role in the capital markets is a timely and important issue. Fitchner, Heemskerk and Garcia-Bernardo (2017) persuasively argue that because they are the largest shareholder in eighty eight percent of the S&P 500 firms for every industry.

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Figure 1
Annual Distribution of REIT SEOs over the period 1990 - 2013

Figure 2
Patterns of Cross-Holding by Institutional Investors at REITs from 2000 to 2014
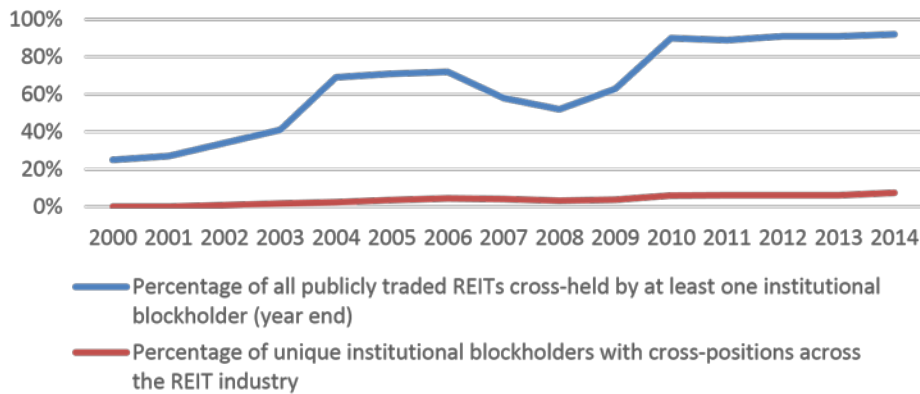
Figure 3
Nareits outperform index Reits
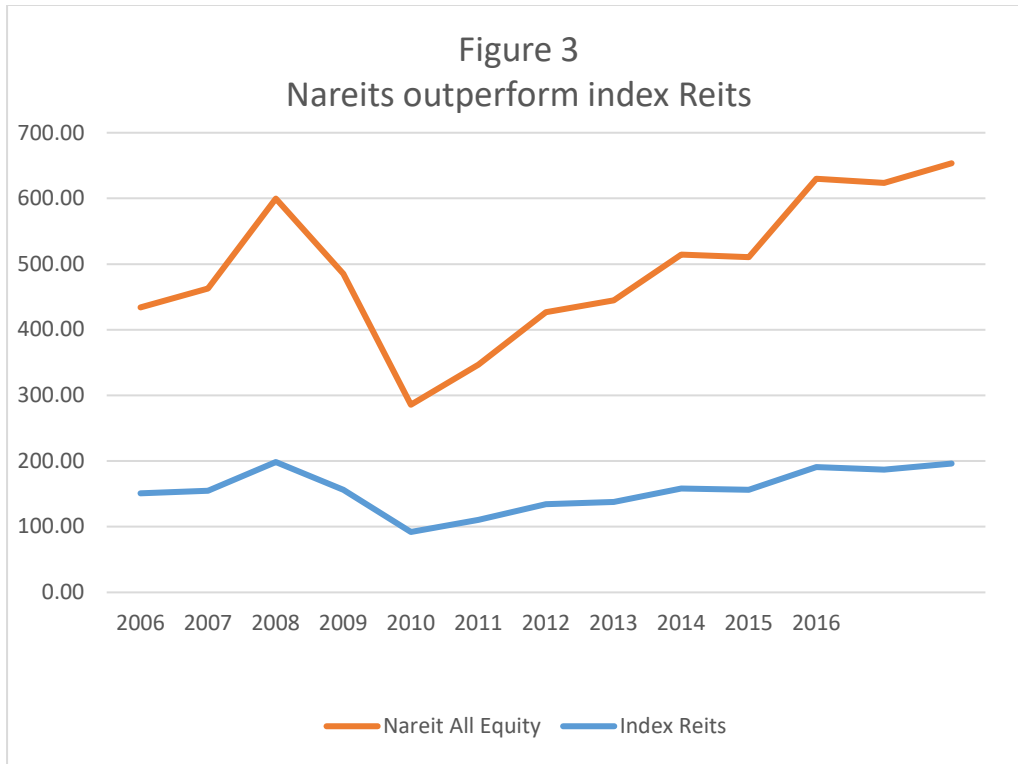
Table 1: Summary Statistics for Institutional Ownership from 2014 and 2000

anel A 2014					
Variable	**Median**	**Mean**	**Minimum**	**Maximum**	**SD**
Cross-Institutional Block for an Individual REIT%	34.65%	35.21%	0%	82.76%	18.45%
Total Institution & Mutual Fund %	83.00%	74.16%	5.00%	100.00%	29.20%
Number of Institutions & Mutual Funds	275	299	2	925	190
Number of Cross-Block Institutions & Mutual Funds	5	4.92	0	12	2.54
Individual Block %	0%	1.52%	0%	61.00%	8.09%
Institution Block %	0%	3.18%	0%	15.66%	4.22%
Mutual Fund Block %	9.18%	7.31%	0%	17.61%	5.29%

anel B 2000					
Variable	**Median**	**Mean**	**Minimum**	**Maximum**	**SD**
Cross-Institutional Block for an Individual REIT%	0%	13.65%	0%	30.09%	4.77%

Cross Block Ownership of Traded Commercial Real Estate Portfolios

Total Institution & Mutual Fund %	55.69%	46.81%	0.00%	77.20%	16.77%
Number of Institutions & Mutual Funds	140	226	0	831	205
Number of Cross-Block Institutions & Mutual Funds	0	2.07	0	5	0.19
Individual Block %	0%	0%	0%	32.00%	11.01%
Institution Block %	7.44%	4.03%	0%	15.66%	4.22%
Mutual Fund Block %	0%	1.86%	0%	28.10%	2.23%

Index Funds with No Business Relationships: Vanguard Fund, Vanguard REIT, BlackRock Trust

Actively Managed Asset Funds with No Business Relationships: Invesco, and Fidelity Asset Management Fund FMR, T Rowe Price Asset Management Fund, LaSalle Advisers, Farallon Capital Management

Actively Managed Asset Funds with Advisory Business Relationships: BlackRock Fund, Daiwa Asset Management Fund, Securities Capital Research & Management, The Cali Group/Merrill Lynch-Bank of America,

Investment Management Advisory and Mutual Fund Services with Underwriting Business Relationships: JP Morgan, Morgan
Stanley, Goldman Sachs, Deutsche Bank, Barclay's Global

Commercial/Investment Bank with Underwriting and Lending Relationships: State Street Corporation

Real Estate Operating Companies with Development or Property Management Relationships: Cohen and Steers, CBRE Clarion

Individuals: The Mack Family (William, Richard and Stephen), Thomas Lee Equity Fund, Gerald Ford

Private Investment Managers: Capital ARC Holdings, Pacific Financial Research Management Insurance: Prudential Insurance Co

Table 2: Trend in Mean Cross-Blockholdings & Standardized HHI from 2000 until 2014 for REITs

	Panel A Cross Blockholdings						Panel B Standardized HHI	
Year	Index	Actively Managed Only	Actively Managed/Advisory	Bank	Real Estate	Individual	S&P Treatment Sample	Control Sample
1999	0.0%	2.3%	1.1%	0.0%	7.5%	8.2%	0.07	0.05
2000	0.0%	3.0%	1.7%	0.2%	10.3%	8.6%	0.08	0.06
2001	3.5%	4.6%	2.1%	1.4%	6.1%	9.8%	0.34	0.09
2002	3.7%	4.6%	2.2%	1.4%	6.4%	9.9%	0.39	0.10
2003	5.2%	4.7%	2.4%	3.0%	6.6%	9.5%	0.50	0.09
2004	6.9%	4.7%	2.4%	3.1%	6.6%	9.2%	0.61	0.08
2005	7.1%	4.7%	2.8%	3.8%	6.7%	8.8%	0.66	0.11
2006	10.0%	5.1%	3.1%	3.8%	7.1%	6.5%	0.73	0.11
2007	12.8%	3.4%	2.4%	4.7%	6.0%	5.9%	0.87	0.12
2008	15.1%	4.0%	2.9%	4.7%	5.3%	2.3%	0.81	0.11
2009	16.4%	5.8%	4.3%	5.0%	4.2%	1.9%	0.77	0.13
2010	16.9%	6.3%	4.9%	5.0%	4.2%	1.1%	0.85	0.11
2011	18.8%	6.6%	5.5%	5.2%	4.1%	0.9%	0.80	0.10
2012	19.7%	7.0%	4.4%	5.9%	3.8%	0.9%	0.82	0.13
2013	19.8%	7.7%	3.1%	5.2%	2.9%	0.75	0.90	0.13
2014	22.9%	7.6%	6.13%	5.8%	4.0%	0.05	0.92	0.12

Test of Differences in Standardized HHI
Wilcoxon Signed-Rank Test   4.99***
Asymptotic Significance Level   0.000

Table 3: Propensity Score Model (Pre-Announcement Index Membership Period)

Panel A: Results from models which is used to generate the propensity scores for matched sample. The dependent variable is an indicator variable for REITs that are part of an index (1) and those that are not (0). Age and assets are transformed into logarithms. Firm age is in quarters. Assets is book value in total assets (in $Millions). Leverage is total liabilities divided by total assets. Cash ratio is total cash and equivalents divided by total assets. All continuous variables are Winsorized at the 1st and 99th percentiles. Parameter estimates for each variable (Coefficient) and the z statistic are reported. The estimation includes all publicly traded REITs from 2000 to 2014.

Panel A Logistic Model (nearest neighbor)				Panel B Probit Model (common support)			
Variable	**Coefficient**	**z**	**Prob(z)**	**Variable**	**Coefficient**	**z**	**Prob(z)**
Intercept	-1.876	-11.14	0.000	Intercept	-2.729	-8.14	0.000
ROA	0.159	8.67	0.000	ROA	0.051	7.99	0.000
Leverage	-0.377	1.44	0.232	Leverage	-0.128	-8.76	0.000
Assets	1.017	10.11	0.000	Assets	1.47	15.79	0.000
Cash/TA	0.141	2.20	0.028	Cash/TA	0.117	2.62	0.033
Dividend Yield	-0.078	-0.40	0.686	Dividend Yield	-0.001	-0.08	0.912
Firm Age	0.594	5.61	0.000	Firm Age	0.048	7.87	0.000
Year-Quarter FE	Yes			Year-Quarter FE	Yes		
Property Type FE	Yes			Property Type FE	Yes		
F	171.00			LR Chi2	516.56		
Probability (F)	0.00			Probability (Chi2)	0.00		
Adjusted R2	0.2049			Pseudo R2	0.3840		
Number of unique REITs used to compute the model	2492			Observations	2492		

Panel B: Summary statistics for the treatment (760) and control group (760) samples of REITs used in this study during 2000 to 2014. The bias statistics provide evidence regarding the covariates balance between groups before and after using nearest neighbors matching. Cash ratio is cast to total assets. Firm Size is total assets ($million). Debt ratio is debt to total assets. Firm age is age of the REIT in years defined by extent of time as a publicly listed entity. The final two columns report the t-test for differences in means between the two subsamples.

Variable	Groups	Mean Treated	Mean Control	t	Prob(t)
ROA	Unmatched	.006	.003	10.84	0.000
	Matched	.006	.005	0.16	0.873
Leverage	Unmatched	0.48	0.39	2.52	0.012
	Matched	0.48	0.45	-0.22	0.823
Assets ($millions)	Unmatched	4,439	2,907	9.60	0.000
	Matched	4,439	4,108	0.05	0.959
Firm Age (years)	Unmatched	16.60	10.19	12.63	0.000
	Matched	16.60	15.84	0.18	0.861
Cash/TA	Unmatched	0.03	0.03	0.03	0.992
	Matched	0.03	0.03	0.02	0.995
Dividend Yield %	Unmatched	4.92	4.83	0.59	0.654
	Matched	4.92	4.87	0.22	0.880

Table 4: The Effect of an Exogenous Shock in Cross-Block Ownership on the Likelihood of Secondary Equity Issuances

Table 4 presents the results from a multinomial logistic regression that predicts both the likelihood and form of seasoned equity offering (SEOs) for a sample of REITs. The final sample includes 760 fully marketed offers and accelerated offers and 760 REITs in the control sample that did not issue equity in a specific year over the period 1990-2013. An accelerated offer is defined as any offer in which the announcement date occurs within 2 trading days of the offer date; otherwise the offer is classified as a fully marketed offer. The offer date is adjusted using the volume-based correction approach outlined in Safieddine and Wilhelm (1996), among others. Total proceeds are the total amount of dollars (in millions) raised in the U.S. Total proceeds are adjusted for inflation and reported in 2013 purchasing power. The REIT SEO firms are matched with a sample of REITs that did not issue any type of equity offering for the four quarters pre-and post the SEO date using the propensity matching scoring process. The Treatment1 group equals one for REITs that have publicly been announced as part of the S&P500 or MSCI index, and zero otherwise. The Treatment2 group equals one for REITs that have publicly been announced as part of any minor index, and zero otherwise. A matched control sample for each is the comparison sample based on a Propensity Score Match methodology. A Post dichotomous variable is defined for the period that encompasses both the housing and credit/financial crises from the first quarter 2006 to the fourth quarter 2009. WSKI is an indicator variable equal to one if a firm either has a market capitalization of at least $700 million in the year preceding the offering or has issued more than $1 billion in nonconvertible securities over the three years preceding the offering, and zero otherwise. Firm Size is the natural logarithm of the number of shares outstanding multiplied by share price all measured one quarter prior to the announcement. M/B Equity is the sum of market capitalization plus book value of total assets minus book value of equity divided by the book value of total assets, all measured one quarter prior to the announcement. Leverage is the sum of short- and long-term debt divided by the book value of total assets. Runup is the cumulative excess return for the prior 12 months ending one month prior to the announcement. StockVol is the standard deviation of daily stock returns over the prior 6 months ending one month prior to the announcement. Ln(Proceeds) is the natural logarithm of proceeds raised in the issue. We cluster the standard errors at the firm level. Debt Issuance equals one if the REIT issued an equity in the year of or previous year of the SEO announcement. Age and assets are transformed into logarithms. Firm age is in quarters. Assets is book value in total assets (in $Millions). Leverage is total liabilities divided by total assets. Cash ratio is total cash and equivalents divided by total assets.

Variable	No Offer		Fully Marketed	
	Coefficient	Test Statistic	Coefficient	Test Statistic
Intercept	1.26***	(4.97)	-4.17**	(10.39)
Index Fund:				
Treatment 1 (S&P 500/MSCI)	-2.12***	(-10.91)	-1.74**	(-3.67)
Treatment 2 (Other Indices)	0.16	(1.41)	-0.40**	(-3.91)
Financial Crisis Shock:				
Post* Treatment 1	0.33	(1.19)	-0.14***	(2.82)
Post* Treatment 2	-1.02***	(4.11)	-0.59***	(3.77)
Recent New Capital & Frequent Users:				
Debt Issuance $_{t-1}$ or $_t$	2.24***	(12.21)	-0.11	(0.69)
WKSI	-0.07	(-1.33)	-0.89	(-1.09)
Post*WKSI	-0.55***	(3.18)	-0.72***	(4.00)
Governance:				
Cross BlockBoard=1	-1.22	(0.93)	-2.67***	(2.21)
HHI	-0.00	(0.03)	-0.19	(0.70)

Non-Index Single Block Ownership	-0.31***	(3.09)	-0.25*	(1.87)
Firm Characteristics:				
180-Day Run-Up	-0.13**	(2.07)	0.06	(0.94)
ROA $_{t-1}$	-0.44***	(3.99)	-0.37***	(4.14)
Firm Size $_{t-1}$	-1.51**	(3.00)	-1.07***	(6.20)
Leverage $_{t-1}$	-0.34***	(2.88)	-0.33***	(2.99)
Volatility $_{t-1}$	0.02***	(2.12)	0.05***	(3.28)
M/B Equity $_{t-1}$	-0.70***	(3.02)	-1.22***	(2.58)
Cash/TA $_{t-1}$	-0.09***	(-5.04)	-0.15	(-0.21)
Dividend Payout $_{t-1}$	-0.69	(1.01)	0.09	(0.15)
Firm Age	0.03	(0.85)	0.02	(0.71)
SEO Features:				
Underwriter Rank	-0.06***	(4.00)	-0.06***	(4.01)
Ln (Proceeds)	0.09**	(2.19)	0.10**	(2.27)
Purpose: Investment=1	-0.22	(1.14)	0.17*	(-1.74)
Fixed Effects:				

Year	Yes
Property Type	Yes
Pseudo R-square	0.398
N (REIT SEO events and control pair)	1520

Table 5: Share Price Reaction to Equity Offerings

Table 5 presents abnormal returns by cross-block ownership structure and SEO offer type. Each panel reports the cumulative abnormal return surrounding the announcement of an SEO for REITs with and without cross-blockholdings. The significance level of the difference between those with and without cross-blocks is tested with a t-statistic. The differences across firms with different types of cross-block mutual funds is tested with the Kruskal-Wallis H test. The model parameters are estimated from day -286 to day -31, where day 0 is the announcement date. The standard errors are clustered by firm and year to consider the correlation in residuals within each year.

Share Price Reaction	With Cross-Blocks	Without Cross-Blocks	T test Difference
Car (-1,+1)	-1.2	-2.6	-1.4***
p-value	0.0000	0.0000	
Car (-2,+2)	-1.7	-2.3	-0.6***
p-value	0.0000	0.0000	

Share Price Reaction	Index	Bank	Real Estate	Actively Managed	Kruskal-Wallis
Car (-1,+1)	-1.19	-2.53	-1.18	-2.74	2.17***
p-value	0.0000	0.0020	0.3960	0.0010	
Car (-2,+2)	-1.99	-2.51	-1.20	-2.86	2.09**
p-value	0.0000	0.0003	0.3140	0.0000	

Table 6: Differences in Non-Index Single Block Ownership surrounding SEO

Table 6 presents the univariate differences in non-index single block ownership for the samples of REITs. In panel A, the difference in non-index single block ownership for the TREATMENT relative to the CONTROL subsample is BLOCK (or ΔBLOCK) in the year-ends surrounding an SEO minus. In Panel B, the difference in differences in non-index single block ownership for the TREATMENT and CONTROL samples when the REIT issues an SEO. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The mean non-passive block percentage is 10.7% (14.1%) for the TREATMENT (CONTROL) subsample.

Panel A: Annual Differences in Non-Index Single Block Ownership when REITs issue SEO for firms with passive index investors

	S&P 500/MSCI	Other Indices	T statistic
BLOCK	-0.019**	-0.053***	4.98***
ΔBLOCK	-0.017**	-0.022**	5.54***

Panel B: Differences in Non-Index Single Block Ownership between the TREATMENT and CONTROL subsamples at year-ends surrounding an SEO issuance. The mean non-index single block percentage is 10.7% (14.1%) for the TREATMENT (CONTROL) subsample. he means non-index single block percentage is 8.3% (12.0%) for the TREATMENT (CONTROL) subsample.

	Accelerated			Fully Marketed		
	Mean Qt	Qt-1→Qt+1	Qt-1→Qt	Mean Qt	Qt-1→Qt+1	Qt-1→Qt
BLOCK	-0.062***	-0.077***	0.019**	-0.008***	-0.011***	0.004***
ΔBLOCK	-0.018**	-0.036**	-0.012***	-0.005***	-0.010***	-0.003***

Table 7: The Effect of Cross-Block Ownership on the Likelihood of Any Type of Secondary Equity Issuances

Table 7 presents the results from biprobit logistic regressions that predicts both the likelihood of a REIT issuing any type of seasoned equity offering (SEO) and a secondary equity offering in a specific year over the period 2001-2013. An accelerated offer is defined as any offer in which the announcement date occurs within 2 trading days of the offer date; otherwise the offer is classified as a fully marketed offer. The offer date is adjusted using the volume-based correction approach outlined in Safieddine and Wilhelm (1996), among others. Total proceeds are the total amount of dollars (in millions) raised in the U.S. Total proceeds are adjusted for inflation and reported in 2013 purchasing power. The REIT SEO firms are matched with a sample of REITs that did not issue any type of equity offering for the four quarters pre-and post the SEO date using a propensity matching scoring process. The Predicted Probability of being added to an index and the Inverse Mills Ratio is obtained from the first equation. Underwriter rank reputation data is obtained from Jay Ritter's website (http://bear.cba.ufl.edu/ritter). Firm Size is the natural logarithm of the number of shares outstanding multiplied by share price all measured one quarter prior to the announcement. M/B Equity is the sum of market capitalization plus book value of total assets minus book value of equity divided by the book value of total assets, all measured one quarter prior to the announcement. Leverage is the sum of short- and long-term debt divided by the book value of total assets. Runup is the cumulative excess return for the prior 12 months ending one month prior to the announcement. StockVol is the standard deviation of daily stock returns over the prior 6 months ending one month prior to the announcement. Ln(Proceeds) is the natural logarithm of proceeds raised in the issue. We cluster the standard errors at the firm level. Debt Issuance equals one if the REIT issued an equity in the year of or previous year of the SEO announcement. Age and assets are transformed into logarithms. Firm age is in quarters. Assets is book value in total assets (in $Millions). Leverage is total liabilities divided by total assets. Cash ratio is total cash and equivalents divided by total assets. The results in table 6 are the estimated results from the models 1 and 2 of the bivariate probit model (the combined biprobit analysis is not included due to space limitation). The Wald tests confirm endogeneity in that the value is significantly different from zero and the Log Likelihood statistics are consistent with the models having statistically significant prediction value. In the first model, being in a lesser index usually precedes being add to either the S&P500 or MSCI index. The results are adjusted for heteroscedasticity and clustering.

First model: The effect of total cross block ownership concentration and lesser index membership on S&P 500/MSCI index membership addition

1 Instrument: Treated 2	Bivariate Probit Model Coef	P = z
Constant	-1.019***	0.000
Treated 2 (other indices)	0.875***	0.000
Size	0.360	0.104
Trading Volume	0.038	0.186
ROA	0.251***	0.001
Firm Age	0.011***	0.003
Momentum	0.023***	0.001
Level Ln (HHI)	0.042	0.197
Property Sector Fixed Effect	Yes	
Time Fixed Effect	Yes	
Log Likelihood	-3554	
Maximum Absolute Gradient	0.00358	
Number of Iterations	4	

Cross Block Ownership of Traded Commercial Real Estate Portfolios

Optimization Method	Quasi-Newton
AIC	7116
Schwarz Criterion	7143
Wald Likelihood Ratio	580.81 (p=0.000)

Second model: The effect of cross block ownership and unobservable factors that predict index addition to the S&P 500/MSCI index membership on the probability of any type of SEO, accelerated or fully marketed

2 Instruments: Inverse Probability of Index Addition and Mills Ratio from Model 1	Bivariate Probit Model Coef.	P > z
Constant	0.072	0.621
Predicted Probability Index	1.29***	0.000
Inverse Mills Ratio	0.029	0.593
Change in Ln (HHI)	0.122***	0.031
Non-Index Single Block	-0.110	0.242
Leverage	0.088***	0.0000
SDO	-1.003***	0.0000
Volatility of Stock Returns	-0.107	0.0890
M/B Equity	0.019***	0.0030
Cash/TA	-0.217***	0.0000
Underwriter Rank	0.144	0.192
Ln(Proceeds)	0.026***	0.044
Property Sector Fixed Effect	Yes	
Time Fixed Effect	Yes	
Log Likelihood	-6958	
Maximum Absolute Gradient	0.0000756	
Number of Iterations	12	

Optimization Method	Quasi-Newton
AIC	13000
Schwarz Criterion	13000
Wald Likelihood Ratio	249.98 (p=0.000)

	Effect of index addition treatment from the combined model
ATE (average effect of treatment)	12%
ATT (average effect of treatment to the treated)	34%