

# Can Securitization Work? Lessons from the U.S. REIT Market<sup>1</sup>

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## Abstract

*In light of recent experience we ask whether there are any measurable economic “goods” associated with real estate securitization. To this end, we analyze securitized equity interests in commercial property (the so-called listed REIT market), with a particular focus on the U.S. experience. A comparison of the recent U.S. housing and commercial property market cycles reveals some similarities but more importantly some stark differences. Differential performance is largely attributable to excess housing supply relative to balanced supply realized on the commercial property side of the market. We conjecture that an important contributing factor to the muted commercial property supply response was the “civilizing influence” of the REIT sector. A formal test of the conjecture is applied, with results that suggest the REIT market indeed moderated supply outcomes in the U.S. Relationships between the REIT market and new construction are generally weaker in other analyzed countries, where we attribute this finding to structural differences. We conclude that securitization can work, but that attention to structural detail is essential in order to maximize the benefits associated with creating a transparent and liquid market for securitized investment interests.*

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# Can Securitization Work? Lessons from the U.S. REIT Market

## 1. Introduction

Recent experiences in the U.S. residential mortgage and MBS markets have caused many market participants, analysts and policymakers to be sceptical that any social good can result from securitization. To assess whether securitization is capable of working, we appeal to the generalizable experience of a related sector. Namely, we study securitized equity interests in commercial property, known broadly as the listed equity Real Estate Investment Trust (or REIT) market. We maintain that developing a deeper understanding of the REIT market experience can aid in understanding what went wrong in the MBS/structured securities market, and furthermore will suggest potential policy solutions in terms of how structural features—both good and bad—can be applied to better organize the securities production process going forward.

We start the paper by analyzing the recent boom and bust in both the housing and commercial property markets. Although the summary characteristics of the dual property markets resemble each other in some ways, we find that the commercial property market downturn occurred later than on the residential side. There have also been very significant differences in market performance since early 2009. Specifically, commercial property markets in the U.S. have in aggregate more or less fully recovered to their pre-crisis pricing levels, whereas residential property markets have recovered only marginally from the troughs of the cycle.

We find that large and persistent differences in new construction during the growth years of the early and mid-2000s help to explain these performance differentials. Although it is well known that far too many housing units were produced in the U.S. over the period, it is less well known that commercial property markets did *not* experience a construction boom – staying in balance throughout the biggest real estate bubble in the U.S. since the 1920s.

After considering several potential explanations for the muted supply response on the commercial side, we hypothesize that REITs played a central role in moderating supply. Specifically, our conjecture is that commercial property investors and other U.S. REIT market participants discover prices quickly and without substantial bias. These firms are covered by industry analysts, rating agencies, and “talking

heads” that convey bad as well as good information about the current state of commercial property markets. Exchange-traded shares also induce significant volatility into listed share prices, which may give market participants pause when contemplating resource allocation decisions that affect the supply of extremely durable commercial space in local markets.

There are also important structural factors, which in aggregate differentiate the U.S. REIT market from other REIT markets that exist around the globe. The vast majority of U.S. equity REITs are internally managed. Many REITs are run by experienced as well as talented managers that invest in good to high quality assets, lending credibility to the sector. The REITs themselves are going concerns that hold a portfolio of assets in which management reputation and time consistency are critical to continued affordable access to capital markets. Restrictive payout requirements reinforce this going concern effect, in that growing firms must return to the capital markets on a regular basis to raise money from outside investors that have many other investment opportunities. All together, transparency, price discovery and structural factors work to defeat distortions originating from self-interested short-termist agents who might otherwise use time lags and noise in information production to prolong booms that turn into prolonged busts.

To test our “civilizing influence” hypothesis we measure the market share of assets held by REITs as a proxy for the general effects of *attention* paid by key market participants to transparent firms for which valuable information is generated through exchange-traded share prices and related information production activities. We then estimate a reduced form model of construction supply for the United States as well as for several other countries with relatively large REIT markets. In the U.S. case we find fairly strong and robust evidence that REITs exerted a price-independent moderating effect on supply response. Although we document that supply response across most commercial property markets around the globe has moderated in the last 10 to 15 years, we only find weak evidence of a similar REIT market penetration effect in other countries.

We believe an important reason for the inconsistent results is structural differences in how REIT and commercial property markets operate at the country level. This leads us to conclude that financial plumbing matters with respect to realized costs and benefits of securitization. Moreover, and counter to the current fashion, we hold up U.S. securitization vis-à-vis commercial property equity interests as a model of a well-structured market that has helped allocate scarce resources efficiently. We make this

claim about a sector that predictably boomed and busted every 15 years or so prior to the introduction of a “viable and credible” securitized equity market.

## **II. The U.S. Property Market Boom and Bust**

### ***II.A. A Parallel Bubble in Residential and Commercial Property Markets?***

There is general agreement that the U.S. experienced a bubble in many prominent residential real estate markets in the five-plus years leading up to the financial market meltdown of 2007-08. The bubble period was characterized by rapid increases in house prices, together with substantial increases in the supply of homes. This boom was followed by a bust, characterized by steeply declining house prices and persistent weakness in most housing markets around the country.

Although many analysts have focused their attention on problems associated with housing and the housing finance system, some have argued that there was a parallel bubble in commercial property markets in the U.S. (Ellis and Naughton (2010), Levitin and Wachter (2012)). To assess this issue, consider Figure 1. The left hand panel displays three price series pertaining to housing markets in the U.S.: An index of home builder share price performance, the aggregated Case-Shiller index of home prices, and a truncated index of credit default swap (CDS) prices on AAA-rated sub-prime mortgage-backed securities (the so-called ABX index). The right hand panel displays a comparable set of price-index series for commercial property in the U.S.: An index of real estate investment trust (REIT) share prices, the MIT transaction-based index of commercial property prices, and credit spreads on AAA-rated commercial mortgage-backed securities (CMBS).

#### **Figure 1 Here**

An initial examination of the two sets of time series data suggests a similar boom-bust pattern in housing and commercial property markets. For example, the homebuilder series shows that prices more than quadrupled from 2000 to late 2005, followed by a more than 75 percent price decline, with prices bottoming in early 2009. A similar pattern can be seen with commercial REIT index prices. The ABX and CMBS index time series are particularly dramatic. Residential ABX prices on AAA-rated bonds decline from a par value of 100 in early 2007 to just over 20 percent of par in early 2009 (implying

something in excess of a 40 percent required yield!), while AAA-rated CMBS credit spreads increase from about 30 basis points to over 15 percent (1,500 basis points) during the same time frame.

A closer and more complete examination of these data reveal, however, significant differences in the two sets of time series. First, note that the home-builder price index peaks in late 2005 and that Case-Shiller house prices do so around the middle of 2006. With hindsight we now know that the early highs on the housing side signaled big troubles to come in the broader financial markets. In contrast, there is a year-plus delay in commercial property market peaks. This delay is somewhat puzzling, suggesting that the two markets were not as closely synchronized as some have suggested. It also means that the downward slide in commercial property prices was particularly sharp, as both markets hit a bottom in early 2009.

There is a second, more crucial difference between U.S. housing and commercial property markets. Case-Shiller house prices remain near their lows, while home builder and ABX price indices show what can best be described as a tepid recovery. In contrast, commercial property prices are seen to have almost fully recovered to their pre-crisis highs. Thus, while price declines were sharp but V-shaped on the commercial side of the property market, housing price declines have been more protracted and ultimately more severe.

## ***II.B. What Explains the Post-Crisis Differences Between Housing and Commercial Property Markets?***

In our discussions with economists and industry professionals, we have heard a number of different rationales as to why commercial property markets have vastly outperformed housing markets since early 2009. Many of the proposed explanations have focused on demand-side fundamentals, in terms of identifying differences in the demand for space in the two markets. Certainly rental housing, which constitutes the multi-family housing sector of commercial property markets, has benefited from a dysfunctional and highly uncertain housing market. But other important commercial property sectors (see Figure 2), most notably office and retail, have seen share prices spike up in an economy with stubbornly high rates of unemployment and considerable softness in consumer spending. Even hotel property prices, which historically have a close relationship to GDP growth due to their very short (daily) rental terms, have experienced sharp price increases while GDP growth has stagnated.

## Figure 2 Here

We have also heard arguments that U.S. commercial property, particularly higher quality income-producing property in desirable locations, has benefitted as investors seek safe investment havens during these times of accommodative monetary policy and general economic uncertainty. There is also a related argument that commercial property has benefitted from a general shortage of low-risk, high quality collateral availability, as commercial property offers durable assets with stable cash flow streams.<sup>1</sup> The latter argument begs the question as to why commercial property has done well relative to housing, since commercial property experienced the same kind of volatility and price declines that housing did from 2006 to early 2009. The safe haven argument in our opinion has merit, but cannot by itself explain the very large differences in price performance between housing and commercial property since early 2009.

Another argument we have heard relies on short sales to explain the differences in recent performance, in that it was easier to short commercial property through the REIT market than it was to short housing. For several reasons we believe that short selling can provide at best only a partial explanation. First, if true, we would not have expected to see the big increase in commercial property prices that some describe as a bubble prior to the onset of the financial crisis. Second, exchange-traded home builder shares have been around for a long time, and can be shorted. More importantly, housing could be effectively and efficiently shorted through the development of credit default swap derivative indices on prime and sub-prime residential mortgage-backed securities. Although CDS markets did not develop in earnest until the early-middle 2000's, they did provide investors the opportunity to short housing (as John Paulson did among others, as famously described in Lewis (2010)). Indeed, we conjecture that shorting housing through CDS markets is part of the reason why the peak and subsequent downturn in housing security prices happened well ahead of the analogous turning point in commercial property prices.

What about supply side rationales for the post-crisis performance differentials? We believe that a focus on the supply side indeed provides the key to understanding this issue. But benchmarking appropriate supply flows on the housing side is complex, as they depend on factors such as household formation,

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<sup>1</sup> The general argument that U.S. assets perceived to be safe have benefitted from the demand of foreign investors has been made by Caballero and Krishnamurthy (2009), as well as Bernanke et al (2011). Discussion specifically about demand for triple-AAA rated MBS securities is to be found in Diamond and Rajan (2009). Anecdotal discussion on the strength of prime commercial property as an investment class is to be found in "A Special Report on Property" in the Economist, 3 March (2011).

regulation and second home demand in addition to fundamental variables such as movements in mortgage rates and household income. There is no dispute among researchers, however, that there has been and currently is excess housing supply nationally, and that excess supply varies significantly across states. For example, California, Nevada, Florida and Arizona are typically cited as having experienced the biggest housing market boom and bust. According to Wheaton (2012), the four cited states house about 20 percent of the population of the U.S., but accounted for 30 percent of the housing starts and mortgage loans in the U.S. in 2005, over 40 percent of the second and investment homes in 2005, and 50 percent of the foreclosure starts in 2009.

One simple way to express the housing oversupply problem is as follows.<sup>2</sup> Over the last 40 years annual construction has averaged close to 300,000 more units than new households. This incremental supply presumably reflects a steady state in second home growth and demolitions (or some other aspect of aggregate demand for housing). From 1998 to 2008 excess supply averaged approximately 600,000 units per year, implying an excess stock of about 3 million housing units in 2008. Since 2008 some of this excess stock has been absorbed, but estimates are that there is still 1.0 to 1.5 million too many housing units in the U.S. And, as noted by Wheaton and Nechayev (2008) and Wheaton (2012), an overhang of foreclosed homes, declining rates of home ownership, and uncertainty as to policy direction make it unclear just how long it will take to absorb the remaining units (also see Blomquist (2012) on the effects of the shadow inventory of housing in the U.S.).

This is in contrast to the commercial property markets, where new completions of office space as a percentage of the existing stock is shown in the left hand panel of the United States graph of Figure 3. The time series starts in 1990, showing completions equalling about 5 percent of the existing stock in that year. The 1990 start date occurs after the bust in commercial property prices, where the high rates of completion were due to construction lags. Going back to the middle-late 1980s, completions were around 9 percent of stock. With this intense level of construction activity, the skylines of many major U.S. cities were re-shaped in the late 1980s, including those of Boston, Atlanta, Dallas, Denver and Los Angeles. After 1990 we observe completions falling almost to zero in 1994-96, and increasing again in the late 1990s/early 2000s to peak at just above 3 percent. Finally, a subdued supply cycle occurs during the middle 2000s, peaking at about 2 percent in 2008. It is worth noting that similar analysis of other

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<sup>2</sup> We thank Bill Wheaton for suggesting this approach.

commercial property types such as retail, multi-family and warehouse show similar and often lower levels of construction activity.

### **Figure 3 Here**

Excluding 1990 as reflecting residual construction momentum from the go-go years of the middle 1980s, we see that from 1991 to 2011 new office construction as a percentage of existing stock averaged 1.5 percent, with local peaks in 1999 and 2008 at 3.5 and 2.3 percent, respectively. It has been estimated that office space depreciates at a rate of 1.5 to 2.0 percent per year (Smith et al (2005)), implying that over the most recent 21 year period the supply of office product has remained roughly in balance. Crucially, during the frothiest part of the house price and construction boom of 2002 to 2008, we see no evidence of a Savings & Loan style development bonanza on the commercial property side of the market. Rather, office property construction activity from 2002 to 2008 was quite modest, seen to be in the 1 to 2 percent range.

Large and persistent differences in supply response to a dual asset pricing boom therefore helps explain performance differentials since early 2009. Housing is still dealing with inventory overhang problems, while commercial property markets were appropriately (or some would argue, under-) supplied. This then begs the question of why all the supply in housing, but not in commercial. On the housing side, many commentators have focused on mortgage market capital flows, ineffective and distortionary bank regulation and accommodative housing policy as underlying causative factors for the boom. But capital flows and bank regulation affected commercial property markets as well, suggesting that decades of accumulated pro-housing policy may have been particularly important in distorting that market.

The analytical focus in our view should not be on explaining the supply response on the housing side, which was not surprising given surging house prices and tsunami-like capital flows that occurred in private-label MBS markets, but rather on why the commercial supply side was so muted in the face of similar asset price and capital flow increases. Based on our discussions with real estate economists and industry specialists, we can offer three explanations for why supply was so restrained on the commercial side.

One rationale we have heard from several sources is that the severe S&L bust that occurred in the late 1980s and early 1990s was still fresh in the collective memories of market participants (see also Zhu



(2002)). This explanation has some merit, but begs the question of why things were different this time when in the past commercial property markets in the U.S. predictably blew up every 15 years or so.

A second rationale is that commercial property rents never recovered to the middle 1980s levels, implying that land was simply not ripe for significant new development during the middle 2000s. This argument can be assessed by comparing built asset prices to the cost of construction. In Figure 4 we display the time series of real national office rents obtained from NCREIF data as well as the ratio of national (real) office property values to construction cost.

#### **Figure 4 Here**

The figure shows that real office rents (net operating income) peaked in the middle 1980s, declining precipitously thereafter. In fact, real rents have never recovered to their middle 1980 values, which lends considerable support to the “not ripe for development” argument. But the values seen in the right hand panel of Figure 4 show the ratio of office property values to cost began to approach those of the middle 1980s, when national completions as a percentage of stock in the late 1980s exceeded 8 percent. By contrast, as referred to in Figure 3, completions remained below 2.5 percent of the existing stock throughout the middle and late 2000s.

### ***II.C. The REIT Market Effect***

Although the “not ripe for development” story is undoubtedly an important reason why commercial property development has remained in check, we believe that, given the very low realized rates of development achieved during the frothiest real estate and financing markets in decades, something more is going on. This causes us to consider a third rationale that is unique to this paper.<sup>3</sup> Our conjecture relies on the existence of the REIT market as a moderating influence on supply response in the face of high asset prices. In this market, investors and other market participants discover prices quickly and without substantial bias. Firms are relatively simple in terms of their structure and business focus, are relatively transparent with formal governance mechanisms and reporting requirements in place, and are

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<sup>3</sup> A few others, including notably MacKinnon (2010), have made the link between the development of the U.S. REIT market, price discovery achieved through exchange-traded share prices, and effects on construction activity. But we believe we are the first to emphasize the critical role of attention required by key market participants, as well as the first to formally empirically test the hypothesized causative linkages.

covered by industry analysts, rating agencies, and “talking heads” that convey bad as well as good information about the state of commercial property markets.

The fact that these firms are going concerns—many of which are operated by experienced as well as talented managers, and that own good to high quality assets, with shares traded on public exchanges—has several important implications for how information production affects resource allocations in commercial property markets in the U.S. First and foremost, debt and equity capital providers as well as other agents such as brokers and privately-owned property investors look to the REIT market for information about the individual firms and the properties they own, not to mention for an assessment of the relative health of the entire commercial property sector. For example, when new office construction is announced and occurs in Washington D.C., and share prices of REITs that hold office property in Washington D.C. react negatively to this information, it sends a signal to construction lenders and other market participants that further supply of office space may negatively impact rents going forward. This in turn may constrain additional construction lending. In contrast, private ownership markets only provide information with a time lag, implying that capital misallocations can persist for longer periods of time and result in boom-bust outcomes.

There are other important effects. Crucially, the production of real-time information through price discovery and daily monitoring by industry analysts mitigates distortions originating from self-interested agents (such as asset investment brokers and loan originators that work on commission with no longer-term stake in the success or failure of transactions) who might otherwise use time lags and noise in information production to prolong booms by promoting continued investment. A further consideration is that exchange-traded shares induce significant volatility into listed share prices, which may give market participants pause when contemplating resource allocation decisions that affect the supply of extremely durable commercial space in local markets.

In addition, REITs are going concerns that hold a portfolio of assets in which management reputation and time consistency (consistently delivering on promises made at some point in the past) are critical to continued affordable access to capital markets. In other words, investment and financing decisions are not one-shot games with REITs. This is in contrast to transactions undertaken by private firms, where traditional private equity investment and mortgage financing decisions assume much more of a one-shot profile. Payout requirements imposed on REITs reinforce this going concern effect. Specifically, REITs distribute a high percentage of available cash flow (typically more than 60 percent and often more than

70 percent) as dividends to shareholders. These high payouts, in turn, cause high-growth REITs to return to the capital markets on a frequent basis to raise money for investment purposes. Doing so imposes a discipline on management, requiring managers of active firms to go out on road shows with their investment bankers in order to convince outside investors to contribute capital to their firm.

REITs also operate at lower leverage levels than private firms. Private firms often have difficulty in sourcing reasonably priced outside equity capital, and instead typically rely on mortgage debt with debt-to-value ratios exceeding 70 percent. This is in contrast to REITs, the majority of which operate at less than 50 percent leverage ratios. Less leverage had beneficial effects during the financial crisis (lending further credibility to the sector), as there were only a small number of REIT bankruptcies (two or three) in a sector with well over 100 listed firms. Less leverage and financial distress among REITs undoubtedly contributed to the swift rebound in REIT prices after early 2009, whereas widespread financial distress is still haunting housing markets around the U.S.

We will examine the REIT market-supply moderation conjecture shortly. At this point we emphasize that our conjecture depends on the fact that this market did not become “viable and credible” until the 1990s—with the associated increase in attention paid by key property market participants—which can explain why this time was different in terms of the muted supply response. We maintain that a similar “viable and credible” information source did not exist on the housing side, where the previously cited home-builder index was not widely followed. Nor did the broader investment and policymaking community pay close attention to what the newly developed ABX-CDS markets were saying about housing and the broader economy until it was too late.

### **III. Testing for the REIT Market Effect**

Exchange-traded share prices are a public good that is made available to all market participants. When market participants *pay attention* to these price signals and incorporate them into their day-to-day investment and financing decisions, they can, we conjecture, have a moderating influence on boom-bust tendencies in asset markets.

In this section we provide a formal empirical test of our conjecture that in the United States the REIT sector influenced commercial property construction activity. The baseline model we have in mind

reflects the intuition expressed in our analysis of how the value of income-producing real estate compares to the cost of construction. In this model the propensity to develop new property increases when built property value increases relative to construction cost. The standard reduced form supply relationship is as follows (see DiPasquale and Wheaton (1996)):

$$S = f(P,C)$$

where  $S$  denotes the supply of new space,  $P$  is the value of built income-producing property and  $C$  is construction cost. In this model asset price,  $P$ , is a sufficient statistic that summarizes relevant space and financial market conditions, such as vacancy rate, relevant government policies, the expected growth rate in cash flows, and the risk-adjusted discount rate applied to valuing expected future cash flows.

We augment the standard model in an attempt to identify the conjectured REIT market effect. Recall that we argued that a central reason why the REIT market tempered oversupply tendencies, while analogous markets on housing side did not, is that the relevant commercial property market participants consider information contained in REIT share prices to be informative and therefore relevant when making resource allocation decisions that ultimately affect the stock of space. That is, we hypothesize that the mere existence of REIT share prices alone is not sufficient to moderate construction activity. Rather, we conjecture that an additional necessary condition is that market participants actually pay attention to the information content of prices and consider them to be relevant.

With this logical framework in mind, we propose REIT market penetration – the degree to which the office market has been securitized vis-à-vis REITS - as a proxy for relevance of REITs to the broader market. REIT market share is calculated as the value of commercial property held by REITs relative to the total value of all commercial property. The augmented specification is therefore,

$$S = f(P,C,M)$$

where  $M$  denotes REIT market share.

After controlling for the built property prices and construction cost, the expected relation between REIT market share and supply depends on whether we are in boom or bust periods. By this we mean that REIT market share, as a proxy for attention and relevance, is hypothesized to mitigate construction boom tendencies by reducing supply impulse responses when asset prices rise. By contrast, when asset

prices decline, the REIT market share effect is expected to be positive; i.e., it ameliorates the declines in supply that would otherwise occur in response to asset prices and construction costs

### ***III.A. Specification and Specification Tests***

As a starting point we recognize that there are various types of income-producing property. These property types respond differently to movements in macroeconomic variables that determine the demand for space. For example, the demand for office space is most responsive to white collar employment, while the demand for apartment space depends on factors such as home ownership rates, demographics and immigration. Because of this we will focus most of our attention in this section on the office property market. The office sector is perhaps the most important commercial property type, in that it is large and has historically shown a propensity to boom and bust more than other property types (in the U.S. and elsewhere).<sup>4</sup>

The regressions are run using quarterly data from Q1 1990 through Q4 2011. The dependent variable in our analysis is the change in the log of new completions of office space, as obtained from CB Richard Ellis, measured in thousands of square feet.

Reduced form explanatory variables are derived as follows. We use two alternative measures of commercial property asset price,  $P$ . The first comes from NCREIF, which provides an index of privately held office values. Because the NCREIF relies in part upon appraised values in lieu of an asset sale, they are known to suffer from appraisal lagging and price smoothing problems. Nevertheless, the index values are considered to be accurate barometers of office prices in the U.S. The second measure is based on share prices of REITs that hold office property. Relative to NCREIF values, REIT prices do not suffer from the aforementioned appraisal problems. But the REIT prices do potentially suffer from bias (as well as reduced R-square values in a regression) given that share prices reflect going concern values that differ from the net value of assets in place. Bias and noise may also be the result of share price movements based on capital market dynamics that are unrelated to commercial property market

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<sup>4</sup> At the same time, office property investment tends to less show correlation with the broader economy than other forms of commercial property, show sluggishness of market adjustment, and be driven by longer-term investment oscillations (see Wheaton (1999), and Sivitanides, Torto, and Wheaton (2003)).

fundamentals. REIT data are from the Data Stream office REIT index. Nominal indexed NCREIF and REIT office prices are converted into real values using CPI.

Construction cost comes from Marshall Swift's index of nominal unit construction costs, and are a simple average of eastern, central and western costs for fireproof steel frame buildings. These nominal average cost numbers are again converted to real costs using CPI.

We develop three measures of office REIT market penetration. The first measure is the sum of the book value of debt and preferred stock plus the market capitalization of equity for listed office REITs, all as a percentage of the investment value of the total stock of office space at its reported market value. Because this first measure uses REIT share prices, it will correlate with the REIT price variable used to measure commercial asset values. This leads us to develop two other measures of REIT market share that depend on asset book value. The second measure is the net property investment of listed REITs at book value as a percentage of the investment value of the total stock of office space at its reported market value. The third measure is net real estate investment of listed REITs at book value as a percentage of the investment value of the total stock of office space at its reported market value. The REIT real estate investment data are obtained from quarterly financial statement filings accessed through SNL Financial. The investment value of the total stock of office space data are obtained from CB Richard Ellis. This investment value measure is the multiple of the estimated total stock of office space square feet in a given quarter and the average capitalized value of net office rents per square foot.

Finally, in order to consider the conjectured pricing effects of the REIT market on new supply, we create two dummy variables that are interacted with the office REIT market share variable. One dummy variable equals 1 if in the current quarter the REIT price index (from Bloomberg) exceeds that of the previous quarter, and the other dummy variable equals 1 if in the current quarter the REIT price index is less than that of the previous quarter.

For model estimation purposes, all variables are expressed as first differences except for the REIT market share variable. REIT market share is in levels because using first differences would change the economic meaning of market penetration as a measure of critical mass relating to relevance and capturing the attention of commercial property market participants. Asset price and construction cost variables are expressed as log differences.

We also potentially include up to eight quarters of lags for all RHS variables in recognition that it takes time to plan and build new office space. When lags are included, we take the sum of the current value plus all lagged quarters, inclusive of all intermediate quarters.<sup>5</sup> The number of lags for any given variable is determined by maximizing the adjusted  $R^2$  jointly across all variables in the regression. To enhance comparability, the sum total of the current and lagged values is then divided by the number of lags plus one to produce an average quarterly value. Lastly we include an AR(1) process in the specification to correct for residual serial correlation in the error term.

### ***III.B. Estimation Results***

Estimation results are reported in Table 1. In Column 1 of the table, we report estimates from the benchmark model that includes only asset price and construction cost as RHS variables. Columns 2, 3 and 4 report specifications that include the REIT market penetration variable, which differ from each other depending on how the numerator of the variable is calculated (as described previously).

#### **Table 1 Here**

Consider first the benchmark model results reported in column 1. This model delivers decent results, in that variable coefficient signs are as expected and the asset price variable coefficient is statistically significant. The insignificance of the construction cost variable is similar to findings of other studies estimating commercial property supply equations in reduced form (see, e.g., Holland, Ott and Riddiough (2000)), and is often attributed to aggregation in the Marshall and Swift index of construction cost. The number of quarterly lags in the price variable,  $P$ , is 7, which confirms that one to two year lags exist in property development (see also Ott, Riddiough, Yi and Yoshida (2008)). The AR(1) error correction term is negative and significant in both regressions, implying negative serial correlation in the error term prior to applying the correction. The Durbin-Watson statistics suggest that the models are not inappropriately specified in terms of their time-series properties.

Now consider the comparative regression results reported in equations (2), (3) and (4), which incorporates REIT market share as a variable using the three different metrics discussed above. Results are generally consistent across the alternative measures, in that asset price and construction cost retain

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<sup>5</sup> For example, if 5 lags are included, the sum is composed of all lags up to the maximum of the 5<sup>th</sup> lag, plus the current value, for a sum total that includes six values.

their signs and statistical (in)significance when compared to the benchmark model. Critically, we also see that REIT market share coefficient is significant in up-markets. Given the negative sign on that coefficient, the economic interpretation is that REITs exert a significant moderating influence on supply response in rising markets, where the strength of the moderating influence is increasing in market share. The positive coefficients on the REIT market share variable in falling markets is also consistent with a moderating influence on declines in construction supply, though those coefficients are not statistically significant.<sup>6</sup>

In summary, the results suggest that the conjectured REIT market share effect is operative, in that, over the sample period, the commercial property supply response in periods of high asset price returns was increasingly moderated as the share of assets held by REITs increases. The results are consistent with the view that increasing attention was paid to a sector with firms generally run by well-respected managers that owned higher quality assets, and that this attention had a moderating effect on the office construction supply cycle.

### *III.C. Robustness*

We conduct similar tests of the conjectured REIT effect using data from three other countries with relatively large REIT markets and for which there is good data availability. These countries are Australia, France and Japan. Australia is the second largest REIT market in the world after the U.S., and has the highest REIT office market share in the world, peaking at 35% in 2005. France is the third largest REIT market in the world, but only has an office market penetration of about 4%. Similarly, Japan is a relatively large market, but office market penetration is about that of France.

Our estimation results (which are not reported for space considerations) are consistent across countries, in the sense that the price variable is positive and statistically significant in all of the country-level estimations. But only in Japan do we find evidence for the hypothesized REIT market-supply moderation effect. We can offer two explanations for the inconsistent results. First, while the U.S. and Japan have well-structured REIT markets, structural inefficiencies exist with Australian and French

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<sup>6</sup> Results are unchanged when we use NCREIF rather than REIT data to measure asset prices. We also consider the possibility that supply outcomes are reacting to the volatility in asset prices, along the lines of the impact of total uncertainty on commercial real estate investment documented in Holland, Ott and Riddiough (2000). We find that uncertainty has no statistical effect on supply outcomes; rather, its inclusion further strengthens the significance of the REIT market share variable.



REITs. For example, Australian REITs are generally externally managed—which is a structure that is known to generate inferior investment performance (See Capozza and Seguin (2000)). French REITs tend to be structurally rather complex and hence relatively opaque (See Greenstreet Advisors (2012) report on Pan-European REITs). Second, there are significant differences in the institutional ownership of REITs. As of 2010, institutions own 67.4% and 65.2% of the value-weighted shares issued by U.S. and Japanese REITs, respectively. In contrast, institutions own only 33.4% and 26.9% of the REIT equity market in Australia and France, respectively. These relations suggest to us that institutional ownership may be a better proxy for relevance and attention among key players than REIT market share.

We have calculated new construction as a percentage of stock for a number of countries located in Asia-Pacific and Europe that also have active REIT markets. Consistent with the U.S. experience, it is apparent that construction activity has generally decreased over time on average across most countries, and that construction activity is less volatile in the more recent past. Yet, many of these countries really do not have “credible and viable” REIT markets that invite the attention of key players in the commercial property markets—suggesting that other factors are playing a role in moderating the supply side. We in fact are sympathetic with this view, believing that structural factors such as internet technology, more efficient space usage by firms, and serious regulatory/political and natural constraints in many major cities around the globe are contributing to moderating construction activity.<sup>7</sup>

That said, as noted in our estimations using U.S. data, structural changes in the supply and demand for space will show up in real rents and ultimately property prices. After controlling for property prices in construction estimation equations, the fact that REIT market share is significant in the U.S. (and Japan) in spite of these other structural adjustments, implies that both effects are relevant. These positive findings are associated with countries where REITs are well structured and credible. By this we mean a REIT sector populated with a large number of firms that are known to be well managed as well as well governed, own and internally operate high quality assets, are relatively transparent, and are subject to rules that create incentives for managers to maximize shareholder value as a going concern. In this setting, price discovery and analyst coverage help defeat the destructive effects of information lags, one-off investment/financing incentive problems, and short-termist agents that are key players in allocating resources in a market that is otherwise susceptible to boom and bust tendencies.

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<sup>7</sup> See Miller (2012) for more on office space demand, and Malpezzi et al. (1998) for an analysis of the effects of regulation and natural constraint on supply.

#### **IV. Concluding Comments**

Conventional wisdom changes when the facts change. And facts associated with the recent financial market crisis implicate securitized real estate as a central actor in the crisis, particularly the mortgage related securities produced in the United States. As a result, real-estate related securitization is rather out-of-fashion at the moment.

In the face of current fashion, this paper asks the question of whether there are economic goods that can be generated by the securitization of real estate interests. To address this question we consider the securitization of commercial property equity interests through the so-called listed equity REIT market. Our principal finding is that the U.S. REIT market provides an excellent example of how a well-structured real estate securitization market, by moderating construction boom and bust tendencies, can generate positive spillover benefits to the economy at large. The contrast between commercial property and housing markets leads us to conclude that financial market plumbing critically matters to the success of securitization.

The outperformance of U.S. commercial property MBS (CMBS) relative to private-label MBS is, in our view, another case in point. Analogous to the similar yet distinct experiences in commercial and residential property markets, the U.S. CMBS market collapsed together with private-label residential MBS market in the midst of the financial crisis. But the CMBS market has reemerged whereas the private-label RMBS market has not. Performance differences between CMBS and private-label RMBS in terms of default rates have also been stark. As with the REIT market experience in commercial property, structural differences explain a lot. Unlike the private-label RMBS market, the CMBS market stuck to relatively simple mortgage designs and first mortgage positions in the asset capital structure. It also had a dedicated special servicer whose only function was to address financially distressed loans. There were no robo-signing problems on the CMBS side of the business. And perhaps most importantly, for most of the CMBS market's history, a small dedicated group of "B-piece buyers" existed that closely scrutinized the risk characteristics of the security structure and underlying collateral asset pool. This scrutiny both complemented and substituted for due diligence performed by credit rating agencies.

These findings argue for the further development of credit default swap (CDS) markets on MBS. Well-functioning markets in such instruments can provide speculators the opportunity to short housing at low

cost, and homeowners and lenders the opportunity to better manage housing and mortgage loan risks (e.g., Fabozzi, Shiller and Tunaru (2009)). To be sure, the financial crisis has taught us that market design of such instruments should be carefully considered to ensure sufficient information production and price discovery as well as maintain incentives for creditors to properly screen and monitor borrowers (Bolton and Oehmke (2011), An, Deng, and Gabriel (2011)).

The impact of REIT markets on new construction activity does not appear to be as strong in most other countries. While these more tentative findings may in part be due to the relative youth of the non-U.S. REIT markets and the resulting paucity of data, discussions with industry specialists suggest to us the deeper causes are due to structural differences. In the U.S. many high-quality assets and management teams are located within the REIT sector, and U.S. REITs have relatively straightforward business models that enhance transparency. Further documenting structural variation, identifying better proxies for attention supplied by key market participants, and assigning causation remains topics for future research.

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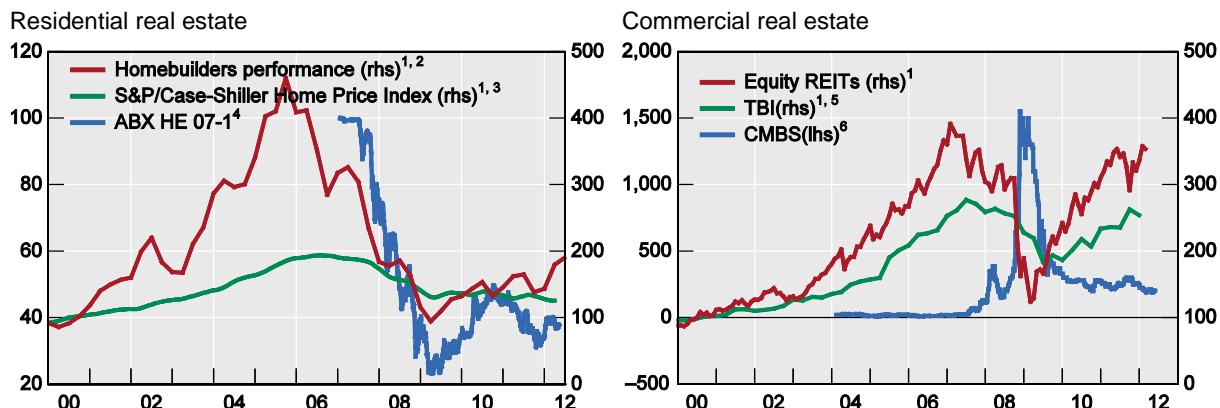
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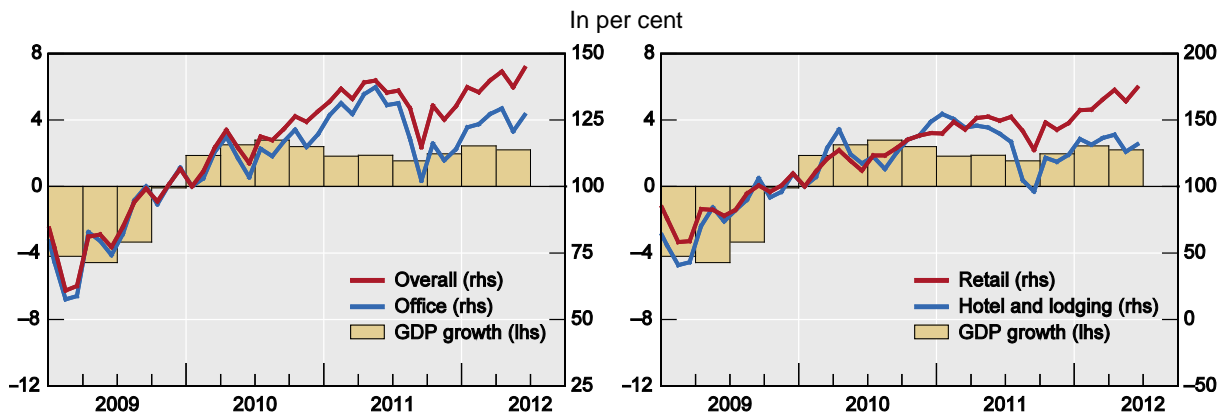
Figure 1  
US property markets



<sup>1</sup> 2000 = 100. <sup>2</sup> S&P Homebuilding Select Industry index. <sup>3</sup> Composite 20. <sup>4</sup> As a percentage of par. <sup>5</sup> MIT Transaction-Based Index, all properties total return index. <sup>6</sup> Spreads to Libor of five-year AAA-rated securities, in basis points. CMBS = commercial mortgage-backed securities.

Sources: Bloomberg; Datastream; MIT Center for Real Estate; JPMorgan Chase; NAREIT.

Figure 2  
REITs prices<sup>1</sup> and output growth<sup>2</sup>

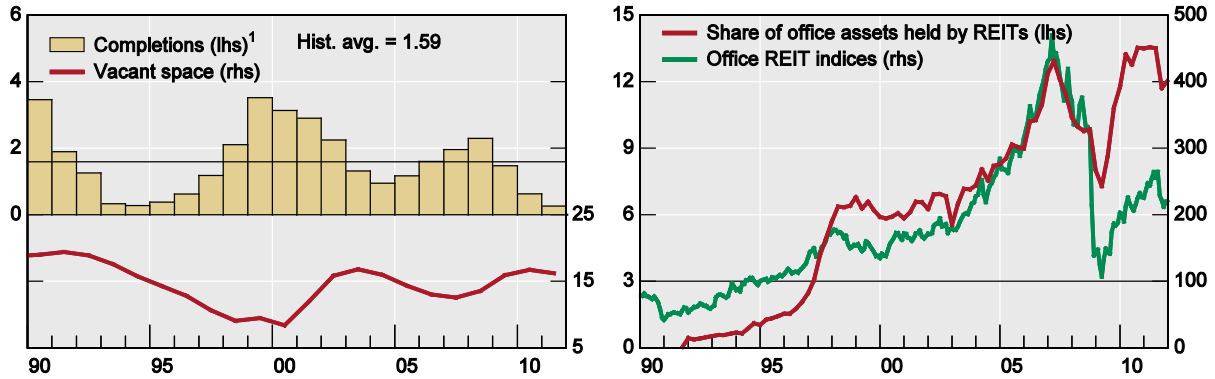


<sup>1</sup> Deflated by CPI inflation; January 2010 = 100. <sup>2</sup> Annual change, in per cent.

Sources: Datastream; national data.

Figure 3

United States – real office property market



<sup>1</sup> As a percentage of its total stock, beginning of the period.

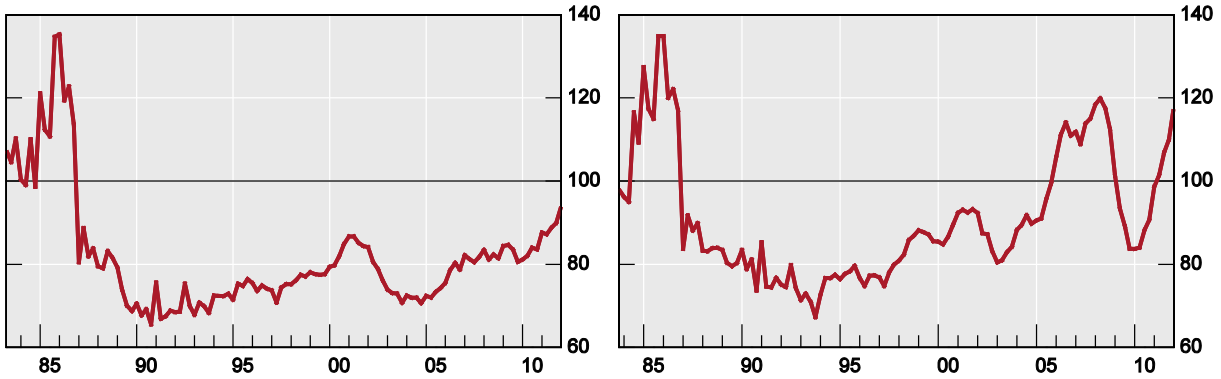
Sources: CB Richard Ellis; Datastream; SNL Financial; authors' calculations.

Figure 4

Real office property rents and construction costs<sup>1</sup>

Real net operating income index<sup>2</sup>

Ratio of real capitalised property value to real construction cost



<sup>1</sup> Deflated by CPI inflation. <sup>2</sup> December 1982 = 100

Sources: Marshall Valuation Service; NCREIF; national data.



**Table 1: Regression Models for Construction Completions (United States)**

	Models with REIT prices							
	(1)Benchmark		(2)Share def.1		(3)Share def.2		(4)Share def.3	
	Coeff.	lag	Coeff.	lag	Coeff.	lag	Coeff.	lag
Constant	0.177 ** (0.083)		0.234 ** (0.099)		0.249 ** (0.102)		0.254 ** (0.101)	
Sum of current & lagged $\Delta$ REIT_price	1.226 ** (0.614)	7	1.650 ** (0.655)	7	1.484 ** (0.686)	7	1.445 ** (0.694)	7
Sum of current & lagged $\Delta$ K (constr. Cost)	-1.574 (2.265)	0	-1.088 (2.118)	0	-1.099 (2.096)	0	-1.126 (2.086)	0
Sum of current & lagged market share $\times$ StrongD1			-0.026 *** (0.009)	4				
Sum of current & lagged market share $\times$ WeakD1			0.018 (0.017)	4				
Sum of current & lagged market share $\times$ StrongD2					-0.038 *** (0.013)	4		
Sum of current & lagged market share $\times$ WeakD2					0.019 (0.023)	4		
Sum of current & lagged market share $\times$ StrongD3							-0.035 *** (0.011)	4
Sum of current & lagged market share $\times$ WeakD3							0.017 (0.021)	4
$\rho$	-0.325 *** (0.115)		- *** (0.11)		- *** (0.11)		-0.385 *** (0.112)	
R <sup>2</sup>	0.26		0.34		0.35		0.35	
Adjusted – R <sup>2</sup>	0.19		0.26		0.27		0.27	
S.e. of regression	0.32		0.30		0.30		0.30	
Durbin-Watson	1.96		2.04		2.06		2.07	
Sample (observation)	Q1 94-Q4 11 (72)		Q1 94-Q4 11 (72)		Q1 94-Q4 11 (72)		Q1 94-Q4 11 (72)	

The dependent variable is the change in log square feet of construction completions for office. The regressors are change in the log REIT price index, change in construction cost and the level of the three market shares as defined on page 13. The coefficients of seasonal dummies are not shown. Coefficient standard errors are in parentheses.  $\rho$  is the estimate of the coefficient of first-order autocorrelation in the error term.

