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Volatility Connectedness of MOVE Index and Bond Returns

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Abstract

Research Originality: To the best of our knowledge, this is the first study which measures the impact of the MOVE index on bond yield volatility by comparing its effect on both short-term and long-term. The paper contributes to the existing literature by providing a better understanding of the relationship between maturity and volatility spillover.

Research Objectives: This study examines the dynamic volatility connectedness between 2 and 10-year bond yields and the MOVE Index. Furthermore, it is aimed at detecting the transmitter of volatility among variables.

Research Methods: Using a data set from 2010 to 2022, the study utilizes a Time-Varying Parameter Vector Autoregression (TVP-VAR) model to analyse the dynamics and relationship between bond yields and the MOVE Index.

Empirical Results: The study finds a significant volatility spillover between the MOVE Index and Türkiye's bond yields. Notably, the linkage between the MOVE Index and the 10-year bond rates is stronger than with the 2-year rates. Additionally, the MOVE Index emerges as the primary transmitter of volatility, impacting both bond yields.

Implications: This study sheds light on the complexity and dynamics of volatility spread in Türkiye's bond market, providing essential insights for forecasting bond yields and shaping financial policies.

Keywords:
bond volatility; time-varying parameter vector autoregression; merrill lynch option volatility estimate index

How to Cite:

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INTRODUCTION

In the intricate realm of financial markets, the behaviour of fixed-income securities assumes a pivotal role, in shaping investment strategies, risk management protocols, and policy formulation processes. Amid the arsenal of metrics under scrutiny by financial analysts and investors, the MOVE Index emerges as a critical barometer. This index offers a comprehensive snapshot of implied volatility within the bond market, providing insight into market participants' expectations regarding future price fluctuations. Implicit in the MOVE Index is its function as an indicator of market uncertainty and prevailing risk sentiment. Constructed similarly to the VIX, it is a yield curve-weighted index that measures the normalized implied volatility of 1-month Treasury options, with weights distributed across 2-, 5-, 10-, and 30-year contracts over the next 30 days. Understanding the intricate nexus between the MOVE Index and bond volatility holds immense significance for a diverse array of stakeholders, including market participants, policymakers, and researchers. This comprehension unravels the complex interplay between market sentiment and tangible dynamics in financial markets, shedding light on how shifts in implied volatility align with actual fluctuations within the bond market. Moreover, this understanding carries profound implications for the formulation of investment strategies, the execution of risk management decisions, and the shaping of policy directives within the intricate landscape of the financial arena.

In this comprehensive study, we embark on an exhaustive exploration of the intricate relationship linking the MOVE Index and bond volatility. Our endeavour involves a meticulous examination of the nuanced dynamics that underpin this connection, employing advanced econometric methodologies, notably the TVP-VAR models. These techniques enable us to undertake a comprehensive, empirically grounded investigation into how alterations in the MOVE Index reverberate through the bond market, and conversely, how bond market dynamics influence the MOVE Index. Our examination extends over a temporal continuum, considering diverse external factors and noteworthy events. Our ultimate goal is to furnish valuable insights into the multifaceted interactions that characterize the fixed-income market, thereby contributing to a more profound comprehension of the intricate dynamics that pervade financial markets. The implications of our research extend far and wide, impacting various facets of the financial landscape. For market participants, a comprehensive understanding of the MOVE Index's connection to bond volatility provides invaluable insights for managing their investment portfolios. Recognizing the pulse of market sentiment and its reflection in volatility levels can inform more informed trading decisions and risk mitigation strategies. Policymakers, too, can benefit from our findings. In a world where monetary and fiscal policies wield substantial influence over market dynamics, our research contributes to the arsenal of tools available for crafting effective policy directives. A nuanced grasp of how the MOVE Index reacts to economic events and policy changes can guide policymakers in their pursuit of financial stability.

The volatility of bonds has been extensively studied in recent years, especially in developed markets (Gong & Xue, 2023; Bouteska et al., 2023; Duong et al., 2023;

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Zaremba et al., 2021; Chen et al., 2022; Ozbekler et al., 2021; Hsu et al., 2020; Skintzi & Refenes, 2006). Also, the examination of volatility spillover between equity and fixed-income markets holds significance in the realms of investment analysis, risk mitigation strategies, and the formulation of regulatory policies and portfolio management. The nexus between bonds and financial markets represents a salient subject matter that has received extensive scrutiny within the discipline of finance. Notably, the phenomenon of volatility dispersion and transmission between bonds and equities (Steeley, 2006; Dean et.al., 2010; Tian & Hamori, 2016; Zhang et.al., 2021; Mensi et.al., 2022) have recently garnered significant scholarly attention. Chulia & Torro (2008) undertook an in-depth analysis of the interplay between the DJ Euro Stoxx 50 index futures contract and the Euro Bond futures contract, specifically emphasising the phenomenon of volatility transmission. Their empirical inquiry revealed the presence of a bidirectional spillover of volatility between these two financial instruments.

Similarly, a study conducted by Fleming et al. (1998) examined the specific characteristics of volatility linkages among the stock, bond, and money markets in the United States. The results demonstrated the presence of robust volatility linkages among these three financial markets. Skintzi & Refenes (2006) have explored the dynamic interconnection within the European bond market and analysed price and volatility transmission from the US market. Their findings suggest that there are significant volatility spillovers from both the aggregate Euro area bond market and the US bond market to individual European markets. Another investigation delving into the volatility dynamics of both the stock and bond markets was undertaken by Reilly et al. (2000). As posited by the authors, the volatility of these two asset classes exhibits disparities, and over time, it has undergone substantial fluctuations. Another study that examines stock volatility and bond volatility was conducted on the Swiss market by Young & Johnson (2004), contrary to the claims of previous studies, there is no linear relationship between stock volatility and bond volatility.

The existing literature has not solely addressed the association between bond volatility and stock volatility but has also considered the influence of various other categories of variables on bond volatility. Longstaff & Schwartz (1993) elucidates that the price risk inherent in a default-free bond can be attributed to two primary sources: fluctuations in prevailing interest rates and variations in the volatility of interest rates. Bewley et al. (2004) reveal that, within a short-term timeframe, stock market volatility does not exert a statistically significant influence on bond spreads. Nevertheless, a distinct reversal of this relationship over an extended temporal horizon becomes apparent. A comparable study by Won et al. (2013) examined the persistence of increases in country credit spreads within emerging bond markets. The findings from T-GARCH regressions indicate that, during financial crisis periods, credit spreads in emerging countries may experience sustained growth due to the interplay between spread fluctuations and volatilities, thereby contributing to heightened turbulence in emerging bond markets. Viceira (2012) delved into the temporal fluctuations in bond risk, assessed through the covariation of bond returns with both stock returns and consumption growth, as well as variations in the volatility of bond returns.

One of the most advanced techniques used to measure the volatility spillovers between bonds and other financial assets is the TVP-VAR model. The TVP-VAR model has garnered considerable prominence within the realm of econometrics, offering a versatile framework for the modelling and analysis of dynamic relationships present in economic and financial datasets. This comprehensive review encompasses a curated selection of seminal and contemporary studies that employ TVP-VAR models. These studies span diverse applications, including investigations into monetary policy, macroeconomic forecasting, financial markets, and the examination of structural shifts. In the seminal work of Primiceri (2005), the TVP-VAR model was introduced and applied to scrutinize the effects of monetary policy on the United States economy. This pioneering research catalysed subsequent investigations into the modelling of time-varying parameters. Giannone et al. (2008) advanced the TVP-VAR methodology by incorporating a Bayesian approach for parameter estimation. Their research, focusing on real-time forecasting in macroeconomics, accentuated the practical relevance and applicability of TVP-VAR models. D'Agostino et al. (2013) harnessed TVP-VAR models to evaluate the impact of structural modifications on macroeconomic forecasts, highlighting the model's intrinsic capacity to capture the dynamic evolution of economic processes. Caggiano et al. (2014) explored thoroughly the ramifications of uncertainty shocks on unemployment dynamics, utilizing the TVP-VAR framework to illuminate the role of economic uncertainty in shaping labour market fluctuations. In addressing the intricate task of predicting stock returns within the context of fluctuating volatility and trading patterns, Chauvet and Potter (2013) demonstrated the efficacy of TVP-VAR models in encapsulating intraday dynamics.

Hubrich and Tetlow (2015) explored the propagation of financial stress to the real economy during crises, underscoring the utility of TVP-VAR models in comprehending the dynamics of financial market contagion. De Grauwe & Grimaldi (2006) leveraged TVP-VAR models to dissect exchange rate dynamics and to pinpoint intervals characterized by currency crises, thereby shedding light on the underlying shifts in exchange rate behaviour. Giannone & Lenza (2010) investigated meticulously the enigmatic Feldstein-Horioka puzzle, employing TVP-VAR models to scrutinize the interplay between savings and investments across different countries. Mumtaz & Surico (2012) probed the intricate interrelationships between monetary policy, financial markets, and the macroeconomy, thereby showcasing the capacity of TVP-VAR models to capture time-varying parameters within these intricate relationships. The collective findings presented in these studies underscore the versatility and efficacy of TVP-VAR models in encapsulating evolving dynamics across various domains, encompassing macroeconomic forecasting and financial market analysis. These models persist as indispensable tools for researchers seeking to unravel the intricate relationships within intricate economic and financial systems. Moreover, methodological refinements, such as Bayesian estimation and the fusion of TVP modelling with factor analysis, contribute to the ongoing evolution and enhancement of TVP-VAR modelling techniques. Zhang et al. (2021) utilized TVP-VAR model to assess the dynamic influence of volatility originating from foreign companies listed on

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stock markets and their effect on the primary stock markets in Japan, South Korea, Hong Kong, and Singapore. Findings indicated that the volatility associated with foreign companies from developed markets did not lead to heightened volatility in the host markets. Whereas, foreign companies from emerging markets will bring stronger volatility spillover to host markets.

The TVP-VAR model is frequently employed by scholars for the identification of volatility spillover effects emanating from bonds towards various other financial variables. As demonstrated by Huang et al. (2023b), the TVP-VAR model serves as a valuable tool in ascertaining the co-movement patterns and network interconnectedness that exist between bond markets and the broader financial asset markets. Similarly, in the study of Li et al. (2022), this model was effectively utilized to investigate the intricate and dynamic linkages prevailing among oil prices, green bonds, carbon markets, and the stock prices of companies characterized by a low-carbon footprint. Akdeniz (2021), assessed the applicability of the Taylor rule to the Turkish economy. Employing a TVP-VAR model, the research encompasses a time frame spanning from May 1986 to December 2019. The empirical findings of this investigation reveal the dynamic nature of responses in interest rates in response to perturbations affecting both the inflation gap and output gap. In parallel, Akyıldırım et al. (2022) conducted an exploration of the dynamic interconnectedness inherent among financial assets within the Turkish context, with a particular focus on the backdrop of the Covid-19 pandemic. To this end, daily data extending from 2008 to 2021 was subjected to scrutiny, encompassing six distinct sub-markets, including money, bonds, foreign exchange, stocks, commodities, and credit risk. By employing TVP-VAR models, the study elucidates a notable augmentation in the dynamic interconnectedness among these financial assets during periods marked by turbulence. These periods of turbulence were witnessed at both global and local levels within the sample time frame. This observation suggests that financial stress manifested within one category of assets has the potential to diffuse and magnify risks within other interconnected asset classes. In concert, these two studies significantly contribute to an enhanced comprehension of the intricacies characterizing the Turkish economy. Akdeniz's research underscores the imperative of incorporating considerations related to time-varying parameters and the dynamics of exchange rates when undertaking an analysis of monetary policy within the framework of the Taylor rule.

In contrast, the study by Akyıldırım et al. (2022) underscores the pervasive dynamic interconnectedness observable within the realm of financial assets, particularly during periods of economic stress. This study offers valuable insights into the transmission of shocks across diverse segments of the Turkish financial market. In Türkiye, there are limited studies that address bond volatility (Yavuz, 2012; Gencer & Musaoğlu, 2014; Alkan & Çiçek, 2020; Torun & Demireli, 2020; Kutlu & Karakaya, 2023) aside from the TVP-VAR model. Öner (2019) investigated the influence of the volatility index, denoted as VIX, on the bond prices of emerging economies. Employing causality analysis as the methodological approach, the study identified instances of unidirectional causality as well as bidirectional causality between specific countries and the VIX. Kumar et.al

(2022) searched the effect of VIX and MOVE indices on equity and bond market volatilities on the government bond term premium and key macroeconomic variables. Results reveal a positive interaction between MOVE and the term premium.

Following the general elections in Türkiye, there have been significant changes in the perspective of the economy, leading to a rise in policy interest rates. Alongside the increase in policy rates, bond yields have also shown a parallel increase, attracting the interest of foreign investors. By the end of 2023, foreign investors allocated a higher share to bonds than stocks in their net purchases in Turkish capital markets. While the net equity position increased by $217 million throughout 2023, the net position in bond investments experienced a substantial increase of $885 million. All these data indicate a shift of foreign investors towards bonds in the Turkish capital markets. Furthermore, as of the end of 2023, foreign investors' share in stock ownership was 34.78%, while their share in bond investments was 1.06%. This situation indicates that there is still a long way for foreign investors to go in the bond market. For foreign investors, monitoring certain indicators is essential when investing in the bond market. Not only the Country's Credit Default Swap (CDS), which indicates the country's credit rating, but also the MOVE index, measuring bond volatility, emerges as a crucial decision variable. Therefore, in the study, the dynamic relationship between 2 and 10-year government bond yields and the MOVE index is examined. Recommendations to foreign investors will be provided based on the findings of this study, aiming to determine which, between 2 or 10-year bonds, is more sensitive to volatility.

The absence of a study in the literature in this field signifies its originality. The uniqueness of the study lies in the concurrent utilization of 2 and 10-year bond yields along with the MOVE index measuring bond volatility, revealing the dynamic relationship between these variables. As indicated by the review of the literature, there have been no identified studies within Türkiye that specifically address the bond yields and MOVE Index returns. This study aims to fill this gap that has emerged in the literature. Therefore, the originality of this study lies not only in being the first to examine the relationship between volatility and maturity for bond yields but also in being one of the pioneering works to address the dynamic connectedness among the variables. The findings obtained from this study will provide recommendations to investors, particularly for bond investments, highlighting the significant importance of the MOVE index. Our empirical approach, spanning a considerable time horizon and accounting for external factors and events, adds depth to the understanding of how financial markets react to varying conditions. It also opens the door to further investigations into the complexities of financial markets.

METHODS

As indicated by the review of the literature, there have been no identified studies within Türkiye that specifically address the bond yields and MOVE Index returns. This study aims to fill this gap that has emerged in the literature. To this end, this study examines the dynamic connectedness among the MOVE Index, Türkiye's 2-year

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government bond yield, and Türkiye's 10-year government bond yield. We utilized daily closing price data obtained from the Investing database for the MOVE Index, the 2-year Turkish government bond yield, and the 10-year Turkish government bond yield from January 29, 2010, to February 7, 2022. Table 1 provides a summary of the variables' usage and definitions. This research endeavour scrutinizes the dynamic connectedness between the MOVE Index, the 2-year and the 10-year government bond yields of Türkiye. The dataset comprises daily closing prices, sourced from the Investing database, spanning from January 29, 2010, to February 7, 2022. A succinct overview of the variables, along with their respective definitions, is presented in Table 1.

Prior to embarking upon the analytical phase, logarithmic daily returns for the series were computed utilising the following formula ($100 \times LN[Series_t/Series_{t-1}$). Subsequently, two discrete TVP-VAR models were constructed, one encompassing the 2-year bond yield and the MOVE Index, and the other involving the 10-year bond yield and the MOVE Index.

Table 1. Definition of Series

Series	Series Definitions	Series Usage
MOVE	Move Index	The daily logarithmic returns were calculated and utilized in the analysis. [100*LN(Move $_t$/Move $_{t-1}$)]
Bond2yr	Türkiye's 2-year bond interest rate	The daily logarithmic returns were calculated and utilized in the analysis. [100*LN (bond2yr$_t$/bond10yr$_{t-1}$)]
Bond10yr	Türkiye's 10-year bond interest rate	The daily logarithmic returns were calculated and utilized in the analysis. [100*LN(bond10yr$_t$/bond10yr$_{t-1}$)]

TVP-VAR

The investigation into the dynamic volatility spillover relationship between Türkiye's 2-year and 10-year government bond yields and the MOVE Index was conducted by applying TVP-VAR model, as originally formulated by Antonakakis and Gabauer in 2017. In this study, a TVP-VAR (1) model was employed, featuring time-varying volatility parameters selected through the Bayesian Information Criterion.

$$q_t = x_t q_{t-1} + \omega_t \qquad \omega_t \sim L(0, Z_t) \qquad (1)$$

$$vec(x_t) = vec(x_{t-1}) + \sigma_t \qquad \sigma_t \sim L(0, v_t) \qquad (2)$$

The connectedness index developed by Diebold and Yılmaz (2012) is based on the vector moving average model using generalized impulse response functions (Koop et al., 1996), "θ^g_{mnt}" , and generalized forecast error variance decompositions (Peseran and Shin, 1998), "$\acute{\alpha}^g_{mnt}(J)$". The error variance decomposition explains the variable m's contribution to the variable n. Equation 3 shows generalized error variance decomposition (Gökgöz and Kayahan, 2023).

$$\alpha^g_{mnt}(J) = \frac{U^{-1}_{mm,t}\sum_{t=1}^{J-1}(\iota'_m Y_t U_t Y \iota_n)^2}{\sum_{n=1}^{L}\sum_{t=1}^{J-1}(\iota_m Y_t U_t Y'_t \iota_m)} \qquad \tilde{\alpha}^g_{mn,t}(J) = \frac{\alpha^g_{mnt}(J)}{\sum_{n=1}^{N}\alpha^g_{mnt}(J)} \qquad (3)$$

In the Equation 3, ι_m represents a zero-vector containing a unit at position m (" $\sum_{n=1}^{L} \tilde{\alpha}_{mnt}^{L}(J) = 1$ " and " $\sum_{m,n=1}^{L} \tilde{\alpha}_{mnt}^{L}(J) = L$)". Based on the generalized error variance decomposition, the total connectedness index (TCI), which represents the network of connectedness among the series, is formulated as follows:

$$C_t^g(J) = \frac{\sum_{m,n=1,m\neq n}^{N} \tilde{\alpha}_{mnt}^{g}(J)}{\sum_{m,n=1}^{L} \tilde{\alpha}_{mnt}^{g}(J)} \quad (4)$$

The TCI does not consider the lagged effects of an asset on itself and can be explained as the average (off-diagonal) volatility spillover from all other assets to a specific asset. On the other hand, the total directional connectedness explains the volatility spillovers of variable m to all other n:

$$C_{m\to nt}^g(J) = \sum_{n=1,m\neq n}^{L} \tilde{\alpha}_{nmt}^{g}(J) \quad (5)$$

Equation 6 formulates the total directional connectedness, which calculates the volatility spillovers of all variables n to the variable m.

$$C_{m\leftarrow nt}^g(J) = \sum_{n=1,m\neq j}^{L} \tilde{\alpha}_{mnt}^{g}(J) \quad (6)$$

Net total directional connectedness is obtained by calculating the differences between total directional connectedness to others and from others:

$$C_{mt}^g(J) = B_{m\to nt}^g(J) - B_{m\leftarrow nt}^g(J) \quad (7)$$

The total net directional connectedness indicates whether variable m serves as a net transmitter ($C_{mt}^g(J) > 0$) or receiver ($C_{mt}^g(J) < 0$) of volatility in the connectedness network.

Net Pairwise Directional Connectedness (NPDC) is calculated by decomposing the net total directional connectedness between series:

$$NPDC_{mn}(H) = \tilde{\alpha}_{nmt}(H) - \tilde{\alpha}_{mnt}(H) \quad (8)$$

Net pairwise Directional Connectedness defines whether variable m exerts a stronger or weaker influence on variable n or is influenced by variable n (Antonakakis et al., 2019; Arifoğlu et al., 2023). In the analysis, we first calculated the daily logarithmic returns of the series and subsequently established two separate TVP-VAR models with the series identified as stationary. One model incorporates the MOVE Index and Türkiye's 2-year bond yields, whereas the second model encompasses the MOVE Index and Türkiye's 10-year bond yields.

RESULT AND DISCUSSION

Preceding the commencement of the descriptive statistical analysis, the daily logarithmic returns for the respective series were computed. Figure 1 visually presents the time-series plots for the returns of the MOVE Index (denoted as "Move ") in conjunction with the returns of Türkiye's 2-year government bonds (referred to as "Bond2yr") and Türkiye's 10-year government bonds (referred to as "Bond10yr").

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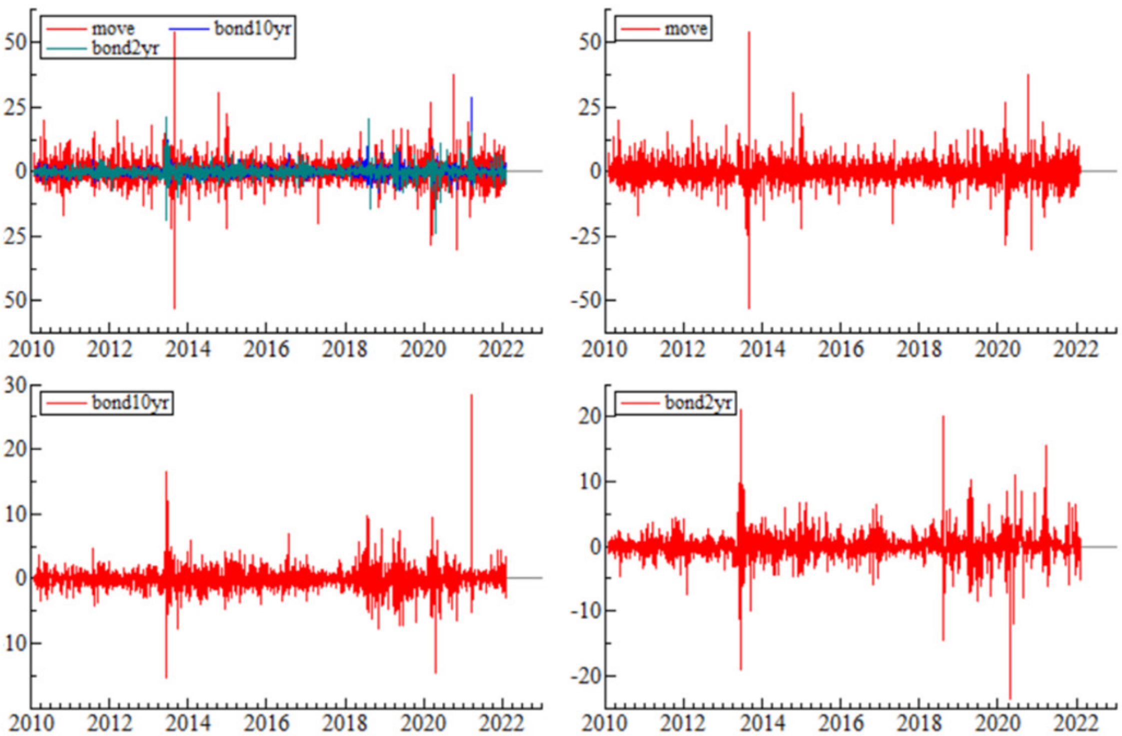
Figure 1. Time Series Plots of Return Series



The horizontal axis of Figure 1 corresponds to the years, whereas the vertical axis represents the return values. The depicted plots visually convey the volatility of returns in all series, with discernible periods characterized by heightened volatility. Notably, these findings suggest that episodes of increased volatility are attributable to a confluence of factors, encompassing global events such as the imposition of sanctions against Russia by the United States and the European Union in July-August 2014, the outbreak of the COVID-19 pandemic in January 2020, as well as events directly impacting the Turkish economy, such as the Pastor Brunson crisis in July-August 2018. Comprehensive descriptive statistics for the return series are presented in Table 2.

Table 2. Descriptive Statistics

	Move	**Bond2yr**	**Bond10yr**
Mean	-0.003654	0.019410	0.022328
Median	-0.285576	0.000000	0.000000
Maximum	5.375.661	2.118.163	2.841.833
Minimum	-5.274.955	-2.348.636	-1.539.604
Std. Dev.	4.548.478	1.998.264	1.662.144
Skewness	0.472900	0.241755	1.777.357
Kurtosis	2.116.969	2.786.099	4.258.234
Jarque-Bera	40744.56***	76102.74***	194397.6***

Source: Data processing

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In accordance with the findings from the descriptive statistical analysis, it is discerned that the 10-year bond yield exhibits the highest average return among the series, while the MOVE Index presents the lowest average return. Notably, the examination underscores the MOVE Index as the most volatile series within the dataset, as evidenced by its highest standard deviation. Regarding skewness, both the MOVE Index and the 2-year bond yield series demonstrate skewness values approaching zero, indicating a relatively symmetric distribution. In stark contrast, the skewness value for the 10-year bond yield series significantly departs from zero, signifying a notably asymmetric distribution compared to the other two series. Furthermore, it is important to note that none of the series adhere to a normal distribution, as confirmed by the Jarque-Bera statistics. These results emphasize the departure from normality in the data distribution. The unit root test results are displayed in Table 3.

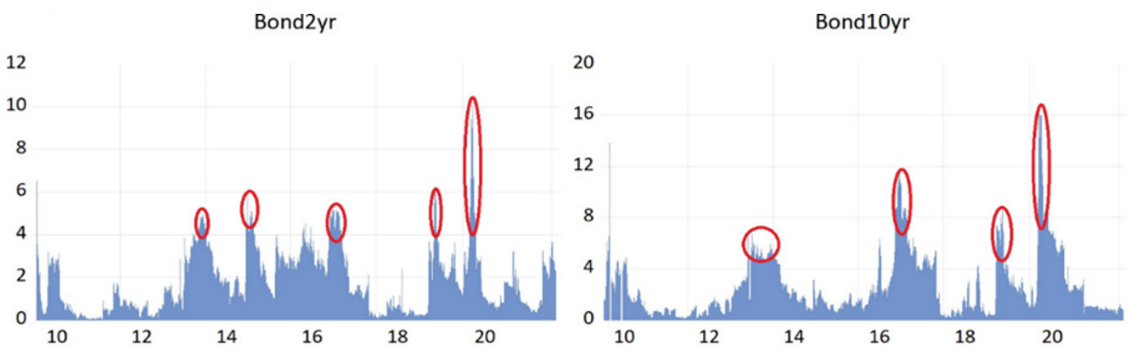
Table 3. Unit Root Analyses

Series	ADF		PP	
	Level-Intercept and Trend Model	Level-Intercept Model	Level-Intercept and Trend Model	Level-Intercept Model
Move	-35.5986***	-57.0809***	-35.5986***	-57.0809***
Bond10yr	-27.1928***	-58.6679***	-27.1928***	-58.6679***
Bond2yr	-52.7381***	-52.7694***	-52.7381***	-52.7694***

Source: Data processing

The ADF and PP unit root analyses confirmed that all series are stationary at the level (I0), meaning they do not exhibit unit roots or non-stationary behaviour. The next step is to develop two different TVP-VAR models. The first TVP-VAR model captures the relationship between the MOVE Index and the 2-year bond yield, while the second model explores the dynamic interplay between the MOVE Index and the 10-year bond yield. Figure 2 provides the time-varying connectedness between the MOVE Index and the 2-year and 10-year bond yields through time series plots of total connectedness indices.

Figure 2. TCIs Between 2-Year and 10-Year Bond Yields and the MOVE Index



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The TCI represents the dynamic interaction between the MOVE Index and the 2-year bond yield, is recorded at 1.8. In contrast, when considering the interaction between the MOVE Index and the 10-year bond yield, this index averages 2.6. These TCIs provide valuable insights into the evolving degrees of connectedness among the financial variables, occasionally reaching as high as 10.

Upon closer examination of these periods characterized by heightened TCI, it becomes evident that they frequently coincide with significant events that have had a profound impact on Türkiye and the global arena. These notable events encompass the 'Gezi Park Protests' of 2013, the 'December 17-25 Operations,' the 'Sanctions Imposed on Russia by the US and EU' in 2014, the 'July 15th Coup Attempt' in 2016, the 'Pastor Brunson Crisis' in 2018, and the declaration of the COVID-19 pandemic in 2020. During these pivotal junctures, the connectedness between the MOVE Index and both the 2-year and 10-year Turkish bond yields intensified. This result resonates with the results of Kennedy and Palerm (2014), who examined bond spreads in emerging markets and identified the influence of both local and global risks on bond yields. The findings reveal that global and local risks affect the total connectedness between bond yields and the MOVE Index. During periods of political risk, investors' tendency to avoid risk leads to volatility in bonds and other financial assets. This also contributes to volatility in the MOVE Index, a measure of US bond volatility. Furthermore, our TCI findings illustrate that the impact of global and local risks on total connectedness varies. This aligns with the findings of Spnenshine and Kumari (2022), who demonstrated that different political risks have varying effects on bond yields. Various global and local political risks can influence bond yields in diverse ways. The uncertainty caused by risk and policymakers' responses can lead to different effects on the volatility of financial assets. Local and global political risks influence the volatilities and connectedness of financial assets. Investors in bond markets should consider the MOVE Index and political risks in their investment decisions. Additionally, the variability of connections over time suggests that risk management strategies should be dynamic in response to different global and local events.

Table 4 provides a comprehensive depiction of the average total dynamic connectedness between bond yields and the MOVE Index. The 'From Others' section signifies the volatility spillover received from other series, while the 'To Others' section denotes the volatility spillover transmitted to other series. A series is considered a net volatility transmitter when the 'To Others' component surpasses the 'From Others' component. Conversely, if the 'From Others' part exceeds the 'To Others' part, the series is identified as a net volatility receiver. Based on the results, it becomes evident that the MOVE Index predominantly functions as a net volatility transmitter to bond yields. This signifies that the MOVE Index plays a pivotal role in transmitting volatility to bond yields. Furthermore, it is noteworthy that the MOVE Index accounts for 1.99% of the variance in the 2-year bond yield and 2.97% of the variance in the 10-year bond yield. Consequently, the volatility spillover originating from the MOVE Index to Türkiye's 10-year bond yields is more pronounced compared to its impact on Türkiye's 2-year bond yields. The concept that longer-term financial instruments inherently carry higher risks due to increased uncertainty over extended durations is evident in the market. A rise in the MOVE Index, which measures risk in bond yields, can be interpreted as an indicator of increased risk. This explains why the 10-year bond yield's connectedness to the MOVE Index is more pronounced than the 2-year bond yield.

Table 4. The Average Total Dynamic Connectedness between Bond Yields and the MOVE Index

The Average Dynamic Connectedness between Bond2yr and Move			
	Move	**bond2yr**	**from**
Move	98.43	1.57	1.57
Bond2yr	1.99	98.01	1.99
To	1.99	1.57	3.56
Including own	100.42	99.58	TCI
Net	0.42	-0.42	1.78
The Average Dynamic Connectedness between Bond10yr and Move			
	Move	**bond10yr**	**from**
Move	97.78	2.22	2.22
Bond10yr	2.97	97.03	2.97
To	2.97	2.22	5.19
Including own	100.75	99.25	TCI
Net	0.75	-0.75	2.59

Source: Data processing

This finding aligns with Zhang and Zhang's (2023) observation that long-term bonds harbour higher risk/return profiles than shorter-term bonds. Investors holding bonds in their portfolios should pay careful attention to the MOVE Index, with increased focus as the bond's maturity lengthens. This result suggests that the dynamics of bond yield risk are significantly influenced by the duration of the bonds, with longer maturities reflecting greater sensitivity to market volatility as measured by the MOVE Index. As such, investors must be cognizant of the varying degrees of risk associated with different bond maturities, particularly in a market environment characterized by fluctuating volatility levels. The MOVE Index emerges as a crucial tool for gauging the impact of market-wide uncertainty on bond yields, especially for those with longer maturities.

Figure 3 visually portrays the time-varying net total pairwise connectedness between the MOVE Index and the 2-year and 10-year Turkish bond yields, highlighting the dynamic nature of this connectedness. In the visual representations of net total pairwise connectedness, when the positive y-axis values are observed, it signifies periods when net volatility is transmitted from the MOVE Index to bond yields. Conversely, during periods when the y-axis values are negative, it indicates that bond yields are transmitting net volatility to the MOVE Index. While the roles of these series as either volatility receivers or transmitters may vary over time, the overarching pattern suggests that, on

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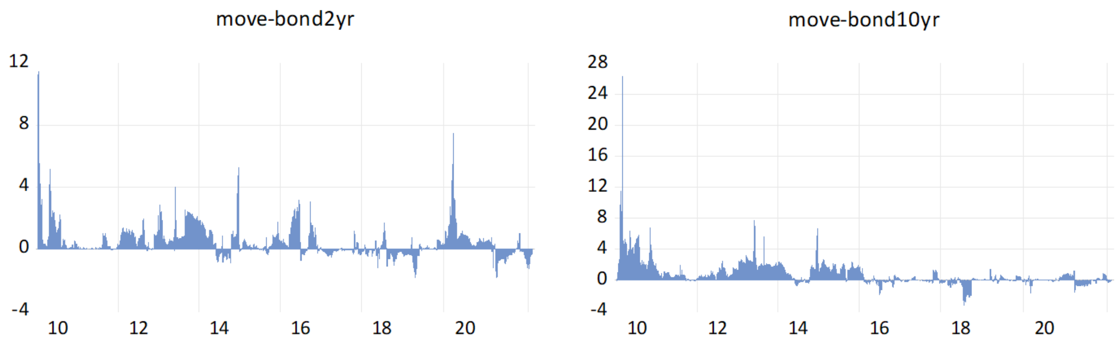
average, bond yields tend to serve as net volatility receivers, whereas the MOVE Index consistently operates as a net volatility transmitter.

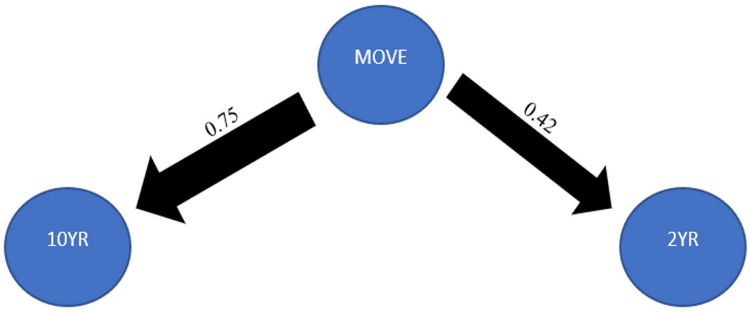
Figure 3. Net Total Pairwise Connectedness



The dynamics of volatility reception and transmission among these series exhibit variations across different periods. Up until 2016, bond yields consistently played the role of net volatility receivers, without any occurrences of them acting as net volatility transmitters. Before COVID-19, bond yields predominantly positioned themselves as net receivers of volatility about the MOVE Index, with this trend intensifying notably at the onset of the pandemic. The July 15th, 2016, coup attempt in Turkey posed a significant political risk, predominantly impacting bond yields, which were more affected by this specific domestic event rather than external factors. This impact was more pronounced on 2-year bond yields, while 10-year bonds were less affected, potentially due to their longer maturity. The global uncertainty triggered by the COVID-19 pandemic initially impacted financial markets and led investors to seek alternative financial assets. The risks posed by the pandemic influenced central authorities' policies and the volatility of financial assets. The peak of net volatility reception by 2-year bond yields against the MOVE Index coincides with the early phase of COVID-19. Before the pandemic, the Turkish bond market was relatively influenced by internal factors; however, it shifted sharply to global influences during the pandemic. Additionally, recent observations show a decrease in net volatility transmission between the MOVE Index and 10-year bond yields. This could be attributed to increased interaction and two-way volatility transmission between bond yields and the MOVE Index. The effects of COVID-19 on bond yields show parallels with findings from studies by Malliaropulos and Migiakis (2023) and Uddin et al. (2024), highlighting the impact of global events and COVID-19 on bond yields.

Our findings offer significant factors for investors, financial analysts, and policymakers. Policymakers should better prediction and management of potential and existing risks. Additionally, investors should consider the potential risks and rewards during these periods in their decision-making processes. This highlights the importance of adapting to changing market dynamics and the critical role of thorough risk assessment in financial and policy planning. Figure 4 provides a visual representation of the average network of net volatility spillover.

Figure 4. The Average Net Volatility Spillover Network between the MOVE Index and 2-Year and 10-Year Government Bond Yields



Within the volatility spillover network involving the MOVE Index and bond yields, the values displayed on the arrows denote the extent of net volatility transmission. The net spillover network reveals that the net volatility transmission from the MOVE Index to the 10-year bond yield surpasses the net spillover observed in the case of the 2-year bond yield. This conclusion further confirms the findings of previous studies (Yavuz, 2012; Öner, 2019; Alkan and Cicek 2020; Torun and Demireli 2020) conducted on the Turkish bond market. The findings of the study are not only consistent with research conducted on Turkish financial markets but also align with the findings of various studies (Li et al., 2021; Ge & Zhang, 2022; Malinská, 2022; Grishchenko et al., 2022; Huang et al., 2023a; Qin et al., 2023; Wang et al., 2023; Wei et al., 2023, 2023b; Christensen et al., 2024; Uddin et al., 2024) conducted on international markets. To this end, as it stated in many studies (Çepni et al., 2020; Bai et al., 2021; Bekaert & De Santis, 2021; Chen et al., 2022; Zhang et al., 2022; Asonuma et al., 2023; Wu et al., 2022; Zhang & Zhang, 2023; Zhou & Wei, 2023; Chen et al., 2024) volatility, as a risk indicator, begins to exert a significant influence on bond yields as the maturity extends.

CONCLUSION

This study has conducted a detailed examination of the volatility spread dynamics between Türkiye's bond yields and the MOVE Index. The findings indicate that both local and global events significantly impact the volatility spread in the Turkish financial environment. The analysis results have specifically revealed a marked increase in the volatility spread between the MOVE Index and bond yields, particularly at the onset of the COVID-19 pandemic. The MOVE Index generally exhibits a more significant volatility effect on 10-year bond yields than on 2-year bond yields. This is primarily due to the longer maturities of 10-year bonds, which inherently contain more uncertainty. Since the MOVE Index is regarded as an indicator measuring overall uncertainty in the bond market, it is expected to have a more pronounced effect on the interest rates of 10-year bonds. The increased risk in bond yields with extended maturity and its high connection with volatility is providing significant outcomes for policymakers, financial advisors, and investors. The impact of the uncertainty factor on the long-term

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predictability of bond yields should be considered by decision-makers. Global indicators like the MOVE Index and external influences must be assessed when forecasting bond interest rates and shaping financial policies.

This study sheds light on the complexity and dynamics of volatility spread in Türkiye's bond market, providing essential insights for future investment and risk management strategies. Future research could explore the relationships between the MOVE Index, Türkiye's bond yields, Sukuk returns and other financial variables in a broader context. This would aid in a more comprehensive understanding of the connections between financial markets and the evolution of volatility spread over time. Additionally, incorporating global financial events and other potential variables into the analysis will contribute to a better understanding of international factors affecting Türkiye's financial structure.

REFERENCES

Akdeniz, Ç. (2021). Taylor Kuralının Farklı Para Politikası Rejimleri Altında Geçerliliği: Türkiye Ekonomisi için TVP-VAR Modeli Uygulaması. *Finansal Araştırmalar ve Çalışmalar Dergisi*, *13*(25), 293-308.

Akyıldırım, E., Güneş, H., & Çelik, İ. (2022). Türkiye'de Finansal Varlıklar Arasında Dinamik Bağlantılılık: TVP-VAR Modelinden kanıtlar. *Gazi İktisat ve İşletme Dergisi*, *8*(2), 346-363.

Alkan, B.& Çiçek, S. (2020). Spillover Effect in Financial Markets in Türkiye. *Central Bank Review*, *20*(2), 53-64.

Antonakakis, N., Cuñado, J., Filis, G., Gabauer, D., & Gracia, F. P. (2019). Oil and Asset Classes Implied Volatilities: Dynamic Connectedness and Investment Strategies, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3399996.

Antonakakis, N., & Gabauer, D. (2017). Refined Measures of Dynamic Connectedness based on TVP-VAR. *MPRA Paper 78282*, University Library of Munich, Germany.

Arifoğlu, A., H. Gökgöz & T. Kandemir (2023). Testing the Factors Affecting Intraday Market Electricity Prices by Connectedness Approach. *Sosyoekonomi*, 31(57), 179-194.

Asonuma, T., Niepelt, D., & Ranciere, R. (2023). Sovereign Bond Prices, Haircuts and Maturity. *Journal of International Economics*, *140,* 103689. https://doi.org/10.1016/j.jinteco.2022.103689.

Bai, J., Bali, T. G., & Wen, Q. (2021). Is There a Risk-Return Tradeoff in the Corporate Bond Market? Time Series and Cross-sectional Evidence. *Journal of Financial Economics*, *142*(3), 1017–1037. https://doi.org/10.1016/j.jfineco.2021.05.003.

Bekaert, G., & De Santis, R. A. (2021). Risk and Return in International Corporate Bond Markets. *Journal of International Financial Markets, Institutions and Money*, *72,* 101338. https://doi.org/10.1016/j.intfin.2021.101338.

Bewley, R., Rees, D., & Berg, P. (2004). The Impact of Stock Market Volatility on Corporate Bond Credit Spreads. *Mathematics and Computers in Simulation*, *64*(3), 363-372.

Bouteska, A., Sharif, T., & Abedin, M. Z. (2023). Volatility Spillovers and Other Dynamics Between Cryptocurrencies and the Energy and Bond Markets. *Quarterly Review of Economics and Finance*, *92*, 1–13.

Caggiano, G., Castelnuovo, E., & Groshenny, N. (2014). Uncertainty Shocks and Unemployment Dynamics in U.S. Recessions. *Journal of Monetary Economics*, *67*, 78-92.

Çepni, O., Demirer, R., Gupta, R., & Pierdzioch, C. (2020). Time-Varying Risk Aversion and the Predictability of Bond Premia. *Finance Research Letters*, *34,* 101241. https://doi.org/10.1016/j.frl.2019.07.014.

Chauvet, M., & Potter, S. (2013). Forecasting Output. In Elliott, G., & Timmermann, A (Eds). *Handbook of Economic Forecasting*, Volume 2, Part A, 141-194. Netherlands: Elsevier. https://doi.org/10.1016/B978-0-444-53683-9.00003-7.

Chen, X., Wang, J., & Wu, C. (2022). Jump and Volatility Risk in the Cross-Section of Corporate Bond Returns. *Journal of Financial Markets*, *60,* 100733. https://doi.org/10.1016/j.finmar.2022.100733.

Chen, X., Wang, J., Wu, C., & Wu, D. (2024). Extreme Illiquidity and Cross-Sectional Corporate Bond Returns. *Journal of Financial Markets*, *68,* 100895. https://doi.org/10.1016/j.finmar.2024.100895.

Christensen, J. H. E., Lopez, J. A., & Mussche, P. L. (2024). International Evidence on Extending Sovereign Debt Maturities. *Journal of International Money and Finance*, *141,* 103009. https://doi.org/10.1016/j.jimonfin.2023.103009.

Chuliá, H., & Torró, H. (2008). The Economic Value of Volatility Transmission between the Stock and Bond Markets. *The Journal of Futures Markets*, *28*(11), 1066–1094.

D'Agostino, A., Gambetti, L. & Giannone, D. (2013), Macroeconomic Forecasting and Structural Change. *Journal of Applied Econometrics*, *28*(1), 82–101.

De Grauwe, P., & Grimaldi, M. (2006). *The Exchange Rate in a Behavioural Finance Framework*. Princeton University Press.

Dean, W. G., Faff, R. W., & Loudon, G. F. (2010). Asymmetry in Return and Volatility Spillover between Equity and Bond Markets in Australia. *Pacific-Basin Finance Journal*, 18, 272–289. https://doi.org/10.1016/j.pacfin.2009.09.003.

Diebold, F. X., Yılmaz, K. (2012). Better to Give than to Receive: Predictive Directional Measurement of Volatility Spillovers. *International Journal of Forecasting*, 28 (1), 57–66.

Duong, H. N., Kalev, P. S., & Tian, X. (2023). Short Selling, Divergence of Opinion, and Volatility in the Corporate Bond Market. *Journal of Economic Dynamics & Control*, *147*, 104592. https://doi.org/10.1016/j.jedc.2022.104592.

Fleming, J., Kirby, C., & Ostdiek, B. (1998). Information and Volatility Linkages in the Stock, Bond, and Money Markets. *Journal of Financial Economics*, *49*, 111–137.

Ge, F., & Zhang, W. (2022). The Determinants of Cross-Border Bond Risk Premia.

Journal of International Financial Markets, Institutions and Money, *81,* 101680. https://doi.org/10.1016/j.intfin.2022.101680.

Gencer, H. G., & Musoglu, Z. (2014). Volatility Transmission and Spillovers among Gold, Bonds, and Stocks: An Empirical Evidence from Türkiye. *International Journal of Economics and Financial Issues*, *4*(4), 705-713.

Giannone, D., & Lenza, M. (2010). The Feldstein-Horioka Fact. *Proceeding of NBER International Seminar on Macroeconomics*, 6(1), 103-117.

Giannone, D., Reichlin, L., & Small, D. (2008). Nowcasting: The Real-time Informational Content of Macroeconomic Data. *Journal of Monetary Economics*, *55*, 665–676.

Gökgöz, H. & Kayahan, C. (2023). The Analysis of Volatility Spillover Effect between Bitcoin and Developed and Developing Countries via the TVP-VAR. *Hacettepe University Journal of Economics and Administrative Sciences*, *41*(1), 109-125.

Gong, Y., Li, X., & Xue, W. (2023). The Impact of EPU Spillovers on the Bond Market Volatility: Global Evidence. *Finance Research Letters*, *55*(B), 103931.

Grishchenko, O. V., Song, Z., & Zhou, H. (2022). Term Structure of Interest rates with short-run and long-run risks. *Journal of Finance and Data Science*, *8*, 255–295. https://doi.org/10.1016/j.jfds.2022.09.001.

Hsu, C.-H., Lee, H. C., & Lien, D. (2020). Stock Market Uncertainty, Volatility Connectedness of Financial Institutions, and Stock-Bond Return Correlations. *International Review of Economics & Finance*, 70, 600-621.

Huang, T., Jiang, L., & Li, J. (2023a). Downside Variance Premium, Firm Fundamentals, and Expected Corporate bond Returns. *Journal of Banking and Finance*, *154,* 106946. https://doi.org/10.1016/j.jbankfin.2023.106946.

Huang, Z., Zhu, H., Hau, L. and Gibbons, X. (2023b). Time-Frequency Co-Move ment and Network Connectedness Between Green Bond and Financial Asset Markets: Evidence from Multiscale TVP-VAR Analysis. *The North American Journal of Economics and Finance*, *67*, 101945. https://doi.org/10.1016/j.najef.2023.101945.

Hubrich, K., & Tetlow, R. J. (2015). Financial Stress and Economic Dynamics: The Transmission of Crises. *Journal of Monetary Economics*, *70*, 100-115.

Kennedy M. & Palerm, A. (2014). Emerging Market Bond Spreads: The Role of Global and Domestic Factors from 2002 to 2011. *Journal of International Money and Finance, 43*, 70-87. https://doi.org/10.1016/j.jimonfin.2013.12.008.

Koop, G., Pesaran, M. H., and Potter, S. M. (1996). Impulse Response Analysis in Nonlinear Multivariate Models. *Journal of Econometrics*, 74 (1), 119–147.

Kumar, A., Mallick, S., Mohanty, M. S., & Zampolli, F. (2017). Market Volatility, Monetary Policy and the Term Premium. *BIS Working Paper No. 606*.

Kutlu, M. & Karakaya, A (2023). Asymmetry in Return and Volatility Spillovers Between Stock and Bond Markets in Türkiye. *EGE Academic Review*, 23(2), 297-314.

Li, H., Zhou, D., Hu, J., & Guo, L. (2022). Dynamic Linkages Among Oil Price, Green Bond, Carbon Market, and Low-Carbon Footprint Company Stock Price: Evidence from the TVP-VAR Model. *Energy Reports*, 8, 11249–11258.

Li, X., Yang, B., Su, Y., & An, Y. (2021). Downside Risk and Defaultable Bond Returns. *Journal of Management Science and Engineering*, *6*(1), 99–110. https://doi.org/10.1016/j.jmse.2021.02.006.

Longstaff, F. A., & Schwartz, E. S. (1993). Interest Rate Volatility and Bond Prices. *Financial Analysts Journal*, *49*(4), 70-74.

Malinská, B. (2022). Time-Varying Pricing of Risk in Sovereign Bond Futures Returns. *Finance Research Letters*, *47,* 102531. https://doi.org/10.1016/j.frl.2021.102531.

Malliaropulos, D. & Migiakis, P. (2023). A Global Monetary Policy Factor in Sovereign Bond yields. *Journal of Empirical Finance*, *70*, 445-460. https://doi.org/10.1016/j.jempfin.2022.12.011.

Mensi, W., Shafiullah, M., Vo, X. V., & Kang, S. H. (2022). Spillovers and Connectedness between Green Bond and Stock Markets in Bearish and Bullish Market Scenarios. *Finance Research Letters*, *49*, 103120. https://doi.org/10.1016/j.frl.2022.103120.

Mumtaz, H. & Surico, P. (2012). Evolving International Inflation Dynamics: World and Country-Specific Factors. *Journal of the European Economic Association, 10*(4), 716-734.

Öner, H. (2019). Korku endeksi ile gelişmekte olan ülke tahvil piyasaları arasındaki ilişkinin ampirik analizi. *Muhasebe Bilim Dünyası Dergisi*, 21(1), 140-154.

Ozbekler, A. G., Kontonikas, A., & Triantafyllou, A. (2021). Volatility Forecasting in European Government Bond Markets. *International Journal of Forecasting*, *37*(4), 1691-1709. https://doi.org/10.1016/j.ijforecast.2021.03.009.

Pesaran, H. H., & Shin, Y. (1998). Generalized Impulse Response Analysis in Linear Multivariate Models. *Economics Letters*, *58*(1), 17–29.

Primiceri, G. E. (2005). Time Varying Structural Vector Autoregressions and Monetary Policy. *The Review of Economic Studies*, *72*(3), 821–852.

Qin, W., Cho, S., & Hyde, S. (2023). Time-Varying Bond Market Integration and the Impact of Financial Crises. *International Review of Financial Analysis*, *90,* 102909. https://doi.org/10.1016/j.irfa.2023.102909

Reilly, F. K., Wright, D. J. & Chan, K. C. (2000). Bond Market Volatility Compared to Stock Market Volatility. *The Journal of Portfolio Management*, *27*(1), 82-92.

Skintzi, V. D., & Refenes, A. N. (2006). Volatility Spillovers and Dynamic Correlation in European Bond Markets. *Journal of International Financial Markets, Institutions and Money*, *16*(1), 23-40.

Sonenshine, R. & Kumari, S. (2022). The Differential Impact of Political Risk Factors on Emerging Market Bond Spreads and Credit Rating Outlooks. *Journal of Economics and Business*, *120*, 106066. https://doi.org/10.1016/j.jeconbus.2022.106066.

Steeley, J. M. (2006). Volatility Transmission between Stock and Bond markets. *Journal* *of International Financial Markets, Institutions and Money*, *16*(1), 71-86. https://doi.org/10.1016/j.intfin.2005.01.001.

Tian, S., & Hamori, S. (2016). Time-Varying Price Shock Transmission and Volatility Spillover in Foreign Exchange, Bond, Equity, and Commodity Markets: Evidence from the United States. *The North American Journal of Economics and Finance*, *38*, 163-171. https://doi.org/10.1016/j.najef.2016.09.004.

Torun, E. & Demireli, E. (2010). Getiri ve Volatilitenin Etkileşimi: Amerika ve Türkiye Tahvil Piyasaları Örneği. *Nevşehir Hacı Bektaş Veli Üniversitesi SBE Dergisi*, *10*(1), 403-424.

Uddin, G. S., Yahya, M., Park, D., Hedström, A., & Tian, S. (2024). Bond Market Spillover Networks of ASEAN-4 Markets: Is the Global Pandemic Different? *International Review of Economics and Finance*, *92*, 1028–1044. https://doi.org/10.1016/j.iref.2024.02.065.

Viceira, L. M. (2012). Bond Risk, Bond Return Volatility, and the Term Structure of Interest Rates. *International Journal of Forecasting*, *28*(1), 97-117.

Wang, S., Wang, X., & Xu, L. (2023). Debt Maturity Structure and the Quality of Risk Disclosures. *Journal of Corporate Finance*, *83,* 102503. https://doi.org/10.1016/j.jcorpfin.2023.102503.

Wei, X., Xiao, X., Zhou, Y., & Zhou, Y. (2023). Spillover Effects between Liquidity Risks Through Endogenous Debt Maturity. *Journal of Financial Markets*, *64*. https://doi.org/10.1016/j.finmar.2023.100814

Won, S., Yun, Y. S., & Kim, B. J. (2013). Emerging Bond Market Volatility and Country Spreads. *Emerging Markets Finance and Trade*, *49*(1), 82-100.

Wu, J. Y., Opare, S., Bhuiyan, M. B. U., & Habib, A. (2022). Determinants and Consequences of Debt Maturity Structure: A Systematic Review of the International Literature. In *International Review of Financial Analysis, 84*, 102423. https://doi.org/10.1016/j.irfa.2022.102423.

Yavuz, H. H. (2012). Tahvil Piyasası Oynaklığının Belirlenmesinde Makroekonomik Değişenlerin Oynaklığının Analizi. *Maliye Finans Yazıları*, *16*(96), 15-33.

Young, P. J., & Johnson, R. R. (2004). Bond Market Volatility vs. Stock Market Volatility: The Swiss Experience. *Swiss Society for Financial Market Research*, *18*(1), 8-23.

Zaremba, A., Kizys, R., & Aharon, D. Y. (2021). Volatility in International Sovereign Bond Markets: The Role of Government Policy Responses to the COVID-19 Pandemic. *Finance Research Letters*, *43*, 102011. https://doi.org/10.1016/j.frl.2021.102011.

Zhang, H., Guo, B., & Liu, L. (2022). The Time-Varying Bond Risk Premia in China. *Journal of Empirical Finance*, *65*, 51–76. https://doi.org/10.1016/j.jempfin.2021.11.004.

Zhang, Y., Wang, M., Xiong, X., & Zou, G. (2021). Volatility spillovers between stock, bond, oil, and gold with portfolio implications: Evidence from China. *Finance Research Letters*, *40*, 101786. https://doi.org/10.1016/j.frl.2020.101786.

Zhang, X., & Zhang, Z. (2023). The Cross-section of Chinese Corporate Bond Returns. *Journal of Finance and Data Science*, *9,* 100100. https://doi.org/10.1016/j.jfds.2023.100100.

Zhou, Y., & Wei, X. (2023). Bond Liquidity, Debt Maturity and Bond Risk Premium. *Finance Research Letters*, *54,* 103716. https://doi.org/10.1016/j.frl.2023.103716.

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