# The US Term Structure and Return Volatility in Global REIT Markets*

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## Abstract

This paper examines the information content of the U.S. term structure of interest rates on the market for real estate investment trusts (REITs) by decomposing the term structure of U.S. Treasury yields into two components that reflect the expectations factor and the maturity premium. We show that the expectations factor component of the U.S yield curve has significant explanatory power over return volatility in REIT stocks, both in the U.S. and globally, even after controlling for stock market trading activity. The expectations factor is generally found to have a positive effect on REIT market volatility, more significantly for the U.S. and Japanese REITs, highlighting the role of global funding conditions (via expected short rates) on return fluctuations in real estate markets. Comparing the findings for the pre- and post-global crisis periods, however, we find that the U.S. term structure has largely lost its explanatory power over global REIT markets, implied by largely insignificant effects during the post-global crisis period. The findings highlight the changing dynamics in REIT investments in the aftermath of the 2018 global credit crunch, possibly due to the slowdown of investments in the real estate sector globally, and suggest that investors will have to focus more on the idiosyncratic risk factors that drive these markets.


**Keywords:** Real estate investment trusts; term structure; volatility.
**JEL:** C22, C58, G14, G15.

## 1. Introduction

The real estate sector plays a critical role in global economies, often moving in tandem with aggregate economic trends, due its close link to the construction sector and other related business segments. On the investment side, owing to the advances in financial markets, the securitization of real estate in the form of real estate investment trusts (REIT's) has allowed investors to take advantage of diversification and hedging benefits of these assets with lower transactions costs. Moreover, REIT's provide a feasible alternative for institutional or international investors who are exposed to various market frictions that prevent them from investing directly in physical real estate.

Historically, REITs as an investment tool started in the U.S. in the 1960s and were then introduced to Europe and Asia. Having experienced tremendous growth, the global market capitalization for these assets reached $1.7 trillion in 2017 up from $734 billion in 2010 (Ernst and Young, 2017). Today, while the U.S. remains the largest listed real estate market, the market is increasingly becoming more global as the number of countries with at least one actively traded REIT has reached 25.

Given the close link between consumer spending patterns, labor market conditions and real estate demand, interest rate uncertainty driven by monetary policy actions can play a critical role in the performance of real estate investments. In fact, Marfatia et al. (2017) note that Fed's policy actions are increasingly watched by the real estate markets globally and unexpected changes in the Fed's policy rate have a significant time-varying effect on REIT stocks across the world. This complements the existing evidence provided by an emerging strand in the literature that explores the impact of U.S. monetary policy on global financial markets.

This emerging literature has its roots in earlier findings which indicate that the Fed's interest rate policies can have an impact on financial climate in international markets (Miranda-Agrippino and Rey, 2015; Bruno and Shin, 2015). Supporting these earlier findings, several recent papers proclaim the presence of a global financial cycle that is triggered by U.S. monetary policy and explains patterns in global capital flows and prices across countries (e.g. Passari and Rey, 2015; Rey, 2016, 2018).

Given the role of U.S. monetary policy as a major driver of global credit growth and financial cycles in capital flows (Miranda-Agrippino and Rey, 2015), a natural research question then is whether U.S. monetary policy serves as a driver of volatility in international REIT markets. As argued by Zhou and Kang (2011), there is limited evidence in the literature on the volatility behavior of REIT returns and its interest rate sensitivity (see e.g. Devaney, 2001). That being the case, the goal of this paper is to contribute to this thin literature by examining the relation between the U.S. term structure and REIT return volatility in developed economies. The choice of developed economies is motivated by Rey (2016), which presents evidence that U.S. monetary policy shocks are transmitted even to advanced countries with a fully flexible exchange rate.

A distinguishing feature of our analysis is that it differentiates between the two components of the U.S. Treasury yield curve, following Hamilton and Kim (2002). In this decomposition, the first component reflects future short-term rate expectations via the expectations factor component, while the second component captures the time-varying maturity premium. As Bernanke (2006) points out, the forward interest rates embedded in the term structure indicate expected future short rates as well as investors' compensation for holding longer-maturity instruments. Considering that interest rate expectations in the short and long runs can have differential effects on funding conditions and real estate investment decisions, differentiating between the two components of the term structure can enhance our understanding of the relation between the U.S. term structure and global REIT markets from a novel perspective.

Examining REIT return volatility in nine developed countries including Australia, Belgium, Canada, France, Italy, Japan, the Netherlands, the U.K. and the U.S., we find that the expectations factor component of the U.S yield curve has significant explanatory power over return volatility in REIT stocks, both in the U.S. and globally, even after controlling for stock market trading activity. The expectations factor is generally found to have a positive effect on REIT market volatility, more significantly for the U.S. and Japanese REITs, highlighting the role of global funding conditions (via expected short rates) on return fluctuations in real estate markets.

The comparison of the pre- and post-global financial crisis periods, however, indicates that the U.S. term structure has largely lost its explanatory power over global REIT markets after the great credit crunch of 2008. The findings overall highlight the growing importance of idiosyncratic risk factors specific to real estate markets during the post-global crisis era. The rest of the paper is organized as follows. Section 2 provides a brief review of the literature on the investment properties of REITs and on the role of the term structure as a leading indicator of economic activity. Section 3 provides the details of the methodology and data description. Section 4 presents the empirical results and Section 5 concludes the paper.

## 2. Literature Review

The literature on REITs can be divided into several major strands. One strand of the literature focuses on the investment properties of these assets by tracking their financial performance and comparing their returns to those of stocks, bonds and market indices. The comparison of the securitized (REIT) and unsecuritized commercial property markets suggests that price discovery occurs in REIT markets (Barkham and Geltner, 1995), highlighting the leading role of stock valuations over real economic activity.

In studies of whether common risk factors in the returns of stocks and bonds explain REIT returns, the evidence generally indicates that excess returns on equity REITs are related to stock factors, while excess returns on mortgage REITs are related to both stock and bond factors (Peterson and Hsieh, 1997). There is, however, evidence that excess returns of REITs vary over time and are more predictable than comparable returns of value-weighted stocks and bonds (Liao and Mei, 1998). Furthermore, REIT returns are found to exhibit greatest sensitivity to bonds and stocks, while the sensitivity to large cap stock returns has declined over time (Clayton and MacKinnon, 2001).

Another stream of research focuses on the diversification benefits and the volatility patterns of REIT returns. In this strand of the literature, studies that examine the integration between real estate and stock markets generally find mixed evidence (Liu et al., 1990; Ling and Naranjo, 1999). Other studies analyzing the potential of REITs to provide diversification benefits, however, report evidence in support of diversification potential of these assets against market fluctuations (Paladino and Mayo, 1998; Bond and Webb, 1995; Chandrashekaran, 1999; Chen et. al., 2005). These diversification benefits are found to be significant, especially for certain types of assets, such as mixed and mortgage type REITs, but not for equity REITs (Hung et al., 2008).

Finally, the attractiveness of REITs as a diversification tool is found to increase as the holding period increases (Lee and Stevenson, 2005). Similarly, numerous studies have examined the hedging ability of REITs against changes in monetary policy and macroeconomic conditions. There is evidence that, similar to stocks, REITs display poor inflation hedging ability (Chan et. al., 1990 and Liu and Mei, 1992), while these assets may provide a hedge against long-run inflation (Chatrath and Liang, 1998). Finally, mortgage REITs are shown to increase their hedging activities when interest rates decrease, while the opposite is true for equity REITs. (Horng and Wei, 1999).

In the strand of the literature that is more closely related to our focus, several studies have examined the effect of macroeconomic variables on the performance of REIT investments. The literature on the sensitivity of REIT returns to interest rate movements, however, is limited and contains mixed evidence. While several studies find that interest rates are not an important factor in explaining equity REIT returns (Mueller and Pauley, 1995), others report that both equity REITs and mortgage REITs respond to interest rate movements and that mortgage REITs are more sensitive to changes in real interest rates and expected inflation than equity REITs (Chen and Tzang, 1988; Swanson et. al. 2002). There is also evidence that residential and commercial mortgage markets have become more fully integrated with national debt markets (Devaney et. al., 1992). Finally, the relationship between interest rates and commercial mortgages is found to be weaker than it is for residential mortgages, (Sa-Aadu et. al., 1999).

Aside from the REIT literature briefly summarized above, there also exists a considerable body of literature offering supporting evidence for the existence of a relation between the term spread and future GDP growth (e.g. Hamilton and Kim, 2002 and recently, Gebka and Wohar, 2018), macroeconomic variables (Dotsey, 1998; Estrella and Hardouvelis, 1991; Paye, 2012; Christiansen et al., 2012; Chinn and Kucko, 2015; among others) as well as future inflation (e.g. Mishkin, 1990; Carstensen and Hawellek, 2003; Konstantinou, 2005). Indeed, the slope of the yield curve is argued to contain valuable information about the monetary policy adopted by the central bank as well as changes in investors' expectations regarding the current and future states of the economy. Supporting this argument, Marfatia et al. (2017) highlight the role of the U.S. Fed's policy actions over the real estate markets globally as the interest rate decisions by the Fed is shown to drive return volatility in global stock markets (Demirer et al., 2020).

Based on the evidence discussed above, the decomposition of the yield curve into the components that capture short- and long-run interest rate expectations may provide further insight to the explanatory power of U.S. monetary policy actions on international REIT markets. Certainly, monetary policy actions are likely to have a more direct effect on the current and relatively shorter term interest rates, while longer term rates would also reflect changes in investors' risk appetite via the risk premia incorporated in longer term yields. Considering the real estate related investment, while short-term interest rate conditions could determine funding conditions that drive the demand for real estate, long-term expectations captured by the maturity premium component of the yield curve can affect real return expectations on REITs due to the informational content it captures regarding inflationary outlook.

In fact, the pioneering study by Hamilton and Kim (2002) shows that both components possess informational value although this argument has been challenged by the evidence provided by later studies. For example, Ang et al. (2006) provides evidence that the nominal short rates contains more information about GDP growth than any term spread, while Crump et al. (2018) finds that maturity premium, not expected rates, plays a major role in determining bond yields. To the best of our knowledge, the only studies that also utilize the Hamilton and Kim (2002) decomposition of the U.S. yield curve in the context of stock market volatility is the application by Li (2016) to the U.S., the U.K. and Japanese stock markets and the extension by Demirer et al. (2020) to twenty emerging stock markets. In that respect, this study provides new insight to the role of the U.S. term structure over stock market volatility by providing evidence from international REIT markets.

## 3. Data and Methodology

The data used in this study contains daily closing values of REIT indexes for nine developed economies (Australia, Belgium, Canada, France, Italy, Japan, the Netherlands, the U.K. and the U.S.) as well as continuously compounded spot yields for 60-month (5-year), 36-month (3-year), 12-month (1-year) and 3-month maturities, computed from the U.S. zero-coupon Treasury securities. The sample period covers almost 15 years, running from June 17, 2002 until March 11, 2017. The REIT index data are retrieved from Datastream, while the source of the U.S. zero-coupon spot yield data is Bloomberg.

For each REIT index, daily returns are calculated as the logarithmic first differences of daily closing prices in U.S. dollar terms. Following Li (2016), weekly volatilities are calculated as:

$$vol_w = \left[ \frac{1}{N_w - 1} \sum_{t=1}^{N_w} (r_{t,w} - \mu_w)^2 \right]^{0.5} \qquad (1)$$

where $r_{t,w}$ refers to the return on day t in week w. $\mu_w$ is the weekly average return and $N_w$ denotes number of trading days in week w. The weeks with less than three trading days are removed from the sample.

In the case of the decomposition of the U.S term structure, we follow Hamilton and Kim (2002). The yield spread between long-term and short-term interest rates is defined as:

$$Spread_w = i_{l,w} - i_{3,w} \qquad (2)$$

where $i_{l,w}$ and $i_{3,w}$ are the long-term and short-term (3-month) interest rates in week *w*, respectively. The long-term may denote 12-month, 36-month or 60-month periods and we calculate three different spread series based on each maturity.

Following Hamilton and Kim (2002), the yield spread is decomposed into two components, namely the difference between expected future short-term interest rates and the current short-term rate (EF) and the time varying maturity premium (MP).[1] First, we define the long-term interest rate, $i_{l,w}$ , as the sum of average expected future short-term yields and a time-varying maturity premium as follows:

$$i_{l,w} = \frac{1}{k}\sum_{h=0}^{k-1}(\mathrm{E_w} i_{3,w+3h}) + \theta_w , \qquad k = \frac{l}{3} \qquad l = 12, 36 \text{ or } 60 \tag{3}$$

where $E_w i_{3,w+3h}$ is the expectation of future yields for 3-month bond made at week *w*, $\theta_w$ is the time-varying maturity premium and *h* is an integer. We next subtract $i_{3,w}$ from both sides of Eq. (3) and obtain:

$$i_{l,w} - i_{3,w} = \left(\frac{1}{k}\sum_{h=0}^{k-1}(\mathrm{E_w} i_{3,w+3h}) - i_{3,w}\right) + \theta_w , \quad k = \frac{l}{3} \qquad l = 12, 36 \text{ or } 60 \tag{4}$$

Substituting $\theta_w$ from Eq. (3) into Eq. (4), we obtain:

$$i_{l,w} - i_{3,w} = \left(\frac{1}{k}\sum_{h=0}^{k-1}(\mathrm{E_w} i_{3,w+3h}) - i_{3,w}\right) + \left(i_{l,w} - \frac{1}{k}\sum_{h=0}^{k-1}(\mathrm{E_w} i_{3,w+3h})\right), \quad k = \frac{l}{3} \qquad l = 12, 36 \text{ or } 60 \tag{5}$$

The first term in Eq. (5) is the expectations factor (EF), computed as the difference between average expected future short-term interest rates and the current short-term rate:

[1] Even though the Expectation Hypothesis assumes that maturity premium is constant, in the literature there are many studies such as Campbell and Shiller (1989) and Bliss and Fama (1987) that provide evidence of time-varying term premium.

$$EF_w = \frac{1}{k}\sum_{h=0}^{k-1}(\mathrm{E_w} i_{3,w+3h}) - i_{3,w}\,, \quad k = 4{,}12 \text{ or } 20 \tag{6}$$

while the second term is the time varying maturity premium (MP) defined as:

$$MP_w = i_{l,w} - \frac{1}{k}\sum_{h=0}^{k-1}(\mathrm{E_w} i_{3,w+3h})\,, \quad k = \frac{l}{3} \qquad l = 12, 36 \text{ or } 60 \tag{7}$$

Having obtained the two components of the term structure, we then examine the relationship between REIT return volatility and spread by using the following empirical model:

$$vol_{i,w} = \alpha + \beta \cdot EF_w + \gamma \cdot MP_w + \delta \cdot Turnover_{i,w} + \varepsilon_{i,w} \tag{8}$$

where $vol_{i,w}$ is the weekly standard deviation of REIT index returns for stock market *i* as computed in Eq. (1). The explanatory variables include the two components of the U.S. yield spread, namely the difference between average expected future short-term interest rates and the current short-term rate (EF) and the time varying maturity premium (MP). Moreover, given the evidence of a strong positive contemporaneous correlation between volume and volatility, as a control variable, share turnover (Turnover), which is trading volume scaled by the number of shares outstanding, is added into the model.[2]

Since the model in Eq. (8) has the two explanatory variables, EF and MP, which are not directly observable in week *w*, the model suffers from the errors-in-variables problem and the use of OLS may lead to biased and inconsistent coefficient estimates. Therefore, an instrumental variable (IV)

[2] Lamoureux and Lastrapes (1990) relates the observation of persistent return volatility to the mixture of distributions hypothesis and suggest that conditional volatility persistence in stock returns (the GARCH effects) may reflect serial correlation in the rate of information arrival. Moreover, Cotter and Stevenson (2008) reports that trading volume is an important explanatory variable also in modeling REIT volatility persistence.

method, the generalized method of moments (GMM), is used and the model is estimated by employing long-term interest rate ($i_{l,w}$), 3-month interest rate ($i_{3,w}$), turnover in week w and a constant as instruments (Hamilton and Kim, 2002).

## 4. Empirical Findings

Table 1 presents the descriptive statistics for weekly REIT index volatility estimates as well as the term structure variables. For each country, the first row is the weekly volatility estimate computed from daily REIT index returns using Eq. (1) and the second row is the weekly stock turnover, computed as the traded value scaled by the value of outstanding shares. Italy, U.K., U.S. and France experience relatively higher volatility in their REIT markets, while Belgium is the least volatile on average. Not surprisingly, the highly active U.S. REIT market enjoys the greatest level of stock turnover, highlighting the relatively stronger liquidity and trading activity in this market, followed by the U.K. as the most active real estate markets.

In the case of the term structure variables, we observe negative mean values for *EF* across the three different horizons, implying the general expectation for lower future short rates. The maturity premium, on the other hand, is found to have positive mean values across all three horizons and greater for longer maturities, reflecting the risk premium associated with longer-term instruments. Comparing the pre- and post-global financial crisis periods in Table A1 and A2 in the Appendix, not surprisingly, we observe a notable increase in the volatility estimates in all markets during the post-crisis period.[3] Similarly, the spot rates across all maturities are found to be lower during the post-crisis period, thanks to the quantitative easing policies employed during this period.

Table 2 presents the estimates for Eq. (8) over the whole sample period. For each country, three sets of models are estimated using the *EF* and *MP* values based on 12-3 month, 36-3 month, and 60-3 month spreads reported in each row, respectively (robust t-statistics in parenthesis). As stated before, due to the existence of the errors-in-variables problem, the model is estimated via the GMM method. Consistent with the evidence that establishes a link between trading activity and return

[3] We use the collapse of Lehman Brothers (Sep. 15, 2008) as the cut-off date for the pre- and post-global crisis periods.

volatility in stock markets (e.g. Chuang et al., 2009; Giot et al., 2010), we observe a positive and highly significant effect of stock turnover on volatility in all REIT markets with the exception of Italy and France. Regarding the effect of the U.S. term structure, however, we observe that REIT markets display heterogeneous patterns in terms of their sensitivity to the two components of the U.S. yield curve.

While the expectations factor is generally found to have a positive effect on REIT market volatility (implied by positive $\beta$ estimates), we find the opposite (although more limited across the different markets) is the case for the maturity premium, implied by negative $\gamma$ estimates. The positive effect of the expectations factor is the strongest for the U.S. and Japanese REITs (in a statistical sense), suggesting that the component of the yield curve that is related to expected future short rates has significant explanatory power over REIT market uncertainty in these economies. It can be argued that this component of the yield curve captures information regarding global funding conditions (via expected short rates) and the positive effect on volatility thus reflects the funding channel that affects fluctuations in real estate investment returns.

In related studies not necessarily focusing on REIT markets, Kim and Nguyen (2009) documents a volatility effect associated with the expectations factor component of the yield spread in major Asia Pacific stock markets. Similarly, Nguyen and Ngo (2014) documents evidence of significant volatility responses in Asian stock markets to the U.S. Fed's target interest rate surprises. In the case of REITs, noting that the Fed's policy actions are increasingly watched by the real estate markets globally, Marfatia et al. (2017) shows that unexpected changes in the Fed's policy rate have a significant time-varying effect on REIT stocks across the world, particularly in Australia, Canada, and New Zealand. Against this backdrop and considering that higher values for the expectation factor imply the expectation of higher future short rates relative to the current short rate, the positive volatility effect observed in Table 2 could reflect investors' worries about future short-term funding conditions, which in turn, leads to uncertainty in borrowing costs and housing demand, thus contributing to volatility in the REIT stock returns.

In the case of the maturity premium, however, the findings in Table 2 suggest a more limited volatility effect with significant effects observed only for Belgium and Canada. Unlike the expectations component of the yield curve, however, the maturity premium is found to have a negative effect on volatility, suggesting that higher values for the maturity premium are associated with lower REIT market volatility. Considering that higher values for the maturity premium reflect rising inflationary expectations and a fast growing economy, the negative effect on REIT volatility could reflect investors' confidence on the current state of economic fundamentals. Nevertheless, the findings for the whole sample period suggest that the U.S. yield curve has explanatory power over REIT market volatility both in the U.S. and globally, however, the effect is asymmetric across the components of the yield curve that are related to short- and long-term interest rate expectations.

Tables 3 and 4 present the estimates for Eq. (8) for the pre- and post-global financial crisis periods using the collapse of Lehman Brothers (Sep. 15, 2008) as the cut-off date. While the positive effect of stock turnover on volatility remains robust during the two sub-periods, we observe that the explanatory power of the expectations factor is largely limited to the pre-crisis period with the estimated $\beta$ values turning mostly insignificant during the post-crisis period. The significant findings obtained during the pre-global crisis period support the finding in Yunus (2009) of interconnectedness across the property markets in Australia, Hong Kong, Japan, the U.K. and the U.S. over the 1990–2007 period, with the lead role of the U.S. and Japan in maintaining the long run relationship between these countries.

The insignificant U.S. term structure effect during the post-crisis period, however, is in line with the finding by Akinsomi et al. (2016) that the interconnectedness of the global real and financial economy has weakened in the aftermath of global financial crisis due to the slowdown of investment in the real estate sector globally. Overall, our findings suggest that the U.S. term structure indeed has significant explanatory power over return volatility in real estate stocks, however, this explanatory power has weakened during the aftermath of the global financial crisis. Accordingly, one can argue that idiosyncratic factors including country specific or market specific fundamentals have played a more dominant role in REIT market fluctuations following the global financial crisis.

## 5. Conclusion

The role of U.S. monetary policy decisions over return and volatility dynamics in global financial markets is well-documented in the literature. Given that the Fed's policy actions are increasingly watched by the real estate markets globally (Marfatia et al., 2017), this paper examines the effect of the U.S. term structure on global REIT markets by decomposing the term structure of U.S. treasury yields into two components that reflect the expectations factor and the maturity premium. By doing so, we are able to distinguish between the effects of short- and long-term expectations of interest rates over volatility dynamics in global real estate stocks.

We show that the expectations factor component of the U.S yield curve has significant explanatory power over return volatility in REIT stocks, both in the U.S. and globally, even after controlling for stock market trading activity. The expectations factor is generally found to have a positive effect on REIT market volatility, more significantly for the U.S. and Japanese REITs, highlighting the role of global funding conditions (via expected short rates) on return fluctuations in real estate markets. Comparing the findings for the pre- and post-global crisis periods, however, we find that the U.S. term structure has largely lost its explanatory power over global REIT markets, implied by largely insignificant effects during the post-global crisis period.

Overall, the findings highlight the changing dynamics in REIT investments in the aftermath of global financial crisis, possibly due to the slowdown of investment in the real estate sector globally, and suggest that investors will have to focus more on idiosyncratic risk factors that drive these markets. For future research, it would be interesting to explore the role of cross-border capital flows as a driver of volatility and whether capital flows serve as a channel that links U.S. term structure to volatility in global REITs.

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# Table 1

## Descriptive Statistics

| Country | Variable | Mean | Std. Dev. | Skewness | Kurtosis | JB | Obs. |
|---|---|---|---|---|---|---|---|
| Australia | Volatility | 0.0144 | 0.0113 | 2.698 | 13.446 | 3202.212*** | 556 |
| | Turnover | 0.0040 | 0.0015 | 1.495 | 8.854 | 1000.970*** | |
| Belgium | | 0.0101 | 0.0063 | 2.169 | 11.076 | 1946.927*** | 556 |
| | | 0.0013 | 0.0005 | 1.508 | 6.606 | 511.921*** | |
| Canada | | 0.0113 | 0.0079 | 2.287 | 10.761 | 1879.914*** | 556 |
| | | 0.0023 | 0.0009 | 1.612 | 6.800 | 575.206*** | |
| France | | 0.0153 | 0.0087 | 1.384 | 5.733 | 349.213*** | 554 |
| | | 0.0016 | 0.0013 | 0.796 | 4.411 | 104.454*** | |
| Italy | | 0.0185 | 0.0122 | 1.733 | 6.861 | 618.210*** | 551 |
| | | 0.0020 | 0.0016 | 2.977 | 15.869 | 4616.288*** | |
| Japan | | 0.0125 | 0.0103 | 3.057 | 16.917 | 5208.168*** | 541 |
| | | 0.0031 | 0.0012 | 1.090 | 4.520 | 159.208*** | |
| Netherlands | | 0.0137 | 0.0092 | 1.766 | 7.179 | 693.410*** | 556 |
| | | 0.0031 | 0.0016 | 0.775 | 4.130 | 85.302*** | |
| UK | | 0.0156 | 0.0113 | 1.810 | 6.828 | 643.062*** | 556 |
| | | 0.0052 | 0.0026 | 1.197 | 4.735 | 202.416*** | |
| US | | 0.0159 | 0.0171 | 3.116 | 14.814 | 4133.132*** | 556 |
| | | 0.0094 | 0.0074 | 2.437 | 9.801 | 1621.482*** | |
| Term Structure | $i_3$ | 0.0165 | 0.0175 | 0.842 | 2.265 | 78.189*** | |
| | $i_{12}$ | 0.0189 | 0.0173 | 0.700 | 2.059 | 65.949*** | |
| | $i_{36}$ | 0.0239 | 0.0150 | 0.315 | 1.881 | 38.158*** | |
| | $i_{60}$ | 0.0293 | 0.0129 | -0.153 | 2.013 | 24.753*** | |
| | EF123 | -0.0005 | 0.0054 | -0.902 | 4.125 | 104.744*** | |
| | EF363 | -0.0016 | 0.0146 | -0.425 | 2.895 | 16.962*** | |
| | EF603 | -0.0038 | 0.0171 | -0.566 | 2.582 | 33.709*** | |
| | MP123 | 0.0029 | 0.0051 | 1.395 | 4.638 | 242.488*** | |
| | MP363 | 0.0091 | 0.0113 | 0.304 | 2.469 | 15.124*** | |
| | MP603 | 0.0166 | 0.0117 | 0.152 | 2.003 | 25.188*** | |

**Note.** This table presents the descriptive statistics for weekly REIT index return volatility estimates as well as the term structure variables. For each country, the first row is the weekly volatility estimate computed from daily returns using Eq. (1) and the second row is the weekly turnover, computed as the traded value scaled by the value of outstanding shares. $i_k$ denotes the spot rate for the k-month maturity Treasury security. Following the decomposition in Eq. (5), three sets of *EF (expectations factor)* and *MP (maturity premium)* values are computed based on 12-3 month, 36-3 month, and 60-3 month spreads.

## Table 2: U.S. Term Structure and REIT Index Volatility (whole sample)

| Country | Period | Constant | EF | MP | Turnover | $R^2$ | Wald |
|---|---|---|---|---|---|---|---|
| Australia | 123 | 0.0011 | 0.0149* | -0.0068 | 0.0033*** | 19.2% | 4.0595** |
| | | (0.549) | (1.667) | (0.774) | (5.565) | | (0.044) |
| | 363 | 0.0012 | 0.0130* | -0.0035 | 0.0033*** | 20.3% | 5.5037** |
| | | (0.643) | (1.902) | (0.784) | (5.645) | | (0.019) |
| | 603 | 0.0014 | 0.0129* | -0.0015 | 0.0033*** | 20.5% | 4.7722** |
| | | (0.746) | (1.932) | (0.359) | (5.586) | | (0.029) |
| Belgium | 123 | 0.0060*** | -0.0006 | -0.0085** | 0.0032*** | 7.9% | 1.8464 |
| | | (5.567) | (0.110) | (2.154) | (3.114) | | (0.174) |
| | 363 | 0.0060*** | 0.0011 | -0.0038* | 0.0032*** | 8.1% | 1.5279 |
| | | (5.439) | (0.274) | (1.778) | (3.079) | | (0.216) |
| | 603 | 0.0060*** | 0.0012 | -0.0027 | 0.0032*** | 8.1% | 0.9352 |
| | | (5.407) | (0.309) | (1.350) | (3.044) | | (0.334) |
| Canada | 123 | 0.0060*** | 0.0038 | -0.0144* | 0.0024*** | 9.0% | 5.7363** |
| | | (5.312) | (0.638) | (1.960) | (3.880) | | (0.017) |
| | 363 | 0.0060*** | 0.0056 | -0.0067** | 0.0023*** | 9.4% | 5.5934** |
| | | (5.305) | (1.394) | (2.178) | (3.781) | | (0.018) |
| | 603 | 0.0061*** | 0.0055 | -0.0059* | 0.0023*** | 9.5% | 4.7923** |
| | | (5.391) | (1.394) | (1.921) | (3.726) | | (0.029) |
| France | 123 | 0.0142*** | 0.0082* | -0.0002 | 0.0007 | 2.2% | 2.9005* |
| | | (18.485) | (1.846) | (0.041) | (1.584) | | (0.089) |
| | 363 | 0.0143*** | 0.0065* | -0.0006 | 0.0006 | 2.0% | 3.1810* |
| | | (18.307) | (1.912) | (0.242) | (1.480) | | (0.075) |
| | 603 | 0.0143*** | 0.0062* | -0.0012 | 0.0006 | 2.0% | 3.7078* |
| | | (18.278) | (1.862) | (0.594) | (1.377) | | (0.054) |
| Italy | 123 | 0.0182*** | 0.0079 | -0.0161 | 0.0001 | -0.2% | 4.6491** |
| | | (12.979) | (0.960) | (1.446) | (0.388) | | (0.031) |
| | 363 | 0.0183*** | 0.0093 | -0.0067 | 0.0001 | 1.3% | 5.4736** |
| | | (13.019) | (1.547) | (1.591) | (0.244) | | (0.019) |
| | 603 | 0.0184*** | 0.0091 | -0.0052 | 0.0001 | 1.4% | 4.1052** |
| | | (13.087) | (1.586) | (1.248) | (0.163) | | (0.043) |
| Japan | 123 | -0.0019 | 0.0163** | -0.0017 | 0.0046*** | 29.3% | 4.5240** |
| | | (0.764) | (2.053) | (0.299) | (4.886) | | (0.033) |
| | 363 | -0.0018 | 0.0130** | -0.0016 | 0.0046*** | 30.5% | 5.9234** |
| | | (0.722) | (2.143) | (0.600) | (4.809) | | (0.015) |
| | 603 | -0.0017 | 0.0131** | 0.0010 | 0.0046*** | 30.8% | 4.2669** |
| | | (0.664) | (2.199) | (0.405) | (4.748) | | (0.039) |
| Netherlands | 123 | 0.0041*** | 0.0009 | -0.0070 | 0.0031*** | 30.9% | 1.4923 |
| | | (4.475) | (0.187) | (1.214) | (8.160) | | (0.222) |
| | 363 | 0.0041*** | 0.0023 | -0.0018 | 0.0031*** | 30.7% | 0.8874 |
| | | (4.441) | (0.599) | (0.767) | (7.952) | | (0.346) |
| | 603 | 0.0042*** | 0.0023 | -0.0010 | 0.0031*** | 30.6% | 0.5757 |
| | | (4.472) | (0.635) | (0.446) | (7.842) | | (0.448) |
| UK | 123 | 0.0064*** | 0.0043 | -0.0055 | 0.0018*** | 17.9% | 1.4048 |
| | | (3.636) | (0.650) | (0.713) | (4.536) | | (0.236) |
| | 363 | 0.0064*** | 0.0048 | -0.0002 | 0.0018*** | 17.9% | 0.6483 |
| | | (3.623) | (1.027) | (0.046) | (4.433) | | (0.421) |
| | 603 | 0.0065*** | 0.0047 | 0.0002 | 0.0018*** | 18.0% | 0.5829 |
| | | (3.616) | (1.037) | (0.065) | (4.398) | | (0.445) |
| US | 123 | -0.0025* | 0.0090 | -0.0127 | 0.0020*** | 73.9% | 5.5937** |
| | | (1.780) | (1.389) | (1.211) | (10.540) | | (0.018) |
| | 363 | -0.0025* | 0.0097** | -0.0038 | 0.0020*** | 73.8% | 6.4646** |
| | | (1.720) | (2.290) | (1.119) | (10.157) | | (0.011) |
| | 603 | -0.0024* | 0.0094** | -0.0036 | 0.0019*** | 73.7% | 7.2117*** |
| | | (1.685) | (2.191) | (0.943) | (10.206) | | (0.007) |

**Note:** This table presents the estimates for Eq. (8) over the whole sample. Following the decomposition in Eq. (5), EF and MP are the expectations factor and maturity premium, respectively. For each country, three sets of models are estimated using the *EF* and *MP* values based on 12-3 month, 36-3 month, and 60-3 month spreads reported in each row, respectively (robust t-statistics in parenthesis). Turnover is multiplied by 1,000. The last column is the Wald test (p-value in parenthesis) for the equality of the estimated coefficients for EF and MP. ***, **, * represent significance at 1, 5 and 10 percent, respectively.

**Table 3: U.S. Term Structure and REIT Index Volatility (pre-crisis period)**

| Country | Period | Constant | EF | MP | Turnover | R2 | Wald |
|---|---|---|---|---|---|---|---|
| Australia | 123 | -0.0023 | 0.0147* | -0.0020 | 0.0041*** | 32.1% | 4.4246** |
| | | (0.871) | (1.840) | (0.245) | (4.735) | | (0.035) |
| | 363 | -0.0020 | 0.0121** | 0.0005 | 0.0040*** | 32.1% | 4.3382** |
| | | (0.796) | (2.176) | (0.162) | (4.883) | | (0.037) |
| | 603 | -0.0017 | 0.0119** | 0.0012 | 0.0039*** | 34.3% | 4.1963** |
| | | (0.695) | (2.194) | (0.423) | (4.820) | | (0.041) |
| Belgium | 123 | 0.0066*** | 0.0061 | -0.0041 | 0.0018*** | 5.1% | 2.7819* |
| | | (10.449) | (1.483) | (0.949) | (3.280) | | (0.095) |
| | 363 | 0.0066*** | 0.0056 | -0.0011 | 0.0017*** | 6.8% | 2.8511* |
| | | (10.327) | (1.624) | (0.604) | (3.232) | | (0.091) |
| | 603 | 0.0066*** | 0.0055 | -0.0004 | 0.0017*** | 7.5% | 2.5269 |
| | | (10.587) | (1.620) | (0.216) | (3.202) | | (0.112) |
| Canada | 123 | 0.0061*** | 0.0029 | -0.0075 | 0.0017*** | 9.9% | 2.9408* |
| | | (6.728) | (0.689) | (1.399) | (4.364) | | (0.086) |
| | 363 | 0.0062*** | 0.0039 | -0.0015 | 0.0017*** | 10.6% | 1.8351 |
| | | (6.952) | (1.211) | (0.684) | (4.396) | | (0.176) |
| | 603 | 0.0063*** | 0.0039 | -0.0008 | 0.0016*** | 10.7% | 1.5479 |
| | | (7.048) | (1.228) | (0.384) | (4.311) | | (0.213) |
| France | 123 | 0.0151*** | 0.0129*** | 0.0035 | -0.0002 | 2.1% | 3.4416* |
| | | (19.547) | (2.982) | (0.761) | (0.612) | | (0.064) |
| | 363 | 0.0152*** | 0.0095*** | 0.0013 | -0.0003 | 1.9% | 4.6511** |
| | | (19.364) | (2.993) | (0.517) | (0.766) | | (0.031) |
| | 603 | 0.0153*** | 0.0092*** | 0.0007 | -0.0003 | 2.1% | 5.2154** |
| | | (19.482) | (2.934) | (0.264) | (0.922) | | (0.022) |
| Italy | 123 | 0.0121*** | 0.0143** | -0.0027 | 0.0012*** | 5.5% | 5.2107** |
| | | (12.919) | (2.380) | (0.442) | (3.610) | | (0.022) |
| | 363 | 0.0122*** | 0.0116** | -0.0010 | 0.0011*** | 8.5% | 5.5351** |
| | | (13.111) | (2.552) | (0.320) | (3.359) | | (0.019) |
| | 603 | 0.0123*** | 0.0115** | 0.0004 | 0.0011*** | 8.3% | 4.8585** |
| | | (13.204) | (2.572) | (0.130) | (3.249) | | (0.028) |
| Japan | 123 | 0.0000 | 0.0126** | -0.0004 | 0.0035*** | 29.5% | 2.3386 |
| | | (0.031) | (2.116) | (0.080) | (7.440) | | (0.126) |
| | 363 | 0.0001 | 0.0101** | 0.0011 | 0.0034*** | 32.0% | 2.8255* |
| | | (0.120) | (1.967) | (0.401) | (7.290) | | (0.093) |
| | 603 | 0.0003 | 0.0103** | 0.0028 | 0.0034*** | 32.8% | 2.1369 |
| | | (0.264) | (2.002) | (0.975) | (7.275) | | (0.144) |
| Netherlands | 123 | 0.0053*** | 0.0083** | -0.0004 | 0.0021*** | 34.9% | 2.9239* |
| | | (8.105) | (1.971) | (0.096) | (7.369) | | (0.087) |
| | 363 | 0.0053*** | 0.0066** | -0.0002 | 0.0021*** | 36.1% | 4.3945** |
| | | (8.202) | (2.069) | (0.086) | (7.210) | | (0.036) |
| | 603 | 0.0054*** | 0.0066** | 0.0003 | 0.0020*** | 36.1% | 4.0262** |
| | | (8.539) | (2.074) | (0.172) | (7.203) | | (0.045) |
| UK | 123 | 0.0014 | 0.0034 | -0.0001 | 0.0018*** | 30.5% | 0.2593 |
| | | (0.805) | (0.603) | (0.026) | (5.419) | | (0.611) |
| | 363 | 0.0015 | 0.0031 | 0.0020 | 0.0018*** | 30.7% | 0.0392 |
| | | (0.830) | (0.719) | (0.774) | (5.267) | | (0.843) |
| | 603 | 0.0015 | 0.0031 | 0.0023 | 0.0018*** | 30.8% | 0.0249 |
| | | (0.839) | (0.739) | (0.931) | (5.184) | | (0.875) |
| US | 123 | 0.0011 | 0.0093*** | 0.0052 | 0.0017*** | 58.6% | 0.8819 |
| | | (1.279) | (3.259) | (1.157) | (11.048) | | (0.348) |
| | 363 | 0.0012 | 0.0064*** | 0.0019 | 0.0016*** | 58.6% | 1.9084 |
| | | (1.363) | (2.869) | (0.743) | (10.655) | | (0.167) |
| | 603 | 0.0013 | 0.0061*** | 0.0011 | 0.0016*** | 58.3% | 2.8241* |
| | | (1.454) | (2.865) | (0.444) | (10.341) | | (0.093) |

**Note:** This table presents the estimates for Eq. (8) for the pre-global financial crisis period using the collapse of Lehman Brothers (Sep. 15, 2008) as the cut-off date. Following the decomposition in Eq. (5), EF and MP are the expectations factor and maturity premium, respectively. For each country, three sets of models are estimated using the *EF* and *MP* values based on 12-3 month, 36-3 month, and 60-3 month spreads reported in each row, respectively (robust t-statistics in parenthesis). Turnover is multiplied by 1,000. The last column is the Wald test (p-value in parenthesis) for the equality of the estimated coefficients for EF and MP. ***, **, * represent significance at 1, 5 and 10 percent, respectively.

## Table 4: U.S. Term Structure and REIT Index Volatility (post-crisis period)

| Country | Period | Constant | EF | MP | Turnover | R2 | Wald |
|---|---|---|---|---|---|---|---|
| Australia | 123 | 0.0075** | 0.0184 | -0.0122 | 0.0022*** | 7.7% | 0.5325 |
| | | (2.441) | (0.502) | (0.570) | (3.151) | | (0.466) |
| | 363 | 0.0073** | 0.0173 | -0.0119 | 0.0022*** | 8.1% | 1.1059 |
| | | (2.446) | (0.564) | (0.958) | (3.216) | | (0.293) |
| | 603 | 0.0075 | 0.0181 | -0.0046 | 0.0022*** | 7.5% | 0.6520 |
| | | (2.456) | (0.607) | (0.526) | (3.150) | | (0.419) |
| Belgium | 123 | -0.0005 | -0.0369*** | -0.0087 | 0.0104*** | 29.6% | 6.8182*** |
| | | (0.221) | (3.977) | (0.896) | (4.438) | | (0.009) |
| | 363 | -0.0006 | -0.0295*** | -0.0076** | 0.0104*** | 30.0% | 7.6876*** |
| | | (0.240) | (4.197) | (2.165) | (4.692) | | (0.006) |
| | 603 | -0.0005 | -0.0279*** | -0.0036 | 0.0104*** | 29.6% | 9.3033*** |
| | | (0.217) | (4.025) | (1.304) | (4.574) | | (0.002) |
| Canada | 123 | 0.0020 | 0.0090 | -0.0257 | 0.0051*** | 18.0% | 1.2789 |
| | | (0.654) | (0.324) | (1.537) | (2.855) | | (0.258) |
| | 363 | 0.0013 | 0.0118 | -0.0207*** | 0.0054*** | 19.7% | 2.2030 |
| | | (0.384) | (0.554) | (2.640) | (2.880) | | (0.138) |
| | 603 | 0.0011 | 0.0127 | -0.0149*** | 0.0055*** | 19.0% | 1.5355 |
| | | (0.349) | (0.605) | (2.598) | (2.914) | | (0.215) |
| France | 123 | 0.0029 | -0.0110 | -0.0110** | 0.0063*** | 26.1% | 0.0000 |
| | | (1.021) | (0.892) | (2.024) | (4.139) | | (1.000) |
| | 363 | 0.0030 | -0.0064 | -0.0035 | 0.0063*** | 25.7% | 0.0583 |
| | | (1.028) | (0.624) | (0.857) | (4.080) | | (0.809) |
| | 603 | 0.0030 | -0.0059 | -0.0023 | 0.0063*** | 25.7% | 0.1059 |
| | | (1.027) | (0.594) | (0.733) | (4.081) | | (0.745) |
| Italy | 123 | 0.0222*** | -0.0217 | -0.0376 | 0.0009 | 2.5% | 0.2005 |
| | | (8.653) | (0.634) | (1.293) | (0.644) | | (0.654) |
| | 363 | 0.0222*** | -0.0096 | -0.0187* | 0.0009 | 2.1% | 0.1315 |
| | | (8.538) | (0.398) | (1.907) | (0.648) | | (0.717) |
| | 603 | 0.0222*** | -0.0080 | -0.0118 | 0.0010 | 1.6% | 0.0228 |
| | | (8.530) | (0.337) | (1.539) | (0.684) | | (0.880) |
| Japan | 123 | -0.0091* | 0.0361 | 0.0010 | 0.0080*** | 45.8% | 1.6934 |
| | | (1.680) | (1.365) | (0.092) | (3.747) | | (0.193) |
| | 363 | -0.0090* | 0.0292 | -0.0058 | 0.0079*** | 45.9% | 2.8214* |
| | | (1.674) | (1.309) | (1.304) | (3.767) | | (0.093) |
| | 603 | -0.0091* | 0.0289 | -0.0014 | 0.0080*** | 45.7% | 2.0557 |
| | | (1.700) | (1.344) | (0.378) | (3.773) | | (0.152) |
| Netherlands | 123 | 0.0019 | -0.0162 | -0.0192 | 0.0043*** | 20.5% | 0.0205 |
| | | (0.739) | (0.889) | (1.535) | (5.626) | | (0.886) |
| | 363 | 0.0018 | -0.0084 | -0.0037 | 0.0043*** | 19.5% | 0.0804 |
| | | (0.719) | (0.541) | (0.609) | (5.669) | | (0.777) |
| | 603 | 0.0018 | -0.0077 | -0.0011 | 0.0043*** | 19.4% | 0.1691 |
| | | (0.693) | (0.518) | (0.214) | (5.590) | | (0.681) |
| UK | 123 | 0.0021 | -0.0151 | -0.0025 | 0.0045*** | 57.7% | 0.7034 |
| | | (1.438) | (1.360) | (0.250) | (12.981) | | (0.402) |
| | 363 | 0.0021 | -0.0118 | 0.0003 | 0.0045*** | 57.8% | 1.1309 |
| | | (1.442) | (1.222) | (0.069) | (12.763) | | (0.288) |
| | 603 | 0.0021 | -0.0115 | -0.0001 | 0.0045*** | 57.9% | 1.1940 |
| | | (1.462) | (1.215) | (0.014) | (12.800) | | (0.275) |
| US | 123 | -0.0086*** | 0.0292 | -0.0570*** | 0.0022*** | 79.2% | 14.1865*** |
| | | (3.764) | (0.906) | (2.640) | (9.967) | | (0.000) |
| | 363 | -0.0090*** | 0.0382** | -0.0199*** | 0.0022*** | 78.1% | 8.8989*** |
| | | (3.545) | (2.006) | (2.596) | (9.168) | | (0.003) |
| | 603 | -0.0090*** | 0.0386 | -0.0112 | 0.0022*** | 77.8% | 6.1592** |
| | | (3.588) | (2.043) | (1.559) | (9.207) | | (0.013) |

**Note:** This table presents the estimates for Eq. (8) for the post-global financial crisis period, using the collapse of Lehman Brothers (Sep. 15, 2008) as the cut-off date. Following the decomposition in Eq. (5), EF and MP are the expectations factor and maturity premium, respectively. For each country, three sets of models are estimated using the *EF* and *MP* values based on 12-3 month, 36-3 month, and 60-3 month spreads reported in each row, respectively (robust t-statistics in parenthesis). Turnover is multiplied by 1,000. The last column is the Wald test (p-value in parenthesis) for the equality of the estimated coefficients for EF and MP. ***, **, * represent significance at 1, 5 and 10 percent, respectively.

# APPENDIX

## Table A1

## Descriptive Statistics (pre-crisis period)

| Country | Variable | Mean | Std. Dev. | Skewness | Kurtosis | JB | Obs. |
|---|---|---|---|---|---|---|---|
| Australia | Volatility | 0.0120 | 0.0086 | 2.793 | 13.855 | 2024.258 | 326 |
| | Turnover | 0.0035 | 0.0012 | 1.305 | 7.122 | 323.275 | |
| Belgium | | 0.0088 | 0.0046 | 1.435 | 6.964 | 325.328 | 326 |
| | | 0.0013 | 0.0006 | 1.327 | 5.578 | 185.975 | |
| Canada | | 0.0100 | 0.0056 | 1.286 | 5.390 | 167.399 | 326 |
| | | 0.0024 | 0.0011 | 1.489 | 5.812 | 227.827 | |
| France | | 0.0148 | 0.0088 | 1.570 | 6.925 | 340.984 | 324 |
| | | 0.0012 | 0.0015 | 1.299 | 4.563 | 124.167 | |
| Italy | | 0.0149 | 0.0087 | 1.766 | 7.796 | 477.457 | 323 |
| | | 0.0025 | 0.0018 | 2.532 | 12.000 | 1435.203 | |
| Japan | | 0.0112 | 0.0080 | 1.957 | 7.946 | 527.231 | 318 |
| | | 0.0032 | 0.0013 | 0.808 | 3.763 | 42.351 | |
| Netherlands | | 0.0105 | 0.0061 | 1.539 | 5.990 | 250.151 | 326 |
| | | 0.0025 | 0.0017 | 1.536 | 6.135 | 261.722 | |
| UK | | 0.0128 | 0.0084 | 1.794 | 7.423 | 440.725 | 326 |
| | | 0.0062 | 0.0025 | 1.386 | 5.311 | 176.901 | |
| US | | 0.0116 | 0.0079 | 1.804 | 7.029 | 397.348 | 326 |
| | | 0.0063 | 0.0035 | 1.599 | 5.053 | 196.190 | |
| Term structure | $i_3$ | 0.0272 | 0.0155 | 0.333 | 1.529 | 35.418 | |
| | $i_{12}$ | 0.0299 | 0.0146 | 0.231 | 1.478 | 34.387 | |
| | $i_{36}$ | 0.0341 | 0.0107 | 0.110 | 1.617 | 26.655 | |
| | $i_{60}$ | 0.0382 | 0.0075 | 0.054 | 1.945 | 15.280 | |
| | EF123 | -0.0007 | 0.0070 | -0.607 | 2.397 | 24.920 | |
| | EF363 | -0.0024 | 0.0190 | -0.201 | 1.674 | 26.069 | |
| | EF603 | -0.0063 | 0.0220 | -0.114 | 1.487 | 31.778 | |
| | MP123 | 0.0033 | 0.0063 | 0.956 | 2.871 | 49.847 | |
| | MP363 | 0.0092 | 0.0142 | 0.229 | 1.681 | 26.486 | |
| | MP603 | 0.0172 | 0.0140 | 0.060 | 1.585 | 27.394 | |

**Note.** This table presents the descriptive statistics for weekly REIT index return volatility estimates as well as the term structure variables. For each country, the first row is the weekly volatility estimate computed from daily returns using Eq. (1) and the second row is the weekly turnover, computed as the traded value scaled by the value of outstanding shares. $i_k$ denotes the spot rate for the k-month maturity Treasury security. Following the decomposition in Eq. (5), three sets of *EF (expectations factor)* and *MP (maturity premium)* values are computed based on 12-3 month, 36-3 month, and 60-3 month spreads.

## Table A2

## Descriptive Statistics (post-crisis period)

| Country | Variable | Mean | Std. Dev. | Skewness | Kurtosis | JB | Obs. |
|---|---|---|---|---|---|---|---|
| Australia | Volatility | 0.0178 | 0.0135 | 2.305 | 10.403 | 728.937 | 230 |
| | Turnover | 0.0046 | 0.0016 | 1.608 | 9.936 | 560.262 | |
| Belgium | | 0.0119 | 0.0077 | 1.913 | 8.445 | 424.387 | 230 |
| | | 0.0012 | 0.0004 | 1.481 | 6.498 | 201.343 | |
| Canada | | 0.0131 | 0.0101 | 2.003 | 7.716 | 366.939 | 230 |
| | | 0.0021 | 0.0007 | 1.215 | 5.416 | 112.539 | |
| France | | 0.0159 | 0.0086 | 1.132 | 4.095 | 60.594 | 230 |
| | | 0.0021 | 0.0007 | 1.741 | 8.914 | 451.344 | |
| Italy | | 0.0236 | 0.0144 | 1.290 | 4.790 | 93.690 | 228 |
| | | 0.0014 | 0.0008 | 3.027 | 18.196 | 2542.007 | |
| Japan | | 0.0142 | 0.0126 | 3.043 | 14.669 | 1609.246 | 223 |
| | | 0.0029 | 0.0010 | 1.605 | 6.662 | 220.393 | |
| Netherlands | | 0.0183 | 0.0108 | 1.352 | 5.136 | 113.764 | 230 |
| | | 0.0038 | 0.0011 | 0.623 | 3.391 | 16.328 | |
| UK | | 0.0196 | 0.0134 | 1.422 | 4.779 | 107.793 | 230 |
| | | 0.0039 | 0.0023 | 1.753 | 6.199 | 215.894 | |
| US | | 0.0222 | 0.0236 | 2.082 | 7.272 | 341.105 | 230 |
| | | 0.0139 | 0.0091 | 1.786 | 5.473 | 180.850 | |
| Term structure | $i_3$ | 0.0012 | 0.0012 | 4.359 | 27.132 | 6309.225 | |
| | $i_{12}$ | 0.0033 | 0.0028 | 3.230 | 16.648 | 2185.058 | |
| | $i_{36}$ | 0.0096 | 0.0052 | 0.333 | 2.102 | 11.999 | |
| | $i_{60}$ | 0.0166 | 0.0072 | 0.028 | 1.654 | 17.395 | |
| | EF123 | -0.0002 | 0.0009 | -3.987 | 25.620 | 5512.724 | |
| | EF363 | -0.0004 | 0.0010 | -4.455 | 28.838 | 7158.800 | |
| | EF603 | -0.0002 | 0.0013 | -2.942 | 17.700 | 2402.505 | |
| | MP123 | 0.0023 | 0.0024 | 3.321 | 17.338 | 2392.947 | |
| | MP363 | 0.0089 | 0.0050 | 0.317 | 2.037 | 12.738 | |
| | MP603 | 0.0157 | 0.0075 | -0.059 | 1.655 | 17.477 | |

**Note.** This table presents the descriptive statistics for weekly REIT index return volatility estimates as well as the term structure variables. For each country, the first row is the weekly volatility estimate computed from daily returns using Eq. (1) and the second row is the weekly turnover, computed as the traded value scaled by the value of outstanding shares. $i_k$ denotes the spot rate for the k-month maturity Treasury security. Following the decomposition in Eq. (5), three sets of *EF (expectations factor)* and *MP (maturity premium)* values are computed based on 12-3 month, 36-3 month, and 60-3 month spreads.