Interest Rate Swaps and Nonfinancial Real Estate Firm Market Value in the US

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1. Abstract

In this paper I examined the impact of interest rate hedging on real estate firms' market values. REITs enter into derivatives contract often to protect themselves from falling property value and rising borrowing cost. I tested whether REITs effectively isolated themselves from such risks during 2004-2006, a period of rapid rate hikes. I demonstrated that firm values increase with interest rate swap usage, which is consistent with my hypothesis. I also found a positive correlation between hedging premium and rate hike expectations.

2. Introduction

A derivative is a financial contract based on an underlying asset. It derives its value from the asset's price such as exchange rates, interest rates, stock prices and commodity prices. Since their inception several decades ago, derivatives have gained tremendous acceptance and use by a wide variety of financial players, ranging from traders looking to speculate to firms looking to hedge exposure. More and more firms seek to reduce their exposure to price fluctuations, or hedge, through the use of derivatives.

An interest rate derivative (IRD) is defined as an agreement of exchange based on different interest rates over a predetermined period of time. The most prevalent IRD, interest rate swap(IRS), specifies an exchange of payments that consist of an agreed upon fixed interest rate and a floating interested rate based on a reference index, most typically 3-month LIBOR rate. The notional amount of the contract is not paid at the terminal date; only the periodic payments due between parties are exchanged.

A single-currency interest rate swap can be represented by the following diagram.

Fixed payment
(fixed rate x notional)

Payer

Receiver

Floating payment
(floating rate x notional)
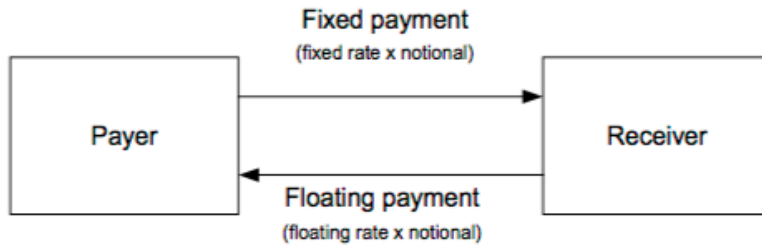
Market participants employ interest rate derivatives for hedging interest rate risk or taking a position on the future path of interest rates. Under an upward sloping term structure, the non-financial end of the swap typically pays fixed rate and receives floating rate to hedge against rising interest rates. Aside from interest rate swaps, other derivatives include caps/floors and forward rate agreements. Firms choose which derivative to use based of their own position, risk profile, expectations for future interest rates and demand from investors.

This paper focuses on the impact that interest rate hedging has on firms' market values. A large number of US firms have entered into the relatively new financial contracts of IRD in hedging against interest rate risks. Real estate firms, in particular, have embraced interest rate swaps as a hedge against potential rise in interest rate, cost of debt and fall in property values.

Real estate investment trusts(REITs) are particularly susceptible to interest rate risks. There are two broad types of REITs: equity REITs, which own, operate and lease income-producing real estate, and mortgage REITs, which invest in mortgages and mortgage-backed securities. Recent years have seen a spike in use of IRD for lessors (equity REITs) of real estate property.

REITs exist so that the companies that own the properties can avoid paying corporate taxes as long as they distribute 90% of taxable income as unqualified dividends. This means that REITs aren't able to retain their earnings or adjusted funds from operations (AFFO - the REIT equivalent of free cash flow). Thus, in order to grow, REITs need to raise external debt and equity capital from investors. As a result, higher interest rates increase a REIT's cost of debt and

make it incrementally harder to achieve profitable growth. That's especially true because REITs frequently use secondary offerings (i.e. they sell new shares) to raise growth capital.
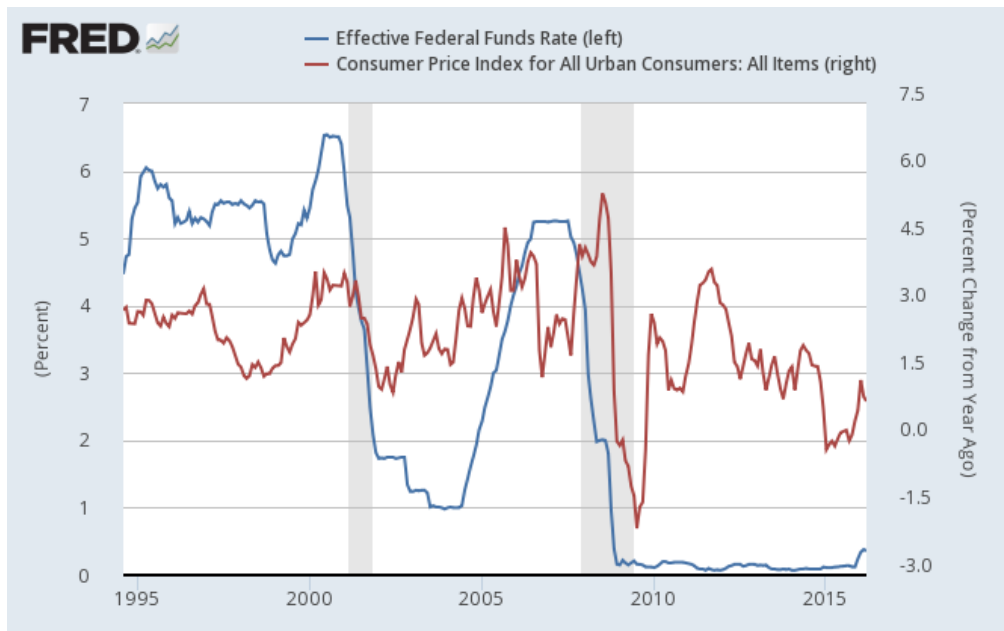
The period from 2004 to 2006 proved to be a challenging time for many REITs, due to the fact that the Federal Reserve raised interest rates 17 times during the three years. Rapid rate hikes and increased volatilities raised costs of external debt while suppressing property value, prompting more and more real estate firms to hedge by entering into floating-rate receiver swaps.

3. Literature review

Hedging, according to the Modigliani Miller paradigm (1963) is independent of firm's market value. Their approach argued that financial risk management and means of financing is irrelevant in creating value since shareholders are capable of leveraging or deleveraging their own portfolios. Later theories have implied that market frictions are large enough such that hedging mechanisms can be viewed as a value-increasing strategy. (Allayannis & Weston, 2001)

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Stulz (1984) attributes corporate hedging to managers' risk aversion. Before the 1990s, due to the scarcity of data there was little empirical evidence. Since the issuance of SFAS 105 in 1990, which requires all firms to report information about financial instruments with off-balance sheet risk, many studies focused on testing theories of hedging and managerial risk aversion. Visvanathan(1998) examines the determinants of the use of interest rate swaps by S&P 500 nonfinancial firms, and suggests that instead of interest rate sensitivity, distress costs and debt maturity structure are the main factors in firms' decision to enter swaps. Haushalter (2000) found similar results supporting managerial risk aversion theory in commodity hedging activities in the oil and gas industry.

There are more studies focusing on factors that influence firm's incentives to hedge. Smith and Stulz(1985) identified tax structures as a stimulus for firms to hedge. Batram(2000) found evidence of tax value creation through the appropriate management of derivatives positions. Froot, Scharfstein and Stein (1993) introduced the costly access to external financing as the main market inefficiency that causes underinvestment. Geczy, Minton, and Schrand (1997) found supporting empirical evidence in Fortune 500 firms that currency hedging is used to reduce underinvestment. Allayannis and Ofek (2000) found that firms use currency derivatives usage to hedge against exchange rate risk exposure instead of speculate.

Recently more academics have given attention to testing the direct relation between hedging and firm value. Allayannis & Weston (2001) finds a positive relation between firm value and the use of foreign currency derivatives, with a statistically significant hedging premium for large firms with exposure to exchange rates. On average they found that after holding other factors constant, hedging increased firm value by approximately 4.9%. Carter et al(2004) finds that airline firms have a higher market valuation when using commodity derivatives to hedge fuel price volatility.

Previous literature has yet to account for the impact of hedging with interest rate derivatives on firm value. In this article, I address the question of whether the use of interest rate derivatives directly affects the market valuation of firms with exposure to interest rate risks. In particular, I examine if the use of interest rate swaps rewards real estate firms with higher market valuation.

4. Sample Description and Hypothesis

My sample consists of all the nonfinancial lessors of residential and nonresidential real estate from 2004 to 2006 in the COMPUSTAT database under NAICS classifications 531110 and 531120. Most of the sample firms are equity REITs, which owns, operates and leases income-producing real estate. My sample only includes firms that have non-missing data on market value. Excluded are financial firms and market makers who take the financial-end of the contract and may have different motivations for using derivatives and engage in speculative activities. Using the aforementioned selection criteria, I obtained a total that 89 firms and a total of 267 firm-year observations between 2004 and 2006 to include in the data set. From June 2004 to June 2006, the Federal Reserve raised rates 17 times, from 1.0% to 5.25%. Rapid rate hikes and increased volatilities resulted in rises in costs of external debt for property owners and lessors, prompting more and more to de-lever or hedge against rising rates. One prominent measure was to enter into floating rate receiver swaps.

SFAS 105, issued in June 15, 1990, requires firms to report information about financial instruments with off-balance sheet risk (e.g., futures, forwards, options and swaps). Firms must report the fact, contract, or notional amount of the financial instrument. SFAS 133 was issued a few years later in June 1998, adding more requirements for firms to recognize all derivatives in

the statement of financial position and measure those instruments at fair value. I record only

nonfinancial interest rate swap users that report using swaps for hedging purposes. I perform

tests using a binary dummy, indicating if the firm uses interest rate swaps or not in a particular

year.

4.1   Response Variable

I use Tobin's Q as a proxy for firm market value.

Tobin's Q$=\dfrac{Total\ book\ value\ of\ assets-book\ value\ of\ equity+market\ value\ of\ equity}{Total\ book\ value\ of\ assets}$

Tobin's Q is the ratio of the market value of a firm's assets divided by the replacement cost of

the company's assets. There are other methods for constructing Tobin's Q, as discussed in

Allayannis and Weston (2001): recursive build-up of fixed-asset replacement costs(Perfect and

Wiles(1994)); market value to book value of assets; market value to book value of sales, all of

which yield no significant differences regarding the results. A benefit of using Tobin's Q is that

it makes it more straightforward to compare firm values without the need to adjust for risks or

normalize.

Table 1 presents summary statistics of the main variables that I use. My sample has a mean value

of assets of $3.02 billion and a mean sales value of $512.06 million. Around 49 percent of the

observations are interest rate swap users. The mean Tobin's Q is 1.375 with a standard deviation

of 0.434.

Table 1 Summary Statistics, n=267

Variable	# of Obs.	Mean	Std.Dev.	Min.	Max
Panel: All firms					
Sample description					
Total Assets(Mil)	267	3,051.320	3,759.012	15.278	22,084.455
Total Sales(Mil)	267	512.063	700.491	0.092	4,915.000
Market Value(Mil)	267	2,328.021	3,104.710	0.21	22,428.847
Interest rate swap use dummy	267	0.489	0.501	0	1
Tobin's Q	267	1.375	0.434	0.328	4.914
Controls					
Market to Book value	267	3.336	13.201	0.001	195.416
Debt ratio	267	0.471	0.183	0.000	0.899
Return on Assets	267	0.034	0.043	-0.130	0.397
Dividend dummy	267	0.835	0.372	0	1

This table presents summary statistics for my sample of non-financial REITS in the US from 2004 to 2006. The interest rate swap dummy equals 1 if the firm reports use of interest rate swaps and takes a position of paying fixed and receiving floating. Tobin's Q is used as a proxy for firm value, the market value of assets divided by the replacement cost of assets. Market to Book is a proxy for growth opportunities. Profitability is related to Return on Assets, the annually compounded net income divided by total assets. Growth opportunities has the proxy Market to Book value. Leverage is represented by debt ratio(long term debt/total assets). The dividend dummy variable equals 1 if the company pays dividend in that year.

4.2   Control variables

To infer that hedging increases firm value, certain variables should be controlled. Below are a

list of variable controls used in my multivariate test, and the how I expect them to affect the

response variable.

a. Investment growth: growth is represented by market to book ratio. Myers(1997) and Smith and Watts(1992) argued that future investment opportunities boost firm value. Empirically, Geczy, Minton, and Schrand (1997) suggests that hedgers are more likely to have larger investment opportunities, and Froot, Scharfstein, and Stein (1993) gives a theoretical framework for why optimal hedge ratios are positively correlated with investment opportunities. Thus it is necessary to control for investment growth.

b. Size: there is ambiguous evidence. Fama and French(1993) and substantial published literature documents a return premium to small companies. (Banz, 1981; Reinganum, 1981). Peltzman(1997) suggests size leads to higher firm value due to higher efficiency. Lang and Stulz(1994), on the other hand finds a negative correlation due to the degree of diversification that decreases Q values in large firms.

c. Profitability: the proxy is ROA. A positive relationship between firm value and profitability is expected, since hedgers trading at a premium will likely have higher Qs.

d. Access to financial markets: Dividend dummy signifies the access to financial markets. Hedgers may forgo projects due to inabilities to obtain financing. Their capital constraint prompt them to only take on positive NPV projects, keeping Q value high A dividend-paying firm is less likely to be capital constrained and may have a lower Q. So a negative relation between dividends and value is expected. A detailed discussion can be found in Lang and Stulz(1994) and Servaes(1996).

e. Leverage: leverage is represented by debt ratio. Capital structure may play a part in determining firm value, thus it is important to control for such differences.

4.3   Univariate tests

Table 2 Tobin's Q: Hedgers vs Non-Hedgers					
	Users	Nonusers	Difference	t-statistic	P-value
Difference in means					
All years					
Mean	1.407	1.344	0.063	1.194	0.117
Standard Deviation	0.357	0.495			
N	130	137			
2004					
Mean	1.358	1.370	-0.012	-0.115	0.455
Standard Deviation	0.322	0.655			
N	40	49			
2005					
Mean	1.395	1.301	0.094	1.302	0.100
Standard Deviation	0.356	0.328			
N	44	45			
2006					
Mean	1.461	1.360	0.101	1.157	0.125
Standard Deviation	0.386	0.433			
N	46	43			

This table presents a summary of users and nonusers of interest rate swaps in 2004, 2005 and 2006.

This section uses a straightforward test for the hypothesis that the use of interest rate swaps are rewarded by higher valuation by comparing users and nonusers of such swaps with univariate test.

Table 2 presents the mean statistics of firm value between users and nonusers in years 2004, 2005 and 2006. Panel data shows a mean Q for users of 1.407 and a mean Q for nonusers of 1.344, indicating a hedging premium of 0.063. The premium, however, is not statistically significant. The result is consistent with my hypothesis that interest rate real estate hedgers have a larger value than non-hedgers.

Looking at specific years, the hedging premium is a negative -0.012 in year 2004, when the Fed started raising rates after steadily and slowly reducing rates for three years. The number of users in 2004 is also the lowest at 40. The low volatility and decline in interest rate contributes to the low number of users and the negative effect on firm value, as hedgers typically pay out fixed to receive floating rates.

Hedging premium turns positive (0.094) in 2005 and larger (0.101) in 2006, with number of users of interest rate swaps year by year. This fits my expectation that more firms take on derivatives positions in light of rate hike expectations.

4.4   Multivariate tests

In the previous section I examined in a univariate setting the hedging premium for interest rate swap users. As mentioned earlier, a more accurate and informative test needs to controls for variables that possibly impact Q. In particular, I control for size, access to financial markets, profitability, investment growth and leverage. The proxies are ln(assets), dividend dummy, ROA, market to book value and debt ratio respectively.

For the multivariate test, the ordinary least square regression model looks like the following:

$$Tobin's\ Q = \alpha + \beta_1 \lambda + \sum \beta_k * Control\ Variables + \epsilon$$

$$\lambda = \begin{cases} 1 & reported\ hedging\ with\ interest\ rate\ swaps \\ 0 & no\ report\ of\ hedging\ with\ interest\ rate\ swaps \end{cases}$$

	Table 3 Multivariate Results On Interest Rate Swap Use and Firm Value	
	Pooled regression	Fixed effects
	(1)	(2)
Dependent variable: Tobin's Q		
Observations	267	267
R^2	0.489	0.700
Adjusted R^2	0.477	0.534
IRS dummy	0.122	0.036
	3.043***	0.764
Size(log of total assets)	0.020	-0.186
	0.628	-2.756
Profitability(ROA)	3.757	0.741
	7.687***	1.854*
Leverage(Debt ratio)	0.231	0.189
	1.919*	1.143
Growth(MtB ratio)	0.020	0.018
	13.182***	15.206***
Dividend dummy	-0.060	-0.030
	-1.074	-0.3887

Table 3 displays the hedging premium for a variety of control variables described in the previous section. The interest rate swap dummy equals 1 if the firm reports use of interest rate swaps and takes a position of paying fixed and receiving floating. Tobin's Q is used as a proxy for firm value, the ratio of total assets minus the book value of equity plus the market value of equity to the book value of assets. Market to Book is a proxy for growth opportunities. Profitability is proxied by Return on Assets. Leverage is represented by debt ratio(long term debt/total assets). The dividend dummy variable equals 1 if the company pays dividend in 2004, 2005 and 2006.

Table 3, regression 1, presents the results of a pooled OLS regression for the sample of firms.

The main variable is the IRS dummy that equals 1 if a firm uses interest rate swaps to hedge. I

find a 0.122 hedging premium that is significant at 1% level, which is consistent with my

hypothesis. The coefficient value suggest that firms that hedge with IRS have a higher Q relative

to non-hedgers by 12.2% of firm value.

Profitability, leverage and investment growth control variables are statistically significant.

Profitability is significantly positively correlated with firm value at 1% level, which is the

expected relationship. Investment growth also positively impacts Q value, in line with expectations. Firms with more leverage have higher Qs, which is consistent with theories that support the monitoring benefits of debt. Size is shown to be positively correlated with firm value, although not significantly, and access to financial market lowers Q as expected.

To control for unobservable firm characteristics that may affect value, I use a fixed-effects model(Hausman and Taylor(1981) where each firm is assigned a unique intercept. Table 3, regression 2 shows the regression results. The fixed-effect model returns the same coefficient signs as the pooled regression, but with less significance for some variables. IRS dummy is no longer significant and profitability measure is only significant at 10% level. The magnitude of the hedging premium is also less than that in the pooled regression, suggesting a 3.6% increase in firm value with hedging activities.

4.5   By-year Regressions

In a pooled regression, serial correlation in the use of IRS may cause understatements of standard errors, I also test for each year with the same control variables. Results of regressions in years 2004, 2005 and 2006 are shown in Table 4.

Table 4	Interest rate swap dummy	
Year	Obs	Hedging premium
04	89	0.101
		1.444
05	89	0.122
		3.043***
06	89	0.146
		1.938*

Table 4 displays the hedging premium for a variety of control variables in each year. The interest rate swap dummy equals 1 if the firm reports use of interest rate swaps and takes a position of paying fixed and receiving floating.

Tobin's Q is used as a proxy for firm value, the ratio of total assets minus the book value of equity plus the market value of equity to the book value of assets. The regression controls for investment growth opportunities, profitability, leverage and access to financial markets.

Consistent with my hypothesis that hedgers are valued higher, I find a positive correlation in all the by-year regressions. Hedging premium increases from 2004 to 2006 due to rapidly rising rates, and is significant in years 2005 and 2006. As mentioned before, this may be caused by increased volatility and rate hike expectations.

5. Conclusion

This paper focuses on assessing the impact of hedging with interest rate swaps on US real estate firms. It is based on the methodology of Allayannis and Weston(2001) in their review of currency derivatives. My hypothesis is that hedgers of interest rate have higher market values compared to nonhedgers, and that hedging premium increases with rate expectations and volatility.

Using Tobin's Q as an approximation of firm market value, I find significant evidence that the use of interest rate swaps positively affects firm market value in years 2004 to 2006. Controlling for possible variables that affect firm value, I find a 0.122 hedging premium significant at 1% level in pooled OLS regression, indicating that firm hedging with interest rate swap have a 12.2% higher value than firms that do not. Using fixed-effect regression I find a hedging premium of 0.036 that is not significant. By-year regression further shows that when interest rate is raised rapidly, hedging premium becomes larger and more significant. Further research can test for robustness of the results.

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