Mortgage REIT Sector Dynamics and Performance

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Abstract

I test the hypothesis that growth and performance in the Mortgage REIT (MREIT) sector are related to bank capital ratios. Using a cross-sectional experiment across the three main types of MREITs, I show that expansion and contraction in MREITs is significantly related to variation in bank capital. These sector dynamics coincide with variation in MREIT performance in terms of dividend yields. I also document how MREITs adjust investment and financing choices in response to variation in bank capital. The results constitute novel evidence on the relationships between the capitalization of traditional banks and growth and performance in non-depository financial institutions.

1 Introduction

Mortgage REITs (MREITs) are specialized investment vehicles that invest in whole mortgages and/or mortgage-backed securities (MBS). They represent an important source of credit in the U.S. mortgage market (Adrian, Ashcraft, and Cetorelli, 2013).[1] The recent past has seen a record number of active MREITs and at a total market capitalization of $68 billion the sector is more valuable than ever (Schnure, 2018). Since 2016 MREITs have also outperformed Equity REITs in the stock market.[2] However, despite the growing economic significance of MREITs, little is known about the drivers of growth and performance in this sector.

A leading hypothesis posits that the growth of non-depository financial institutions in general is related to the capitalization of traditional banks.[3] When banks are well capitalized, they have capacity to hold risky assets (He, Kelly, and Manela, 2017); when banks are forced to lower the risk profile of their assets, this creates a growth opportunity for (better-capitalized) non-bank financial institutions. The narrative of rapidly expanding non-depository financial institutions during the re-capitalization of traditional banks in the aftermath of the financial crisis fits the MREIT sector well (Schwarcz, 2012).[4] In this study, I empirically assess the importance of bank capital ratios for growth and performance in the MREIT sector.

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[1]MREITs hold approximately 7 percent of the total Agency MBS market (Adrian, Ashcraft, and Cetorelli, 2013). According to Nareit, MREITs help finance 1.8 million U.S. homes and own residential MBS worth $285 billion. Gete and Reher (2018) report that non-depository financial institutions in general originate around 80 percent of loans insured by the Federal Housing Administration (FHA) and more than 50 percent of all mortgage loans.

[2]According to Nareit, MREITs had a total return of 19.79 percent in 2017 (22.85 in 2016), compared to 5.23 percent (8.52) for Equity REITs. In October 2018, dividend yields averaged 10.32 percent, more than twice the average of Equity REITs.

[3]See, for instance, Acharya, Schnabl, and Suarez (2013); Gorton and Metrick (2010); Plantin (2015); Pozsar, Adrian, Ashcraft, and Boesky (2013).

[4]MREITs are registered with the SEC but not subject to prudential regulation. Yet some MREITs invest in long-dated MBS issued by U.S. government-sponsored agencies financed with short-term repo debt, engaging in maturity transformation. Other MREITs invest in whole mortgages and/or commercial mortgage-backed securities (CMBS), providing liquidity and credit transformation. Anecdotal evidence confirms that the regulatory scrutiny of traditional banks benefits MREITs. Barry Sternlicht, CEO of Starwood Property Trust, an MREIT, notes that there are "capacity issues when your Office of the Comptroller of Currency is staring at you the whole time. We like them to keep staring." See Investor's Business Daily, 2016.

To better identify the relationship between bank capital ratios and MREIT outcomes, I conduct a cross-sectional experiment comparing the three main types of MREITs. Agency Residential MREITs invest mainly in Agency Residential MBS guaranteed by U.S. government-sponsored agencies (Fannie Mae and Freddie Mac). These MREITs are exposed to prepayment and interest rate risk but no material credit risk. Non-Agency Residential MREITs invest in private-label residential MBS and are thus exposed to credit risk in addition to prepayment and interest rate risk. Commercial MREITs invest in commercial MBS and whole loans backed by commercial properties, taking on credit and interest rate risk but little prepayment risk given common pre-payment restrictions in commercial mortgage contracts. The three types of MREITs provide a natural cross-sectional experiment because they are all subject to the same statutory requirements but hold very different portfolios of assets.[5]

In the estimation, I control for the interest rates driving MREIT profitability.[6] MREITs earn the difference between the interest on long-term assets and their cost of capital, hedging costs, and operating expenses. The level and slope of the term structure thus affect profitability for all MREITs. Non-Agency Residential and Commercial MREITs take on credit risk, so I control for the credit risk premium. I include the option-adjusted mortgage spread as Agency Residential MREITs are exposed to prepayment risk. Many MREITs commonly finance their assets with short-term variable-rate debt and hedge their exposure to interest rate risk through derivatives, hence I account for the spread on interest rate swaps.

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[5]This approach similar to Chakraborty, Goldstein, and MacKinlay (2017); Rodnyansky and Darmouni (2017); and Frame and Steiner (2018).

[6]Some pundits suggest that the recent emergence of MREITs is in fact primarily a result of the prevailing interest rate environment. See for instance Adrian, Ashcraft, and Cetorelli (2013): "The rapid growth of [mortgage] REITs since the financial crisis can be primarily attributed to the interest rate environment." In addition, I also control for economic fundamentals in terms of recessions/expansionary periods, house prices and commercial property prices.

Over the period 2001-Q1 to 2017-Q4, I document that expansion and contraction in the different MREIT sectors is significantly related to variation in bank capital ratios. The results suggest that Agency Residential MREITs expand when bank capital ratios increase while Non-Agency Residential and Commercial MREITs contract. I estimate that the marginal effect of a one percentage point increase in bank capital ratios is associated with an increase in the number of Agency Residential MREITs of 1.1 and a decline in the number of Non-Agency Residential and Commercial MREITs of 1.6 and 1.1. I also estimate that, concurrent with the expansion and contraction in the number of institutions, aggregate assets of Agency Residential MREITs increase by 17.7 percent relative to the unconditional mean for a one percentage point increase in bank capital ratios, while aggregate assets for Non-Agency Residential and and Commercial MREITs shrink by 39.9 and 26.4 percent.

Next, I document the relationships between bank capital ratios and MREIT investment performance. The results suggest that the expansion of Agency Residential MREITs in response to increased bank capital ratios is accompanied by an improvement in average Agency Residential MREIT dividend yields. I estimate that a one percentage point increase in bank capital ratios is associated with a 55 basis points increase in dividend yields for this MREIT type, which implies an improvement in dividend yields of 5 percent relative to the unconditional mean. Reflecting the contraction in Non-Agency Residential and Commercial MREITs, I estimate that a one percentage point increase in bank capital ratios is associated with a decline in dividend yields of 34 and 157 basis points (4 and 21 percent relative to the unconditional mean) respectively for these MREIT types. By contrast, I find little evidence that price or total returns of MREITs are sensitive to variation in bank capital ratios.

Further, I estimate the response in MREIT profitability metrics as well as investment and financing choices to variation in bank capital. The results suggest that Agency Residential MREITs experience a decline in the yield on interest-bearing assets of 33 basis points for a one percentage point increase in bank capital ratios. As bank capital ratios increase, banks are able to hold riskier (higher-yielding) securities, crowding out specialized Agency Residential MREITs which are then left with lower-yielding assets. I also estimate that these institutions increase their holdings of repo debt and short-term debt by approximately 1 and 2 percent relative to the unconditional mean for a one percentage point increase in bank capital ratios. The results suggest that shortening debt maturities allows Agency Residential MREITs to reduce their cost of capital when the yield on interest-bearing assets declines, leaving the overall net interest margin unaffected. The results further suggest that Agency Residential MREITs manage the increased financing risk associated with shorter debt maturities by simultaneously reducing leverage by 7 percent relative to the unconditional mean.

By contrast, I estimate that the net interest margin of Non-Agency Residential MREITs increases by 11 basis points for a percentage point increase in bank capital ratios, mainly driven by a 36 basis points increase in the yield on interest-bearing assets. This result suggests that Non-Agency Residential MREITs are pushed further up the risk curve into higher-yielding securities when bank capitalization improves. The estimates further suggest that Non-Agency Residential MREITs concurrently mitigate financing risk by reducing leverage slightly by 0.3 percent and lengthening debt maturities by 1.6 percent relative to the unconditional mean. I document similar patterns for Commercial MREITs except the results suggest that for these institutions the net interest margin is unaffected by variation in bank capital ratios.

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Since the 2008 financial crisis, there has been a broad push towards tighter financial regulation, notably through the re-capitalization of banks (Admati, DeMarzo, Hellwig, and Pfleiderer, 2013; Thakor, 2014). The relationship between the health of bank balance sheets and growth in non-bank financial institutions is important for designing prudential regulation (Freixas, Laeven, and Peydró, 2015) but empirical evidence is limited. Higher capital requirements may increase regulatory arbitrage benefiting the growth of shadow banking institutions (Adrian and Ashcraft, 2012; Irani, Iyer, Meisenzahl, and Peydró, 2017; Kashyap, Stein, and Hanson, 2010; Plantin, 2015; Stein, 2010).[7] My results contribute to this debate by providing novel evidence on the relationships between bank capital ratios and growth as well as performance and investment/financing choices of the rapidly expanding non-depository financial institutions in the MREIT sector.

In the mortgage market, Fuster, Lo, and Willen (2017) document increased cost of financial intermediation due to the regulatory burden on traditional banks. Buchak, Matvos, Piskorski, and Seru (2017) and Fuster, Plosser, Schnabl, and Vickery (2018) focus on the emergence of Fintech lenders. Gete and Reher (2018), Demyanyk and Loutskina (2016), Ganduri (2018), and Huszar and Yu (2018) document riskier lending practices among non-bank lenders in the mortgage market. This paper documents first-order effects of bank capitalization on institution-level growth and performance in the MREIT sector. However, I find little evidence that investment and financing practices of MREITs become significantly riskier as bank capital and thus competition with regulated banks varies over time.

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[7]There may also be other reasons for the emergence of shadow banking activities, such as technological advances or superior knowledge (Buchak, Matvos, Piskorski, and Seru, 2017; Ordoñez, 2018). Growth in the shadow banking sector may also be facilitated by the low interest rate environment characterizing the period of time since the 2008 financial crisis (Adrian, Ashcraft, and Cetorelli, 2013).

Within the REIT industry, empirical evidence on the performance of MREITs is scarce and often outdated. For instance, Chen and Peiser (1999) include mortgage REITs in their performance analysis but the study period ends in 1997. Frame and Steiner (2018) study the effects of unconventional monetary policy on the Agency Residential MREIT market, with a focus on risk taking in that sector. Pellerin, Sabol, and Walter (2013) provide a descriptive overview of these institutions. Expanding on prior work, this paper analyzes the sensitivity of MREIT growth and performance to the capitalization of institutions in the traditional banking sector, and characterizes time series and cross-sectional variation in MREIT performance as a function of the prevailing interest rate environment and macroeconomic fundamentals.

Lastly, the results presented in this study also contribute to the well-established literature on the interest rate sensitivity of REITs, see for instance, Allen, Madura, and Springer (2000); Bae (1990); Chen and Tzang (1988); He, Webb, Myer, et al. (2003); Mueller and Pauley (1995); Swanson, Theis, and Casey (2002) and Liow, Ooi, and Wang (2003). This literature is predominantly focused on equity REITs and ignores MREITs, with the notable exception of Liang and Webb (1995). However, the evidence in that study significantly predates the 2008 financial crisis and does not address the relative importance of interest rate factors and the capitalization of traditional banks in the performance of different MREIT types.

The remainder of this paper is structured as follows. Section 2 presents data sources, descriptive statistics, and univariate trends. Section 3 discusses identification and empirical approach. Section 4 presents the main empirical results. Section 5 concludes.

2 Data and Sample Description

2.1 Data Sources and Variable Construction

I study MREITs with non-missing assets over the period 2001-Q1 to 2017-Q4. I sort MREITs into three categories which reflect the typical business models in the sector: Agency Residential MREITs, Non-Agency Residential MREITs, and Commercial MREITs (see Schnure, 2018). The distinction between Residential and Commercial MREITs is based on the Nareit Index Classification. The distinction between Agency and Non-Agency Residential MREITs is based on the average amount of agency securities held relative to total assets, where an institution is classified as an Agency MREIT is the average share of agency securities is greater than 50 percent over the life of the institution in the sample (Frame and Steiner, 2018).
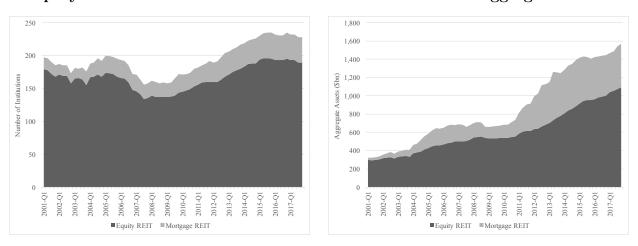
I obtain all MREIT-level data from the Real Estate section of *S&P Global*. For each institution, I collect quarterly data on total assets to calculate institution size. Further, I collect quarterly data on dividend yields, price return and total stock return as equity market-based measures of performance. I also collect quarterly data on net interest margin (spread between interest income on assets and funding costs) and interest yield (yield on interest-bearing assets) as accounting-based measures of MREIT profitability. To characterize MREIT investment profiles on the asset side of the balance sheet, I collect quarterly data on agency securities held (as a measure of prepayment risk exposure) and investment-grade securities held (credit risk exposure). On the liability side, I collect quarterly data on total leverage, measured as the ratio of total equity to assets (liquidity risk exposure), as well as repurchase agreements (repo debt) and short-term debt (refinancing risk exposure).

Further, I obtain data on the quarterly number of MREIT IPOs and quarterly dollar volume of equity raised in MREIT IPOs from Nareit's REIT Capital Offering files. The Nareit files provide IPO data on the level of individual institutions and indicate institution categories, allowing me to calculate the quarterly number and volume of IPOs by MREIT category.

The main independent variable of interest should reflect the capacity of depository institutions to hold risky assets on-balance sheet. I use the Banking section of *S&P Global* to obtain data on the ratio of tier-1 capital to total risk-weighted assets for traditional banks in the U.S.. Tier-1 capital is the capital reported under the U.S. Basel III revised rules. Total risk-weighted assets are defined by the latest regulatory and supervisory guidelines. In my analysis, I use the quarterly aggregate tier-1 capital ratio across institutions.

To construct the covariates, I obtain the following interest rate data from the Federal Reserve Bank of St Louis's Economic Database (FRED). The level and slope of the term structure are based on the 3-month and 1-year Constant Maturity Treasury rate. The term spread is the difference between the 10-year and 3-month rates. I obtain data on *Baa*-rated corporate bond yields and calculate the credit spread as the difference between those yields and the 10-year Treasury rate. I obtain data on the 1-Year ICE Swap Rate from Bloomberg as a proxy for the cost of hedging interest rate exposure. I use the Barclays US MBS Fixed Rate Average option-adjusted mortgage spread (OAS) from Bloomberg as a proxy for prepayment risk. I control for property market and macroeconomic fundamentals using quarterly changes in the Case-Shiller House Price Index, obtained from FRED, quarterly changes in the Commercial Property Price Index published by Real Capital Analytics (RCA), and a quarterly indicator for recessionary periods as defined by the National Bureau of Economic Research.

2.2 Descriptive Statistics

Figure 1 presents the time series of the number of institutions (Panel (a)) and aggregate assets (Panel (b)) in the Equity and MREIT sectors between 2001-Q1 and 2017-Q4. As of 2017-Q4, there are 39 active MREITs and 189 Equity REITs, while aggregate assets total $476 billion for MREITs and approximately $1 trillion for Equity REITs. The MREIT sector is thus smaller than the Equity REIT sector but it is larger than ever by number of institutions and aggregate assets after a period of strong growth since the end of the financial crisis.

Equity REITs and MREITs: Number of Institutions and Aggregate Assets

(a) Number of Institutions   **(b)** Aggregate Assets

Figure 1: The Figure shows the time series evolution of the number of institutions in the Equity and MREIT sectors (Panel (a)) and aggregate assets (in $ bn) by sector (Panel (b)) over the period 2001-Q1 to 2017-Q4. The data used to produce this Figure is obtained from S&P Global.

Figure 2 presents the time series of the number of institutions (Panel (a)) and aggregate assets (Panel (b)) by MREIT type over the period 2001-Q1 to 2017-Q4. The Figure shows that the MREIT sector is dominated by Agency Residential MREITs, which account for 44 percent of institutions and 75 percent of aggregate assets as of 2017-Q4, followed by Commercial MREITs (36 and 14 percent) and Non-Agency Residential MREITs (22 and 11 percent). The

period leading up to the financial crisis was characterized by the expansion of Non-Agency Residential MREITs, while Agency Residential and Commercial MREITs have expanded more since the end of the financial crisis.
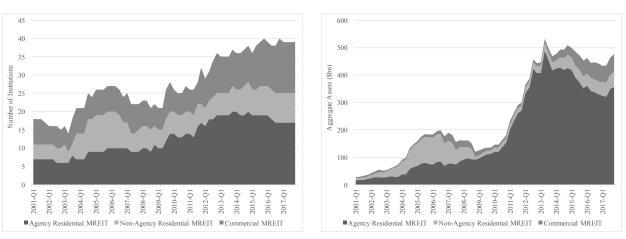
Number of Institutions and Aggregate Assets By MREIT Type

(a) Number of Institutions

(b) Aggregate Assets

Figure 2: The Figure shows the time series evolution of the number of institutions (Panel (a)) and aggregate assets (Panel (b)) by MREIT type over the period 2001-Q1 to 2017-Q4. The data used to produce this Figure is obtained from S&P Global.

Panel A of Table 1 presents descriptive statistics on quarterly institution-level variables between 2001-Q1 and 2017-Q4. On average, there were 13 Agency Residential, 7 Non-Agency Residential and 8 Commercial MREITs active over the study period. Commercial MREITs were most likely to go public during the study period, followed by Non-Agency Residential and then Agency Residential MREITs. Correspondingly, quarterly aggregate IPO volume totaled $46 million for Agency Residential, $67 million for Non-Agency Residential and $71 million for Commercial MREITs. Agency Residential MREITs are the largest MREIT type by quarterly aggregate assets with $190 billion on average, as compared to $40 billion for Non-Agency Residential and $21 billion for Commercial MREITs.

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On average, Agency Residential MREITs produced the highest quarterly dividend yield and total return across the three MREIT types (10.88 and 3.54 percent), whereas Commercial MREITs produced the highest quarterly price return (0.56 percent). Commercial MREITs also exhibit the highest quarterly net interest margin (4.48 percent) and the highest yield on interest-bearing assets (7.30 percent). The Table further shows that even Non-Agency MREITs hold some agency securities albeit significantly less than dedicated Agency Residential MREITs with an average share of agency securities to total assets of 85 percent. The focus on high-quality agency securities is also reflected in the average share of investment-grade securities held by Agency Residential MREITs as compared to the other MREIT types (79 percent as compared to 26 and 17 percent for Non-Agency Residential and Commercial MREITs). Agency Residential MREITs also have the highest leverage with a ratio of equity to assets of 14 percent; at the same time, these institutions hold the highest shares of repo debt (63 percent) and short-term debt (44 percent) across the three MREIT types.

Panel B of Table 1 presents descriptive statistics on the macroeconomic variables used in this study. The bank capital ratio averages 12.56 percent over the study period. The yield on the 3-month Treasury averages 1.30 percent during the study period; the mean term spread is 2.02 percent; the 1-year swap rate (cost of hedging) averages 1.90 percent; the mean credit spread is 2.70 percent, and the OAS averages 0.50 percent. The quarterly change in the House Price Index (HPI) is 0.90 percent as compared to 1.01 percent for the Commercial Property Price Index (CPPI). The likelihood of a given quarter experiencing a recession as defined by the NBER was 13 percent on average.

[Table 1 about here.]

3   Method

3.1   Empirical Approach

To better identify the relationships between bank capital and MREIT outcomes, I compare the three MREIT types. Agency Residential MREITs invest predominantly in Agency Residential MBS guaranteed by the GSEs and thus do not take on material credit risk. By contrast, these MREITs are exposed to prepayment and interest rate risk. Non-Agency Residential MREITs invest in private-label residential MBS without implicit government guarantees and are thus exposed to credit risk in addition to prepayment and interest rate risk. Commercial MREITs invest in commercial MBS and whole loans backed by commercial properties, exposing them to credit and interest rate risk, albeit little prepayment risk. These three types of institutions provide a natural cross-sectional comparison as they are all subject to the same statutory requirements but hold very different portfolios of assets with varying risk profiles.[8]

I expect a positive relationship between higher bank capital ratios and Agency Residential MREITs but a an inverse relationship with the other two MREIT types. When banks are well capitalized they have the capacity to hold riskier assets such as private-label residential MBS and commercial real estate debt, curtailing growth in the Non-Agency Residential and Commercial MREIT sectors relative to Agency Residential MREITs. By contrast, when banks are capital-constrained, forcing them to retain only the safest assets, this creates a growth opportunity for Non-Agency Residential and Commercial MREITs while growth for Agency Residential MREITs, which now compete with banks for the safest MBS, is curtailed.

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[8]This approach similar to Chakraborty, Goldstein, and MacKinlay (2017); Rodnyansky and Darmouni (2017); and Frame and Steiner (2018).

3.2 Regression Specification

To test the hypothesis that bank capital ratios are related to MREIT sector dynamics, I study the quarterly number of active institutions, number of IPOs, aggregate IPO dollar volume and aggregate assets by MREIT type over the period 2001-Q1 to 2017-Q4. To better identify the empirical relationships, I contrast the response to variation in bank capital ratios across the three types of MREITs (Agency Residential MREIT, Non-Agency Residential MREIT, Commercial MREIT) as discussed. I begin by regressing the number of active MREITs by MREIT category on bank capital ratios[9] and control variables as shown in Equation (1):

$$NO_{i,t} = \beta_1 MREIT_i \times BankCap_t + \beta_2 MREIT_i + \beta_3 BankCap_t + \beta_4 Macro_t + u_{i,t} \qquad (1)$$

where $NO_{i,t}$ denotes the number of institutions active in MREIT category i at time t. $MREIT_i$ denotes the three MREIT categories, where Agency Residential MREITs are excluded as the base category. $BankCap_t$ is the tier-1 capital ratio of traditional banks at time t. $MREIT_i \times BankCap_t$ is an interaction term between MREIT type indicators and the bank capital ratio. I control for the following macroeconomic factors ($Macro_t$): interest rate risk (level and slope of the term structure); the cost of hedging interest rate exposure; the credit risk premium; and prepayment risk. I control for house as well as commercial property market prices and for recessions/expansions; $u_{i,t}$ is the residual. I estimate equation (1) using OLS with robust standard errors. In alternative specifications, I replace the dependent variable with the number of IPOs, log of IPO volume and log of aggregate assets.

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[9]Note that all results are robust to lagging the regulatory capital ratio as well. For brevity, results are not tabulated but can be made available on request.

To assess the relationship between MREIT performance and bank capital ratios, I replicate equation (1) but replace the dependent variable with the quarterly average dividend yield, price return and total return by MREIT type. To characterize the relationship between MREIT performance drivers and bank capital ratios, I replace the dependent variable in (1) with measures of MREIT profitability by MREIT type (average net interest margin and yield on interest-bearing asset) as well as characteristics on the asset side of the balance sheet (agency securities to total assets and investment-grade securities to total assets) and liability side of the balance sheet (equity to assets, repo debt to asset and short-term debt to assets).

4 Results

4.1 MREIT Sector Dynamics and Bank Capital

Table 2 presents the results from estimating Equation (1). The equation describes quarterly MREIT sector dynamics by MREIT type as a function of bank capital ratios and covariates.

[Table 2 about here.]

Column (1) presents the results for the number of active institutions. I estimate that the number of active Agency Residential MREITs increases by approximately 1.1 for each percentage point increase in the bank capital ratio while the numbers of active Non-Agency Residential and Commercial MREITs decline by 1.6 and 1.1. The results suggest that as bank capitalization improves, banks have capacity to carry riskier assets on their balance sheet, leaving less risky Agency Residential MBS for MREITs specializing in this asset class while curtailing growth opportunities for Non-Agency Residential and Commercial MREITs, which predominantly invest in riskier real estate debt and related securities.

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Columns (2) and (3) present the results for the number of IPOs and the log of aggregate IPO dollar volume. I estimate a weakly positive relationship between bank capital ratios and the number of Agency Residential MREIT IPOs and insignificant results relating to the number of IPOs in the Non-Agency Residential and Commercial MREIT sectors and IPO volume in any MREIT sector. The results suggest that the relationships between bank capital ratios and the number of active MREITs are driven by existing institutions leaving the market in response to variation in bank capital ratios, rather than by institutions entering the market.

Column (4) presents the results for aggregate assets by MREIT type. Given the log-lin specification, the results suggest that an increase in the bank capital ratio of one percentage point is associated with an increase in aggregate assets of Agency Residential MREITs of 17.7 percent relative to the unconditional mean, whereas aggregate assets for Non-Agency Residential and Commercial MREITs decline by 39.3 and 26.4 percent. The estimates suggest that the number of active institutions in the different MREIT categories and the aggregate assets of those institutions respond in similar ways to variation in bank capital ratios.

In all, the evidence is consistent with the hypothesis that MREIT sector dynamics are linked to the capitalization of the traditional banking sector. The results suggest that when banks are well capitalized, they are able to carry riskier assets on their balance sheet, creating a growth opportunity for Agency Residential MREITs that focus on investing in lower-risk, institutional-grade, government-guaranteed Agency MBS. On the other hand, when banks are capital-constrained and have to prune their portfolios of riskier assets, retaining only the safest investments, this creates a growth opportunity for Non-Agency Residential and Commercial MREITs that focus on investing in riskier real estate debt and related securities.

4.2 MREIT Performance as a Function of Bank Capital

Next, I assess the relationships between bank capital and quarterly measures of MREIT stock market performance. Table 3 presents the results from estimating Equation (1) for average dividend yields, price return and total return by MREIT type as dependent variables.

[Table 3 about here.]

Column (1) presents the results for the quarterly average dividend yield by MREIT type. I estimate that a one percentage point increase in bank capital is associated with an increase in the dividend yield for for Agency Residential MREITs of 55 basis points or 5 percent relative to the unconditional mean while dividend yields decline by 34 and 157 basis points (4 and 21 percent, respectively) for Non-Agency Residential and Commercial MREITs. The results suggest that the growth opportunities for the different MREIT types associated with variation in bank capital are concurrently reflected in MREIT performance in terms of dividend yields.

The estimates in Column (2) suggest that a one percentage point increase in bank capital is associated with an increase in the quarterly price return for Commercial MREITs of 1.65 percentage points (almost three times the unconditional average). Given the evidence on lower dividend yields for these MREITs when bank capital increases, the estimates indicate that investors anticipate future growth in this sector. I find no evidence that price returns for Agency or Non-Agency Residential MREITs are affected by variation in bank capital, or that total returns of any MREIT type are affected (Column (3)). The results suggest that price and total returns of of most MREIT types are resilient to variation in bank capital even though dividends may be significantly affected.

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4.3 Drivers of MREIT Performance

In this section, I document the drivers through which bank capital influences MREIT performance. MREITs may modify their investment and/or financing choices to take advantage of the growth opportunities afforded to them through variation in bank capital ratios. Table 4 presents the estimation results for Equation (1), regressing a set of MREIT profitability measures as well as asset and liability characteristics on bank capital and covariates.

[Table 4 about here.]

For Agency Residential MREITs, Column (1) shows that the net interest margin is insensitive to variation in bank capital. By contrast, Column (2) shows that a one percentage point increase in bank capital ratios is associated with a 33 basis points decline in the yield on interest-bearing assets. As bank capitalization improves, banks are able to hold riskier assets and thus invest in higher-yielding securities, leaving safer, lower-yielding securities for Agency Residential MREITs. This relationship is also reflected in the slight increase in investment-grade securities held by Agency Residential MREITs in response to higher bank capital ratios (Column (4)). The results in Column (5) suggest that Agency Residential MREITs reduce leverage (increase equity-to-assets ratios) by 0.01 or 7 percent relative to the unconditional mean. At the same time, I estimate that Agency Residential MREITs increase their exposure to repo debt, which is mostly short-term, and short-term debt overall by approximately 1 and 2 percent (Columns (6) and (7)). The increased reliance of Agency Residential MREITs on less costly shorter-term debt while the average yield on interest-bearing assets declines allows these institutions to keep net interest margins stable when bank capital ratios increase.

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For Non-Agency Residential MREITs, the estimates in Column (1) show that the marginal effect on the net interest margin of a one percentage point increase in bank capital is 11 basis points, while the marginal effect on the yield on interest-bearing assets is 36 basis points (Column (2)). As bank capitalization improves, banks are able to hold riskier assets and thus invest in higher-yielding securities, forcing Non-Agency Residential MREITs into even higher-yielding assets. The estimates in Column (3) suggest that Non-Agency Residential MREITs seek to counteract this exposure to higher-yielding, riskier assets when bank capital ratios rise by increasing their holdings of safer Agency MBS. By contrast, the share of investment-grade securities held by Non-Agency Residential MREITs is insensitive to variation in bank capital ratios (Column (4)). The results in Column (5) suggest that Non-Agency Residential MREITs slightly reduce leverage by 0.013 or 0.3 percent relative to the unconditional mean. At the same time, I estimate that Non-Agency Residential MREITs reduce their exposure to repo debt and short-term debt by approximately 0.5 and 1.6 percent (Columns (6) and (7)). The results suggest that Non-Agency Residential MREITs hedge their increased exposure to higher-yielding, riskier securities in response to higher bank capital ratios by adopting a more conservative financing profile with lower leverage and longer debt maturities.

For Commercial MREITs, I find no association between variation in bank capital and the net interest margin (Column (1)) but I estimate that the marginal effect on the yield on interest-bearing assets of a one percentage point increase in bank capital is 32 basis points (Column (2)). As for Non-Agency Residential MREITs, higher bank capital ratios crowd Commercial MREIT investment into higher-yielding assets. In contrast to Non-Agency Residential MREITs, the results suggest that Commercial MREITs concurrently reduce their

holdings of safer assets such as Agency MBS and investment-grade securities (Column (3) and (4)). However, the results in Column (5) suggest that Commercial MREITs reduce leverage by 0.024 or almost 1 percent relative to the unconditional mean. At the same time, I estimate that Commercial MREITs reduce their exposure to repo debt and short-term debt by approximately 0.7 and 0.6 percent (Columns (6) and (7)). The results suggest that, similar to Non-Agency Residential MREITs, Commercial MREITs hedge their increased exposure to higher-yielding, riskier securities in response to higher bank capital ratios by reducing financing risk through lowering leverage and lengthening debt maturities.

4.4 The Role of Other Institutions in the Agency Residential MBS Market

In the Agency MBS market, traditional banks are not the only institutions whose activity might affect MREIT outcomes. Frame and Steiner (2018), who analyze the effect of unconventional monetary policy and Agency MREIT growth and risk taking in detail, report that the increase in Agency MREIT market share coincided with the shrinkage of Agency MBS holdings by the U.S. government-sponsored agencies, which had long been the largest investors in this market. Starting with QE1 in 2009-Q1, the central bank quickly became the largest investor in the Agency MBS market. In this section, I assess the relationships between the activity of the U.S. government-sponsored agencies and the Federal Reserve Bank in the Agency MBS market and Agency Residential MREIT outcomes versus the other two MREIT types. I obtain data on the Agency MBS holdings of the central bank and the U.S. government-sponsored agencies as a share of total Agency MBS outstanding from the Federal Reserve Bank of New York. I then employ quarterly growth rates of the holdings shares to replace bank capital ratios as the independent variable in re-estimating equation (1).

The results in Table 5 suggest that an increase in the share of Agency MBS held by the U.S. government-sponsored agencies (Panel A) and the Federal Reserve (Panel B) is associated with a decline in the number of Agency Residential MREITs and their aggregate assets relative to the other two MREIT types. This result is consistent with Frame and Steiner (2018), who document that the central bank's activity in the Agency MBS market crowds out investment by Agency Residential MREITs. I find no evidence that Agency Residential MREIT IPO activity is affected by the holdings shares of the U.S. government-sponsored agencies or the central bank.

[Tables 5 to 7 about here.]

The estimates in Table 6 show that Agency Residential MREIT dividend yields benefitted when the U.S. government-sponsored agencies withdrew from the Agency MBS market. The results also suggest that Agency Residential MREIT price and total returns increase in the U.S. government-sponsored agencies' holdings share, likely as markets anticipate a future growth opportunity. I also document a positive relationship between the Federal Reserve's Agency MBS holdings share and Agency Residential MREIT dividend yields.

The estimates in Table 7 suggest that Agency MREIT profitability improves in response to greater holdings shares by the U.S. government-sponsored agencies and the Federal Reserve as Agency Residential MREITs are crowded into holding higher-yielding securities. At the same time, the estimates suggest that this trend is counter-balanced by Agency Residential MREIT adopting a more conservative posture in terms of their financing choices with higher equity-to-assets ratios and reduced exposure to repo and general short-term debt.

5 Conclusion

MREITs represent an important source of capital in the U.S. mortgage market but little is known about the drivers of growth and performance in this sector. I test the hypothesis that growth and performance in MREITs are related to bank capital ratios. To better identify the effects, I employ a cross-sectional experiment across the three main types of MREITs, Agency and Non-Agency Residential as well as Commercial MREITs. Over the period 2000-Q1 to 2017-Q4, I show that expansion and contraction in MREITs is significantly related to variation in bank capital. I also document that these sector dynamics coincide with variation in MREIT performance in terms of dividend yields. The results further illustrate how MREITs adjust investment and financing choices in response to variation in bank capital. However, I find little evidence that MREITs adopt riskier investment or financing policies as bank capital and thus competition from banks for assets varies. The findings presented in this study constitute novel evidence on the relationships between the capitalization of traditional banks and growth and performance in non-depository financial institutions. The results here also contribute to the long-standing literature on the performance and interest rate sensitivity of REITs, which often excludes MREITs from empirical analyses.

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Descriptive Statistics on MREITs and Macroeconomic Variables

Panel A: Institution-Level Variables	Agency Residential MREITs		Non-Agency Residential MREITs		Commercial MREITs	
	Mean	SD	Mean	SD	Mean	SD
Number of Institutions	12.76	4.78	6.51	1.82	8.32	2.64
Number of IPOs	0.18	0.38	0.26	0.73	0.34	0.70
IPO Volume	46.06	137.47	66.71	201.64	70.74	177.04
Total Assets	190.44	155.17	39.61	26.53	21.48	18.62
Dividend Yield	10.88	3.25	9.48	2.74	7.45	4.34
Price Return	0.26	10.77	-0.95	12.62	0.56	21.54
Total Return	3.54	11.22	1.84	13.00	2.65	21.40
Net Interest Margin	2.26	0.56	3.35	0.83	4.48	1.30
Interest Yield	4.59	1.32	5.71	1.00	7.30	2.19
Agency Securities/Assets	0.85	0.07	0.11	0.05	0.08	0.12
Investment-Grade Securities/Assets	0.79	0.10	0.26	0.13	0.17	0.14
Leverage (Equity/Assets)	0.14	0.03	0.23	0.08	0.37	0.11
Repo Debt/Assets	0.63	0.08	0.22	0.07	0.16	0.09
Short-Term Debt/Assets	0.44	0.21	0.25	0.11	0.08	0.12
Panel B: Macroeconomic Variables	N	Mean	SD	P25	Median	P75
Bank Capital Ratio	68	12.56	2.22	10.32	13.11	14.97
3-Month Treasury	68	1.30	1.56	0.08	0.83	1.76
Term Spread	68	2.02	1.02	1.43	2.10	2.74
1-Year Swap Rate	68	1.90	1.69	0.50	1.26	3.08
Credit Spread	68	2.70	0.83	2.15	2.63	3.12
Option-Adjusted Spread	68	0.50	0.30	0.28	0.41	0.59
Quarterly Change in HPI	68	0.90	2.33	-0.41	1.15	2.85
Quarterly Change in CPPI	68	1.01	2.49	0.58	1.76	2.66
NBER Recession Indicator	68	0.13	0.34	0.00	0.00	0.00

Table 1: The Table reports descriptive statistics on MREITs (Panel A) and macroeconomic variables (Panel B) on a quarterly frequency over the period 2001-Q1 to 2017-Q4. The variables Number of Institutions, Number of IPOs, IPO Volume and Total Assets are aggregated across the institutions in each MREIT category. The remaining institution-level variables are averaged across the institutions in each MREIT category. All variables are defined in the text. The institution-level data in Panel A is obtained from S&P Global. The data on bank capital is also from S&P Global, and the variable is calculated as described in the text. The data on interest rates and fundamentals is obtained from the Federal Reserve Bank of St Louis's Economic Database, Bloomberg, Real Capital Analytics and the National Bureau of Economic Research, as outlined in the text.

MREIT Sector Dynamics and Bank Capital Ratios

Variables	(1) Number of Institutions	(2) Number of IPOs	(3) IPO Volume	(4) Aggregate Assets
3-Month Treasury	-2.365***	-0.098	-0.730	-0.799***
	(0.39)	(0.12)	(0.56)	(0.12)
Term Spread	-2.413***	0.061	-0.012	-0.810***
	(0.26)	(0.09)	(0.25)	(0.07)
1-Year Swap Rate	0.348	0.156*	0.734*	0.158
	(0.31)	(0.08)	(0.40)	(0.10)
Credit Spread	-1.861***	-0.197**	-0.936**	-0.603***
	(0.33)	(0.10)	(0.38)	(0.10)
Option-Adjusted Spread	-0.220	0.218	1.012	0.096
	(0.75)	(0.20)	(0.86)	(0.22)
Quarterly Change in HPI	-0.060	0.020	0.083	-0.046**
	(0.07)	(0.02)	(0.08)	(0.02)
Quarterly Change in CPPI	0.021	-0.037	-0.089	0.000
	(0.07)	(0.04)	(0.11)	(0.02)
NBER Recession Indicator	1.544***	-0.140	-0.211	0.300*
	(0.51)	(0.23)	(0.76)	(0.17)
Bank Capital Ratio	1.079***	0.078*	0.252	0.177***
	(0.18)	(0.04)	(0.16)	(0.04)
× Non-Agency Residential MREIT	-1.619***	-0.015	-0.147	-0.393***
	(0.12)	(0.04)	(0.16)	(0.04)
× Commercial MREIT	-1.087***	-0.010	-0.129	-0.264***
	(0.13)	(0.04)	(0.17)	(0.04)
Observations	204	204	204	204
R-squared	0.815	0.077	0.077	0.829
REIT Type Main Effects	Y	Y	Y	Y

Table 2: The Table reports the results from estimating Equation (1) using OLS over the period 2001-Q1 to 2017-Q4. Column (1) shows the results for the number of institutions active in the three MREIT categories in a given quarter. Column (2) shows the results for the number of IPOs by MREIT type. Column (3) shows the results for the log of aggregate equity volume raised in IPOs by MREIT type. Column (4) shows the results for quarterly aggregate assets held by the institutions in the three MREIT categories. All variables are as defined in the text. In all regressions, Agency Residential MREITs are the omitted category. × denotes interaction terms between the bank capital ratio and the other two MREIT types (Non-Agency Residential and Commercial MREITs). Fixed effects for the MREIT types are included as indicated. Robust standard errors are shown in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

MREIT Performance and Bank Capital Ratios

Variables	(1) Dividend Yield	(2) Price Return	(3) Total Return
3-Month Treasury	0.119	0.631	0.835
	(0.61)	(3.39)	(3.36)
Term Spread	-0.960***	4.800***	4.738***
	(0.33)	(1.63)	(1.67)
1-Year Swap Rate	-0.794	3.163	2.788
	(0.59)	(3.03)	(3.04)
Credit Spread	1.523***	-0.072	0.202
	(0.57)	(3.15)	(3.19)
Option-Adjusted Spread	1.766	-14.810**	-15.253**
	(1.34)	(6.30)	(6.47)
Quarterly Change in HPI	-0.027	1.948***	1.967***
	(0.10)	(0.66)	(0.68)
Quarterly Change in CPPI	-0.003	-1.852	-1.763
	(0.17)	(1.19)	(1.19)
NBER Recession Indicator	1.365	-5.279	-3.989
	(1.09)	(6.55)	(6.54)
Bank Capital Ratio	0.547**	0.575	0.571
	(0.24)	(0.95)	(0.99)
× Non-Agency Residential MREIT	-0.339*	1.258	1.235
	(0.20)	(0.85)	(0.88)
× Commercial MREIT	-1.573***	1.653*	1.460
	(0.20)	(0.94)	(0.96)
Observations	204	204	204
R-squared	0.552	0.246	0.236
REIT Type Main Effects	Y	Y	Y

Table 3: The Table reports the results from estimating Equation (1) using OLS over the period 2001-Q1 to 2017-Q4. Column (1) shows the results for the average dividend yield by MREIT category in a given quarter. Column (2) shows the results for the average price return by MREIT type. Column (3) shows the results for the average total return by MREIT type. All variables are as defined in the text. In all regressions, Agency Residential MREITs are the omitted category. × denotes interaction terms between the bank capital ratio and the other two MREIT types (Non-Agency Residential and Commercial MREITs). Fixed effects for the MREIT types are included as indicated. Robust standard errors are shown in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Drivers of MREIT Performance and Bank Capital Ratios

Variables	(1) Net Interest Margin	(2) Interest Yield	(3) Agency Securities/ Assets	(4) Investment-Grade/ Assets	(5) Leverage (Equity/ Assets)	(6) Repo Debt/ Assets	(7) Short-Term Debt/ Assets
3-Month Treasury	0.245	-0.238	0.027	0.077***	0.020	-0.014	-0.027
	(0.20)	(0.23)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)
Term Spread	0.394***	-0.012	0.039***	0.080***	0.031***	0.001	-0.021
	(0.09)	(0.16)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
1-Year Swap Rate	-0.087	0.394**	0.001	-0.029	0.000	-0.004	-0.015
	(0.17)	(0.19)	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)
Credit Spread	0.438**	-0.114	0.026	0.080***	0.025*	0.001	-0.039
	(0.18)	(0.23)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)
Option-Adjusted Spread	-0.249	1.656**	0.005	-0.045	-0.038	0.000	0.073
	(0.41)	(0.66)	(0.04)	(0.04)	(0.04)	(0.03)	(0.06)
Quarterly Change in HPI	0.066**	0.039	0.003	0.001	-0.001	0.007***	0.007
	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Quarterly Change in CPPI	0.121***	0.067	0.005	0.015***	0.003	0.015***	0.010**
	(0.03)	(0.06)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
NBER Recession Indicator	0.243	-0.072	0.015	0.001	-0.014	0.032	-0.002
	(0.27)	(0.49)	(0.04)	(0.03)	(0.03)	(0.02)	(0.06)
Bank Capital Ratio	0.064	-0.326***	0.000	0.014**	0.010**	0.011**	0.041***
	(0.06)	(0.08)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)
× Non-Agency Residential MREIT	0.105***	0.358***	0.015***	0.004	0.013***	-0.022***	-0.062***
	(0.04)	(0.06)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)
× Commercial MREIT	-0.045	0.320**	-0.017**	-0.038***	0.024***	-0.045***	-0.078***
	(0.08)	(0.12)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	204	198	204	204	204	204	200
R-squared	0.622	0.547	0.961	0.883	0.748	0.931	0.659
REIT Type Main Effects	Y	Y	Y	Y	Y	Y	Y

Table 4: The Table reports the results from estimating Equation (1) using OLS over the period 2001-Q1 to 2017-Q4. Column (1) shows the results for the average net interest margin by MREIT category in a given quarter. Column (2) shows the results for the average yield on interest-bearing assets by MREIT type. Column (3) shows the results for the average share of agency securities to total assets by MREIT type. Column (4) shows the results for the average share of institutional-grade securities to total assets by MREIT type. Column (5) shows the results for the average ratio of equity to total assets by MREIT type as a proxy for institution leverage. Columns (6) and (7) show the results for the average share of repo debt to total assets and share of overall short-term debt to total assets by MREIT type. All variables are as defined in the text. In all regressions, Agency Residential MREITs are the omitted category. $\times$ denotes interaction terms between the bank capital ratio and the other two MREIT types (Non-Agency Residential and Commercial MREITs). Fixed effects for the MREIT types are included as indicated. Robust standard errors are shown in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Agency Residential MREIT Sector Dynamics and Other Institutions in the Agency MBS Market

Panel A: GSE Holdings Growth	(1)	(2)	(3)	(4)
Variables	Number of Firms	Number of IPOs	IPO Volume	Aggregate Assets
Agency Residential MREIT	5.812***	-0.434**	-0.939*	0.997***
	(0.49)	(0.19)	(0.56)	(0.13)
GSE Holdings Growth	0.069	0.016	0.031	0.015
	(0.05)	(0.02)	(0.07)	(0.01)
× Agency Residential MREIT	-0.122**	-0.003	0.002	-0.027*
	(0.06)	(0.02)	(0.07)	(0.02)
Observations	94	94	94	94
R-squared	0.737	0.164	0.150	0.551
Interest Rate Variables	Y	Y	Y	Y
Fundamentals	Y	Y	Y	Y

Panel B: Federal Reserve Holdings Growth	(1)	(2)	(3)	(4)
VARIABLES	Number of Firms	Number of IPOs	IPO Volume	Aggregate Assets
Agency Residential MREIT	9.591***	-0.109	-0.147	1.953***
	(0.39)	(0.15)	(0.54)	(0.09)
Federal Reserve Holdings Growth	0.138***	0.047***	0.137***	0.023***
	(0.03)	(0.02)	(0.04)	(0.01)
× Agency Residential MREIT	-0.048***	-0.016	-0.017	-0.005**
	(0.01)	(0.02)	(0.03)	(0.00)
Observations	54	54	54	54
R-squared	0.951	0.446	0.502	0.943
Interest Rate Variables	Y	Y	Y	Y
Fundamentals	Y	Y	Y	Y

Table 5: The Table replicates the results shown in Table 2 from estimating Equation (1) using OLS over the period 2001-Q1 to 2015-Q4. The main independent variable of interest (bank capital ratios) is replaced with the share of Agency MBS outstanding held by the U.S. government-sponsored agencies (Panel A) and the Federal Reserve (Panel B). All variables are as defined in the text. In all regressions, Non-Agency Residential and Commercial MREITs are the omitted category. × denotes interaction terms between the bank capital ratio and Agency Residential MREITs. Fixed effects for the MREIT types are included as indicated. Robust standard errors are shown in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Agency Residential MREIT Performance and Other Institutions in the Agency MBS Market

Panel A: GSE Holdings Growth	(1)	(2)	(3)
VARIABLES	Dividend Yield	Price Return	Total Return
Agency Residential MREIT	1.367**	3.299	3.896
	(0.59)	(2.72)	(2.77)
GSE Holdings Growth	0.095	-0.421	-0.394
	(0.06)	(0.34)	(0.34)
× Agency Residential MREIT	-0.232***	0.889**	0.877**
	(0.07)	(0.36)	(0.37)
Observations	94	94	94
R-squared	0.578	0.411	0.407
Interest Rate Variables	Y	Y	Y
Fundamentals	Y	Y	Y

Panel B: Federal Reserve Holdings Growth	(1)	(2)	(3)
VARIABLES	Dividend Yield	Price Return	Total Return
Agency Residential MREIT	4.652***	-2.001	-0.782
	(0.34)	(2.30)	(2.35)
Federal Reserve Holdings Growth	0.021	-0.369	-0.365
	(0.02)	(0.30)	(0.30)
× Agency Residential MREIT	0.032***	-0.173	-0.164
	(0.01)	(0.17)	(0.17)
Observations	54	54	54
R-squared	0.864	0.523	0.518
Interest Rate Variables	Y	Y	Y
Fundamentals	Y	Y	Y

Table 6: The Table replicates the results shown in Table 3 from estimating Equation (1) using OLS over the period 2001-Q1 to 2015-Q4. The main independent variable of interest (bank capital ratios) is replaced with the share of Agency MBS outstanding held by the U.S. government-sponsored agencies (Panel A) and the Federal Reserve (Panel B). All variables are as defined in the text. In all regressions, Non-Agency Residential and Commercial MREITs are the omitted category. × denotes interaction terms between the bank capital ratio and Agency Residential MREITs. Fixed effects for the MREIT types are included as indicated. Robust standard errors are shown in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Drivers of Agency MREIT Performance and Other Institutions in the Agency MBS Market

Panel A: GSE Holdings Growth

Variables	(1) Net Interest Margin	(2) Interest Yield	(3) Agency Securities/ Assets	(4) Investment-Grade/ Assets	(5) Leverage (Equity/ Assets)	(6) Repo Debt/ Assets	(7) Short-Term Debt/ Assets
Agency Residential MREIT	-1.272***	-1.784***	0.798***	0.533***	-0.143***	0.459***	0.267***
	(0.15)	(0.17)	(0.01)	(0.02)	(0.01)	(0.01)	(0.03)
GSE Holdings Growth	-0.014	-0.035	-0.002*	0.000	-0.003***	0.000	0.002
	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
x Agency Residential MREIT	0.046*	0.023	0.002	-0.001	0.005***	-0.001	-0.004
	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	94	94	94	94	94	94	94
R-squared	0.697	0.692	0.990	0.940	0.870	0.941	0.666
Interest Rate Variables	Y	Y	Y	Y	Y	Y	Y
Fundamentals	Y	Y	Y	Y	Y	Y	Y

Panel B: Federal Reserve Holdings Growth

Variables	(1) Net Interest Margin	(2) Interest Yield	(3) Agency Securities/ Assets	(4) Investment-Grade/ Assets	(5) Leverage (Equity/ Assets)	(6) Repo Debt/ Assets	(7) Short-Term Debt/ Assets
Agency Residential MREIT	-1.695***	-2.851***	0.763***	0.574***	-0.210***	0.542***	0.454***
	(0.18)	(0.30)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)
Federal Reserve Holdings Growth	-0.026	-0.047**	-0.001	-0.003*	0.000	0.002***	0.003***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
x Agency Residential MREIT	0.015***	0.042***	0.000	-0.001	0.001**	-0.001***	-0.001***
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	54	54	54	54	54	54	54
R-squared	0.740	0.741	0.990	0.940	0.955	0.994	0.990
Interest Rate Variables	Y	Y	Y	Y	Y	Y	Y
Fundamentals	Y	Y	Y	Y	Y	Y	Y

Table 7: The Table replicates the results shown in Table 4 from estimating Equation (1) using OLS over the period 2001-Q1 to 2015-Q4. The main independent variable of interest (bank capital ratios) is replaced with the share of Agency MBS outstanding held by the U.S. government-sponsored agencies (Panel A) and the Federal Reserve (Panel B). All variables are as defined in the text. In all regressions, Non-Agency Residential and Commercial MREITs are the omitted category. $\times$ denotes interaction terms between the bank capital ratio and Agency Residential MREITs. Fixed effects for the MREIT types are included as indicated. Robust standard errors are shown in parentheses. Significance is indicated as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.