Tax Constraints to Corporate Hedging

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Abstract

Theory suggests that tax convexity incentivizes hedging, but empirical support is limited. This might occur because derivatives can generate taxable income, which disincentivizes hedging. We study how the tax treatment of derivatives income affects hedging in real estate investment trusts and non-financial firms. To avoid taxes, REITs' revenue must be from real estate. Pre-2004, close-out derivatives income constituted non-real estate revenue, increasing taxation risk. When the Jobs Act excluded derivatives income from non-real estate revenue, hedging, borrowing, and investment increased for higher taxation-risk firms. We find comparable results for non-financial firms following a reduction in taxable derivatives income with IRS-Regulation-107047-00.

Keywords: Jobs Act, IRS Regulation 107047-00, real estate investment trust firms, general non-financial firms, interest rate hedging, access to credit, investment.

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1 Introduction

Theory shows that tax convexity might create incentives for firms to hedge (Smith and Stulz, 1985). If corporate income is subject to a convex tax schedule, then, by Jensen's inequality, firms can lower their expected tax bill by reducing income volatility through hedging. However, while early empirical studies find a positive relation between "proxies" for tax convexity and hedging (e.g., Nance et al., 1993; Tufano, 1996; Géczy et al., 1997), Graham and Smith (1999) and Graham and Rogers (2002) find no evidence that tax convexity affects hedging using a measure of convexity that explicitly quantifies the tax savings from lower income volatility. We argue that this can occur because according to the U.S. Internal Revenue Code derivatives themselves can generate taxable hedging income. Therefore, even firms facing a convex tax schedule might have low incentives to hedge if they expect that derivatives could generate sizable taxable derivatives income.

This paper studies how the tax treatment of hedging income, the gains and losses on the hedges, affects corporate incentives to hedging. To perform our empirical analysis, we consider two related identification settings, one concerning real estate investment trust (REIT) firms and the other one concerning general non-financial companies. REITs provide an ideal setting to study this question because they are not subject to corporate taxes and therefore tax convexity has no direct role in explaining their hedging policies.[1] Their hedging income, however, can be subject to taxation. Moreover, these firms rely heavily on variable rate debt to finance their real estate acquisitions, face material interest rate risk, and disclose detailed hedging information.[2] While similar hedging data is not available for general non-financial firms, we can study how the tax treatment of hedging income affects the hedging propensity of these firms.

To maintain their tax-exempt status, REITs must generate 95% of their gross revenue from real estate activities and fulfill several other requirements (e.g., Geltner et al., 2014).[3] The objective

[1] REIT dividends, however, are taxed as ordinary dividends and subject to the marginal personal tax rate, which ranged from 10% to 35% in 2004 compared to 35% for corporate taxes. According to the Congressional Budget Office (2007), the effective tax rate paid by the average household in 2004 was 20.1%, and given that REIT dividends are not taxed if their stocks are held through a 401(k) plan or similar, the effect of tax convexity is likely to be attenuated for REITs.

[2] Similar hedging information is not available for other industries. Airlines are one exception (e.g., Carter, Rogers and Simkins, 2006a,b; Rampini, Sufi and Viswanathan, 2014), but there are only about 20-30 passenger airlines in the U.S. depending on the sample period with a combined market capitalization in 2021, for example, of about $103 billion, while our sample includes almost 150 companies with a combined market capitalization of about $1.6 trillion in the same year.

[3] Some of these other requirements include having at least 75% of the assets consisting of commercial real estate, distributing at least 90% of their income as dividends, maintaining at least 100 shareholders, holding real estate

of these requirements is to ensure that they maintain a real estate focus. What constitutes a real estate focus is, however, subject to discretion. Before 2004, the Internal Revenue Service (IRS) adopted a narrow interpretation of whether derivatives activities are intrinsic to commercial real estate, effectively characterizing any derivatives income from closing out interest rate hedges as non-qualifying (non-real estate) revenue. This increased the risk that REITs using derivatives could fail the 95% income test, facing stiff tax penalties and potentially even lose their tax-exempt status altogether.

In our empirical tests, we take advantage of a regulatory change specific to REITs that excluded derivatives income from closing out interest rate hedges from the 95% income test, therefore reducing the risk that these entities could face stiff tax penalties or lose their tax-exempt status. These regulatory innovations were passed as part of the American Jobs Creation Act of 2004 (Jobs Act) (Pub.L. 108–357, 118 Stat. 1418, enacted on October 22, 2004) (Brody et al., 2009). This change marks a significant departure from pre-existing hedging regulation. With the Jobs Act, regulators recognized that hedging is intrinsically important to real estate activities and, as such, close-out derivatives income should not be characterized as non-real estate revenue for the purpose of the 95% income test. Using this design, we test whether interest rate hedging by REITs ex-ante more likely to fail the 95% income test because of hedging income changed relative to firms unlikely to fail the 95% income test following the Jobs Act. Relatedly, we study how this change influenced access to credit and commercial real estate acquisitions for the affected real estate firms.

We study related questions in a similar identification setting for general non-financial firms. The Ticket to Work and Work Incentives Improvement Act (Pub.L. 106-170, signed into law on December 17, 1999) made it easier for people with disabilities to return to work. The Act also paved the way for the passage in 2001 of IRS Regulation 107047-00, which allows for a more favorable tax treatment of corporate hedging transactions by general non-financial firms. Prior to the reform, derivatives had to reduce risk to qualify as hedging transactions (as opposed to speculation). The reform made it easier for these financial instruments to qualify as hedging transactions by establishing that derivatives used in the ordinary course of business to manage risk qualify as hedging transactions even if in practice they do not reduce risk.[4]

assets for at least two years, and limiting ownership of the outstanding value of the securities of any one issuer to no more than 10%.

[4]Prior to the reform, transactions to terminate, close-out, reverse, or counteract a hedging transaction did not

These regulatory changes are important for tax purposes because losses on hedging transactions are ordinary losses and can be used to reduce business income on the day the derivatives position is closed, while losses on derivatives characterized as speculation cannot. Similarly, gains on hedging transactions are treated as ordinary gains and taxed as business income but only on the day the derivatives are closed, which could be potentially even several years from the current fiscal years. On the other hand, if derivatives are characterized as speculations, they are marked-to-market at the end of each year. In this case, 40% of the gains are treated as short-term capital gains and taxed at the prevailing corporate tax rate, which was 35% in 2000, while the remaining 60% are taxed more favorably as long-term capital gains. In sum, the reform allowed for a more favorable tax treatment of corporate hedging transactions both in the case of losses and gains, similar to the Jobs Act of 2004 for real estate investment trusts.

Using a difference-in-difference design, we find that hedged variable rate debt scaled by total debt and variable rate debt increased by 7.2 percentage points (p.p) and 10.8 p.p., respectively, for pre-event lower rental revenue REITs (those more likely to fail the 95% test) relative to higher rental revenue firms post Act. Importantly, comprehensive transaction-level data reveals that property-level mortgage financing increased for treated firms relative to control firms post Act. We also find that treated firms invest significantly more in property acquisitions and property improvements. These new properties are more likely to be in their core property types and display significantly higher occupancy rates. Conceptually, these results are in line with financial distress theories (Smith and Stulz, 1985; Purnanandam, 2008), showing that hedging increases debt capacity by reducing distress risk, and financial constraints models (Froot et al., 1993; Mello and Parson, 2000), showing that hedging mitigate credit constraints by lowering the volatility of cash flows that can used to finance investment.[5]

Firm-level data further shows that increased access to credit occurs through higher variable rate debt, which is riskier but easier to hedge after the reform. In our empirical design, closing out hedges is easier post Jobs Act. Therefore, we should expect early debt termination, which typically requires closing out hedges, to increase post reform. We find support for this prediction. We also find that the treated firms pay less taxes and are less likely to exit the sample following

qualify as hedges because they did not reduce risk if viewed independently. After the reform, they are considered to be part of the original hedging transaction and qualify as hedges.

[5]Chernenko and Faulkender (2011) also find that firms use interest rate hedging to mitigate financial constraints.

the reform. Additional analysis reveals that treated firms are significantly less likely to make diversifying property acquisitions post Jobs Act, suggesting that following the increase in financial hedging with the Act, affected firms reduced operational hedging through diversification.

Our findings pass a battery of validity and robustness tests. A key assumption of any difference-in-difference estimation is that the outcome variable for treated, and control firms follows a parallel trend prior to the treatment. We find no indication of a violation of parallel trends in our formal tests. Relatedly, we find no evidence of change in the hedging policies of the treated firms relative to the control firms when we re-estimate our base hedging models over "placebo" time windows prior to the Jobs Act (Roberts and Whited, 2013).

In robustness tests, we find that our results hold when we consider alternative sample periods, when we control for interest rates, real estate credit, and fundamentals, when we use alternative proxies of real estate exposure, when we match treated and control firms, and when we saturate our models with potentially important pre-event control variables. Notably, we do not find any change in the proportion of fixed rate debt swapped to variable rate debt. In our regressions, we control for property-quarter year fixed effects to help mitigate the concern that variation in economic incentives for hedging correlated with our real estate revenue variable could explain our results. To further address this concern, we re-estimate our hedging regressions for a sample of non-tax-exempt real estate companies and a sample of foreign REITs, which are both unaffected by the Jobs Act. There is no evidence of any change in hedging in these placebo tests.

We find comparable results for a general sample of non-financial firms following IRS Regulation 107047-00. Our analysis shows that interest rate hedging propensity increased by about 6% for firms with lower tax shields (those more likely to benefit from the reform) relative to their higher tax shield counterparts in the period following IRS Regulation 107047-00. Relatedly, we find a significant increase in access to credit and investment for lower tax shield firms relative to control firms post reform. In line with our REIT results, these findings suggest that the tax treatment of corporate derivatives has a significant impact on corporate hedging, borrowing, and investment beyond any specific industry effect.

Congress introduced REITs in 1960 to allow households' exposure to commercial real estate, a $20.7 trillion asset class in 2021 (Nareit, 2022).[6] Our findings indicate that the narrow character-

[6]This $20.7 trillion is the total value of investable commercial real estate. Data from from S&P Global Market

ization of derivatives income from closing out hedges as non-real estate revenue pre 2004 limited hedging, access to credit, and property acquisitions, effectively hindering Congress mandate for real estate investment trust firms to facilitate households' commercial real estate exposure. When the Jobs Act of 2004 excluded close-out derivatives income from the 95% income test, hedging increased for the affected firms, facilitating access to credit and commercial real estate acquisitions.[7] Our findings for the general sample of non-financial firms lead to similar conclusions.

In addition to the tax literature discussed above, our article is also related to the literature on the effects of a shift in the supply of hedging instruments on corporate risk management. This literature has focused on the introduction of weather derivatives (Pérez-González and Yun, 2013), crop insurance (Cornaggia, 2013), and the shift in derivatives supply due to changes in basis risk (Gilje and Taillard, 2017) and bankruptcy costs (Giambona and Wang, 2020; Giambona et al., 2023).[8] In the insurance industry, Sen (2023) shows that the inability of the insurance regulators to recognize certain types of risk hinders hedging for life insurance companies. Unlike previous studies, we focus on the effect of tax incentives on hedging policies, access to credit, and corporate investment. This change is a demand-side shock that eliminated potential taxes on derivatives income, leading to an increase in the demand of hedging instruments by the affected firms.

Our paper contributes also to the debate on why U.S. corporations seem to have lower levels of debt than expected based on the potentially sizable tax shields of debt (e.g., Graham, 2000). A few studies have suggested that firms might have alternative ways to shield their income from taxes, including leases (Graham and Tucker, 2006) and employee stock options (Graham et al., 2004). Faulkender and Smith (2016) further show that accounting for the tax rates that multinational corporations face abroad contributes to better explain the cross-sectional variation in leverage levels. Our findings suggest that the the tax treatment of derivatives income can play an important role in explaining why firms might have lower leverage than expected based on the prevailing federal corporate income tax rate. Firms can increase leverage using variable rate debt, which is in larger

Intelligence SNL Real Estate reveals that real estate investment trusts own about $2.3 trillion of the investable commercial real estate in 2021. Goetzmann et al., 2021 estimate that the total value of commercial real estate in 2020 is $32.8 trillion after adding non-investable real estate, such as assets held by non-financial firms for their operations.

[7]Nearly 50% of U.S. households owned real estate investment trust (REIT) shares directly or indirectly through 401(k) plans or similar vehicles in 2022, compared with 23% in 2001 (Nareit, 2021, 2024).

[8]Our paper is also related to the literature on the effect of hedging on growth in banking (Schrand and Unal, 1998), merger activities (Garfinkel and Hankins, 2011), operational hedging (Hankins, 2011; Almeida et al., 2017, 2020), and payout policies (Bonaimé, Hankins and Harford, 2014).

supply and typically less expensive than fixed rate debt because these loans help lenders match the interest rate exposure of their own short-term liabilities (Santomero, 1983). However, variable rate debt can be risky if it cannot be hedged. If the tax treatment of derivatives income disincentivizes corporate hedging, access to debt financing will be constrained.

In response to the global financial crisis, the Dodd-Frank Act of 2010 required the introduction of market clearing and several compliance requirements affecting the use of derivatives for both financial institutions and corporate end-users. The regulations impacted swaps especially, which for about 70% include instruments used to manage interest rate risk,[9] the single most important source of risk for firms worldwide. While this might improve the stability of financial markets, our findings highlight that it is important to evaluate the extent to which it might also hinder corporate hedging. Ultimately, our article can help inform the policy debate by highlighting the importance for government agencies to coordinate regulatory efforts to balance the need for higher market stability with the consequences for corporate risk management and firm performance that limiting hedging by imposing more stringent regulations might have.

The rest of the paper is organized as follows. The effect of the Jobs Act on the treatment of derivatives income for REITs is discussed in Section 2. Section 3 discusses data and empirical design. Section 4 presents our main hedging results, validity tests, and robustness tests. Results on financing and real activities are also presented in Section 4. Section 5 concludes.

2 The Jobs Act of 2004 and Derivatives Income for Real Estate Investment Trusts

In this section, we discuss the legislative history of the American Jobs Creation Act of 2004 (Pub.L. 108–357, 118 Stat. 1418, enacted on October 22, 2004). We also analyze how the Jobs Act changed the treatment of derivatives income for tax-exempt real estate investment trust firms, which is the centerpiece of our identification strategy. This reform came seven years after the changes in the treatment of derivatives introduced by the REIT Simplification Act of 1997.

The Jobs Act of 2004 was part of the economic policy agenda of President George W. Bush aim-

[9]Based on data from the OCC Quarterly Report on Bank Trading and Derivatives Activities and the Commodities Future Trading Commission Weekly Swaps Report.

ing at reducing taxes for individuals and business entities. This agenda faced significant opposition. The Economic Growth and Tax Relief Reconciliation Act of 2001, the first tax reducing legislation focusing on personal income tax cuts, was passed using the reconciliation process to bypass the Senate filibuster. The Jobs and Growth Tax Relief Reconciliation Act of 2003, which also focuses on personal income tax cuts, was fiercely opposed by many, including President Bush's own Economic Advisement Council, Treasury Secretary Paul H. O'Neill (fired in December 2002), Congressional Budget Office, Congressional Joint Committee on Taxation, 450 economists (including 10 Nobel Price winners), and Democrats. The Jobs Act of 2004 was the last important piece of legislation part of this economic agenda, focusing on business tax cuts, which the Congressional Budget Office estimated would add $1.8 trillion to the U.S. national debt. Despite the strong opposition, President Bush mastered to implement it successfully because public consensus was relatively easy to build in the aftermath of the dot-com bubble crisis of 2001. Most importantly, for the first time since the presidency of Eisenhower in 1953-1954, a Republican president could count on a majority in both the House and Senate for a relatively long-period of time, 2003-2006. These circumstances made it easier for President Bush to pass tax cut measures that faced a strong opposition.[10]

For our purposes, the most important change introduced by the Jobs Act of 2004 is the amendment of § 856 of the Internal Revenue Code, which concerns real estate investment trusts. In particular, the Act amended subsection 856(c)(5)(G) of the Code, which after the reform reads as follows: "(G) Treatment Of Certain Hedging Instruments. Except to the extent provided by regulations, any income of a real estate investment trust from a hedging transaction (as defined in clause (ii) or (iii) of section 1221(b)(2)(A)) which is clearly identified pursuant to section 1221(a)(7), including gain from the sale or disposition of such a transaction, shall not constitute gross income under paragraph (2) to the extent that the transaction hedges any indebtedness incurred or to be incurred by the trust to acquire or carry real estate assets."

Notably, the accompanying legislative history of the Jobs Act of 2004 contained in H.R. Rep. No. 108-755 (p. 333) makes it clear that the tax treatment of derivatives transactions used by

[10]There is no evidence that REITs lobbied significantly during the pre-reform period or that any lobbying was directed to the Jobs Act. Data from LobbyView shows that combined 4 of our treated firms (to be defined later, including Mills Corp, Developers Diversified Realty, Simon Property, and Vornado Realty Trust) contributed an average of $416 thousand for the period 1999-2004, compared with a combined average of $947 thousand for 5 of our control firms (Crown American Properties, Host Marriott, ProLogis, Rouse, and Rayonier) during the same time period.

real estate investment trust firms to reduce interest risk are prospectively to be conformed to § 1221 of the Internal Revenue Code. This is important because Section 1.1221-2(d)(3) interprets counteracting hedges broadly by stating: "if a transaction is entered into primarily to offset all or any part of the risk management effected by one or more hedging transactions, the transaction is a hedging transaction." This interpretation is further confirmed in several of the IRS responses to requests from REITs to exclude income from different types of offsetting hedging transactions from their 95% income test. For example, in the Private Letter Ruling (PLR)-135684-14, the IRS, citing Section 1.1221-2(d)(3), explicitly allowed for an offsetting swap income to be excluded from the 95% income test even if "the cash flows of a counteracting hedge may not offset on a dollar-for-dollar basis the cash flows of a related original hedge."[11]

The pre-existing 1997 regulation only allowed periodic exchanges of cash flows received in accordance to the terms of an interest rate swap. Therefore, cash flows not structured as period payments, such as those from terminating or unwinding an existing hedging position would have constituted non-qualifying income for the purpose of the 95% income test. That is, this income would have been added to total gross revenue (the denominator of the 95% income test) but not real estate revenue, making it more difficult for REITs to pass the 95% test. Instead, the Jobs Act of 2004 treats any transactions put in place to terminate, sell, or offset a pre-existing hedge as a hedging transaction. That is, after 2004, hedging income were excluded altogether from the 95% income test, effectively eliminating any concerns for REITs that closing out an existing hedging position could have impacted their ability to meet the 95% income test.

In addition, the Jobs Act amended subsections 856(d)(8)(A) and (B) of the Code to make it easier for real estate investmetn trusts to consider as part of their rental income those rents received from their own taxable REIT subsidiaries (TRS).[12] In particular, prior to the reform, the law required that, for a REIT to be able to use rents received from their own TRS as part of their rental income, the following two conditions have to be met at all times: (1) at least 90% of leased space of the property is rented to entities other than the TRS and (2) the rent the TRS pays to the REIT is comparable to rents paid for comparable space by other unrelated tenants of that specific

[11] Similar language is used in related PLR rulings (e.g., IRS, PLR-103634-13; IRS, PLR-135685-14; IRS, PLR-110336-11; IRS, PLR-121929-12).

[12] A TRS allows a REIT to exclude non-qualifying income from impermissible activities (e.g., landscaping, cleaning, or concierge) from the 95% income test, but this income is subject to corporate taxes. A REIT cannot have more than 20% of its assets invested in one or more TRS.

property (R&H, 2004; Edwards and Bernstein, 2005). The Act eliminated the requirements that these conditions have to be met at all times, therefore making it easier for REITs to add rents from their own TRS to the numerator of the 75% income tests. This change makes it easier for REITs to hedge more because TRS rents are added to the numerator of the 75% income test, mitigating the potential negative effect on the test from derivatives income, which are added to the denominator of such test.

Failure to meet the 95% or 75% income tests is very costly for a REIT, even when failing these tests can be attributed to reasonable cause and not willful neglect. The greater of non-qualifying income based on the 95% or 75% income tests is converted into net income by multiplying it by the ratio of the REIT's net to gross income and is subject to a 100-percent tax (Internal Revenue Code § 857(b)(5)). If failing the 95% or 75% income tests cannot be attributed to reasonable cause, a REIT will loose its tax-exempt status and will be eligible to seek REIT status again only 5 years after the failing episode (Internal Revenue Code § 856(g)(3)). These costs are effectively transferred to the shareholders because they would be facing corporate taxes instead of receiving tax-advantaged dividends, jeopardizing the core purpose of the Internal Revenue Code to provide tax-efficient exposure to commercial real estate to individuals. The costs associated with paying stiff corporate taxes or losing their REIT status altogether highlight that low rental revenue REITs faced significant constraints in terms of derivatives access prior to the Jobs Act.

The potential tax consequences of closing out an existing hedging position prior to the reform could have been sizable. To exemplify, we consider the Macerich Company, which prior to the Jobs Act had a ratio of rental plus operating revenue to total revenue of 86.2% (=\$489/\$567 million), placing the company in the sample bottom quartile (and potentially at risk of failing the 95% income test).[13] Data manually collected from SEC filings reveals that prior to the Act, the firm had \$250 million of 5-year maturity variable rate debt, which was hedged with \$250 million 2-year maturity variable-to-fixed rate swaps.[14] Following the reform, the firm increased its hedging position significantly using \$850 million 5-year maturity variable-to-fixed rate swaps to fix the

[13]Gains on sales of real estate properties, mortgage income, dividends from other REITs, and other real estate related income are part of the numerator of the 95% income test. In this example, we focus exclusively on a firm's ability to generate revenue strictly from core rental operations, rather than extraordinary activities (e.g., selling properties) that might be indicative of a struggle to pass the 95% income test.

[14]Typically, investment and commercial banks with strong credit ratings are the counterparties in these swap transactions. The bank usually offsets the swap through an inter-dealer broker and just keeps a fee for setting up the original swap transaction.

interest rate on $850 million 5-year maturity variable rate debt.

This sharp increase in hedging might have been prohibitive for Macerich prior to the reform because the potential hedging income from closing out the the open hedges could have further strained the firm's ability to meet the 95% income test. Suppose, for example, that after 2 years the company needed to sell the assets associated with the $850 million dollar swaps. To do that, Macerich would probably repay the outstanding variable rate debt and close out the existing swaps by terminating the swap, selling it, or entering an offsetting fixed-to-variable rate swap. If interest rates had increased, for example, by 2% in the period leading to when the firm needed to terminate the swap,[15] this would result in hedging income over the remaining 3 years (assuming for simplicity a discount rate of 0%) of $51 million (=$850 million × 2% × 3). Prior to the reform, this income was non-qualifying income and would have been added to gross revenue, causing the ratio of rental plus operating revenue to total revenue to drop from 86.2% to 79.1% (=$489/($567+$51) million), further increasing the risk to fail the 95% income test and pay stiff tax penalties. Notably, because closing out hedges was not explicitly permitted prior to the reform, failing the 95% income test because of a close out hedge could qualify as willful neglect and make a firm potentially lose its REIT status.

Many other companies also saw a surge in variable-to-fixed swaps following the Act. For example, Archstone-Smith Trust increased variable-to-fixed swaps from $0 pre-reform to $965 million, 7-year maturity, in 2006q1. For instance, terminating $800 million of these swaps 2 years later and assuming a 2% increase in interest rates would result in hedging income of $80 million (=$800 million × 2% × 5). Prior to the Act, this would have caused the ratio of rental revenue to total gross revenue to drop from 90.7% (=$1,102/$1,215 million) to 85.1% (=$1,102/($1,215+$80) million). Post Act, hedging income was excluded altogether from the 95% income test, making it easier for the firm to hedge. Other companies experiencing a significant increase in variable-to-fixed swaps following the Act include, among others, Public Storage, Alexandria Real Estate Equities, Mid-America Apartment Communities, Inc., SL Green Realty, Mills Corporation. As for the Macerich Company and Archstone-Smith, these swaps could have generated hedging income affecting their 95% income test prior to the Act.

[15]This 2% is well within the range of 6.3% for the 12-month LIBOR in the 10-year ending in 2007q2 (the last quarter in our main sample period).

Examples also of abound of REITs terminating existing swaps in the post reform period. In their 2006 10-K's, Global Signal reported terminating several interest rate swaps with a total notional value of $1.2 billion, receiving a payment of $34 million from the counterparty. Similarly, Ashford Hospitality Trust reported that in November 2005 the company terminated $105 million interest rate swaps and received about $1.6 million from the counterparty. In December 2004, Equity Residential terminated several swaps in connection with mortgages and unsecured notes in excess of $800 million, paying about $7.3 million to the counterparty. Similarly, Equity Office Properties Trust terminated swaps with a combined notional amount of $800 million in March 2004 and paid $69.1 million to the counterparty. In April 2005, CarrAmerica Realty Corporation terminated swap agreements with a total notional value of $175 million, paying approximately $2 million to the counterparty. Other cases of firms terminating swaps post Act include Rouse Company, Brandywine Realty Trust, Equity Office Properties Trust, Kilroy Realty Corporation, Life Storage, Inc. Over the period 2001q3-2007q2, 56 firms terminated swap agreements, of which 16 firms terminated swaps both pre and post Act while 13 firms terminated swaps only before the Act and 27 only after the Act. Overall, these firms got involved in 100 termination events, of which 40 pre Act, and 60 post Act.[16]

The amendments introduced by the Jobs Act are important because REITs use significant amount of debt to finance their property acquisitions. Figure 1, Panel A, shows that pre-Jobs Act about 32% of all interest rate swaps and caps newly originated by the firms in our sample had a maturity of more than 3 years, out of which 18% had a maturity of more than 5 years. This suggests that if REITs decide to refinance their existing debt because market interest rates are favorable,[17] they will also need to close out the related (potentially, relatively long maturity) hedges. Although REITs typically hold properties for a relatively long period of time, early debt payoff (debt repayment in excess of maturing debt) is not uncommon, increasing from 11.7% pre event to 12.4% post event (Figure 1, Panel B). REITs will need to close out open hedges if they

[16]Our data also shows that firms might use fixed-to-variable rate swaps to offset existing variable-to-fixed rate swaps. This is the case, for example, of Arden Realty Inc., America First Apartment Investors Inc., Simon Property Group, Inc. Offsetting hedges, however, are less common than terminations, possibly because a dollar-for-dollar offset of an existing hedge is difficult to achieve, introducing significant basis risk. Similarly, selling an existing hedge is difficult because in addition to obtaining counterparty consent, it is not easy to find suitable buyers for tailor-made OTC interest rate swaps, which are the most commonly used hedging instruments by real estate investment trusts.

[17]Typically, there are penalties associated with early termination of commercial real estate loans. This, however, does not preclude that prevailing market rates make refinancing a suitable option.

pay off their debt earlier, unless the existing hedges are assumable in connection with the new loan.

[Figure 1]

In our identification strategy, because the Jobs Act allowed REITs to exclude hedging income from the 95% income test, effectively eliminating any concern that such income could make REITs fail the test, hedging by lower rental revenue entities (those ex-ante more likely to fail the test) should increase post reform relative to high rental revenue firms (those ex-ante less likely to fail the test). Importantly, we also study how higher hedging impacts access to credit and investment for the affected firms post Act.

3 Data and Empirical Design

We obtain our data from the following sources. Quarterly firm-level financial data for the real estate investment trusts (SIC 6798) as well as non-tax-exempt real estate companies (SIC 6512, 6794, and 7011) and homebuilders (SIC 1531) used in this paper is from S&P Global Market Intelligence SNL Real Estate. Figure A1 in the Appendix presents key figures of the REIT industry in 2021, showing that REITs have nearly $2.3 trillion of assets under management in 2021. Importantly, for our purposes, this database contains detailed firm-level information on the amount of variable interest rate debt converted into fixed rate debt using swaps and caps,[18] as well as the amount of fixed rate debt that has been swapped to variable rate debt. Transaction-level property data is from the SNL Property Transactions database. Data on derivatives maturity is hand-collected from Item 7(A), 10-K/10-Q SEC filings, section entitled "Quantitative and Qualitative Disclosure about Market Risk". Hedging data on non-financial firms is parsed from annual reports. Information on the implications of the Jobs Act for our sample of real estate companies was obtained from LexisNexis, news agencies, and extensive discussions with industry experts.

Figure 2, Panel A, reports the distribution of the real estate investment trusts in our sample by property type. Our sample firms specialize in eight different property types, including diversified real estate investment (9.2%), health care properties (8.4%), hotel (8.6%), industrial (8.7%), mul-

[18] All the hedging companies in our sample, except for Essex Property Trust, Inc., use only interest rate swaps to manage interest rate risk. Essex Property Trust, Inc. uses caps.

tifamily (13.3%), office (20.8%), retail (25.3%), and specialty (5.8%).[19] Figure 2, Panel B, reveals that our sample firms rely significantly on long-term debt. In the quarter prior to the passage of the Jobs Act (2004q2), these firms had 4.6% of debt maturing in the current year, 9.5%, 11.3%, 12.4%, and 11.0% in one to 4 years from 2004q2, and a remarkable 50.9% maturing in year 5 and the following years. The significant amount of long-term debt suggests that, even in a low interest rate environment, interest risk is potentially a material source of risk for the firms in our sample. As discussed, long-maturity hedges are also common.

[Figure 2]

Real estate investment trust firms provide an ideal setting to study risk management. First, they are exempt from corporate taxes. This allows us to study how the tax treatment of derivatives income affects corporate hedging without the potential contaminating effect of tax convexity, which is muted. Second, during 2001–2007, about 50% of all the assets under management by real estate investment trusts was financed with debt, of which more than a quarter was variable rate debt. Not surprisingly, interest rate expenses at 24.3% of total expenses were higher than depreciation expenses, which accounted for 23.8% of total expenses, and only lower than rental expenses, which were about 34.4% of total expenses (Figure A2). Third, because interest rate risk is material, REITs report detailed information on hedged variable rate debt, the type of derivatives used, notional amount, and maturity in their 10-Ks (Item 7(A)—"Quantitative and Qualitative Disclosures about Market Risk"). Fourth, we also have access to similar hedging data for non-tax-exempt real estate companies, which we use to perform placebo tests. Fifth, the importance of debt financing for real estate entities makes them an ideal setting to study interest rate risk, which is the first material source of risk for 71% of firms worldwide (Giambona et al., 2018).[20] Sixth, focusing on one industry makes it less likely that differences in economic fundamentals across industries explain changes in risk management policies.[21] We complement the REIT data with hedging data for a general sample of non-financial firms.

[19] Diversified companies follow a diversified investment strategy consisting of investing in different property types. The hotel category includes hotels and casinos. Retail includes shopping centers, regional malls, and other retail types. The specialty group includes manufactured home, self-storage, and cineplex theaters.

[20] Unsurprisingly, the notional amount of interest rate derivatives is multifold bigger than the size of any other hedgeable risk derivatives instrument. For example, in 2007 the notional amount of interest rate derivatives setup by banks was $129.6 trillion, followed by $16.6 trillion for foreign exchange risk derivatives (Figure A3).

[21] Theoretically, Adam, Dasgupta and Titman (2007) are one of the first papers to analyze the relationship between industry characteristics and hedging incentives.

To test whether real estate investment trusts with low real estate revenue hedge variable rate debt more intensively following the Jobs Act, we estimate the following difference-in-difference model (e.g., Bertrand, Duflo and Mullainathan, 2004; Athey and Imbens, 2006; de Chaisemartin and D'HaultfŒuille, 2018):

$$\begin{aligned} Hedged\ Debt_{i,q} = \beta \cdot (Pre\text{-}event\ Low\ Real\ Estate\ Revenue_{i,Pre\text{-}event} \times Post\ Jobs\ Act_q) \\ + \gamma \cdot Log\ Assets_{i,q-1} + y_i\ + p_i \times z_q + \ \epsilon_{i,q} \end{aligned} \tag{1}$$

where $Hedged\ Debt_{i,q}$ is hedging by real estate investment trust i in quarter q. We measure hedging with $Hedged\ Variable\ Rate\ Debt/Total\ Debt$, the ratio of hedged variable rate debt to total debt, and $Hedged\ Variable\ Rate\ Debt/Total\ Variable\ Rate\ Debt$, the ratio of hedged variable rate debt to total variable rate debt. $Pre\text{-}event\ Low\ Real\ Estate\ Revenue$ is an indicator for companies with real estate revenue below the sample bottom quartile of 0.906 in the year before the passage of the American Jobs Creation Act (2003q3-2004q2), where real estate revenue is the ratio of the sum of rental revenue plus operating real estate revenue, including revenue from hotel properties, to total gross revenue. Although gains on sales of real estate properties, mortgage income, dividends from other REITs, and other real estate related income can potentially be added to the numerator of the 95% income test, our first measure focus exclusively on a firm's ability to generate revenue strictly from core rental activities. In addition to real estate related revenue, total gross revenue includes also non-qualifying revenue, which REITs derive from non-rental activities, such as tenant-specific trash collection, cleaning services, drycleaning pick up, etc. Detailed definitions of all the variables used in the paper are presented in Table A1 of the Appendix.

The logic of our pre-event low real estate revenue indicator is that, prior to the Jobs Act, firms with a low percentage of real estate revenue are more likely to be concerned with potential non-qualifying income from hedging transactions that could make them fail the 95% income test and face stiff corporate taxes (or potentially even lose their tax-exempt status). It is important to stress that the 95% income test is based on gross revenue, therefore potential derivatives losses played no role in the test prior to the reform or after. Following the Act, hedging income is no longer added to gross revenue for the purpose of the 95% income test, leading to lower potential penalties. As

a result, we can expect hedging for pre-event low real estate revenue firms to increase relative to their counterparts with pre-event high real estate revenue.

In robustness tests, we also consider two alternative proxies for real estate exposure. The first alternative proxy is *Pre-event Low Total Operating Revenue*, an indicator for companies with total operating revenue below the sample bottom quartile of 0.927 in the year before the passage of the American Jobs Creation Act (2003q3-2004q2), where total operating revenue is the ratio of the sum of rental revenue, operating real estate revenue, mortgage income, and gains on sales of real estate to total gross revenue.[22] The second alternative proxy is *Pre-event Low Real Estate & Cash Holdings*, an indicator for companies with total real estate & cash holdings below the sample bottom quartile of 0.779 in the year before the passage of the American Jobs Creation Act (2003q3-2004q2), where real estate & cash holdings is the ratio of real estate asset plus cash and cash equivalent to total assets.

Post Jobs Act is an indicator equal to 1 for the year-quarters after 2004q2, *Log Assets* is the natural logarithm of total assets lagged one quarter, and y_i and $p_i \times z_t$ are respectively firm fixed effects and property type indicators, p_i, interacted with year-quarter interacted fixed-effects, z_t. Standard errors are clustered at the firm level. Our main analysis focuses on the sample period 2001q3–2007q2: a twenty-four-quarter time window centered on 2004q3, which we consider the quarter of the passage of the reform.

The American Jobs Creation Act of 2004 (AJCA) (Pub.L. 108–357, 118 Stat. 1418) was introduced in the House on June 4, 2004 (2004q2), passed the House on June 17, 2004 (2004q2), passed the Senate on July 15, 2004 (2004q3), and was signed into law by President George W. Bush on October 22, 2004 (2004q4). In our empirical design, we consider 2004q3 as the quarter of the passage of the reform because laws are very likely to be enacted after having passed both the House and the Senate unless the President vetoes them, which is unlikely to occur. In our robustness tests, we also perform our analysis for the sample periods 2002q3–2006q2, 2000q3–2008q2, and 1994q4–2009q1. The focus of our analysis is on *Pre-event Low Real Estate Revenue* $\times$ *Post Jobs Act*, difference-in-difference estimator.

[22] Although dividend income and gains from the sale or disposition of stocks and other securities can be added to the numerator of the 95% income test, we do not include these non-real estate items in our second proxy. We do so because a REIT that is able to meet the 95% income test only because of the capital gains from the sale of stocks or other securities is most likely struggling to generate sufficient real estate revenue from core rental activities, therefore facing significant risk of failing its regulatory requirements.

Table 1 reports basic descriptive statistics during the pre-reform period (2001q3-2004q2) for the combined sample, pre-event low real estate revenue companies (treated firms), and pre-event high real estate revenue companies (control firms). The table shows that before the Jobs Act treated firms hedged a significantly lower percentage of variable rate debt than control firms both relative to total debt (3.4% vs. 7.6%) and total variable rate debt (9.9% vs. 21.8%). That is the case although variable rate debt as a percentage of total debt is higher for treated firms compared to control firm, (32.2% vs. 27.6%). In line with our argument, although access to potentially cheaper variable rate debt is valuable to low real estate revenue firms, these firms rely less intensively on interest rate derivatives because pre-reform derivatives income could make them fail their 95% income test and pay tax penalties. Average book assets are $1.628 billion for treated firms compared with $2.283 billion for control firms. Treated firms also have significantly lower leverage than control firms (42.6% vs. 52.9%). By construction, real estate rental revenue is significantly lower for treated firms. Table A2 in the Appendix reports detailed descriptive statistics for all the variables used in the paper for treated firms, control firms, and the combined sample over our sample period 2001q3–2007q2.

[Table 1]

Figure 3 displays geographical heat maps of headquarters (Panel A) and incorporation (Panel B) states of the REITs in our sample in 2003. As it can be noted, REIT headquarters are located across the country, with the top five states being California and New York (16 firms), Maryland (10 firms), and Florida and Illinois (8 firms). The top five states in terms of number of incorporation are Maryland (88 firms), Delaware (13 firms), and California, North Carolina, and Ohio with 3 firms each. Notably, because of protective anti-takeover regulation and other favorable legislation, Maryland is REITs' preferred state of incorporation. This is different from other non-financial firms that more typically incorporate in Delaware.

[Figure 3]

Figure 4 displays the geographical location across U.S. Core-Based Statistical Areas (CBSAs) of property owned by treated and control firms in 2004q2. Although control firms own more properties

than treated firms, Figure 4 visually shows that the two groups are very similar in terms of the CBSAs where they own properties.

[Figure 4]

Figure 5 displays lease maturity (Panel A) and financing patterns (Panel B) for the real estate investment trusts in our sample in 2004q2. There is significant variation in lease maturity across property types. For diversified, health care, industrial, office, and retail companies 90+% of the leases expire between 2 to 5 years from the current year and 6+ years from the current year. Notably, for the health care segment, 78% of the leases expires in year 6+ from current year. Unsurprisingly, all leases expire within 1 year for multifamily and speciality, which includes mainly manufactured homes. Typical lease maturity is one day for hotels. Panel B, shows also significant variation in financing patterns across property types. Firms could demand different levels of exposure to leverage and variable rate debt to match the characteristics of their cash flows and assets or for other reasons. This heterogeneity highlights the importance of controlling for property type in our regressions.

[Figure 5]

To mitigate the concern that differences between treated and control firms could bias our results, we: (1) control for lagged firm size in all regressions; (2) perform within-firm estimations by including firm-fixed effects in our regressions; (3) control for fundamentals and regulatory differences across property types with property-quarter-year fixed effects; (4) assess the the parallel trend assumption; (5) use the Abadie and Imbens (2006) nearest-neighborhood matching estimator to match treated and control firms; (6) saturate our hedging regressions with pre-reform firm characteristics. Importantly, the inclusion of property-quarter-year fixed effects in all our regressions further implies that we are comparing the hedging policies of treated firms and control firms in the same property segment and hence potentially affected by the same industry-wide economic and regulatory shocks. Overall, our main findings and numerous validity and robustness tests suggest that results are unlikely to be influenced by differences in firm characteristics across treated and control firms.

Table A3 in the Appendix reports selected correlations. Notably, real estate revenue has a correlation coefficient of 0.565, statistically significant at the 1% level, with operating profitability, the ratio of net operating income to total assets, but it is uncorrelated with total profitability, the ratio of net income to total assets. Real estate revenue is also positively correlated with leverage, but uncorrelated with total assets. Overall, these correlation patterns mitigate the concerns that our pre-event low real estate revenue indicator could be capturing higher risk of financial distress, as it would have been the case if real estate revenue was positively correlated with total profitability, and negatively correlated with leverage. Instead, in line with the logic of our empirical design, the variable is capturing the extent to which real estate investment trusts are generating revenue from rental activities as opposed to potentially non-qualifying activities.

4 Results

4.1 Variable Rate Debt and Interest Rates

One could argue that real estate investment trusts concerned about losing their tax-exempt status because of non-qualifying income from hedging could use fixed-rate debt instead of variable rate debt. This is possibly one of the reasons why variable rate debt is just around 28.7% of total debt for our sample during the pre-reform period, Table 1. There are advantages, however, with variable rate debt, which is in larger supply and typically less expensive than fixed rate debt because these loans help lenders match the interest-rate exposure of their own short-term liabilities (Santomero, 1983). Therefore, variable rate debt is a potentially desirable source of financing for these REITs. However, it is also a source of funding that increases interest risk if firms cannot properly use interest rate derivatives to hedge. To study the relationship between variable rate debt and interest rate in our sample, we estimate the following regression:

$$\begin{aligned} Interest\ Rate_{i,q} = \beta \cdot Variable\ Rate\ Debt_{i,q-1} + \gamma \cdot Leverage_{i,q-1} \\ + \delta \cdot Log\ Assets_{i,q-1} + y_i\ + p_i \times z_q + \ \epsilon_{i,q} \end{aligned} \tag{2}$$

where *Interest Rate* is the weighted average interest rate on all variable and fixed rate debt for

firm i in quarter q, *Variable Rate Debt* is the lagged ratio of the variable rate debt to total debt, *Leverage* and *Log Assets* are the ratio of total debt to asset and the natural logarithm of total assets, respectively, also lagged one period, and y_i and $p_i \times z_t$ are respectively firm fixed effects and property type indicators, p_i, interacted with year-quarter interacted fixed-effects, z_t. Standard errors are clustered at the firm level.

Table 2 reports results from this estimation. Focusing on column [4], specification controlling for both lagged leverage and log assets, the significantly negative coefficient on the lagged *Variable Rate Debt/Total Debt* suggests that weighted average interest rate is lower for firms using more variable rate debt. The effect is also economically sizable. A one-standard deviation increase in lagged *Variable Rate Debt/Total Debt*, which is 0.229 for the combined sample (Table A2, Panel C), is associated with a 22.4 basis points lower weighted interest rate, obtained by multiplying the coefficient of -0.979 (from Table 2, column [4]) by 0.229. This effect corresponds to a 3.6% decrease relative to the combined sample average weighted interest rate of 6.213% in Table A2, Panel C. Overall, these findings highlight that variable rate debt is a valuable form of debt financing for the firms in our sample, especially if it can be combined with derivatives instruments to hedge interest rate risk.

[Table 2]

4.2 Hedging for Low Real Estate Revenue Companies after the Jobs Act

In this section, we examine the effect of the Jobs Act of 2004 on corporate hedging for pre-event low real estate revenue firms (treated firms) relative to pre-event high real estate revenue firms (control firms) by estimating Eq. 1 – difference-in-difference model. Table 3 presents results from this estimation. Across all four estimations in Table 3, the coefficient on the interaction term of interest, *Pre-event Low Real Estate Revenue* $\times$ *Post Jobs Act*, is positive and statistically significant at the 5% level or higher. The effect is also economically large. Focusing on columns [2] and [4] (estimations with lagged log assets as control), the coefficients of 0.072 and 0.108 suggests that, following the 2004 reform, low real estate revenue firms increased the fraction of total debt hedged and variable rate debt hedged by 7.2 and 10.8 percentage points (p.p.), respectively, relative to control firms. In line with our prediction, these findings indicate that the exclusion of derivatives

income from the 95% income test with the passage of the Jobs Act of 2004 led to an increase in interest rate hedging for real estate investment trusts with an ex ante higher risk of failing the test.

[Table 3]

4.2.1 Robustness and Validity Tests

In our main regressions, the control firms are the "universe" of firms with pre-event high real estate revenue. The advantage of including all firms is that one overcomes possible concerns about the generality of the findings. However, by considering the universe of firms, inevitably, treated and control firms will be potentially different in some important characteristics. To mitigate this concern, in all our regressions we control for lagged log assets, firm fixed effects, and property-quarter-year fixed effects. To further deal with this concern, in 2004q2 (the last pre Jobs Act quarter) we match each treated firm (Pre-event Low Real Estate Revenue: Yes) to its closest control firm (Pre-event Low Real Estate Revenue: No) based log assets. We perform our matching using the Abadie and Imbens' (2006) matching estimator.

Table 4 presents the mean difference t-test and the Wilcoxon rank-sum distributional test for treated and control firms in the matched sample. Clearly, the p-values (for the mean difference t-tests and the Wilcoxon rank-sum distributional tests) are all largely above the 10% threshold for both log assets and the ratio of hedged variable rate debt to total debt. This suggests that treated and control firms are similar in terms of characteristics and distributional assumptions in the matched samples with respect to assets under management and hedging practice prior to the reform.

[Table 4]

Table 5 presents results from the estimation of our difference-in-difference hedging regressions for the matched sample. Focusing on columns [2] and [4], specifications with lagged log assets as control, our findings show a significant and large increase in both the ratio of variable hedged debt to total debt and the ratio of hedged variable rate debt to total variable rate debt. The effects are economically larger compared to those in our base estimation in Table 3. In the matched sample, Hedged Variable Rate Debt/Total Debt increased by 9.7 p.p. for treated firms relative to control

firms post reform (Table 5, column [2]), compared to 7.2 p.p. in the base sample (Table 3, column [2]). Similarly, Table 5, column [4] shows that Hedged Variable Rate Debt/Total Variable Rate Debt increased by 18.1 p.p. for treated firms following the Act in the matched sample, compared to 10.8 p.p. in the base estimation (Table 3, column [4]). Overall, these findings mitigate the concern that our hedging results could be biased by differences between treated and control firms.

[Table 5]

In all our regressions, we include firm fixed effects and quarter-year-property fixed. However, we use a parsimonious approach with respect to time varying control variables to mitigate the potential bias introduced by endogenous control variables (e.g., Lechner, 2008). In our next robustness test, we add as control variables pre-reform indicators for firms with assets, total profitability, leverage, variable rate debt as a percentage of total debt, and earnings volatility above the sample top quartile interacted with post Jobs Act indicator. To control for the potential effects of the reform through taxable REIT subsidiaries (TRS), we also add to our regressions the interaction of an indicator for REITs with TRS in 2003 (72 firms in our sample), which we hand-collect from annual reports, with the post reform indicator. Finally, we control for potential effects through changes in the CMBS market during our sample period by adding to our regressions the interaction of an indicator for REITs with CMBS in 2003 (19 firms in our sample), which, as for TRS is hand-collected from annual reports, with the post reform indicator.

Table 6 shows that with the exception of the CMBS interaction term, which is marginally significant in column [1], these control variables are all statistically insignificant and economically small. The significantly negative coefficient for the CMBS interaction might reflect the fact that CMBS investors require predictable cash flow streams, which issuing firms achieve with fixed-rate debt requiring less hedging. Most importantly, Table 6 shows that our main hedged variable debt results are stronger in this robustness test.

[Table 6]

Next, we examine whether prevailing market interest rates could affect our findings. Figure 6 shows that interest rates, as proxied by the the 3-month LIBOR rate, were relatively volatile during our sample period (previous four quarters standard deviation) but the volatility was about 0.4%

both before and after the reform, mitigating the concern that changes in interest rate volatility affected our results.[23] In Figure 6, we further plot the fixed rate on a 3-year maturity interest rate swap, which is the rate paid by the swap buyer in exchange for receiving the 3-month LIBOR, the 3-month LIBOR, and the 3-year maturity treasury yield. Notably, the 3-year maturity interest rate swap was always higher than the 3-month LIBOR during our pre-reform period, 2001q3-2004q2. The 3-year maturity interest swap rate was also higher than the 3-month LIBOR for most of the post-reform period, with the exception of 2006q3-2007q1. The average spread between the 3-year maturity interest rate swap and the 3-month LIBOR was however lower during 2004q3-2007q2 compared with the pre-reform period. Overall, the evidence in Figure 6 indicates that prevailing market interest rates are unlikely to have a significant effect on our findings.

[Figure 6]

To test formally whether market interest rates could explain why treated firms hedge more post reform (e.g., Faulkender, 2005), in Table 7 we re-estimate our regressions in Table 3 controlling for the interactions of the *Pre-event Low Real Estate Revenue* indicator with the the lagged spread between the 3-year maturity interest rate swap fixed rate and the 3-month LIBOR, the lagged fixed rate on a 3-year maturity interest rate swap, and the lagged 3-month LIBOR, respectively. We find that our hedging results are robust in these estimations.

[Table 7]

Could it be that our results are influenced by macro trends in commercial real estate prices and mortgages in the years leading to the subprime crisis? Figure 7 plots the natural logarithm of the CoStar equally-weighted transaction-based commercial real estate price index, the natural logarithm of the total value of commercial real estate mortgages from the Federal Reserve Economic Data (FRED) database, and the natural logarithm of the S&P 500 index level from CRSP. While commercial real estate prices and commercial real estate mortgage volume increased in the three years leading to crisis (our pre-event period), these trends started in the 1990's and any potential effect on hedging should have been picked up in our placebo tests. As discussed, Table 12 shows

[23]The Fed finds rate volatility (previous 12 months standard deviation) was 0.49% pre-reform (2001q3–2004q2) compared with 0.44% post-reform (2004q3-2007q2).

no effect on hedging for our firms in any of the placebo tests starting in the mid 1990's. Notably, Figure 7 also shows that commercial real estate prices behaved similarly to stock prices before, during, and after the subprime crisis. Moreover, there is no clear reason why treated firms should potentially be affected differently from control firms by these trends in commercial real estate prices and mortgages.

Table 8 shows that our hedging results are robust if we add the interactions of the *Pre-event Low Real Estate Revenue* indicator with a dummy equal to 1 if the lagged percentage change in commercial real estate prices is in the sample top quartile and a dummy equal to 1 if the lagged percentage change in commercial real estate mortgages is in the sample top quartile. In these tests, the commercial real estate price index is the CoStar equal-weighted transaction-based index available by property type and region (Midwest, Northeast, South, and West). We assign the property index to each firm-quarter based on property type and headquarters region. The mortgage value data is from the Federal Reserve Economic Data (FRED) and is at the quarter level. [24]

[Figure 7]

[Table 8]

Figure 8 shows that loan charge-off rates for non-multifamily and multifamily commercial real estate loans in the quarters following the beginning of the subprime crisis were significantly lower than any other type of loans, including 1-4 family residential loans, home equity loans, real estate construction loans, and commercial and industrial loans. These findings further support our claim that commercial real estate prices and loans did not necessarily experience unusual trends in the period leading to the subprime crisis.

[Figure 8]

Relatedly, Figure 9, Panel A, further shows no evidence of any increase in the number of bankruptcies for the REITs in our study during the subprime crisis, with only one bankruptcy in

[24]Table A4 in the Appendix further shows that our results are robust if we interact the *Pre-event Low Real Estate Revenue* indicator with the actual lagged percentage change in commercial real estate prices and the lagged percentage change in commercial real estate mortgages instead of the dummies. Notably, the coefficient on the *Pre-event Low Real Estate Revenue* interacted with the lagged percentage change in commercial real estate mortgages is significantly positive in these estimations, indicating that treated firms hedge more when the volume of CRE mortgages is increasing.

2009. In part, this is explainable by the fact REITs invest in stabilized commercial real estate properties with relatively predictable cash flow streams. By contrast, the number of bankruptcies for residential mortgage REITs, non-financial firms, and financial firms all increased in the years of the subprime crisis. Panel B also shows that, while the number of REITs exiting the sample because of being acquired was sizable up until 2007q1-q2 with 11 exits, there was only 1 exit in 2007q3-q4, and very few or none in the following years. The limited number of exits during the subprime crisis suggests that the REIT industry did not experience an upsurge of restructuring activities during the crisis. Instead, the evidence is more consistent with a reduction in the supply of capital during the crisis as being responsible for a reduction of consolidation activities.

[Figure 9]

In our base estimations, we restrict the sample period to 2001q3-2007q2 to avoid the potential consequences of the subprime crisis on hedging activities. For robustness, we considered three alternative sample periods, a shorter-sample period, 2002q3-2006q3, and two longer sample periods, 2000q3-2008q2 and 1999q4-2009q1. The latter sample period includes several subprime crisis quarters and several quarters following the introduction in the 109^{th} Congress of the REIT Investment Diversification and Empowerment Act on September 29, 2006, which was eventually passed as part of the Housing and Economic Recovery Act of 2008, signed into law by President George W. Bush, on July 30, 2008. One of the key provisions of the 2008 Act for our purposes is that it excluded derivatives income also from the 75% income test, which, unlike the 95% test, does not include in the list of qualifying income dividends and gains from the sale of stock securities and other income, therefore further reducing constraints to derivatives hedging for low real estate revenue firms. Table 9 show that our hedging results hold using these alternative sample periods.[25]

[Table 9]

In our next robustness test, we consider two alternative proxies of real estate exposure. Our first measure is based on the ratio of the sum of rental revenue, operating revenue, mortgage income, and gains on sales of real estate to total gross revenue, *Total Operating Revenue*. The main difference

[25]Table A5 in the Appendix shows that our results hold if we constraint the sample to firms with at least 4 and 12 quarterly observations, respectively, during both the pre- and post-reform period. The 12-quarter restriction implies that the sample only includes firms with observations throughout our entire sample period.

between this measure and our base case measure is that we add extraordinary real estate income, such as gains on sales of real estate, to real estate revenue. Our second measure is based on the ratio of real estate assets & cash holdings to total assets, *Real Estate & Cash Holdings*. In line with our baseline tests, treated firms are those with total operating revenue and real estate & cash holdings below the sample bottom quartile in the four quarter prior to the Jobs Act, 2003q3-2004q2: *Pre-event Low Total Operating Revenue* and *Pre-event Low Real Estate & Cash Holdings*. Table 10 shows that our hedging results hold using these two alternative measures to identify treated firms.

[Table 10]

In our empirical strategy, the Jobs Act encourages low real estate revenue REITs to hedge more by excluding derivatives income from the 95% income test. If this mechanism is correct, we should not find any increase in hedging for non-affected real estate property companies, real estate leasing companies non-structured as tax exempt entities, and homebuilders, neither of which are subject to the 95% income test. In these tests, we identify treated firms based on whether the ratio of operating revenue to total revenue is in the respective sample bottom quartile in the year prior to the Act, 2003q3-2004q2. Similarly, we obtain annual data for a sample of foreign REITs, which are not subject to the Jobs Act. In these tests, we identify treated firms based on whether the ratio of operating revenue to total revenue is in the respective country sample bottom quartile in 2003. Table 11 shows no evidence that hedging increased in these placebo tests.[26]

[Table 11]

A key assumption of any difference-in-difference estimation is that the outcome variable for treated, and control firms follows a parallel trend prior to the treatment. In our setting, the parallel trend assumption requires that, prior to the Jobs Act, hedging for treated and control follows a parallel trend. A violation of this assumption could be problematic because it would

[26] Although the Act could also lead to an increase in the proportion of fixed rate debt swapped into variable rate debt, this is not likely to be an effective risk management strategy for low real estate revenue companies trying to boost their rental revenue by borrowing and increasing real estate investments using hedgeable variable rate debt. Table A6 supports this expectation. We do not find any significant change in the ratio of fixed rate debt swapped to variable rate debt to total debt (Table A6, columns [1]-[2]) or the ratio of fixed rate debt swapped to variable rate debt to total fixed rate debt (Table A6, columns [3]-[4]).

suggest that a trend specific to low real estate revenue companies, rather than the reform, is the reason that hedging increased for treated firms. To assess this assumption formally, we estimate our difference-in-difference model with additional control variables by adding interaction terms of the pre-event low real estate revenue indicator with dummy variables for 2002q4 to 2006q2 and following quarters, where 2004q3 is the quarter of the passage of the Jobs Act (e.g., Autor, 2003; Gormley and Matsa, 2011). The four quarters from 2001q3 to 2002q2 serve as the base case.

Figure 10, Panel A, plots the coefficients on these interaction terms together with 90% confidence intervals for the hedged variable rate debt/total debt dependent variable. There is no indication of a change in hedging of treated firms relative to control firms prior to 2004q2. We find evidence that hedging started to increase in quarters in 2004q2, 2004q3, and more sizably in quarter 2004q4, and the following quarters for treated firm relative to control firms. The evidence that hedging started to increase in 2004q2 is explainable by the increased anticipation that the reform would become law, given that the Act passed the House on June 17, 2004. In Figure 10, Panel B, we find similar patterns when using hedged variable rate debt/total variable rate debt as dependent variable, although estimations are generally noisier.

[Figure 10]

We also perform parallel-trend tests using annualized data from 2001q3 to 2007q2, with 2001q3 - 2002q2 as the omitted year. To obtain annualized data, we calculate averages across four quarters of hedging variables and assets. Overall, estimations are more precise with annualized data, showing no evidence of pre-reform trends. Figure A4 in the Appendix reports these estimations. Overall, the evidence in Figure 10 and Figure A4 mitigates the concern that a trend in the hedging policies of treated firms relative to control firms could be the reason for the findings in Table 3.

As an additional check, we re-estimate our base hedging models over the following twenty-four quarter windows: 1994q3-2000q2, 1995q3-2001q2, 1996q3-2002q2, 1997q3-2003q2, and 1998q3-2004q2. If there were a trend in hedging specific to low real estate revenue firms prior to Jobs Act, we should find this effect to be economically sizable in these "placebo" pre-reform windows (Roberts and Whited, 2013). We find that the coefficients on the interaction terms of interest are always insignificant in these placebo estimations for both the hedged variable rate debt/total debt regression (Table 12, column [1]) and the hedged variable rate debt/total variable rate debt

regression (Table 12, column [4]). Overall, this analysis allows us to rule out any positive trend in hedging for low real estate revenue firms prior to the Jobs Act.

[Table 12]

4.3 Hedging for a General Sample of Non-Financial Firms after IRS REG-107047-00

To assess the generality of our findings, we also consider a general sample of non-financial firms. In this analysis, we exploit a regulatory change contained in The Ticket to Work and Work Incentives Improvement Act of 1999, implemented through IRS Regulation REG-107047-00 of January 18, 2001.[27] As discussed in the introduction, this regulation allowed derivatives activities to qualify as hedging transactions, which are taxed more favorably than speculative transactions, if they are used to manage risk even if in practice they do not reduce risk. Prior to the reform, derivatives had to reduce risk to qualify as hedging transactions. Similar to the Jobs Act for real estate investment trusts, IRS REG-107047-00 reduced the risk of potential tax consequences of corporate hedging transactions.

In our tests, we consider the period 1998-2003. The treated firms are those with a tax shield (the sum of investment tax credit plus tax loss carry forward minus pretax income) in 2000 (the year before REG-107047-00) below the sample 25^{th} percentile (*Pre-event Low Tax Shield*). Firms with low tax shields are more likely to face corporate taxes. In principle, they could have an incentive to hedge to avoid an increase in expected taxes associated with higher cash flow volatility. However, prior to the reform, derivatives could also lead to capital gain taxes while any potential derivatives loss would not be deductible from business income. IRS REG-107047-00 eliminated these latter potential tax consequences of hedging for low tax shield firms. The control group includes firms with a tax shield above the sample 75^{th} percentile. For these firms, using hedging to reduce the potential expected taxes associated with higher cash flow volatility is neither particularly important before nor after the reform. We exclude firms with a tax shield between the 25^{th} and 75^{th} percentiles. *Post IRS REG-107047-00* is a dummy variable equal to 1 for the years 2001-2003, and zero for the years 1998-2000. The dependent variable is an indicator for firms displaying interest rate hedging

[27] IRS REG-107047-00 was first published in the Federal Register in 1-18-2001, 66 FR 4738. A follow up version incorporating comments was published in 3-20-2002, 67 FR 12863

based on keywords parsed from annual reports.

Table 13 shows that interest rate hedging propensity increased by 6.1%, statistically significant at the 1% level, for treated firms relative to control firms in the post reform period. Figure 11 shows no indication that these results are due to a violation of the parallel trend assumption. In line with the logic of our empirical strategy, the low tax shield firms (those subject to more corporate taxes before the reform) increased hedging after REG-107047-00 reduced the risk of potential tax consequences of hedging transactions. In line with our hedging results for REITs, these findings suggest that the tax implications of hedging transactions can have distortionary effects on corporate hedging in a general sample of non-financial firms.

[Table 13]

[Figure 11]

4.4 Financing and Real Activities for Low Real Estate Revenue Companies after the Jobs Act

In this section, we study financing and real activities for low real estate revenue companies relative to high real estate revenue companies after the passage of the Jobs Act. In this analysis, we use comprehensive transaction level data for the years 2001-2007.[28] The only exception is variable rate debt, which is at the firm level. Table 14 Panels A and B report financing and investment results, respectively. Table 14, Panel A, column [1], shows that access to mortgage credit increased for treated firms post reform by 1.2 p.p. relative to control firms. This effect is sizable compared to the sample of 0.016 in Table A2, Panel C. Notably, column [2] shows that variable rate debt as a proportion of total debt increased sizably by 8.3 p.p. for treated firms relative to control firm post reform. In line with the logic of our empirical strategy, this finding suggests that access to cheaper variable rate debt, which is more exposed to interest rate risk but easier to hedge after the Act, increased for treated firms post reform.

[28] We exclude from this analysis foreign property transactions because only 15 firms out of the 120 in our transaction-level data invested in foreign properties during our sample period. They acquired a total of 113 foreign properties compared to 9,824 U.S. properties for the overall sample of firms. 12 of the 15 firms with foreign property acquisitions hold these properties in just one country. The remaining three firms have foreign properties in 2, 4 and 7 countries, respectively. Our transaction-level results are qualitatively very similar if we retain the foreign acquisitions in the sample.

[Table 14]

Table 14, Panel B, presents property-level investment results. Columns [3] and [4] show that the increased access to mortgage financing documented in Panel A was accompanied by a 0.5 p.p. and a 0.4 p.p. increase in property acquisitions and property improvements, respectively. In line with this evidence, Figure 12 visually shows that treated firms acquired significantly more properties post reform (Panel b) compared to pre reform (Panel a), 2,995 v. 983. Instead, the number of properties acquired by control firms post reform (Panel d) relative to pre reform (Panel c) increased by less, 5,399 v. 3,642. Estimating our main difference-in-difference model with the natural logarithm of the firm-level number of property acquisitions, Table A7 shows that treated firms acquired about 34% more properties than controls firms post Act. Notably, the new properties of the treated firms display a 3.1 p.p. higher occupancy rate post post reform, column [5]. We further find that treated firms are about 18.4% less likely to make a diversifying property acquisition, column [6]. That is, they are less likely to acquire a property outside of their top three property types. This evidence is in line with previous literature showing that firms substitute between financial hedging and operational hedging (e.g., Gilje and Taillard, 2017, Almeida et al., 2017, and Hoberg and Moon, 2017).

[Figure 12]

Figure 13 shows that the parallel trend assumption holds for the variables considered in Table 14. We note, however, that the yearly coefficient estimates in the post-reform period are only close to statistical significance for the mortgage regression.

[Figure 13]

Overall, our evidence supports the financial distress (Smith and Stulz, 1985; Purnanandam, 2008) and financial constraints (Froot et al., 1993; Mello and Parson, 2000) models of risk management, identifying hedging as an important channel to increase access to credit and invest. Our results also support the argument that interest rate hedging can increase a firm debt capacity by allowing access to variable rate debt, which is in larger supply and typically less expensive than fixed

rate debt because these loans help lenders match the interest-rate exposure of their own short-term liabilities (Santomero, 1983).[29]

4.5 Taxes, Exit, and Early Debt Payoff after the Jobs Act

In our identification strategy, the Jobs Act reduces the risk that a REIT could fail the 95% income test because of hedging income, facing stiff tax penalties. Further, because derivatives income is excluded from non-qualifying income post reform, it is possible that treated firms retain more non-qualifying income from impermissible activities (e.g., trash collection, concierge services) within the firm rather than transferring it to a TRS and pay taxes. Typically, if a REIT generates significant revenue from impermissible services offered to tenants, these services would be provided through a TRS and taxed. This is done because otherwise this revenue would be counted as non-qualifying income and could make the entity fail the income tests. Because the reform excludes derivatives income from non-qualifying income, a REIT can now keep more non-qualifying income from impermissible activities within the entity. Therefore, we should expect a reduction in corporate taxes for treated firms relative to control firms post reform as documented in Table 15, column [1].

[Table 15]

In our next test, we study the exit propensity of treated firms following the reform. Low real estate revenue REITs might combine their operations with other entities to avoid the potential tax consequences associated with failing the income tests. Because after the Act hedging income are no longer part of the 95% test, we should expect exit propensity to decrease for treated firms post reform in connection with a reduction in the risk of failing the income test. Further, because real estate investment increased for treated firms post Jobs Act, we should expect this also to make it easier for pre-event low real estate firms to pass the 95% income test, become economically stronger, and, as a result, be less likely to exit the sample post reform. In line with this prediction, Table 15, column 2 reveals that there is a 2% reduction in the exit propensity of treated firms compared to control firms post reform.

[29] Data from the Fed's Survey of Consumer Finance shows that in 2004 (2019) households had \$3.34 (\$5.89) trillion dollars in deposits, of which \$1.02 (\$2.00) trillion in checking accounts, \$1.54 (\$2.88) trillion in savings accounts, and \$0.78 (\$1.01) trillion in certificate of deposits.

In our identification strategy, being able to close out existing hedging positions related to refinancing creates higher incentives to hedge after the Act. Because closing out hedges is easier after the reform, we can also expect early debt payoff (which might require closing out hedges) to increase post Act. In line with this expectation, Table 15, column 3 shows that early debt payoff increased by 3.6 p.p. for treated firms relative to control firms post reform. Overall, the evidence in Table 15 further contributes to validate the logic of our identification strategy that the Jobs Act affected corporate outcomes of low real estate revenue firms by lowering the risk that they could fail the 95% and 75% income tests.

4.6 Financing and Investment for a General Sample of Non-Financial Firms after IRS REG-107047-00

We also consider borrowing and investment for a general sample of non-financial firms. Did higher hedging lead to an increase in borrowing and investment activities for the low tax shield firms relative to their high tax shield counterparts following IRS REG-107047-00? In these estimations, following Erickson et al. (2014), we scale net debt change (long term debt minus lagged long term debt) and capital expenditures by lagged gross property, plant, and equipment. Table 16 shows a significant increase in access to credit for the treated firms relative to the control firms following IRS REG-107047-00. Notably, higher access to credit allowed the treated firms to invest more in the post reform period relative to their high tax shield counterparts. Figure 14 shows no indication that the financing and investment results are driven by a violation of the parallel trend assumption. As for the REIT case, these findings suggest that the narrow characterization of hedging transactions pre REG-107047-00 limited hedging and borrowing, and ultimate affected investment activities for low tax shield non-financial firms. REG-107047-00 encouraged hedging activities, with positive repercussions on the ability of low tax shield firms to access credit and invest.

[Table 16]

[Figure 14]

5 Conclusion

Although theory shows that tax convexity might create incentives for firms to hedge, empirical support for this prediction is limited. We argue that this can occur because derivatives themselves can generate taxable hedging income. We study how the tax treatment of hedging income affects corporate incentives to hedging, borrowing, and invest for real estate investment trusts and non-financial firms. We consider firms that were ex ante more likely to face higher taxation after the Jobs Act of 2004 and IRS Regulation 107047-00. These reforms increased hedging incentives for firms facing ex ante higher taxation as the two regulations allowed for a more favorable tax treatment of corporate hedging income.

We find that after the introduction of the Jobs Act of 2004, REITs with lower rental revenue (those ex-ante more likely to face higher taxes) increased interest rate hedging sizably compared to their counterparts with higher rental revenue. Prior to 2004, derivatives income from interest rate hedges constituted non-qualifying revenue for REITs, therefore increasing the risk that these entities could face stiff tax penalties. The 2004 Act excluded derivatives income from non-qualifying revenue, facilitating corporate hedging. Importantly, we also find that, by allowing for a more favorable tax treatment of hedging income, the Jobs Act allowed treated firms to access potentially cheaper variable rate debt and acquire more commercial real estate. This benefited households by facilitating access to commercial real state, a $20.7 trillion asset class (Nareit, 2022). We find comparable effects on hedging, borrowing, and investment for a sample of non-financial firms following IRS Regulation 107047-00.

The Dodd-Frank Act introduced market clearing and several compliance requirements affecting the use of derivatives for both financial institutions and corporate end-users. The regulation impacted especially swaps, which are mainly used to hedge interest rate risk, the single most important source of risk for firms worldwide. Policymakers around the world have introduced similar regulations. While this might improve the stability of financial markets, little is known on how regulation might impact corporate hedging. In this paper, we focus on how regulatory discretion impacts hedging incentives, affecting access to credit and investment.

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Table 1: **Descriptive Statistics.** This table reports the mean for selected variables of the real estate investment trusts in our sample, for the combined sample, the treated firms (Pre-event Low Real Estate Revenue: Yes), and the control firms (Pre-event Low Real Estate Revenue: No). The difference in means between treated and control firms is also reported. Refer to Table A1 for detailed variable definitions. The sample period is 2001q3 - 2004q2, the pre-Jobs Act period. Data is from S&P Global Market Intelligence SNL Real Estate. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Mean	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt	Assets ($B)	Real Estate Revenue	Leverage	Variable Rate Debt/ Total Debt	Obs.
Combined Sample	0.067	0.193	2.116	0.909	0.502	0.287	1,644
Treated:	0.034	0.099	1.628	0.744	0.426	0.322	419
Control:	0.076	0.218	2.283	0.966	0.529	0.276	1,225
Treated - Control	-0.042*** (0.007)	-0.119*** (0.018)	-0.655*** (0.177)	-0.222*** (0.006)	-0.103*** (0.010)	0.046*** (0.014)	

Table 2: **Interest Rate and Variable Rate Debt.** This table presents estimations from weighted average interest rate regressions. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Interest Rate			
	[1]	[2]	[3]	[4]
Lagged Variable Rate Debt	-0.954***		-0.934***	-0.979***
	(0.248)		(0.235)	(0.241)
Lagged Leverage		-0.646	-0.329	0.157
		(0.465)	(0.445)	(0.321)
Lagged Log Assets				-0.112
				(0.082)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,110	2,132	2,110	2,110
Number of Firms	148	148	148	148
Adjusted - R^2	0.769	0.751	0.769	0.770

Table 3: **Hedging for Low Rental Revenue Firms after the Jobs Act.** This table presents estimations from hedging regressions. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1]-[2]) and the ratio of hedged variable rate debt to total variable rate debt (columns [3]-[4]). Pre-event Low Real Estate Revenue is an indicator for companies with real estate revenue below the sample 25^{th} percentile in the year (2003q3-2004q2) before the passage of the Jobs Act. Post Jobs Act is an indicator equals to one in the quarter of the passage of the American Jobs Creation Act (2004q3) and the following quarters, and zero otherwise. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt		Hedged Variable Rate Debt/ Total Variable Rate Debt	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.070***	0.072***	0.108**	0.108**
	(0.026)	(0.027)	(0.051)	(0.052)
Lagged Log Assets		0.001		0.023
		(0.011)		(0.031)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	2,910	2,893	2,615	2,601
Number of Firms	149	149	148	148
Adjusted - R^2	0.616	0.617	0.595	0.596

Table 4: **Pre-Jobs Act Mean Difference and Distributional Tests for Treated and Control Companies: Matched Sample.** This table reports the mean difference t-test p-value and the Wilcoxon rank-sum distributional test p-value of Log Assets and Hedged Variable Rate Debt/Total Debt. We match each Pre-event Low Real Estate Revenue Company: Yes (treated) to its closest Pre-event Low Real Estate Revenue Company: No (control) based on pre-event log assets using the Abadie and Imbens' (2006) matching estimator. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts. Data is from S&P Global Market Intelligence SNL Real Estate.

Characteristics of Treated and Control real estate investment trusts: Matched Sample		Mean	Treated-Control	Mean Difference t-Test p-value	Wilcoxon-Mann-Whitney rank-sum Test p-value	No. of Matched Companies
Log Assets	Treated	13.200	-0.339	0.592	0.230	25
	Control	13.539				24
Hedged Variable Rate Debt/ Total Debt	Treated	0.216	0.005	0.953	0.268	23
	Control	0.211				20

Table 5: **Hedging for Low Rental Revenue Firms after the Jobs Act: Matched Sample.** This table presents estimations from hedging regressions using the matched sample. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1]-[2]) and the ratio of hedged variable rate debt to total variable rate debt (columns [3]-[4]). We match each Pre-event Low Real Estate Revenue Company: Yes (treated) to its closest Pre-event Low Real Estate Revenue Company: No (control) based on pre-event log assets using the Abadie and Imbens' (2006) matching estimator. Refer to Table A1 for detailed variable definitions. The sample includes matched real estate investment trusts over the period 2001q3 - 2007q. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt		Hedged Variable Rate Debt/ Total Variable Rate Debt	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.096**	0.097**	0.175**	0.181**
	(0.041)	(0.042)	(0.072)	(0.074)
Lagged Log Assets		0.002		0.063*
		(0.009)		(0.035)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	960	956	775	773
Number of Firms	50	50	49	49
Adjusted - R^2	0.586	0.586	0.553	0.557

Table 6: **Hedging for Low Rental Revenue Firms after the Jobs Act: Controlling for Interaction Effects.** This table presents estimations from hedging regressions with various interaction effects. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1]) and the ratio of hedged variable rate debt to total variable rate debt (columns [2]). Pre-event Low Real Estate Revenue is an indicator for companies with real estate revenue below the sample 25^{th} percentile in the year (2003q3-2004q2) before the passage of the Jobs Act. Post Jobs Act is an indicator equals to one in the quarter of the passage of the American Jobs Creation Act (2004q3) and the following quarters, and zero otherwise. Pre-event Large Firm, High Total Profitability, High Leverage, High Variable Rate Debt/Total Debt, and High Earnings Volatility are indicators for firms whose values for those variables are above or equal to the sample 75^{th} percentile values in 2004q2. Pre-event TRS and CMBS are indicators for firms with a taxable REIT subsidiary and CMBS financing at the end of 2003, respectively. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Data on TRS and CMBS is collected manually from 10'Qs. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt
	[1]	[2]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.075**	0.135**
	(0.029)	(0.054)
Pre-event Large Firm × Post Jobs Act	0.009	-0.041
	(0.018)	(0.045)
Pre-event High Total Profitability × Post Jobs Act	0.037	0.024
	(0.028)	(0.053)
Pre-event High Leverage × Post Jobs Act	-0.003	0.026
	(0.021)	(0.044)
Pre-event High Variable Rate Debt/Total Debt × Post Jobs Act	0.006	-0.013
	(0.032)	(0.046)
Pre-event High Earnings Volatility × Post Jobs Act	-0.012	-0.048
	(0.024)	(0.052)
Pre-event TRS × Post Jobs Act	-0.020	-0.030
	(0.022)	(0.042)
Pre-event CMBS × Post Jobs Act	-0.045*	-0.053
	(0.023)	(0.051)
Property Type × Year-Quarter Fixed Effects	Yes	Yes
Company Fixed Effects	Yes	Yes
Pre-event Variables	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed
Observations	2,674	2,433
Number of Firms	128	128
Adjusted - R^2	0.626	0.604

Table 7: **Hedging for Low Rental Revenue Firms after the Jobs Act: Interest Rate Controls.** This table presents estimations from hedging regressions. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1]-[3]) and the ratio of hedged variable rate debt to total variable rate debt (columns [4]-[6]). Pre-event Low Real Estate Revenue is an indicator for companies with real estate revenue below the sample 25^{th} percentile in the year (2003q3-2004q2) before the passage of the Jobs Act. Post Jobs Act is an indicator equals to one in the quarter of the passage of the American Jobs Creation Act (2004q3) and the following quarters, and zero otherwise. Lagged Swap Spread is the difference between the lagged fixed rate of a 3-year maturity interest rate swap (3-year Fixed Rate Swap) and the lagged 3-month LIBOR. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Data on the fixed rate of a 3-year maturity interest rate swap and the 3-month LIBOR is from Bloomberg. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt			Hedged Variable Rate Debt/ Total Variable Rate Debt		
	[1]	[2]	[3]	[4]	[5]	[6]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.072***	0.074***	0.074***	0.106**	0.107**	0.105**
	(0.026)	(0.027)	(0.027)	(0.051)	(0.054)	(0.053)
Pre-event Low Real Estate Revenue × Lagged Swap Spread	-0.018			-0.735		
	(0.646)			(1.712)		
Pre-event Low Real Estate Revenue × Lagged 3-year Fixed Rate Swap		-0.548			0.357	
		(0.510)			(1.277)	
Pre-event Low Real Estate Revenue × Lagged 3-month LIBOR			-0.266			0.374
			(0.381)			(0.988)
Lagged Log Assets	0.001	0.001	0.001	0.023	0.023	0.023
	(0.011)	(0.011)	(0.011)	(0.031)	(0.031)	(0.031)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,893	2,893	2,893	2,601	2,601	2,601
Number of Firms	149	149	149	148	148	148
Adjusted - R^2	0.616	0.617	0.617	0.596	0.596	0.596

Table 8: **Hedging for Low Rental Revenue Firms after the Jobs Act: Commercial Real Estate Price and Mortgage Controls.** This table presents estimations from hedging regressions. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1]-[2]) and the ratio of hedged variable rate debt to total variable rate debt (columns [3]-[4]). Pre-event Low Real Estate Revenue is an indicator for companies with real estate revenue below the sample 25^{th} percentile in the year (2003q3-2004q2) before the passage of the Jobs Act. Post Jobs Act is an indicator equals to one in the quarter of the passage of the American Jobs Creation Act (2004q3) and the following quarters, and zero otherwise. Lagged Property-Type Price (Mortgage) Dummy is a dummy variable equal to 1 if the lagged percentage change in the Property-Type Price Index (Mortgage Value) is in the sample top quartile for the period 2001q3-2007q2. The percentage change in the Property-Type Price Index (Mortgage Value) is calculated as the difference between the Property-Type Price Index (Mortgage Value) at time t and $t-1$ divided by the time $t-1$ Property-Type Price Index (Mortgage Value). The Property-Type Price Index is the CoStar equal-weighted transaction-based index available by property type and region (Midwest, Northeast, South, and West). We assign the property index to each firm-quarter based on property type and headquarters region. The mortgage value data is at the quarter level. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. The Property-Type Price Index and the Commercial Real Estate (CRE) Mortgage Value (total value of all commercial mortgages) are from CoStar and the Federal Reserve Economic Data (FRED) database, respectively. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt		Hedged Variable Rate Debt/ Total Variable Rate Debt	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.073***	0.067***	0.110**	0.104*
	(0.027)	(0.027)	(0.052)	(0.054)
Pre-event Low Real Estate Revenue × Lagged Property-Type Price Dummy	0.014		0.010	
	(0.013)		(0.019)	
Pre-event Low Real Estate Revenue × Lagged CRE Mortgage Dummy		-0.002		0.012
		(0.006)		(0.013)
Lagged Property-Type Price Dummy	0.006		0.011	
	(0.005)		(0.012)	
Lagged CRE Mortgage Dummy		Absorbed		Absorbed
Lagged Log Assets	-0.001	0.001	0.018	0.023
	(0.012)	(0.011)	(0.036)	(0.031)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	2,877	2,893	2,590	2,601
Number of Firms	149	149	148	148
Adjusted - R2	0.618	0.617	0.597	0.596

Table 9: **Hedging for Low Rental Revenue Firms after the Jobs Act: Alternative Sample Periods.** This table presents estimations from hedging regressions over alternative sample periods. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1], [3], and [5]) and the ratio of hedged variable rate debt to total variable rate debt (columns [2], [4], and [6]). All regressions included the natural logarithm of lagged assets as control variable. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt
Sample Period:	2002q3-2006q2		2000q3-2008q2		1999q4-2009q1	
	[1]	[2]	[3]	[4]	[5]	[6]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.068***	0.083**	0.072**	0.111**	0.066**	0.100*
	(0.024)	(0.041)	(0.029)	(0.055)	(0.030)	(0.057)
Lagged Log Assets	0.002	-0.001	-0.005	0.016	-0.008	0.007
	(0.011)	(0.034)	(0.010)	(0.029)	(0.010)	(0.027)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed
Observations	1,999	1,802	3,724	3,346	4,357	3,928
Number of Firms	149	146	151	151	151	151
Adjusted - R^2	0.700	0.683	0.560	0.536	0.521	0.504

Table 10: **Hedging after the Jobs Act: Alternative Proxies of Real Estate Exposure.** This table presents estimations from hedging regressions using alternative proxies of real estate exposure. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1] and [3]) and the ratio of hedged variable rate debt to total variable rate debt (columns [2] and [4]). Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt
	[1]	[2]	[3]	[4]
Pre-event Low Total Operating Revenue × Post Jobs Act	0.055**	0.098**		
	(0.024)	(0.045)		
Pre-even Low Real Estate & Cash Holdings × Post Jobs Act			0.069**	0.097*
			(0.028)	(0.053)
Lagged Log Assets	0.001	0.021	0.004	0.028
	(0.011)	(0.032)	(0.010)	(0.030)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	2,893	2,601	2,905	2,608
Number of Firms	149	148	150	149
Adjusted - R^2	0.612	0.596	0.614	0.594

Table 11: **Hedging for Non-Affected and Foreign Real Estate Companies after the Jobs Act: Placebo Test.** This table presents estimations from hedging regressions for non-affected real estate companies and foreign real estate investment trusts (REITs). The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1] and [3]) and the ratio of hedged variable rate debt to total variable rate debt (columns [2] and [4]). The sample in columns [1]-[2] includes real estate investment trusts non-structured as REITs and homebuilders over the period 2001q3 - 2007q2. The sample in columns [3]-[4] contains annual data for foreign REITs over the period 2002 - 2007. Refer to Table A1 for detailed variable definitions. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt
	Panel A: Non-Affected Sample		Panel B: Foreign REITs Sample	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.018	-0.002	-0.037	0.039
	(0.019)	(0.059)	(0.079)	(0.088)
Lagged Log Assets	0.018	0.044	0.011	0.001
	(0.027)	(0.062)	(0.045)	(0.062)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	No	No
Property Type × Year Fixed Effects	No	No	Yes	Yes
Country × Year Fixed Effects	No	No	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	447	353	213	192
Number of Firms	25	24	45	44
Adjusted - R^2	0.356	0.424	0.682	0.811

Table 12: **Hedging for Low Rental Revenue Firms after Placebo Acts.** This table presents estimations from hedging regressions during placebo periods. The dependent variables are the ratio of hedged variable rate debt to total debt (column [1]) and the ratio of hedged variable rate debt to total variable rate debt (columns [4]). All regressions included the natural logarithm of lagged assets as control variable. Base case results are from Table 3. In the first placebo estimation, Post-2001q2 is an indicator equal to one in the quarter of the passage of the placebo act (2001q3) and the following quarters, and zero otherwise. We follow a similar logic for the other placebo estimations. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt	Obs.	Sample Period	Hedged Variable Rate Debt/ Total Variable Rate Debt	Obs.	Sample Period
	[1]	[2]	[3]	[4]	[5]	[6]
Base case (Results from Table 3):						
Pre-event Low Real Estate Revenue × Post Jobs Act	0.072***	2,893	2001q3-2007q2	0.108**	2,601	2001q3-2007q2
	(0.027)			(0.052)		
Placebo Estimations:						
Pre-event Low Real Estate Revenue × Post-2001q2	-0.002	2,904	1998q3-2004q2	-0.032	2,596	1998q3-2004q2
	(0.019)			(0.043)		
Pre-event Low Real Estate Revenue × Post-2000q2	-0.010	2,815	1997q3-2003q2	-0.056	2,489	1997q3-2003q2
	(0.015)			(0.040)		
Pre-event Low Real Estate Revenue × Post-1999q2	0.013	2,685	1996q3-2002q2	-0.028	2,322	1996q3-2002q2
	(0.015)			(0.043)		
Pre-event Low Real Estate Revenue × Post-1998q2	0.027	2,530	1995q3-2001q2	0.036	2,145	1995q3-2001q2
	(0.021)			(0.049)		
Pre-event Low Real Estate Revenue × Post-1997q2	0.024	2,331	1994q3-2000q2	0.063	1,943	1994q3-2000q2
	(0.026)			(0.078)		
Property Type × Year-Quarter Fixed Effects	Yes			Yes		
Company Fixed Effects	Yes			Yes		
Pre-event Low Real Estate Revenue	Absorbed			Absorbed		
Post Placebo Act	Absorbed			Absorbed		

Table 13: **Hedging for Non-Financial Firms after IRS REG-107047-00.** This table presents estimations from hedging regressions for a sample of non-financial firms. The dependent variable is an indicator for interest rate hedging. In these estimations, we focus on firms with non-missing variable rate debt (COMPUSTAT item dltp) in the pre-event year. Hedging data using keywords is parsed from annual reports, items 7A and 8. Pre-event Low Tax Shield is an indicator for companies with a tax shield (the sum of investment tax credit (COMPUSTAT item itcb) plus tax loss carry forward (COMPUSTAT item tlcf) minus pretax income (COMPUSTAT item pi)) in 2000 below the sample 25^{th} percentile. The control group include includes firms with a tax shield above the sample 75^{th} percentile. Post IRS REG-107047-00 is an indicator equal to one in the fiscal year of the passage of the IRS Regulation REG-107047-00 in 2001 and the following years, and zero otherwise. Refer to Table A1 for detailed variable definitions. The sample includes all U.S. firms in COMPUSTAT except financial firms (SIC 6000-6999) over the period 1998 - 2003. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Interest Rate Hedging	
	[1]	[2]
Pre-event Low Tax Shield × Post IRS REG-107047-00	0.060^{***}	0.061^{***}
	(0.016)	(0.018)
Lagged Log Assets		-0.001
		(0.007)
SIC-2 Industry × Year Fixed Effects	Yes	Yes
Company Fixed Effects	Yes	Yes
Pre-event Low Tax Shield	Absorbed	Absorbed
Post IRS REG-107047-00	Absorbed	Absorbed
Observations	8,469	7,935
Number of Firms	1,607	1,574
Adjusted - R^2	0.429	0.435

Table 14: **Financing and Real Activities for Low Rental Revenue Firms after the Jobs Act.** This table presents estimations from firm-level and property-level financing and real activity regressions. Refer to Table A1 for detailed variable definitions. In column [2], the sample includes firm-level data for real estate investment trusts over the period 2001q3 - 2007q2. In columns [1] and [3]-[6], the sample includes annual property-level data for real estate investment trusts over the period 2001-2007. Firm-level data is from S&P Global Market Intelligence SNL Real Estate. Property-level data is from SNL Property Transactions. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Mortgages	Variable Rate Debt	Property Investment	Property Improvements	Occupancy Rate	Property Diversification
	Panel A: Financing Activities		Panel B: Real Activities			
	[1]	[2]	[3]	[4]	[5]	[6]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.012**	0.083**	0.005**	0.004**	0.031***	-0.184***
	(0.005)	(0.040)	(0.002)	(0.002)	(0.009)	(0.063)
Lagged Log Assets	-0.018***	0.010	-0.019***	-0.015***	-0.002	-0.008
	(0.001)	(0.041)	(0.001)	(0.001)	(0.007)	(0.025)
Property-Level Type × Year Fixed Effects	Yes	N.A.	Yes	Yes	Yes	Yes
Property Type × Year-Quarter Fixed Effects	N.A.	Yes	N.A.	N.A.	N.A.	N.A.
Company Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed	Absorbed
Observations	3,447	2,991	9,784	9,800	53,656	13,670
Number of Firms	102	151	116	116	106	126
Adjusted - R^2	0.570	0.644	0.658	0.651	0.104	0.881

Table 15: **Income Tax, Exit Propensity, and Early Debt Payoff of Low Rental Revenue Firms after the Jobs Act.** This table presents estimations from income tax, exit propensity, and early debt payoff regressions. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Income tax and early debt payoff data is from Compustat. Other firm-level data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Total Income Tax/ Total Revenue	Exit Propensity	Early Debt Payoff
	[1]	[2]	[3]
Pre-event Low Real Estate Revenue × Post Jobs Act	-0.002^{**}	-0.020^{*}	0.036^{**}
	(0.001)	(0.012)	(0.018)
Lagged Log Assets	-0.001	-0.020^{**}	-0.054^{**}
	(0.001)	(0.010)	(0.023)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	N.A.
Property Type × Year Fixed Effects	N.A.	N.A.	Yes
Company Fixed Effects	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed
Observations	2,706	3,101	633
Number of Firms	137	152	131
Adjusted - R^2	0.278	0.044	0.470

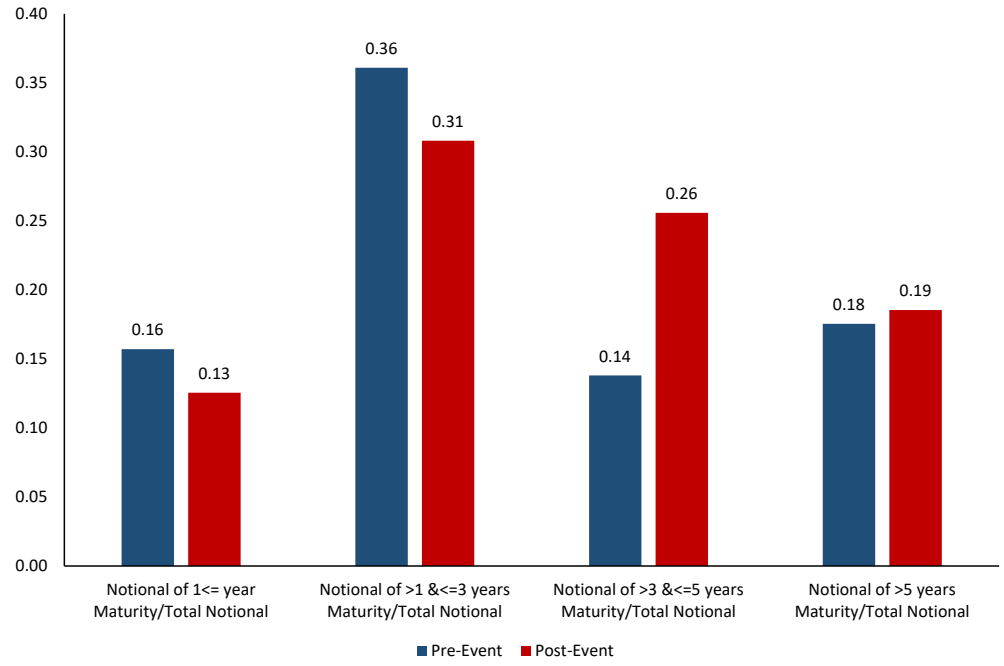
Table 16: **Financing and Investment for Non-Financial Firms after IRS REG-107047-00.** This table presents estimations from financing and investment regressions for a sample of non-financial firms. The dependent variable in column [1] is the ratio of net debt change (long term debt (COMPUSTAT item dltt) minus lagged long term debt) to lagged gross property, plant, and equipment (COMPUSTAT item ppegt). The dependent variable in column [2] is the ratio of capital expenditure (COMPUSTAT item capx) to lagged gross property, plant, and equipment. In these estimations, we focus on firms with non-missing variable rate debt (COMPUSTAT item dltp) in the pre-event year. Pre-event Low Tax Shield is an indicator for companies with a tax shield (the sum of investment tax credit (COMPUSTAT item itcb) plus tax loss carry forward (COMPUSTAT item tlcf) minus pretax income (COMPUSTAT item pi) in 2000 below the sample 25^{th} percentile. The control group include includes firms with a tax shield above the sample 75^{th} percentile. Post IRS REG-107047-00 is an indicator equal to one in the fiscal year of the passage of the IRS Regulation REG-107047-00 in 2001 and the following years, and zero otherwise. Refer to Table A1 for detailed variable definitions. The sample includes all U.S. firms in COMPUSTAT except financial firms (SIC 6000-6999) over the period 1998 - 2003. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Debt Change	Investment
	[1]	[2]
Pre-event Low Tax Shield × Post IRS REG-107047-00	0.060^{**}	0.111^{***}
	(0.025)	(0.020)
Lagged Log Assets	-0.111^{***}	-0.093^{***}
	(0.015)	(0.011)
SIC-2 Industry × Year Fixed Effects	Yes	Yes
Company Fixed Effects	Yes	Yes
Pre-event Low Tax Shield	Absorbed	Absorbed
Post IRS REG-107047-00	Absorbed	Absorbed
Observations	7,384	7,387
Number of Firms	1,493	1,494
Adjusted - R^2	0.045	0.372

Figure 1: **Interest Rate Swaps and Caps Maturity and Early Debt Payoff**

This figure, Panel A, plots the proportion of interest rate swaps and caps notional amounts with maturity ≤1 year, >1 and ≤3 years, >3 and ≤5 years, and >5 years maturity. The sample includes derivatives contracts initiated during 2001q3 - 2007q2 for our sample of REITs. Data on interest rate swaps and caps is collected manually from 10-Qs. Panel B plots early debt payoff in our main sample during 2002-2004 (pre-event) and 2005-2007 (post event). Data on early debt payoff is from Compustat.

Panel A: Interest Rate Swaps and Caps Maturity



Panel B: Early Debt Payoff

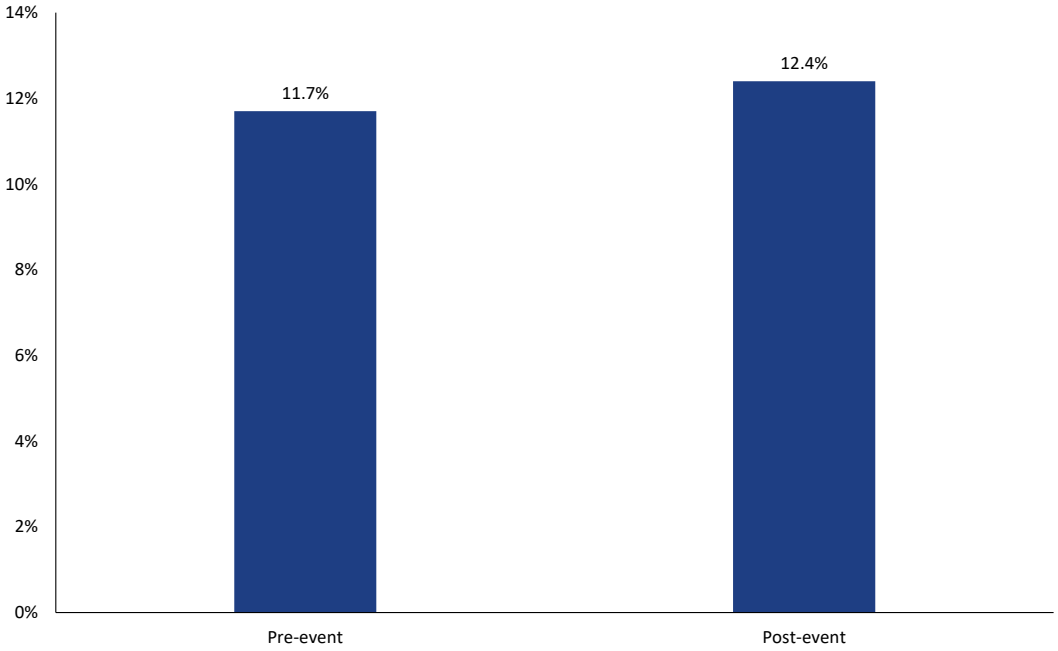
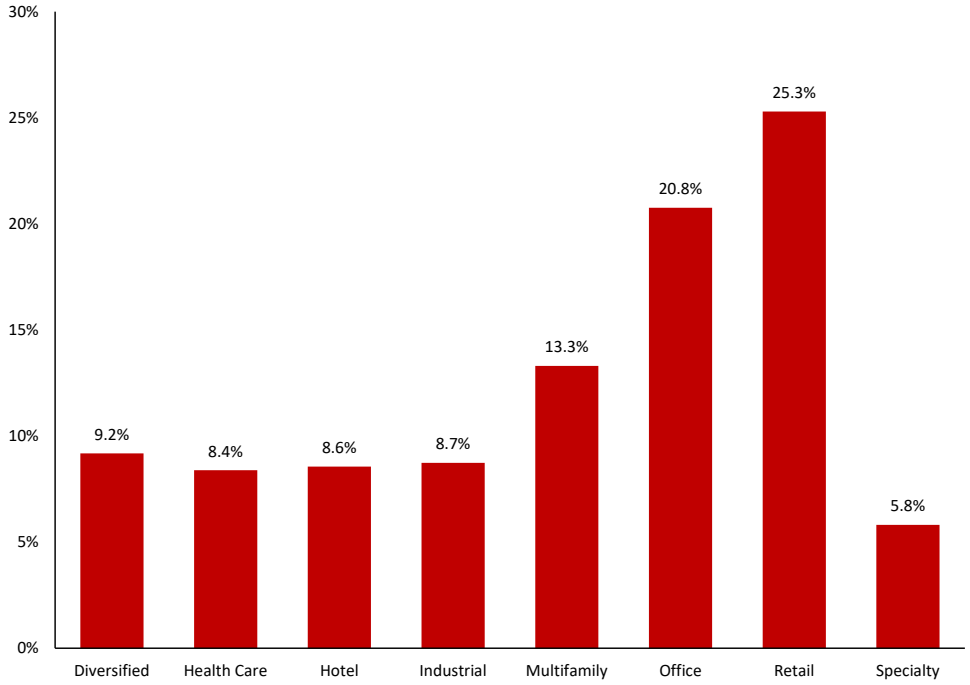


Figure 2: **Percentage of Real Estate Investment Trusts by Property Type and Debt Maturity by Year**

This figure, Panel A, reports the percentage of real estate investment trusts in our sample by property type. The property types include, Diversified, Health Care, Hotel (Hotel and Casino), Industrial, Multifamily, Office, Retail (Shopping Center, and Regional Mall), and Specialty (Manufactured Home, Self-Storage, and Cineplex Theaters). The sample includes real estate investment trusts level data over the period 2001q3 - 2007q2. Panel B reports the percentage of debt maturity by year (from current year to year 5+) for the real estate investment trusts in our sample in 2004q2. Data is from S&P Global Market Intelligence SNL Real Estate.

Panel A: Percentage of Real Estate Investment Trusts by Property Type



Panel B: Debt Maturity by Year

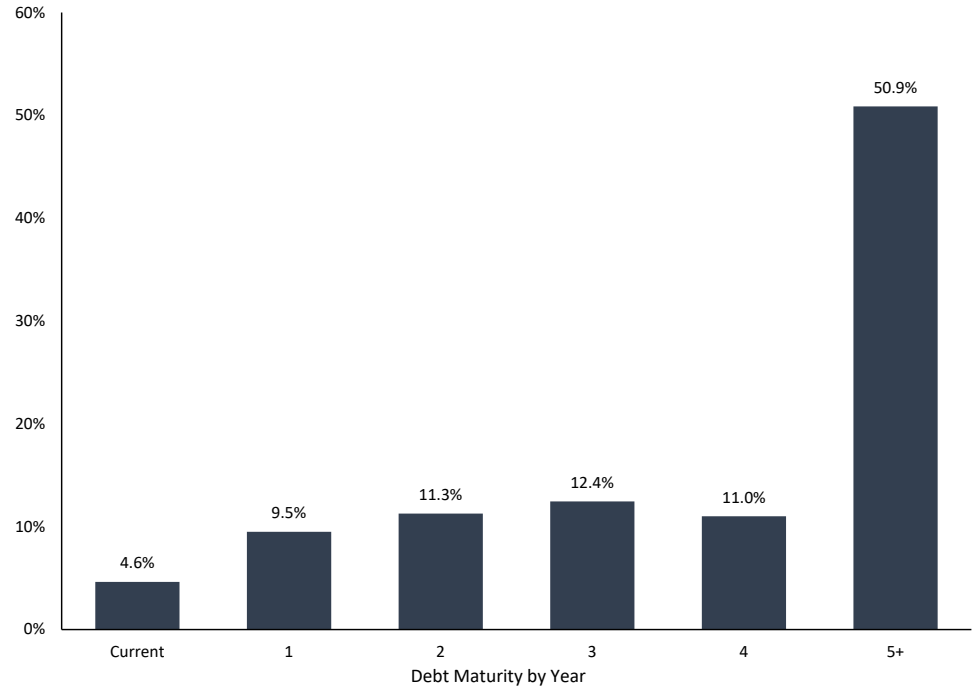
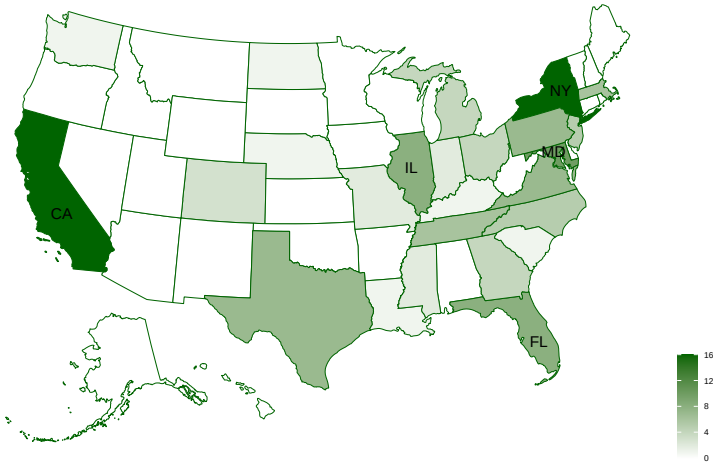
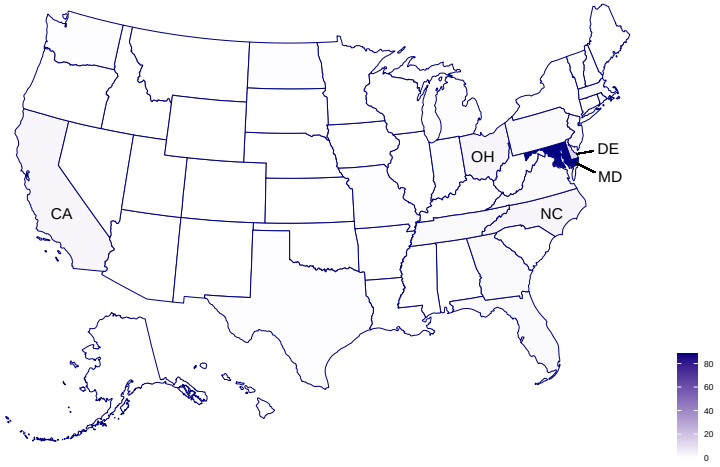


Figure 3: **Headquarter and Incorporation States**

This figure displays geographical heat maps of headquarters (Panel A: 129 firms) and incorporation (Panel B: 130 firms) states of the REITs in our sample in 2003. The top five states in terms of number of headquarters are CA (16), NY (16), MD (10), FL (8), and IL (8). The top five states in terms of number of incorporation are MD (88), DE (13), CA (3), NC (3), and OH (3). Headquarters information is obtained from parsing corporate filings in the SEC EDGAR database. Incorporation information is from CRSP (item stinc).



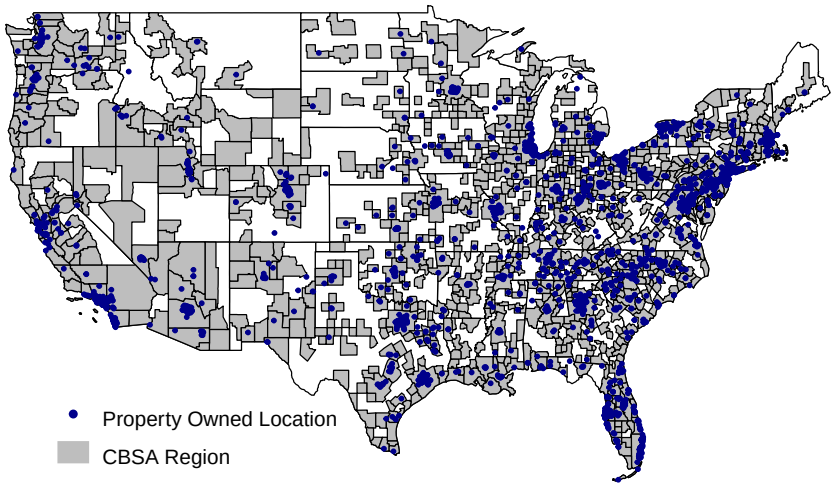
(a) Headquarters States



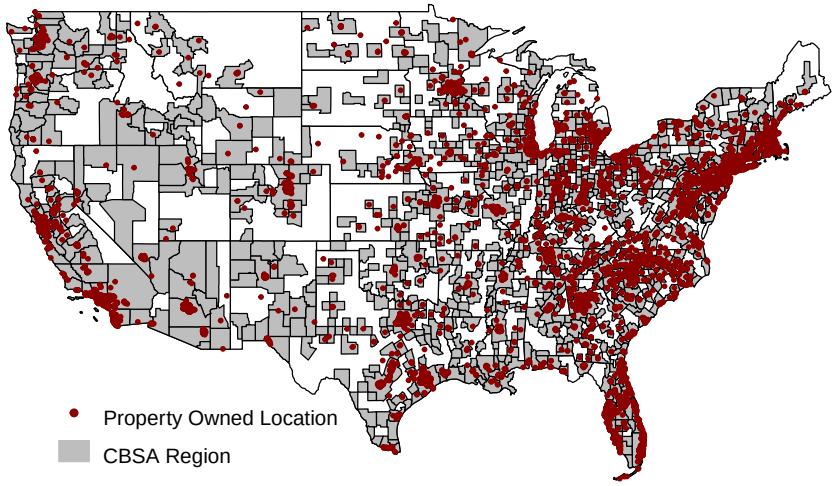
(b) Incorporation States

Figure 4: **Geocoded Property-Level Ownership**

This figure displays the geographical locations across U.S. CBSA of properties owned by the treated (Panel A: 2,637 properties) and control (Panel B: 13,352 properties) REITs in our sample in 2004q2. Each dot represents a property location. Geocoded property-level data is from SNL Property Transactions.



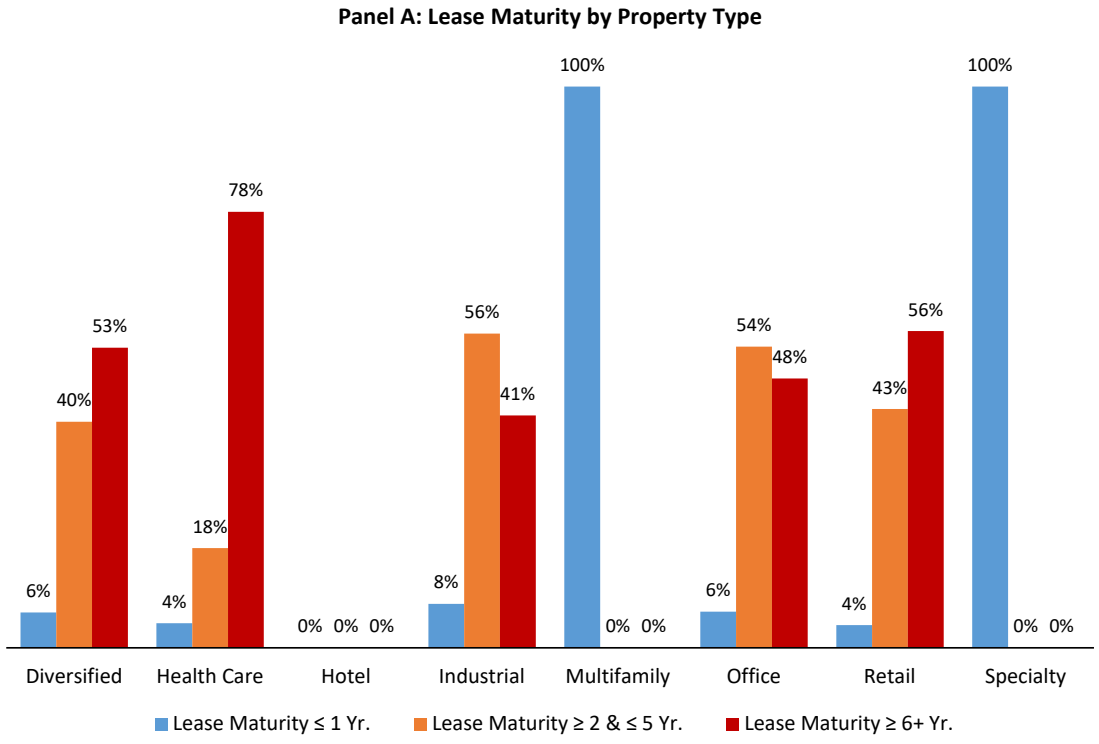
(a) Properties Owned by Treated Firms in 2004q2



(b) Properties Owned by Control Firms in 2004q2

Figure 5: **Lease Maturity and Financing Pattern by Property Type**

This figure, Panel A, reports the percentage of leases maturing within 1 year from the current year, between 2 to 5 years from the current year, and from year 6 onward by property type. Panel B displays financing patterns by property type. The sample includes the real estate investment trusts in our sample in 2004q2. Data is from S&P Global Market Intelligence SNL Real Estate.



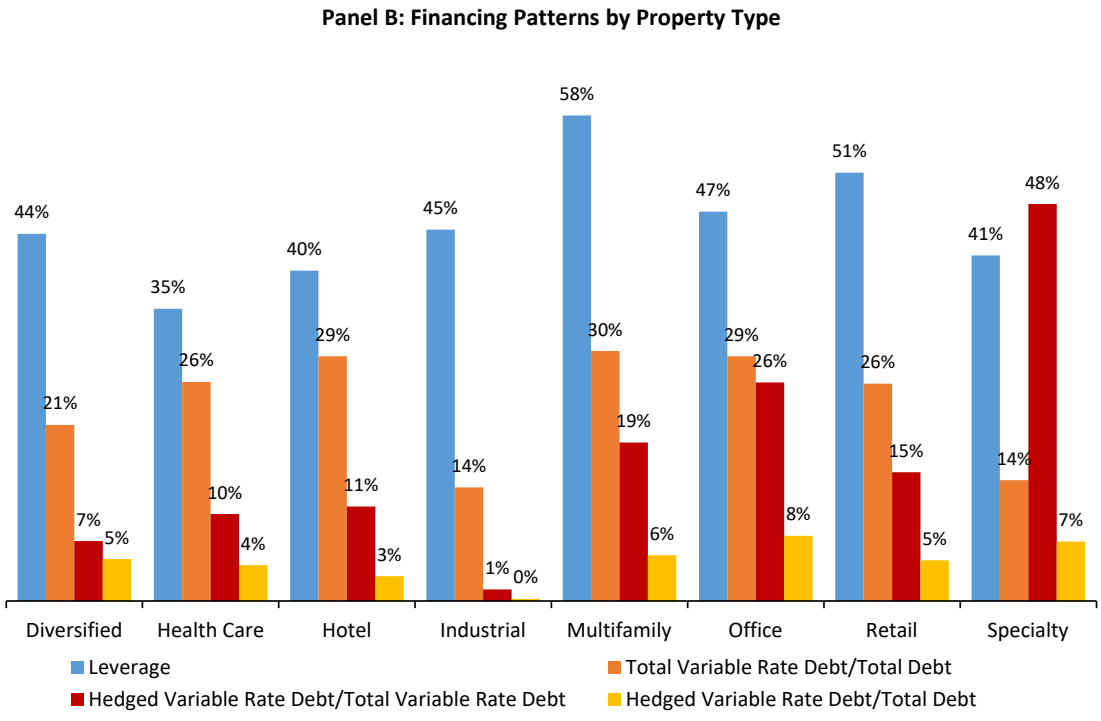


Figure 6: **LIBOR and Interest Rate Swap Fixed Rate**

This figure, Panel A, plots the 3-month LIBOR rate (left y-axis) and the volatility of the 3-month LIBOR rate (right y-axis) based on the previous 4 quarters 3-month LIBOR rate. Panel B plots the quarterly interest rate swap fixed rate of a 3-year maturity interest rate swap with the 3-month LIBOR rate as the floating rate. The data is for semi-annual swaps, for which cash flow exchanges occur every six months. Panel B also plots the 3-year maturity treasury yield and the 3-month LIBOR rate. Data on interest rate swap fixed rates and the LIBOR rate is from Bloomberg. Data on the 3-year treasury yield is from the U.S. Department of the Treasury. The sample period is from 1995q1-2020q4.

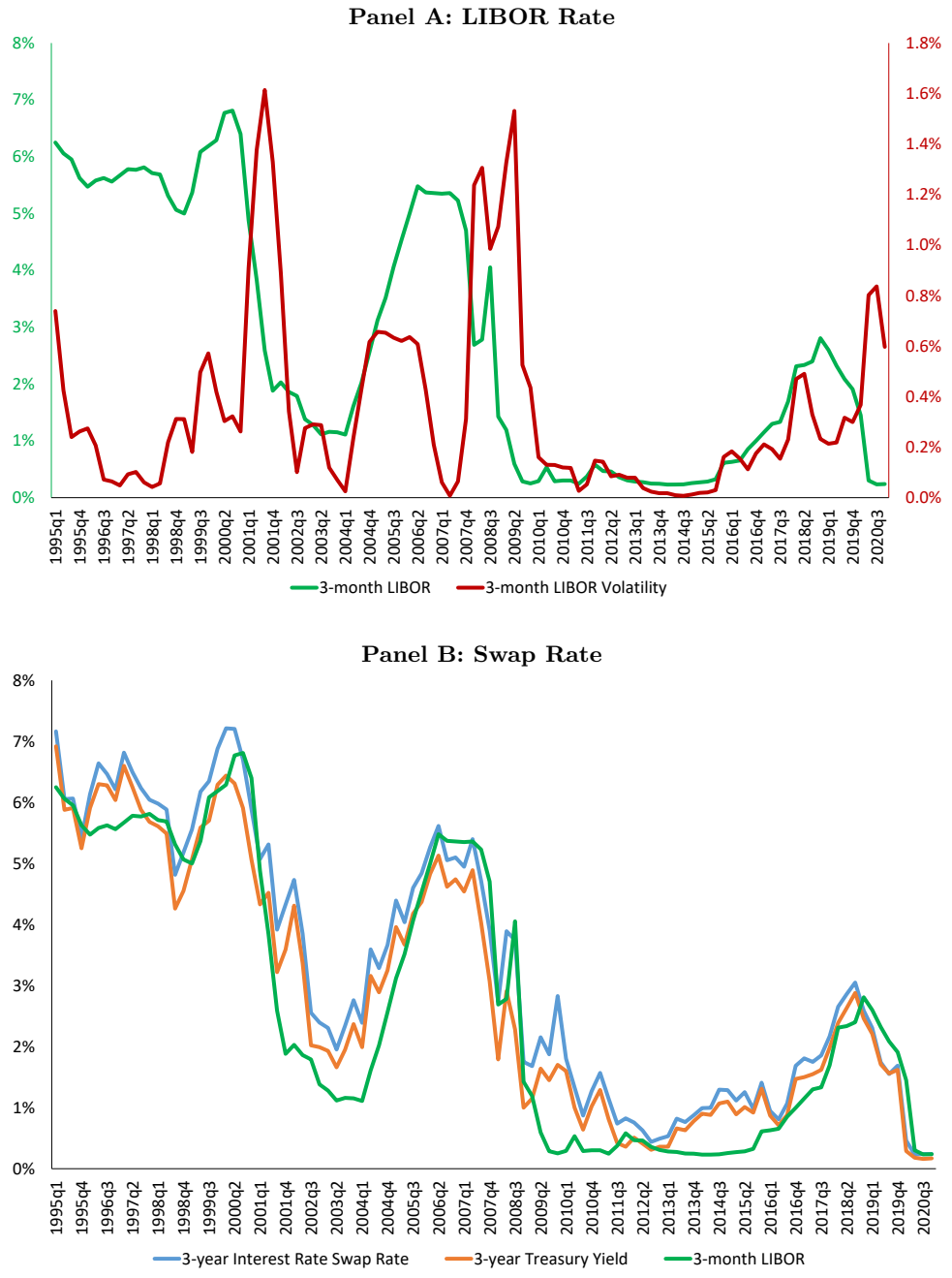


Figure 7: **Commercial Real Estate Prices, Mortgages, and Stock Prices**

This figure plots the log of the quarterly commercial real estate price index level, the log of the value of commercial real estate mortgages, and the log of S&P 500 index level. The commercial real estate index is the national equally-weighted transaction-based commercial real estate index from CoStar. Data on the total value of commercial real estate mortgages is from the Federal Reserve Economic Data (FRED) database. The S&P 500 index level is from CRSP. The sample period is from 1998q1-2022q3.

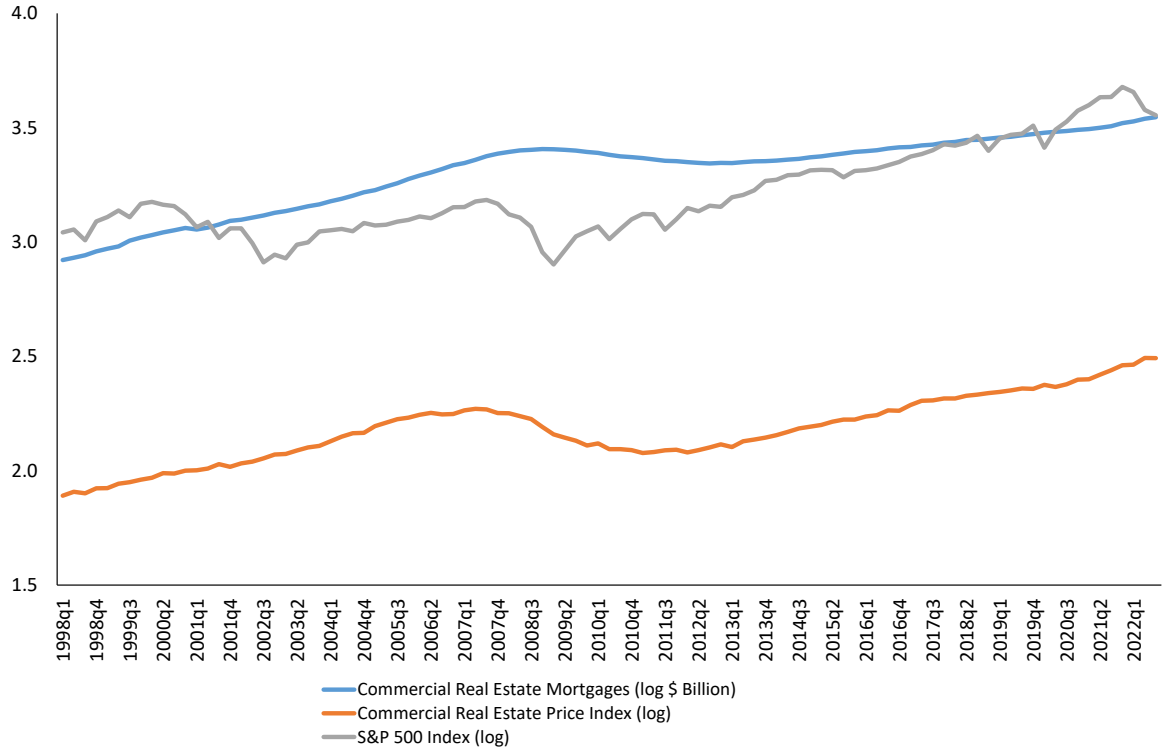


Figure 8: **Loan Charge-off Rates**

This figure plots the quarterly charge-off rates for 1-4 family residential real estate loans, multifamily commercial real estate loans, commercial real estate loans excl. multifamily, business (commercial and industrial) loans, real estate construction and development loans, and home equity loans. Data is from the Federal Deposit Insurance Corporate (FDIC) Quarterly Banking Profile and includes all FDIC-insured institutions. The sample period is from 1994q1-2020q4.

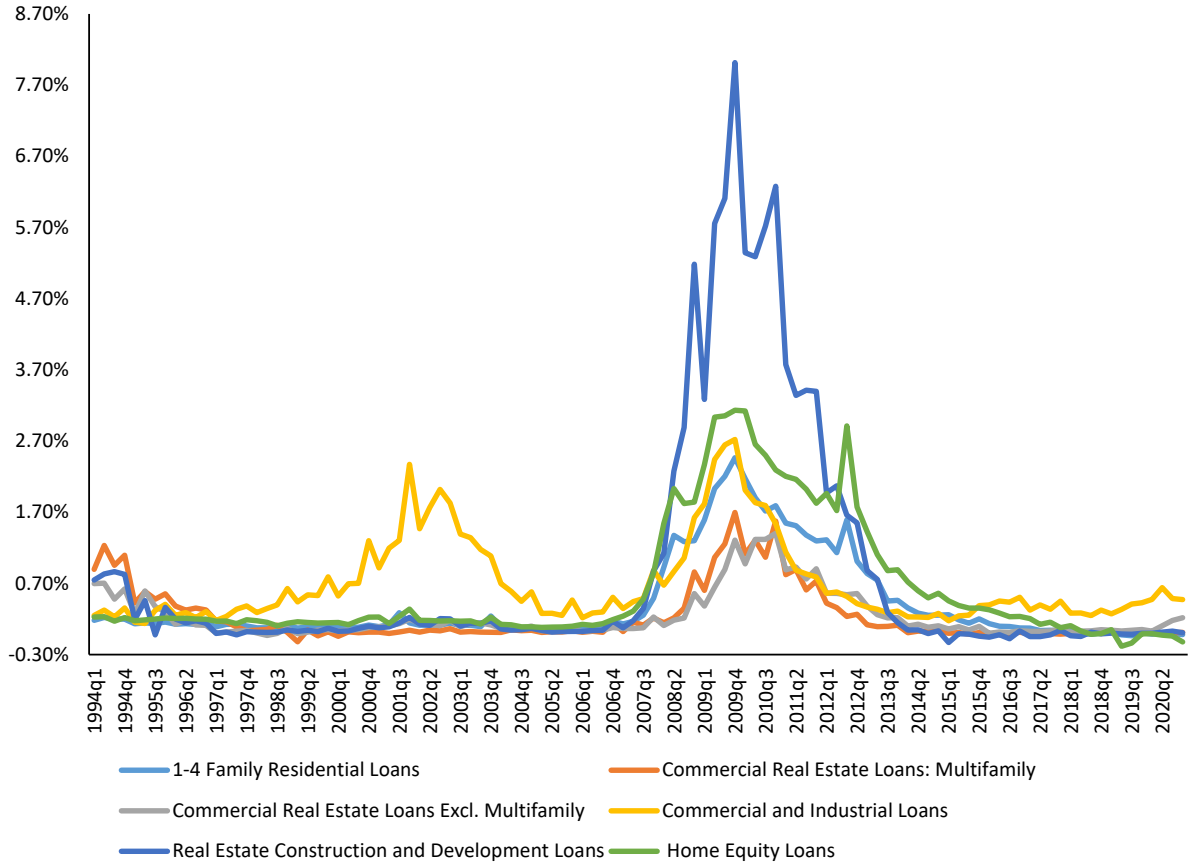


Figure 9: **Bankruptcies and Exits**

This figure, Panel A, reports the number of bankruptcies for commercial real estate leasing REITs, mortgage REITs, non-financial firms (all public firms, excluding firms with SIC codes 6000-6999), and financial firms excluding REITs. The 7 mortgage REIT bankruptcies (1 in 1998, 3 in 2007, 1 in 2008, 1 in 2009, and 1 in 2010) involves entities specializing in residential/multi-family mortgages exclusive or in combination with other commercial real estate mortgages. Panel B reports the number of REITs exiting the sample (left y-axis) and the number of REITs exiting the sample in a given year as a percentage of the total REITs at the end of the previous year (right y-axis). In 2007q1-q2 there were 11 exits, while in 2007q3-q4 there was 1 exit. Bankruptcy data is from the UCLA-LoPucki Bankruptcy Research Database, which includes public firms with $100 million in assets. Data on exits is from S&P Global Market Intelligence SNL Real Estate. The sample period is from 1994-2020.

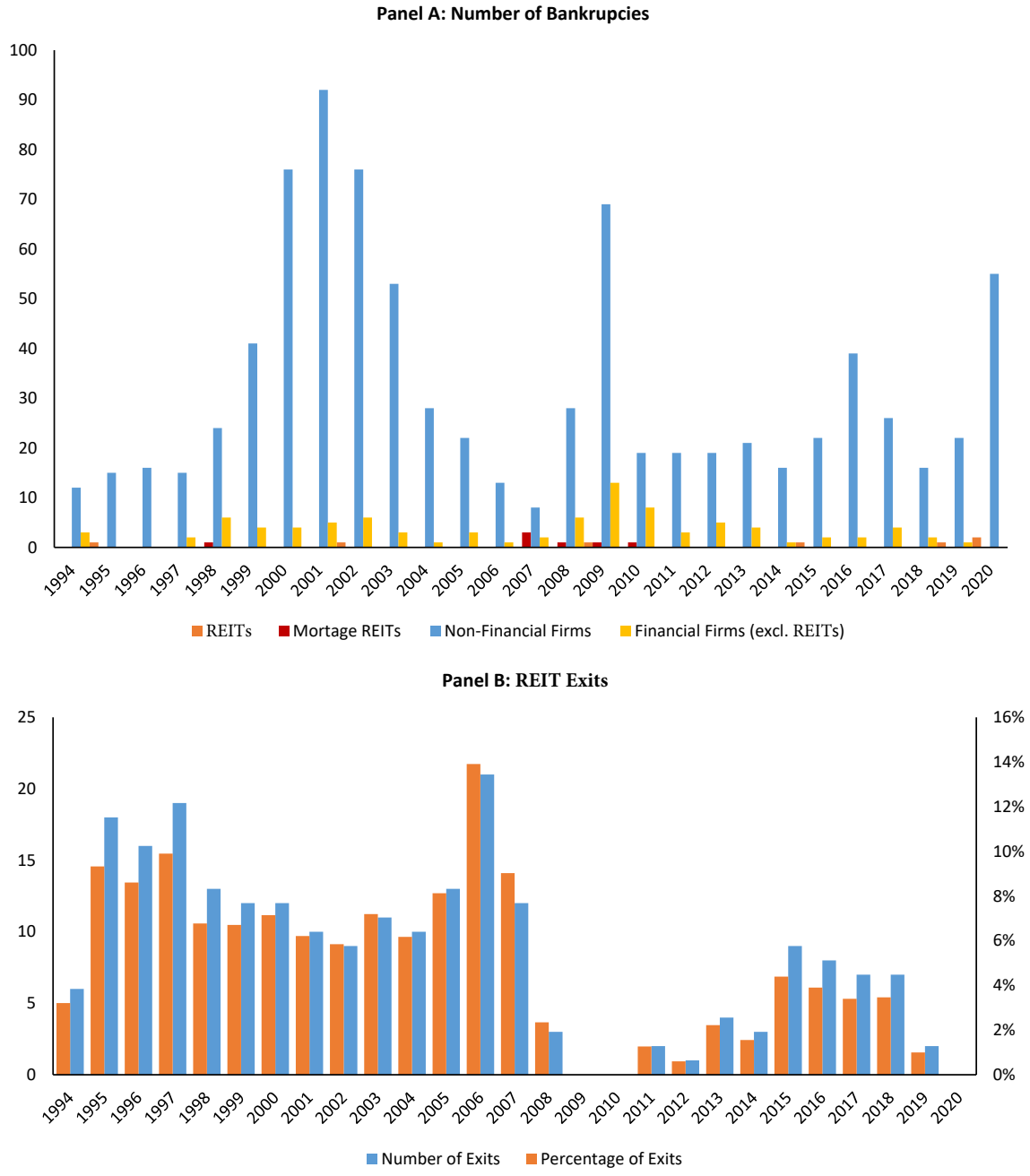


Figure 10: **Hedging for Low Rental Revenue Firms Around the Jobs Act: Treated vs. Control Companies**

This figure reports the point estimates from hedging regressions, using a dependent variables the ratio of hedged variable rate debt to total debt (Panel A) and the ratio of hedged variable rate debt to total variable rate debt (Panel B). The regression specifications are the same as those in columns [1] and [2] of Table 6, except that the effect of Pre-event Low Real Estate Revenue is allowed to vary for each quarter starting from 2002q3 to 2006q2. We also plot the estimate on the interaction of Pre-event Low Real Estate Revenue with an indicator equal to 1 starting in 2006q3 and ending in 2007q2. The sample includes real estate investment trusts over the period 2001q3 - 2007q2, with 2001q3 - 2002q2 as the omitted quarters. Data is from S&P Global Market Intelligence SNL Real Estate. Ninety percent confidence intervals are also plotted.

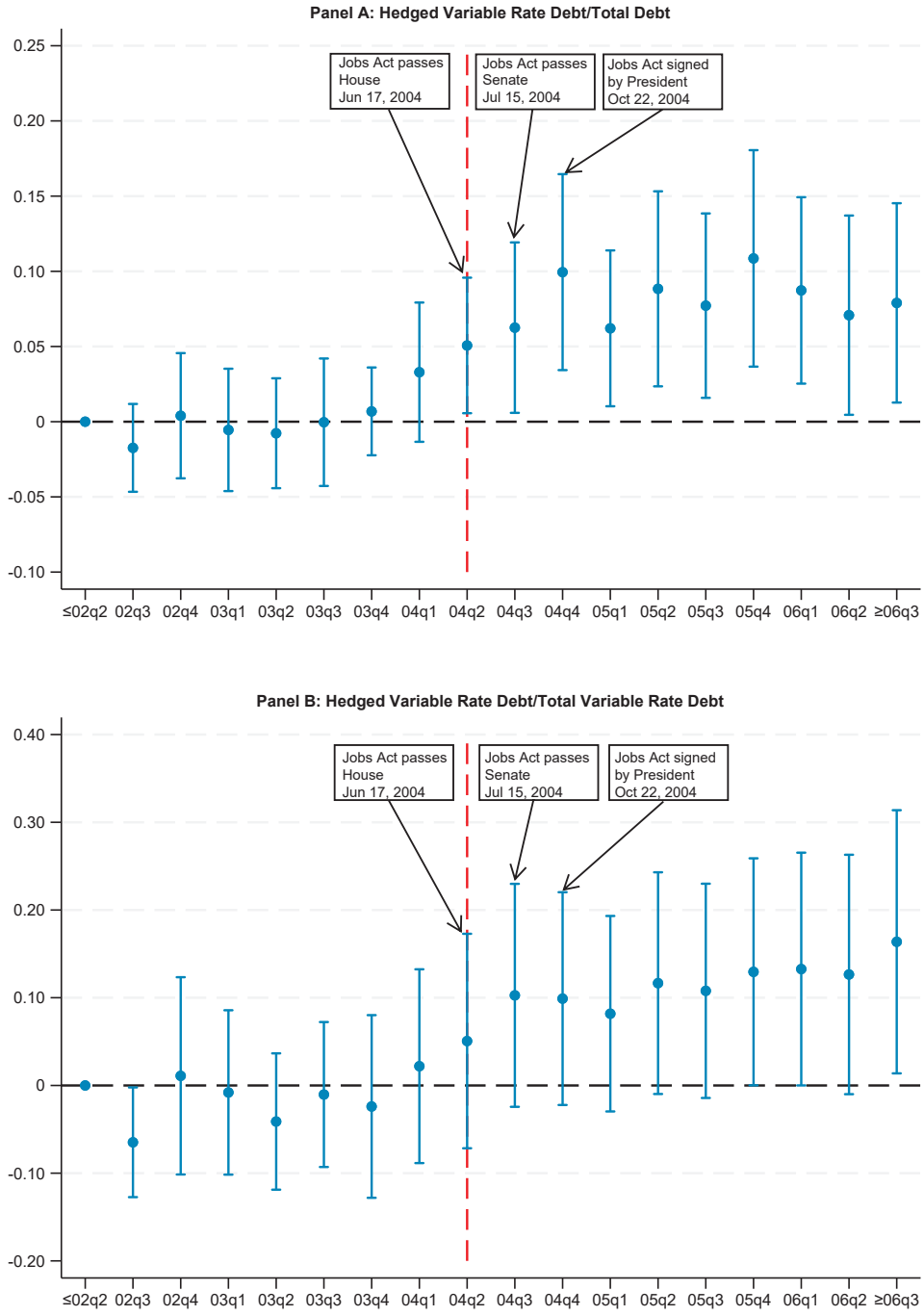


Figure 11: **Hedging for Low Tax Shield Firms Around IRS REG-107047-00: General Sample of Non-Financial Companies**

This figure reports the point estimates from hedging regressions for non-financial firms, using an indicator for interest rate hedging as the dependent variable. The regression specification is the same as in column [2] of Table 13, except that the effect of Pre-event Low Tax Shield is allowed to vary by year for each year starting 2 years prior to the IRS REG-107047-00 regulation and ending 3 years after the regulation. Year 1998 is our base year. The sample includes all U.S. firms in COMPUSTAT except financial firms (SIC 6000-6999) over the period 1998 - 2003. In these estimations, we focus on firms with non-missing variable rate debt (COMPUSTAT item dltp) in the pre-event year. Ninety percent confidence intervals are also plotted.

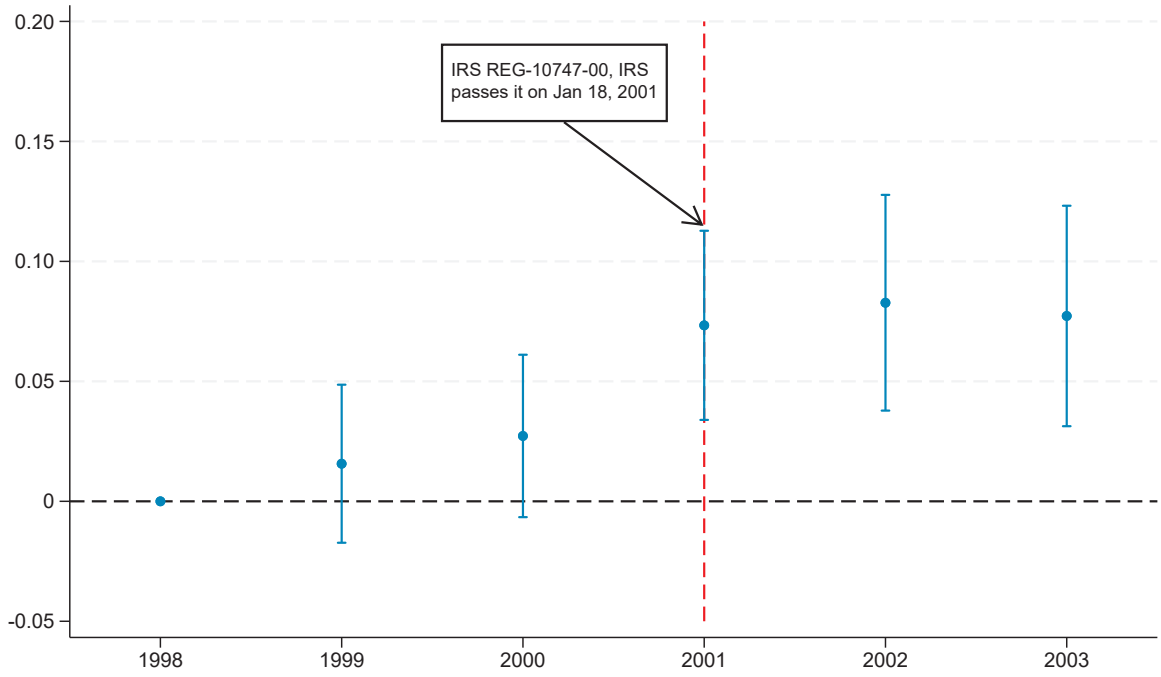
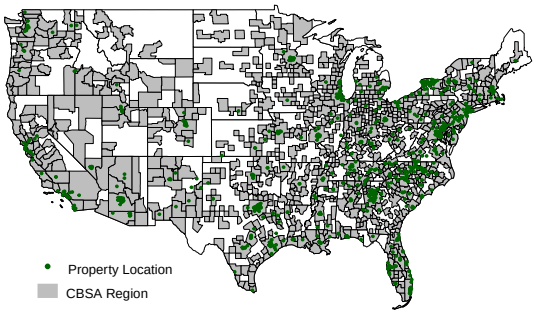
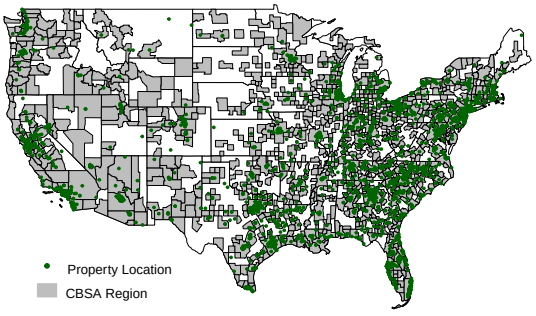


Figure 12: **Geocoded Property-Level Acquisitions**

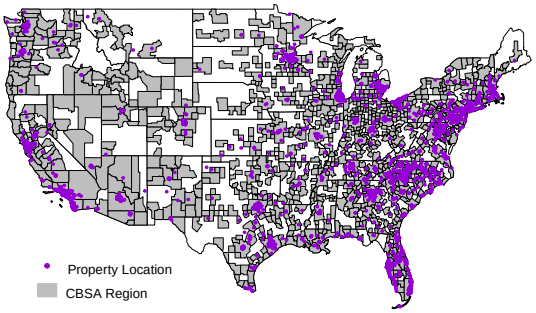
This figure displays the geographical locations across U.S. CBSA of the properties by our the firms in our sample during our 2001q3 – 2007q2. Panels A and B show property acquisitions by the treated REITs in the pre-event (983 properties) and the post-event (2,995 properties) period, respectively. Panel C and D show property acquisitions by the control REITs in the pre-event (3,642 properties) and post-event (5,399 properties) period, respectively. Each dot represents a property location. Geocoded property-level data is from SNL Property Transactions.



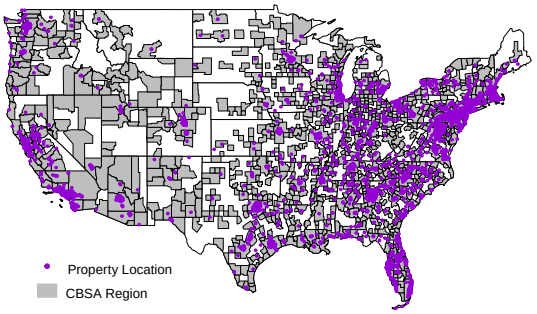
(a) Treated-Firm Acquisitions: Pre-event



(b) Treated-Firm Acquisitions: Post-event



(c) Control-Firm Acquisitions: Pre-event



(d) Control-Firm Acquisitions: Post-event

Figure 13: **Financing and Real Activities for Low Rental Revenue Firms Around the Jobs Act**

This figure reports the point estimates from property-level regressions, using as dependent variables the ratio of mortgages to lagged total assets (Panel A1), the ratio of total variable rate debt to total debt (Panel A2), the ratio of property investments to lagged assets (Panel B1), the ratio of property improvements to lagged assets (Panel B2), occupancy rate (Panel B3), and property diversification (Panel B4). For Panels A1, and B1-B4 the effect of Pre-event Low Real Estate Revenue is allowed to vary by year for each year starting 2 years prior to the Jobs Act and ending 3 years after the adoption. 2004 is pre-event until July 14, 2004, and post-event from July 15, 2004 when the Senate passed the Act. In Panels A1, and B1-B4 the sample includes annual property-level data for real estate investment trusts over the period 2001 - 2007, with 2001 as the omitted year. For Panel A2, the effect of Pre-event Low Real Estate Revenue is allowed to vary for each quarter from 2002q3 to 2006q2. We also plot the estimate on the interaction of Pre-event Low Real Estate Revenue with an indicator equal to 1 starting in 2006q3 and ending in 2007q2. In Panel A2, the sample includes real estate investment trusts over the period 2001q3 - 2007q2, with 2001q3 - 2002q2 as the omitted quarters. Firm-level data is from S&P Global Market Intelligence SNL Real Estate. Property-level data is from SNL Property Transactions. Ninety percent confidence intervals are also plotted.

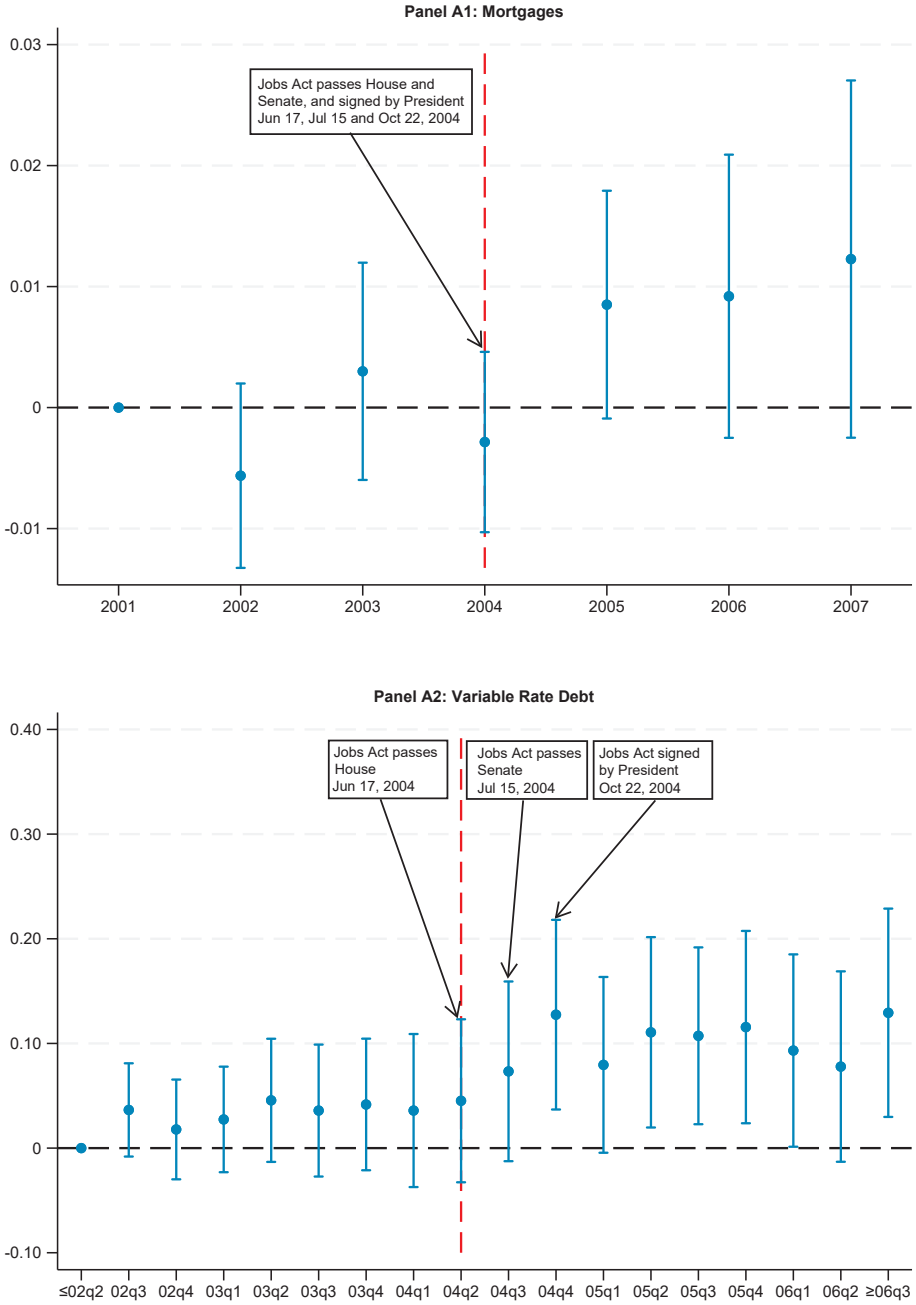
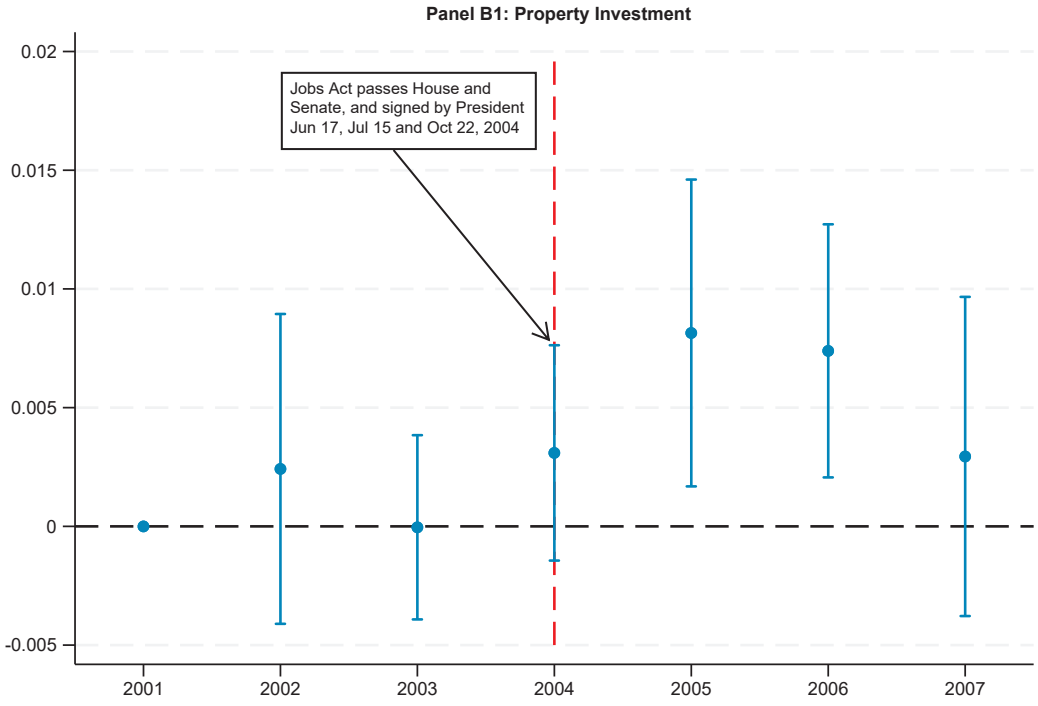


Figure 13: Property-Level Financing for Low Rental Revenue Firms Around the Jobs Act (cont.)



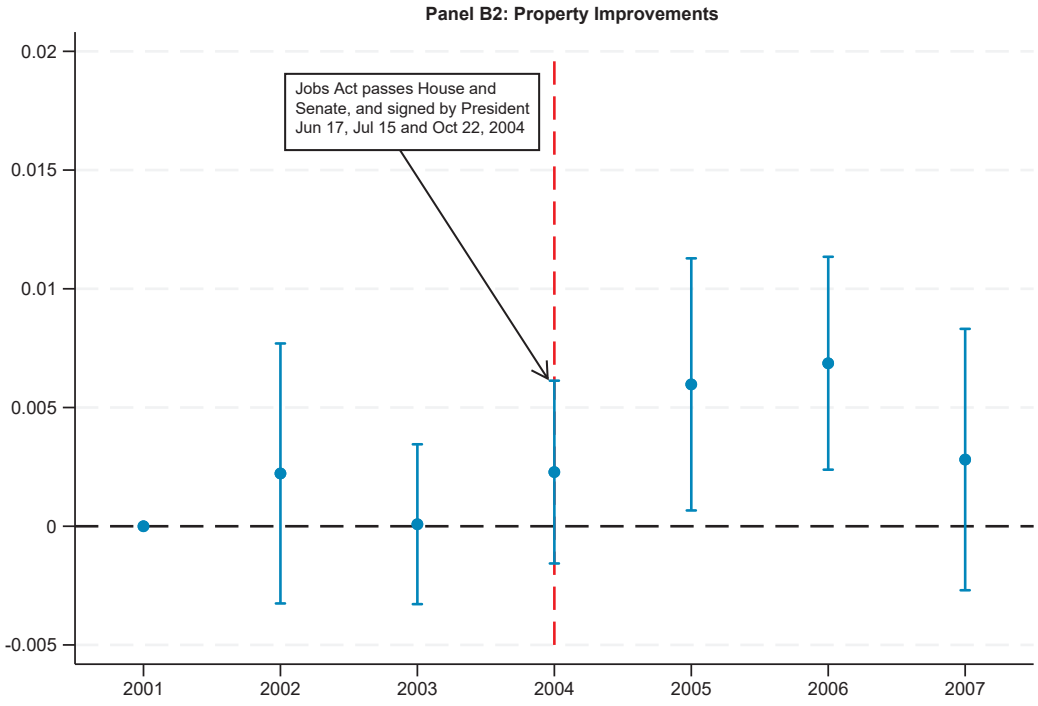
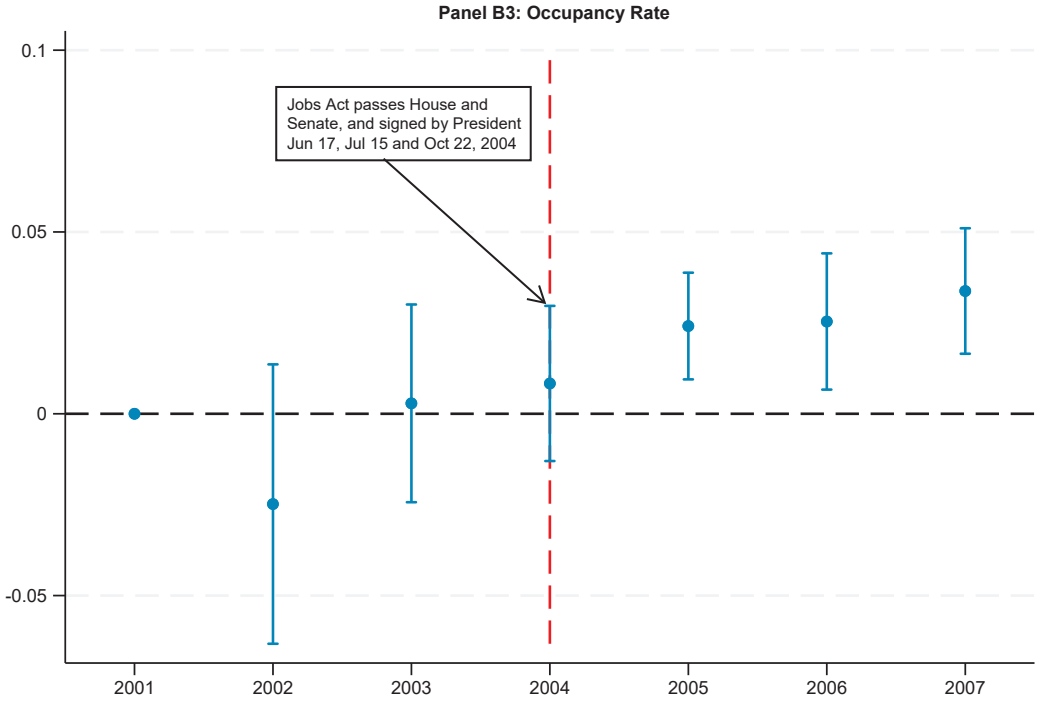


Figure 13: Property-Level Financing for Low Rental Revenue Firms Around the Jobs Act (cont.)



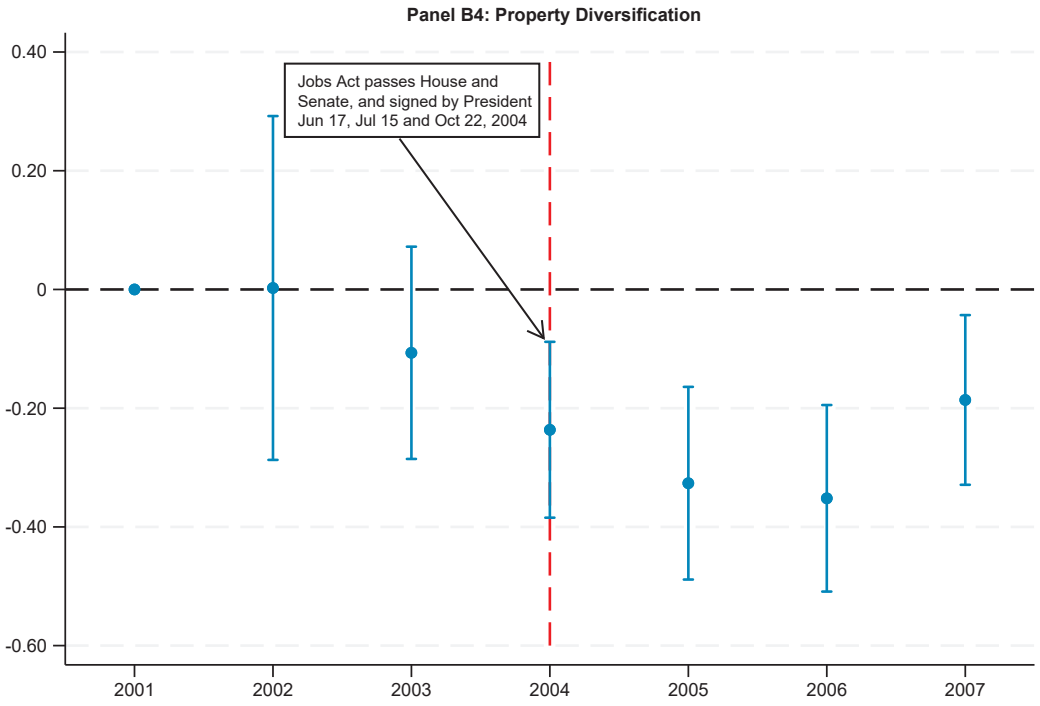
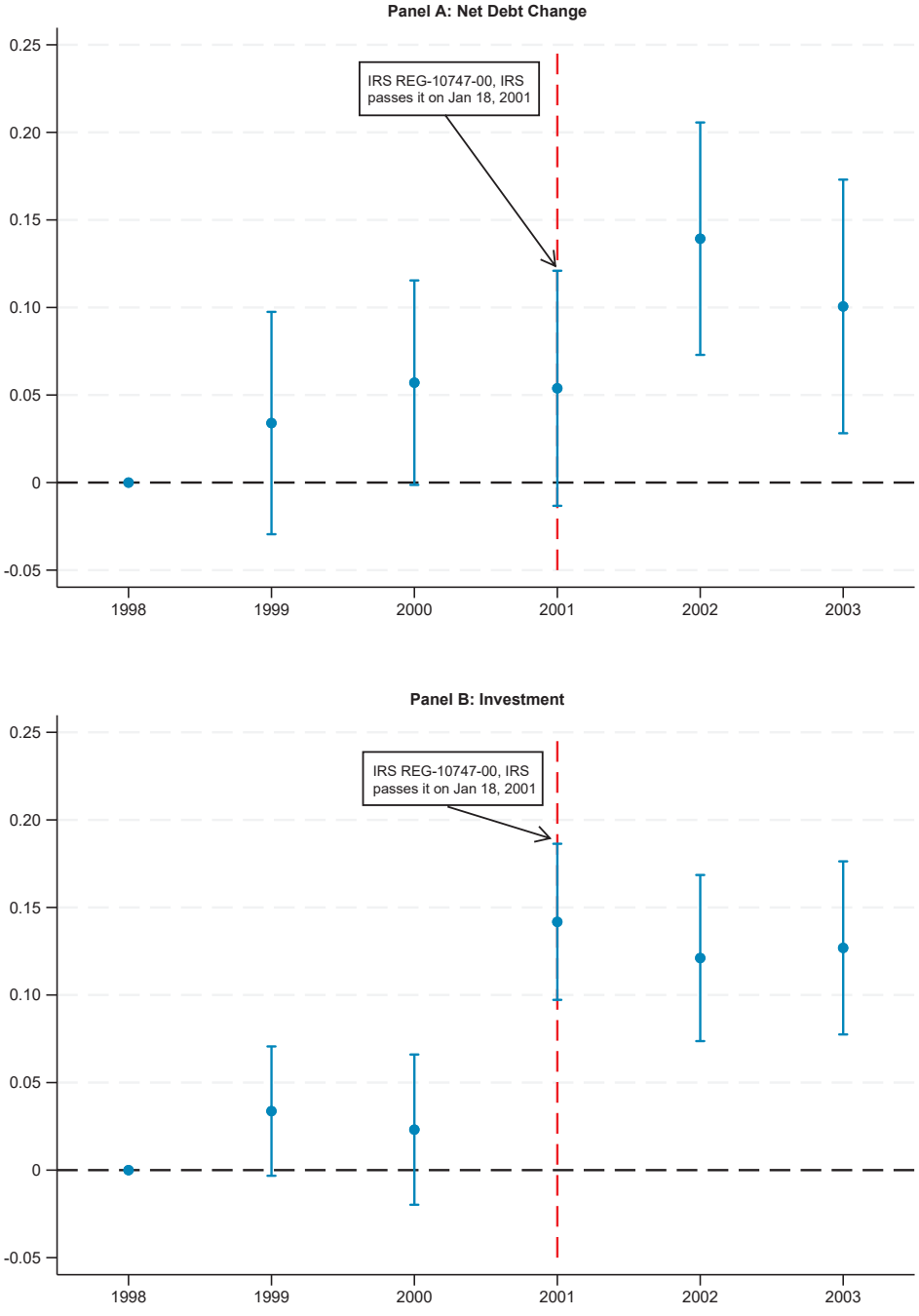


Figure 14: **Financing and Investment for Low Tax Shield Firms Around IRS REG-107047-00: General Sample of Non-Financial Companies**

This figure reports the point estimates from financing and investment regressions for non-financial firms, using as dependent variables the ratio of net debt change (long term debt (COMPUSTAT item dltt) minus lagged long term debt) to lagged gross property, plant, and equipment (COMPUSTAT item ppegt) (Panel A) and the ratio of capital expenditure (COMPUSTAT item capx) to lagged gross property, plant, and equipment (Panel B). The regression specifications are the same as those in column [1] and [2] of Table 16, except that the effect of Pre-event Low Tax Shield is allowed to vary by year for each year starting 2 years prior to the IRS REG-107047-00 regulation and ending 3 years after the regulation. Year 1998 is our base year. The sample includes all U.S. firms in COMPUSTAT except financial firms (SIC 6000-6999) over the period 1998 - 2003. In these estimations, we focus on firms with non-missing variable rate debt (COMPUSTAT item dltp) in the pre-event year. Ninety percent confidence intervals are also plotted.



Appendix to

Tax Constraints to Corporate Hedging

Erasmo Giambona Anil Kumar Ricardo Lopez A.

Keywords: Jobs Act, IRS Regulation 107047-00, real estate investment trust firms, general non-financial firms, interest rate hedging, access to credit, investment.

JEL classification: G32; G33; M41.

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Table A1: **Key Variables.** This table provides detailed definitions of the key variables used in this article.

Variable	Definition
Interest Rate	The weighted average interest rate on all variable and fixed rate debt accounting for hedging (SNL key field 134201).
Exit Propensity	A dummy variable equal to one in the quarter in which the firm exits the sample due to M&A activities or liquidation, and zero otherwise.
Hedged Variable Rate Debt /Total Debt	The ratio of the sum of variable rate debt swapped for fixed-rate debt (SNL key field 134195) plus variable rate debt subject to interest-rate cap agreements (SNL key field 134180) to total debt (SNL key field 134203).
Hedged Variable Rate Debt /Total Variable Rate Debt	The ratio of the sum of variable rate debt swapped for fixed-rate debt (SNL key field 134195) plus variable rate debt subject to interest-rate cap agreements (SNL key field 134180) to total variable debt (SNL key fields 134188 + 134195).
Swapped Fixed Rate Debt /Total Debt	The ratio of fixed rate debt swapped to variable rate debt (SNL key field 134194) to total debt.
Swapped Fixed Rate Debt /Total Fixed Rate Debt	The ratio of fixed rate debt swapped to variable rate debt (SNL key field 134194) to total fixed rate debt (SNL key field 134192).
Variable Rate Debt	The ratio of total variable debt (SNL key fields 134188 + 134195) to total debt.
Total Income Tax/ Revenue	The ratio of the total income tax (Compustat item TXTQ) to total revenue (SNL key field 141780).
Real Estate Revenue	The ratio of sum of rental revenue (SNL key field 132520) plus operating real estate revenue (SNL key field 132526) to total revenue (SNL key field 141780).
Pre-event Low Real Estate Revenue	An indicator for companies with real estate revenue below the sample 25^{th} percentile in the year before the passage of the American Jobs Creation Act (2003q3-2004q2).
Post Jobs Act	An indicator equals to one in the quarter of the passage of the Jobs Act (2004q3) and the following quarters, and zero otherwise.
Total Operating Revenue	The ratio of the sum of rental revenue (SNL key field 132520) plus operating real estate revenue (SNL key field 132526) plus mortgage income (SNL key field 132537) plus gains on sales of real estate (SNL key field 132714) to total revenue (SNL key field 141780).
Pre-event Low Total Operating Revenue	An indicator for companies with total operating revenue below the sample 25^{th} percentile in the year before the passage of the American Jobs Creation Act (2003q3-2004q2).
Real Estate & Cash Holdings	The ratio of the sum of real estate assets (SNL key field 132112) plus cash and cash equivalents (SNL key field 132167) to total assets.
Pre-event Low Real Estate & Cash Holdings	An indicator for companies with real estate & cash holdings below the sample 25^{th} percentile in the year before the passage of the American Jobs Creation Act (2003q3-2004q2).
Leverage	The ratio of total debt minus cash & cash equivalents to total assets.
Operating Profitability	The ratio of net operating income (SNL key field 132708) to total assets.
Total Profitability	The ratio of net income (SNL key field 132740) to total assets.
Earnings Volatility	The ratio of the standard deviation of net income using 12 quarters of past consecutive observations to the average assets estimated over the same period.

Table A1 continued.

Variable	Definition
Log Assets	The natural logarithm of total assets (SNL key field 131929).
Lease Maturity $\leq$ 1 Yr.	The ratio of the dollar amount of leases maturing within 1 year from the current year (SNL key field 134376) to the sum of dollar amount of all leases maturing within 1 year until year 6+ (SNL key fields 134376+134377+134378+134379, 134380+134381).
Lease Maturity $\geq$ 2 & $\leq$ 5 Yr.	The ratio of the dollar amount of leases maturing between 2 to 5 years from the current year (SNL key field 134377+134378+134379+134380) to the sum of dollar amount of all leases maturing within 1 year until year 6+.
Lease Maturity $\geq$ 6+ Yr.	The ratio of the dollar amount of leases maturing from year 6 onward from the current year (SNL key field 134381) to the sum of dollar amount of all leases maturing within 1 year until year 6+.
Early Debt Payoff	The ratio of long-term debt reduction (Compustat item DLTR) minus lagged long-term debt due in one year (Compustat items DD1) to lagged total assets (Compustat item AT).
Mortgages	The ratio of a property's 1st encumbrance (SNL key field 225557) for mortgage type (SNL key field 226663) to lagged total assets. Property-level data is from SNL Property Transactions.
Property Investment	The ratio of a property's initial costs (SNL key field 221778) to lagged total assets. Property-level data is from SNL Property Transactions.
Property Improvements	The ratio of a property's improvement investment (SNL key field 221777) to lagged total assets. Property-level data is from SNL Property Transactions.
Occupancy Rate	A property's occupancy rate (SNL key field 221759). Property-level data is from SNL Property Transactions.
Property Diversification	A dummy variable equal to one if an acquired property's property type (SNL key field 225476) in year n is not among the top three property types among all properties held by a firm in year $n-1$, zero otherwise. Property-level data is from SNL Property Transactions.

Table A2: **Descriptive Statistics.** This table reports descriptive statistics for the real estate investment trusts in our sample over the period 2001q3 - 2007q2. Refer to Table A1 for detailed variable definitions. Firm-level data is from S&P Global Market Intelligence SNL Real Estate. Property-level data is from SNL Property Transactions for the period 2001 - 2007.

Panel A - Pre-event Low Real Estate Revenue: Yes

Variables	Mean	St. Dev.	Min.	25th PCTLE	Median	75th PCTLE	Max.	Obs.
Interest Rate	5.968	0.835	3.800	5.610	5.950	6.380	10.000	275
Exit Propensity	0.012	0.111	0.000	0.000	0.000	0.000	1.000	804
Hedged Variable Rate Debt/Total Debt	0.049	0.126	0.000	0.000	0.000	0.004	0.626	694
Hedged Variable Rate Debt/Total Variable Rate Debt	0.125	0.245	0.000	0.000	0.000	0.115	1.000	569
Swapped Fixed Rate Debt/Total Debt	0.003	0.008	0.000	0.000	0.000	0.000	0.026	721
Swapped Fixed Rate Debt/Total Fixed Rate Debt	0.005	0.013	0.000	0.000	0.000	0.000	0.038	595
Variable Rate Debt	0.299	0.304	0.000	0.076	0.204	0.441	1.000	714
Total Income Tax/Revenue	0.002	0.008	-0.020	0.000	0.000	0.000	0.025	652
Real Estate Revenue	0.772	0.188	0.284	0.712	0.835	0.895	1.011	786
Total Operating Revenue	0.823	0.145	0.504	0.766	0.871	0.925	1.014	786
Real Estate & Cash Holdings	0.687	0.224	0.095	0.574	0.743	0.858	0.989	804
Leverage	0.389	0.226	-0.085	0.248	0.430	0.551	0.808	804
Assets ($B)	2.199	3.866	0.000	0.148	0.663	2.590	23.744	804
Operating Profitability	0.019	0.008	0.001	0.014	0.020	0.023	0.040	794
Total Profitability	0.010	0.011	-0.020	0.004	0.010	0.017	0.034	801
Earnings Volatility	0.010	0.012	0.001	0.003	0.005	0.012	0.044	791
Early Debt Payoff	0.099	0.147	-0.051	0.002	0.045	0.143	0.558	158
Mortgages	0.018	0.027	0.000	0.001	0.004	0.025	0.092	1,015
Property Investment	0.006	0.015	0.000	0.001	0.001	0.003	0.088	2,995
Initial Improvements	0.005	0.013	0.000	0.000	0.001	0.003	0.072	2,997
Occupancy Rate	0.924	0.162	0.000	0.921	0.988	1.000	1.000	12,332
Property Diversification	0.531	0.499	0.000	0.000	1.000	1.000	1.000	4,704

Panel B - Pre-event Low Real Estate Revenue: No

Variables	Mean	St. Dev.	Min.	25th PCTLE	Median	75th PCTLE	Max.	Obs.
Interest Rate	6.253	0.827	2.600	5.710	6.200	6.780	9.340	1,690
Exit Propensity	0.018	0.132	0.000	0.000	0.000	0.000	1.000	2,316
Hedged Variable Rate Debt/Total Debt	0.062	0.117	0.000	0.000	0.000	0.080	0.626	2,216
Hedged Variable Rate Debt/Total Variable Rate Debt	0.190	0.278	0.000	0.000	0.000	0.364	1.000	2,046
Swapped Fixed Rate Debt/Total Debt	0.002	0.007	0.000	0.000	0.000	0.000	0.026	2,228
Swapped Fixed Rate Debt/Total Fixed Rate Debt	0.003	0.010	0.000	0.000	0.000	0.000	0.038	2,191
Variable Rate Debt	0.252	0.200	0.000	0.116	0.219	0.328	1.000	2,294
Total Income Tax/Revenue	<0.001	0.006	-0.020	0.000	0.000	0.000	0.025	2,054
Real Estate Revenue	0.966	0.043	0.491	0.952	0.978	0.994	1.011	2,298
Total Operating Revenue	0.969	0.041	0.504	0.958	0.982	0.995	1.014	2,298
Real Estate & Cash Holdings	0.869	0.089	0.095	0.833	0.886	0.931	0.989	2,316
Leverage	0.508	0.170	-0.085	0.442	0.518	0.610	0.808	2,316
Assets ($B)	2.670	3.408	0.011	0.762	1.513	3.153	26.270	2,316
Operating Profitability	0.025	0.007	0.001	0.021	0.024	0.028	0.044	2,295
Total Profitability	0.007	0.009	-0.020	0.003	0.007	0.011	0.034	2,310
Earnings Volatility	0.007	0.007	0.001	0.002	0.004	0.008	0.044	2,284
Early Debt Payoff	0.127	0.137	-0.051	0.020	0.085	0.192	0.558	485
Mortgages	0.016	0.023	0.000	0.002	0.006	0.017	0.092	2,435
Property Investment	0.011	0.019	0.000	0.001	0.004	0.011	0.088	6,789
Initial Improvements	0.009	0.016	0.000	0.001	0.002	0.009	0.072	6,803
Occupancy Rate	0.915	0.148	0.000	0.901	0.970	1.000	1.000	41,324
Property Diversification	0.619	0.486	0.000	0.000	1.000	1.000	1.000	8,966

Table A2 continued.

Panel C - Combined Sample

Variables	Mean	St. Dev.	Min.	25th PCTLE	Median	75th PCTLE	Max.	Obs.
Interest Rate	6.213	0.834	2.600	5.700	6.130	6.700	10.000	1,965
Exit Propensity	0.016	0.127	0.000	0.000	0.000	0.000	1.000	3,120
Hedged Variable Rate Debt/Total Debt	0.059	0.119	0.000	0.000	0.000	0.067	0.626	2,910
Hedged Variable Rate Debt/Total Variable Rate Debt	0.176	0.272	0.000	0.000	0.000	0.332	1.000	2,615
Swapped Fixed Rate Debt/Total Debt	0.002	0.007	0.000	0.000	0.000	0.000	0.026	2,949
Swapped Fixed Rate Debt/Total Fixed Rate Debt	0.003	0.011	0.000	0.000	0.000	0.000	0.038	2,786
Variable Rate Debt	0.263	0.229	0.000	0.108	0.216	0.344	1.000	3,008
Total Income Tax/Revenue	0.001	0.006	-0.020	0.000	0.000	0.000	0.025	2,706
Real Estate Revenue	0.916	0.132	0.284	0.905	0.963	0.991	1.011	3,084
Total Operating Revenue	0.932	0.103	0.504	0.921	0.970	0.992	1.014	3,084
Real Estate & Cash Holdings	0.822	0.159	0.095	0.780	0.868	0.922	0.989	3,120
Leverage	0.477	0.193	-0.085	0.407	0.501	0.600	0.808	3,120
Assets ($ billion)	2.549	3.537	0.000	0.573	1.362	2.942	26.270	3,120
Operating Profitability	0.023	0.008	0.001	0.019	0.023	0.027	0.044	3,089
Total Profitability	0.008	0.010	-0.020	0.003	0.008	0.012	0.034	3,111
Earnings Volatility	0.007	0.009	0.001	0.002	0.004	0.009	0.044	3,075
Early Debt Payoff	0.120	0.140	-0.051	0.013	0.076	0.183	0.558	643
Mortgages	0.016	0.025	0.000	0.002	0.005	0.020	0.092	3,450
Property Investment	0.010	0.018	0.000	0.001	0.002	0.009	0.088	9,784
Initial Improvements	0.008	0.015	0.000	0.000	0.002	0.007	0.072	9,800
Occupancy Rate	0.917	0.151	0.000	0.908	0.973	1.000	1.000	53,656
Property Diversification	0.588	0.492	0.000	0.000	1.000	1.000	1.000	13,670

Table A3: **Correlations.** This table reports selected correlations. The sample includes real estate investment trusts in 2004q2. Refer to Table A1 for detailed variable definitions. Data is from S&P Global Market Intelligence SNL Real Estate. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Variables	Real Estate Revenue	Operating Profitability	Total Profitability	Assets ($B)
Operating Profitability	0.565***			
Total Profitability	-0.098	0.274***		
Assets ($B)	0.125	-0.004	-0.080	
Leverage	0.439***	0.333***	-0.264***	0.214***

Table A4: **Hedging for Low Rental Revenue Firms after the Jobs Act: Commercial Real Estate Price and Mortgage Ratio Controls.** This table presents estimations from hedging regressions. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1]-[2]) and the ratio of hedged variable rate debt to total variable rate debt (columns [3]-[4]). Pre-event Low Real Estate Revenue is an indicator for companies with real estate revenue below the sample 25^{th} percentile in the year (2003q3-2004q2) before the passage of the Jobs Act. Post Jobs Act is an indicator equals to one in the quarter of the passage of the American Jobs Creation Act (2004q3) and the following quarters, and zero otherwise. Lagged Property-Type Price (Mortgage) Ratio is the lagged percentage change in the Property-Type Price Index (Mortgage Value). The percentage change in the Property-Type Price Index (Mortgage Value) is calculated as the difference between the Property-Type Price Index (Mortgage Value) at time t and $t-1$ divided by the time $t-1$ Property-Type Price Index (Mortgage Value). The Property-Type Price Index is the CoStar equal-weighted transaction-based index available by property type and region (Midwest, Northeast, South, and West). We assign the property index to each firm-quarter based on property type and headquarters region. The mortgage value data is at the quarter level. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. The Property-Type Price Index and the Commercial Real Estate (CRE) Mortgage Value (total value of all commercial mortgages) are from CoStar and the Federal Reserve Economic Data (FRED) database, respectively. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt		Hedged Variable Rate Debt/ Total Variable Rate Debt	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.074***	0.067**	0.111**	0.094*
	(0.027)	(0.026)	(0.053)	(0.054)
Pre-event Low Real Estate Revenue × Lagged Property-Type Price Ratio	-0.006		-0.269	
	(0.185)		(0.437)	
Pre-event Low Real Estate Revenue × Lagged CRE Mortgage Ratio		0.564**		1.604**
		(0.226)		(0.740)
Lagged Property-Type Price Ratio	0.123		0.313	
	(0.109)		(0.256)	
Lagged CRE Mortgage Ratio		Absorbed		Absorbed
Lagged Log Assets	-0.001	0.001	0.017	0.023
	(0.012)	(0.011)	(0.036)	(0.031)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	2,877	2,893	2,590	2,601
Number of Firms	149	149	148	148
Adjusted - R2	0.618	0.617	0.597	0.596

Table A5: **Hedging for Low Rental Revenue Firms after the Jobs Act: Firms with a Minimum Number of Observations Pre- and Post-Act.** This table presents estimations from hedging regressions requiring that firms have a certain number of observations pre- and post-reform. The dependent variables are the ratio of hedged variable rate debt to total debt (columns [1] and [3]) and the ratio of hedged variable rate debt to total variable rate debt (columns [2] and [4]). Refer to Table A1 for detailed variable definitions. The sample in columns [1]-[2] ([3]-[4]) includes real estate investment trusts over the period 2001q3 - 2007q2 that have at least 4 (12) quarterly observations of lagged log assets and hedged variable rate debt during both the pre-reform (2001q3-2004q2) and post-reform (2004q3-2007q2) periods. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variables:	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt	Hedged Variable Rate Debt/ Total Debt	Hedged Variable Rate Debt/ Total Variable Rate Debt
	Minimun 4 quarters		Minimun 12 quarters	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.078***	0.111**	0.087**	0.122*
	(0.028)	(0.054)	(0.033)	(0.064)
Lagged Log Assets	-0.005	0.004	-0.038	-0.098
	(0.014)	(0.045)	(0.028)	(0.059)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	2,485	2,255	1,454	1,283
Number of Firms	114	114	61	61
Adjusted - R^2	0.610	0.597	0.678	0.707

Table A6: **Swapped Fixed to Variable Rate Debt for Low Rental Revenue Firms after the Jobs Act.** This table presents estimations from swapped fixed to variable rate debt regressions. The dependent variables are the ratio of swapped fixed to variable rate debt to total debt (columns [1]-[2]) and the ratio of swapped fixed to variable rate debt to total fixed rate debt (columns [3]-[4]). Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Data is from S&P Global Market Intelligence SNL Real Estate. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

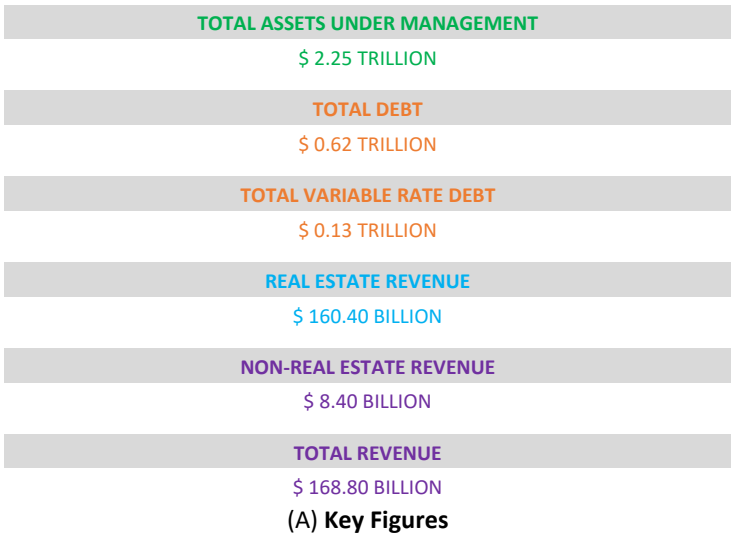
Dep. variables:	Swapped Fixed Rate Debt/ Total Debt		Swapped Fixed Rate Debt/ Total Fixed Rate Debt	
	[1]	[2]	[3]	[4]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.0005	0.0004	0.0005	0.0003
	(0.0011)	(0.0011)	(0.0019)	(0.0019)
Lagged Log Assets		0.0004		0.0010
		(0.0005)		(0.0008)
Property Type × Year-Quarter Fixed Effects	Yes	Yes	Yes	Yes
Company Fixed Effects	Yes	Yes	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed	Absorbed	Absorbed
Observations	2,949	2,932	2,786	2,771
Number of Firms	151	151	147	147
Adjusted - R^2	0.675	0.671	0.657	0.655

Table A7: **Number of Acquisitions for Low Rental Revenue Firms after the Jobs Act.** This table presents estimations from number of acquisitions regressions. The dependent variable is the natural logarithm of the firm-level number of property acquisitions. Refer to Table A1 for detailed variable definitions. The sample includes real estate investment trusts over the period 2001q3 - 2007q2. Firm-level data is from S&P Global Market Intelligence SNL Real Estate. Property-level data is from SNL Property Transactions. Standard errors are clustered at the firm level, and reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Log Number of Acquisitions	
	[1]	[2]
Pre-event Low Real Estate Revenue × Post Jobs Act	0.314*	0.337**
	(0.160)	(0.162)
Lagged Log Assets		-0.211**
		(0.095)
Property Type × Year-Quarter Fixed Effects	Yes	Yes
Company Fixed Effects	Yes	Yes
Pre-event Low Real Estate Revenue	Absorbed	Absorbed
Post Jobs Act	Absorbed	Absorbed
Observations	1,558	1,550
Number of Firms	125	125
Adjusted - R^2	0.333	0.333

Figure A1: **The REIT Industry in 2021**

Panel A presents key figures about real estate investment trusts in 2021. Panel B shows the different types of assets under management by real estate investment trusts in 2021. Data is from S&P Global Market Intelligence SNL Real Estate.



(A) **Key Figures**

(B) **Assets Under Management**

Figure A2: **Expense Categories in the REIT Industry**

This figure displays average interest expenses and other expense categories as a percentage of total expenses over the period 2001-2007 for real estate investment trusts. Data is from S&P Global Market Intelligence SNL Real Estate.

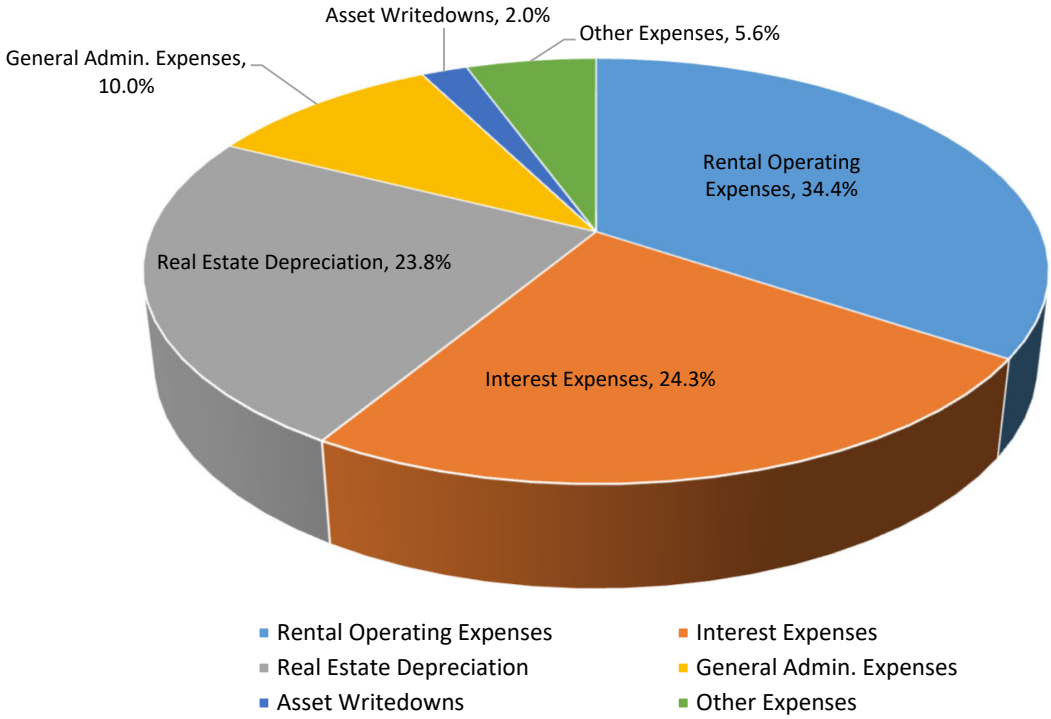


Figure A3: **Notional Amount of Derivatives Contracts Setup by Banks**

This figure reports the notional amount of derivative contracts ($ trillions) setup by banks. The information is presented for interest rate (IR) derivatives, foreign exchange (FX) derivatives, equity (EQ) derivatives, commodity (CM) derivatives, and credit risk (CR) derivatives. The data is from the Office of the Comptroller of the Currency (OCC), derivatives quarterly reports.

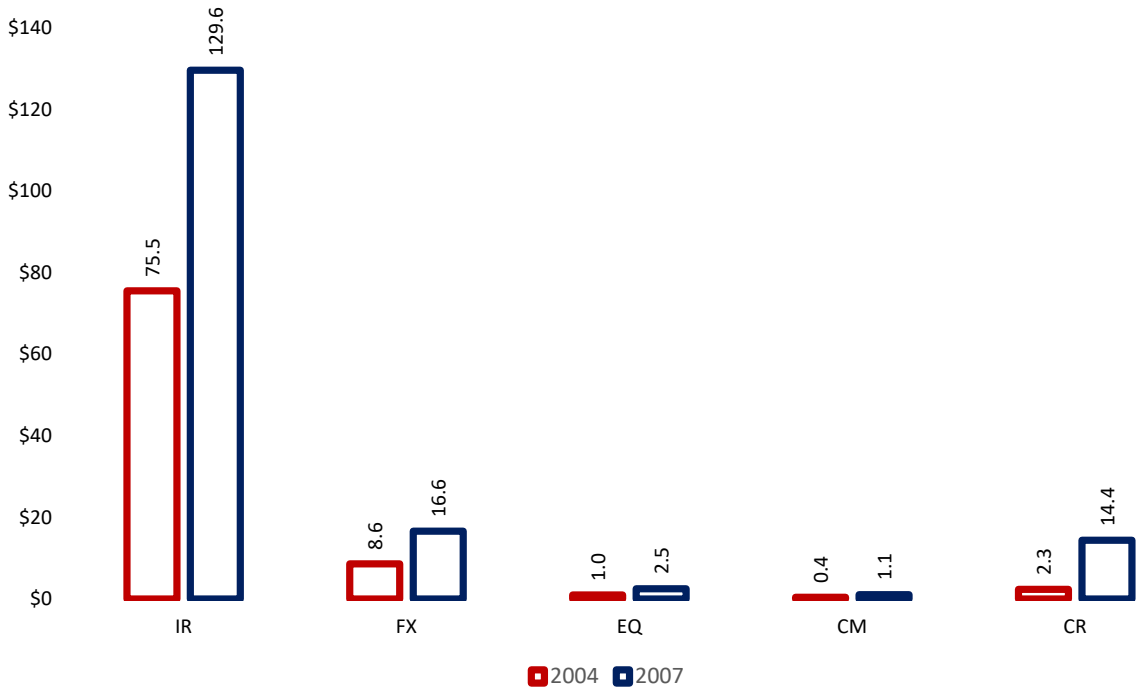


Figure A4: **Hedging for Low Rental Revenue Firms Around the Jobs Act: Using Annualized Data**

This figure reports the point estimates from annualized hedging regressions, using as dependent variables the ratio of hedged variable rate debt to total debt (Panel A) and the ratio of hedged variable rate debt to total variable rate debt (Panel B). In the regressions, the effect of Pre-event Low Real Estate Revenue is allowed to vary by year for each year starting two years prior to the Jobs Act and ending three years after the adoption. To obtain annualized data, we calculate averages across four quarters of hedging variables and the pre-event interaction effects from Table 6. For example, for year 2003q3 - 2004q2, we calculate averages across 2003q3 to 2004q2. The sample includes real estate investment trusts over the period 2001q3 - 2007q2, with 2001q3 - 2002q2 as the omitted year. Data is from S&P Global Market Intelligence SNL Real Estate. Ninety-nine percent confidence intervals are also plotted.