Available online at www.sciencedirect.com

Borsa İstanbul Review

Borsa İstanbul Review 20-3 (2020) 236–243
http://www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Full Length Article

Time-varying propagations between oil market shocks and a stock market: Evidence from Turkey

Onur Polat

Bilecik Seyh Edebali University, Department of Public Finance, Faculty of Economic and Administrative Sciences, 1st Floor, Bilecik Seyh Edebali University Gulumbe Campus, 11210, Bilecik, Turkey

Received 3 July 2019; revised 5 January 2020; accepted 5 January 2020
Available online 10 January 2020

Abstract

We use a Bayesian time-varying parameter vector autoregression (TVP-VAR) model to examine the time-varying transmission mechanisms between structural oil price shocks and Borsa Istanbul, Turkey's stock market (BIST). Our data span the period February 1988 to December 2018, and include monthly West Texas Intermediate (WTI) spot crude oil prices, world crude oil production data, a measure of global real economic activity (the Kilian Index), and BIST data. Accordingly, we contribute to the literature by using a novel approach to estimate the time-varying propagations between oil-specific shocks and financial activity in Turkey. Our results are in line with those of related studies, thus verifying the consistency of the TVP-VAR model in capturing the time-varying nature of oil price shocks.

JEL classification: E44; G10; Q43

Keywords: Oil price shocks; TVP-VAR; BIST

1. Introduction

The high dependence of both emerging and advanced economies on energy means oil price shocks adversely affect countries' real and financial sectors, through various transmission channels. For example, the 1973 and 1979 oil crises caused significant imbalances in the world economy in the 1970s. The 1973 oil crisis emerged after an embargo imposed by the Organization of Petroleum Exporting Countries (OPEC) on October 19, 1973, which caused oil prices to quadruple. At the same time, the global oil supply dropped by 7.5% (Hamilton, 2011) and US inflation increased. Similarly, the 1979 oil crisis resulted in a decrease in US output, with negative effects that spilled over to the rest of the world economy (Sachs, 1982).

The impacts of oil shocks on the economy have been researched in detail since the 1970s oil crises. Furthermore, scholars and policymakers now focus on the short- and long-term effects of oil price shocks on financial and/or macroeconomic indicators. As such, the linkages between oil price shocks and these indicators are accounted for both quantitatively (Enzler & Pierce, 1974; Gisser & Goodwin, 1986; Hamilton, 1983; Mork, 1989) and qualitatively (Bruno & Sachs, 1985; Mork, 1994).

Turkey has faced several financial imbalances and economic crises following the liberalization policies of the 1980s (Akyüz & Boratav, 2003). The liberalization of the capital account in 1989 increased the vulnerability of the Turkish economy to external shocks. Despite the stabilization of the Turkish economy in December 1999, with the support of Bretton Woods Institutions, the country again struggled with financial/political imbalances in 2006, 2008, 2013, 2016, and

E-mail address: onur.polat@bilecik.edu.tr.
Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

https://doi.org/10.1016/j.bir.2020.01.001

2018, which adversely affected its financial system (Polat & Ozkan, 2019). In addition, the TRY[1] depreciated against the USD by over 57% in August 2018. Thus, because Turkey is a net importer of oil and an emerging economy, the spot crude oil price had a significant effect on the country. Here, we investigate the time-varying effects of oil price shocks on the Turkish economy, via the stock market channel. Accordingly, our results provide valuable insight into the time-varying nature of these effects on an emerging economy.

As stated, we investigate the time-varying nature of structural shocks in the global oil market, as well as how these shocks are transmitted to BIST. To do so, we apply a Bayesian estimation of the time-varying parameter vector autoregression (TVP-VAR) model of Del Negro and Primiceri (2015), which allows the coefficients and the variance-covariance matrix of the innovations to change over time. The TVP-VAR model allows us to identify the time-varying nature of the transmissions between the variables, as well as the heteroscedasticity of the innovations.

The rest of the paper is structured as follows. Section 2 reviews the related literature, which includes studies on the effects of oil price shocks on economic activity. Section 3 presents the data and the empirical model. Section 4 discusses our empirical results. Finally, Section 5 concludes the paper.

2. Literature review

The transmission mechanisms between the oil price shocks and financial/real indicators have been the subject of research since the seminal works of Enzler and Pierce (1974) and Rasche and Tatom (1977), who found negative effects of oil price shocks on US economic activity. Not all studies find a significant relationship between oil price shocks and real economic activity (Hamilton, 1983; Loungani, 1986). However, some identify a negative effect on US economic activity (Brown & Yucel, 1999; Ferderer, 1997; Hamilton, 1996), particularly during a recession (Hooker, 1996; Raymond & Rich, 1997), and others find an asymmetric relationship between oil price shocks and macroeconomic determinants (Mork, 1989; Mork, Olsen, & Mysen, 1994, Lee, Ni, & Ratti, 1995).

A recent strand of research finds adverse and significant effects of oil price shocks on the real economic activity of both emerging and advanced countries; see Lee, Lee, and Ratti (2001) (for the United States), Papapetrou (2001) (for Greece), Cuñado and de Gracia (2003) (for 15 European countries), Barsky and Kilian (2004) (for the United States), Guo and Kliesen (2005) (for the United States), and Tang, Wu, and Zhang (2010) (for China).

Another strand reports limited effects of the oil price shocks on macroeconomic indicators. For example, using an SVAR model, Blanchard and Gali (2007) found limited effects of oil price shocks on the macroeconomic performance of some advanced countries in the aftermath of the 1970s stagflation periods. Along similar lines, Álvarez, Hurtado, Sánchez, and Thomas (2011) examine the inflationary effects of oil price shocks in Spain, finding that such shocks have limited effects. Basnet and Upadhyaya (2015) state that the effects of oil price shocks on macroeconomic and financial variables are nonsignificant in the ASEAN-5 countries. A further body of literature focuses on the interaction mechanisms between oil price shocks and macroeconomic indicators for oil-importing/exporting countries. Jiménez-Rodríguez and Sánchez (2005) analyze such linkages for the G-7 countries, Norway and the euro area, finding the following: i) a significant and negative effect on the economic growth of oil-importing countries, except Japan; and ii) a positive effect on economic growth in Norway, and an adverse in the United Kingdom. Then, Cavalcanti and Jalles (2013) find that such shocks have a larger effect in Brazil than they do in the United States.

Many empirical studies analyze the relationships between oil price shocks and financial indicators using, for example, the OLS (Aloui, Nguyen, & Njeh, 2012; Basher & Sadorsky, 2006; Chen, Roll, & Ross, 1986; Faff & Brailsford, 1999; Jones & Kaul, 1996), GARCH (Filis, Degiannakis & Floros, 2011; Jammazi, 2012), Granger causality (Arouri & Nguyen, 2010; Jones & Kaul, 1996), VAR (Apergis & Miller, 2009; Ciner, 2001; Hammoudeh and Aleisa, 2004 Cunado & de Gracia, 2014; Huang, Masulis, & Stoll, 1996; Nazlioglu, Soytas, & Gupta, 2015; Park & Ratti, 2008; Sadorsky, 1999), and SVAR (Chen, Hamori, & Kinkyo, 2014; Kang et al., 2015; Wang, Wu, & Yang, 2013) methods.

Some researchers argue that such relationships are nonlinear (Basher & Sadorsky, 2006; Ciner, 2001; Wang et al., 2013), whereas others note that asymmetry dominates the transmissions between variables (Aloui et al., 2012; Cong, Wei, Jiao, & Fan, 2008). Lastly, many studies also find significant negative impacts of oil price shocks on financial indicators (Cunado & de Gracia, 2014; Jones & Kaul, 1996; Kang, Ratti, & Yoon, 2015a; Miller & Ratti, 2009; Park & Ratti, 2008; Sadorsky, 1999).

Several works analyze importing/exporting countries separately (Filis et al., 2011; Wang et al., 2013), finding conflicting results. Wang et al. (2013) propose that the effects of oil price shocks on financial activity vary depending on whether a country is a net importer or exporter of oil, although Filis et al. (2011) find no evidence to support this finding.

Note that the transmissions between oil price shocks and financial indicators have been analyzed by considering demand- and supply-side shocks (Apergis & Miller, 2009; Cunado & de Gracia, 2014).

Several recent studies investigate the spillover effects of oil price shocks on financial stress indices (Chen et al., 2014; Nazlioglu et al., 2015). Chen et al. (2014) employ an SVAR model that includes an oil supply shock, an oil-specific demand shock, an aggregate demand shock, and a financial shock. They use the Kansas City Financial Stress Index (KCFSI) as a proxy for global financial conditions, finding that oil prices decrease after a positive financial shock. Nazlioglu

[1] TRY is the abbreviation for the Turkish Lira.

et al. (2015) examine mean and volatility spillovers between oil prices and financial stress (Cleveland Financial Stress Index, CFSI) during pre-crisis, crisis, and post-crisis periods (2008 is the crisis period), finding the following: i) the relationship between the oil price and financial stress is dominated by long-run volatility; ii) oil prices Granger cause financial stress during the post-crisis period; and iii) financial stress Granger causes oil prices during a crisis period.

More recently, Kang, Ratti, and Yoon (2015b) empirically analyzed the time-varying effects of oil price shocks on US stock market returns using the Bayesian TVP-VAR model. Their results show that the standard deviation of demand-side structural shocks increased significantly during the global financial crisis (GFC), and that structural oil price shocks account for 25.7% of the long-term variation in the oil price.

Few studies have examined the transmissions between oil price dynamics and stock market returns for Turkey. Nevertheless, those that do employ empirical models such as GARCH-based models, copulas, and VAR models (e.g., SVAR, TVP-VAR). For example, using VAR models, several works find significant and positive impacts of oil price shocks on stock market returns in Turkey (Akgün, Şahin, & Yilmaz, 2013; Eryiğit, 2012; Toraman, Başarır, & Bayramoğlu, 2011).

In contrast, Soytas and Oran (2011) find no evidence of significant links between innovation in spot oil price growth and ISE100 returns in Turkey. The authors propose that the volatility of the world oil market does affect energy stock volatility in Turkey.

Others have analyzed the aforementioned relationship using sectoral-level data from the Turkey stock market. Sattary, Temurlenk, Bilgiç, and Çelik (2014) use a bi-variate GARCH (1,1) model to analyze whether volatility spillovers exist between the world oil market and several BIST sector indices (energy, non-metal mineral products, and transportation). Their empirical results assert that interactions between oil returns and the underlying sectors do exist, except in the non-metal mineral products sector. In a similar work, Gencer and Demiralay (2014) examine the volatility transmissions between oil and five sectors (banking, chemicals-petroleum-plastics, industrials, services) in the Turkish equity market, using a full-parameterization BEKK model. Their results show that volatility and news of the oil market affect banking market returns.

More recently, Akkoc and Civcir (2019) used an SVAR-DCC-GARCH model to analyze the dynamic relationship between oil and stock market returns in Turkey for the period after the 2008 GFC. Their findings verify the time-varying co-movements and volatility spillovers from oil to the Turkish stock market. Similarly, Bildirici (2019) investigates the existence of chaotic behavior in the oil price and stock market returns of Turkey by implementing TAR-TR-GARCH and TAR-TR-TGARCH copula models. Their estimation results show an asymmetric dependence that relies on the impacts of the oil price and the volatility of the stock market. Toparlı, Çatık, and Balcılar (2019) investigate the effects of oil price shocks and macroeconomic variables on the Turkish stock market using the TVP-VAR model, finding that positive oil price shocks had a negative effect on Turkish stock market returns, particularly after the 1994 Turkish financial crisis.

3. Data and methodology

3.1. Data

Our data set consists of monthly West Texas Intermediate (WTI) spot crude oil prices; world crude oil production in millions of barrels per day, averaged monthly; and Kilian Index[2] and BIST data, all for the period February 1988 to December 2018. The oil price data were collected from the FRED database of the St. Louis Federal Reserve. The oil production data were obtained from the U.S. Energy Information Administration (EIA), and the BIST data are taken from Bloomberg. The Kilian Index data are taken from Lutz Kilian's personal web page.[3]

3.2. Methodology

3.2.1. TVP-VAR model

We employ the TVP-VAR model of Primiceri (2005) and Del Negro and Primiceri (2015) to detect the time-varying nature of the effects of oil-specific shocks on BIST returns. The TVP-VAR model consists of a time-varying variance-covariance matrix with an efficient Markov chain Monte Carlo (MCMC) algorithm for the posterior computation. The model is constructed as follows.

Consider the following multivariate time series model, with time-varying coefficients and a time-varying variance-covariance matrix of additive innovations:

$$y_t = c_t + B_{1,t}y_{t-1} + \ldots + B_{t,k}y_{t-k} + u_t, t = 1, \ldots., T, \quad (1)$$

where y_t is an $n \times 1$ vector of endogenous variables, c_t is an $n \times 1$ vector of time-varying coefficients, $B_{i,t}, i = 1, \ldots, k$, are $n \times n$ matrices of time-varying coefficients, and u_t are heteroscedastic unobservable shocks with variance-covariance matrix ψ_t, given by:

$$A_t \psi_t A_t^{'} = \Sigma_t \Sigma_t^{'}, \quad (2)$$

where A_t is the lower triangular matrix

$$A_t = \begin{bmatrix} 1 & 0 & \cdots & 0 \\ \alpha_{21,t} & 1 & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ \alpha_{n1,t} & \cdots & \alpha_{nn-1,t} & 1 \end{bmatrix}, \quad (3)$$

and Σ_t is the diagonal matrix

[2] Kilian (2009) developed a monthly index for global real activity, based on global dry cargo single voyage ocean freight rates. We use the *Kilian Index* as a proxy for global real activity.

[3] The Kilian Index is available from https://sites.google.com/site/lkilian2019/research/data-sets.

$$\Sigma_t = \begin{bmatrix} \sigma_{1t} & 0 & \cdots & 0 \\ 0 & \sigma_{2t} & \ddots & \vdots \\ \vdots & \ddots & \ddots & 0 \\ 0 & \cdots & \sigma_{nt} & 1 \end{bmatrix}. \quad (4)$$

Here, Σ_t follows the equations:

$$y_t = c_t + B_{1,t}y_{t-1} + \ldots + B_{k,t}y_{t-k} + A_t^{-1}\Sigma_t\varepsilon_t \quad (5)$$

$$V(\varepsilon_t) = I_{n,} \quad (6)$$

where

$$y_t = X_t^{'}B_t + A_t^{-1}\Sigma_t\varepsilon_t \quad (7)$$

$$y_t = I_n \otimes \left[1, y_{t-1}^{'}, \ldots, y_{t-k}^{'}\right], \quad (8)$$

where $\otimes$ represents the Kronecker product. The dynamics of the model's time-varying parameters are given as follows:

$$\boldsymbol{B_t} = \boldsymbol{B}_{t-1} + \boldsymbol{v_t} \quad (9)$$

$$\alpha_t = \alpha_{t-1} + \eta_t \quad (10)$$

$$log\sigma_t = log\sigma_{t-1} + \xi_t. \quad (11)$$

All innovations in the model are assumed to be jointly normally distributed, with the following variance-covariance matrix:

$$V = Var\begin{pmatrix} \varepsilon_t \\ v_t \\ \eta_t \\ \xi_t \end{pmatrix} = \begin{bmatrix} I_n & 0 & 0 & 0 \\ 0 & Q & 0 & 0 \\ 0 & 0 & S & 0 \\ 0 & 0 & 0 & W \end{bmatrix}, \quad (12)$$

where I_n is an n-dimensional identity matrix, and Q, S, and W are positive-definite matrices.

Once the reduced form of the VAR model in (1) is estimated, the SVAR representation is specified by $\varepsilon_t = A_t^{-1}\Sigma_t u_t$ in the following equation:

$$y_t = z_t\alpha_t + A_t^{-1}\Sigma_t u_t,\ u_t \sim N(0, I_m) \quad (13)$$

In (13), the first block of endogenous variables within y_t includes, in order, the first difference of the natural logarithm of the global oil supply ($\Delta oilprod_t$), the first difference of real world demand (Δrea_t), the first difference of the natural logarithm of the real oil price (Δrpo_t), and the first difference of the natural logarithm of BIST ($\Delta bist_t$).

4. Results

4.1. Dynamics of real oil price, real world demand, oil supply, and BIST returns

Fig. 1 shows the monthly real WTI crude oil prices, real world demand, world crude oil production, and BIST returns for the study period.

As depicted in Fig. 1, the oil price varied between USD 20 and USD 140, reaching a peak around July 2008, before then decreasing until January 2009. Oil shocks (from both the oil price and the oil supply) are driven by well-known prominent geopolitical incidents, such as the Gulf War in 1990, Iraq War in 2003, oil spike in 2008, and Arab Spring in 2011. In the same period, BIST returns varied between −0.3 and 0.3, clearly indicating the prominent financial stress events (e.g., the 1989 stock market crash, 1994 Turkey currency crisis, 2001 February Turkey financial crisis, and 2008 GFC).

The dynamics of oil price returns and BIST returns are overlaid in Fig. 2 to show the interconnectedness between the two series.

Fig. 2 shows a strong relationship between oil price returns and BIST returns, which may lead to time-varying structural shocks from the oil price to the stock market. Accordingly, we analyze the Bayesian time-varying structural shocks driven by oil prices to the stock market using the TVP-VAR model. Before identifying the TVP-VAR model, we test the stationarity of the variables by carrying out augmented Dickey–Fuller (ADF), Phillips–Perron (PP), and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) tests for each series.[4]

The ADF and PP tests reject the null hypothesis of non-stationarity for the variables in the first difference at the 1% significance level. The KPSS test confirms the stationarity for the variables in the first difference. Consequently, the first differences of the series are I(0) in their level form.

We follow Koop, Leon-Gonzalez, and Strachan (2009) and Kang et al. (2015b) to specify the time-varying reduced form of the VAR model. The model is a state-space model, in which the coefficients and variance-covariance matrix of the innovations vary over time. The model is specified as follows:

$$y_t = z_t\alpha_t + \varepsilon_t, \quad (14)$$

and the state equation is given by

$$\alpha_{t+1} = \alpha_t + k_{1t}\zeta_t, \quad (15)$$

where y_t is an $m \times 1$ vector of endogenous variables; $z_t = (c_t, y_{t-1}, \ldots, y_{t-p})$, where p represents the appropriate lag length of the endogenous variables; $\alpha_t = (\alpha_{0,t}, \alpha_{1,t}, \ldots, \alpha_{p,t})$ are coefficients; $\varepsilon_t \sim N(0, H_t)$ is the error term in (14); and $\zeta_t \sim N(0, \Theta)$ is the error term of the state equation. The optimal lag p is set to 2 in the model, based on the Akaike information criteria (AIC) and Bayes–Schwarz information criterion (BSC) in (14). For the priors, we follow Primiceri (2005), Koop et al. (2009), and Kang et al. (2015b), and use data for the first 5 years as training data (i.e., February 1988 to April 1993). Fig. 3 shows the posterior means and the 16th and 84th percentiles of the time-varying standard deviation of the stock price returns for the period May 1993 to December 2018.

As shown in Fig. 3, the time-varying standard deviation of the BIST returns peaks between 2000 and 2001, coinciding with the 2001 financial crisis in Turkey. The time-varying standard deviation of the BIST returns decreases after 2001, reflecting the recovery in the country's financial condition,

[4] The unit-root tests are conducted on the natural logarithm of the oil prices, the natural logarithm of oil production, and the BIST data.

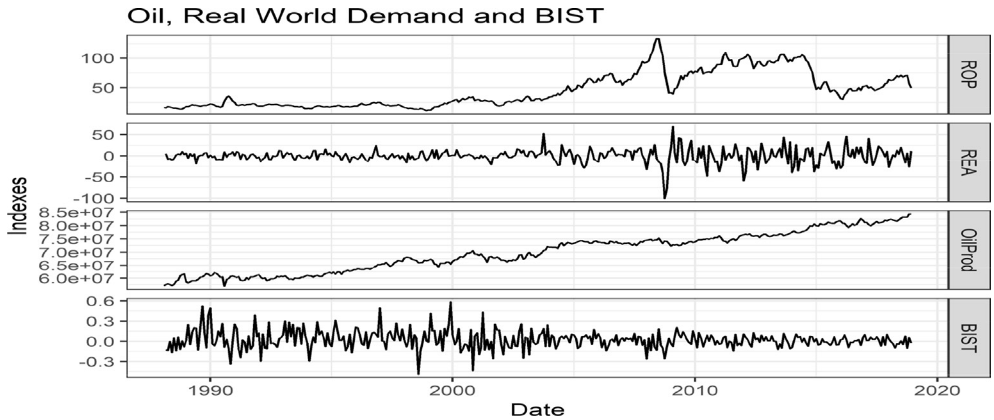

Fig. 1. Dynamics of oil prices, oil supply, and BIST returns for the period February 1988 to December 2018. **Notes:** Oil supply (world oil production) data are given in thousand bbl per month.

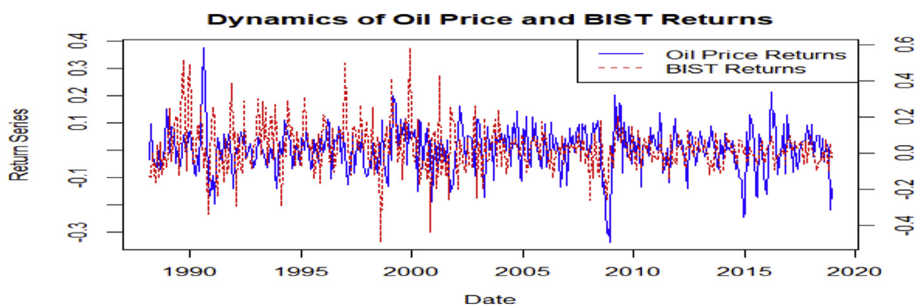

Fig. 2. Dynamics of oil price returns and BIST returns for the period February 1988 to December 2018.

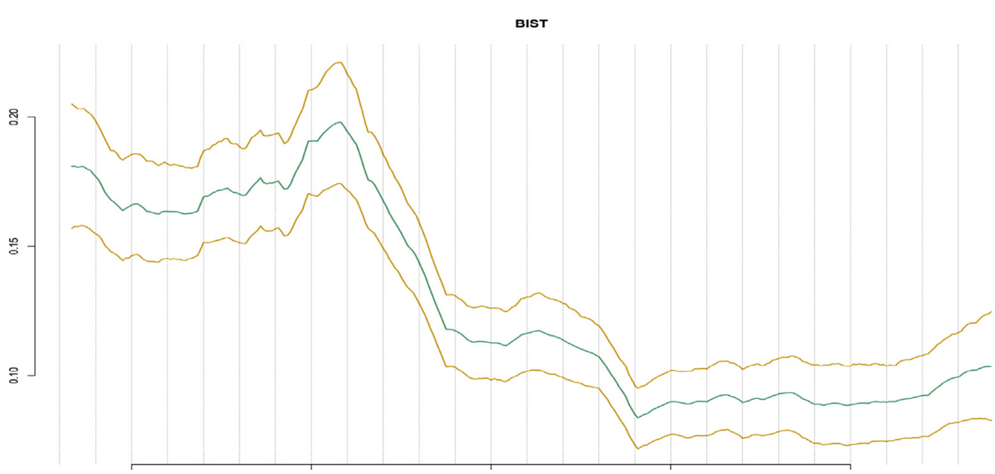

Fig. 3. Time-varying standard deviation of BIST returns.

reaching a trough in 2009. The volatility of the BIST returns begins to increase in 2016. According to Polat and Ozkan (2019), political and economic imbalances may lead to a slight increase in the volatility of the BIST.

In the next step, we follow Kang et al. (2015b) to provide the posterior coefficients of the variables with lag 1 in the TVP-VAR. These correspond to the time-varying coefficients of the lagged real oil price (Δrop_{t-1}), real economic activity (Δrea_{t-1}), and BIST ($\Delta BIST_{t-1}$) in the SVAR model. Consequently, the coefficients indicate the time-varying nature of each parameter in the BIST returns. The posterior coefficients of the lagged oil supply in the oil price are provided to capture the time-varying nature of global oil production in the real oil price equation. Fig. 4 exhibits the posterior means of the coefficients of the variables with lag 1.

As shown in Fig. 4, the posterior mean of the oil price coefficients in the BIST returns equation in the SVAR model has decreased significantly since 1995. In contrast, the posterior mean of the real economic activity coefficients in the BIST returns in the SVAR model has increased since 2004.

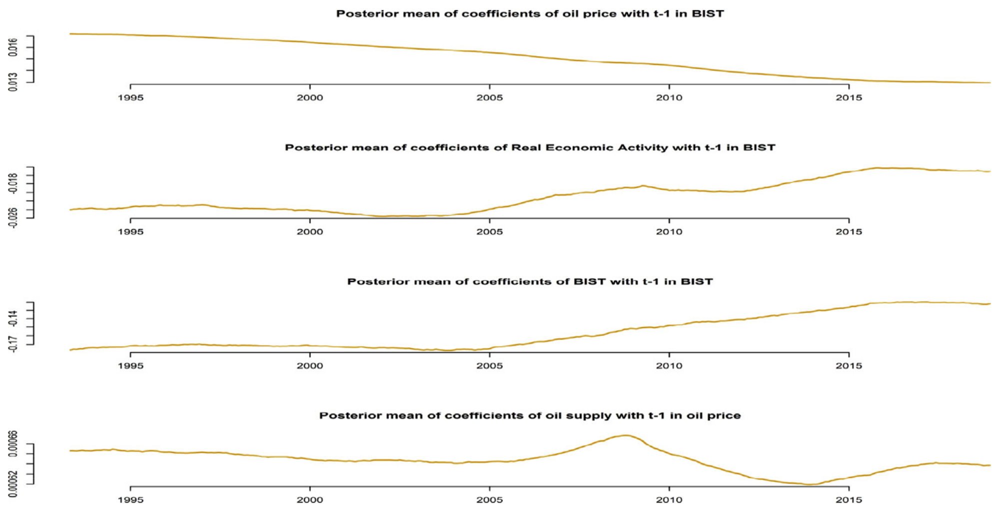

Fig. 4. Posterior means of coefficients of variables with lag 1 in TVP-VAR

Then, the index of the posterior mean of the coefficients of the BIST returns with lag 1 in the BIST returns has increased significantly since 2005. The posterior mean of the coefficients of the global oil supply in the oil price increased significantly between 2005 and 2008, peaking in 2008 (the 2008 oil spike).

We execute the MCMC algorithm 50,000 times, with the first 5000 draws initialized for burn-in to identify the impulse responses. The impulse response functions (IRFs) are calculated from the TVP-VAR model fit; the diagonal elements in the variance-covariance matrix are set to their averages, and the off-diagonal elements are specific to time, as in Del Negro and Primiceri (2015). Figs. 5 and 6 show the response of stock returns to one standard deviation structural oil price and real economic activity shocks; the 5, 25, 50, 75, and 95 percent quantiles are shown.

As shown in Fig. 5, the impact response of the BIST returns to a one percent permanent increase in the oil price is initially negative, becomes positive approximately two months after the shock, until the seventh month, and then flattens out. The dynamics of the IRF are in line with the empirical findings of Toraman et al. (2011), Eryiğit (2012), and Akgün et al. (2013). On the other hand, according to Toparlı et al. (2019), the positive oil price shocks have a negative effect on Turkish stock returns between June 1993 and November 1994. In the empirical model of Toparlı et al. (2019), the log of the crude oil price in Turkish lira is deflated using the consumer price index. In addition, the authors use macroeconomic variables (i.e., real effective exchange rates, industrial production index, and real interest rate) to reflect real/financial activity in Turkey, rather than global real activity in the TVP-VAR model. Finally, in our estimation, the diagonal elements of the variance-covariance matrix are set to their averages over time, whereas the off-diagonal elements are specific to time t, following Del Negro and Primiceri (2015). However; in Toparlı et al. (2019), the responses of each variable are obtained by equating the initial shock size to the time-series average of the stochastic volatility over the data period. The above-mentioned methodological specifications may lead to a difference in the impact responses of BIST returns to a positive oil price shock. Fig. 6 shows the response of the BIST to a one standard deviation structural real economic activity shock.

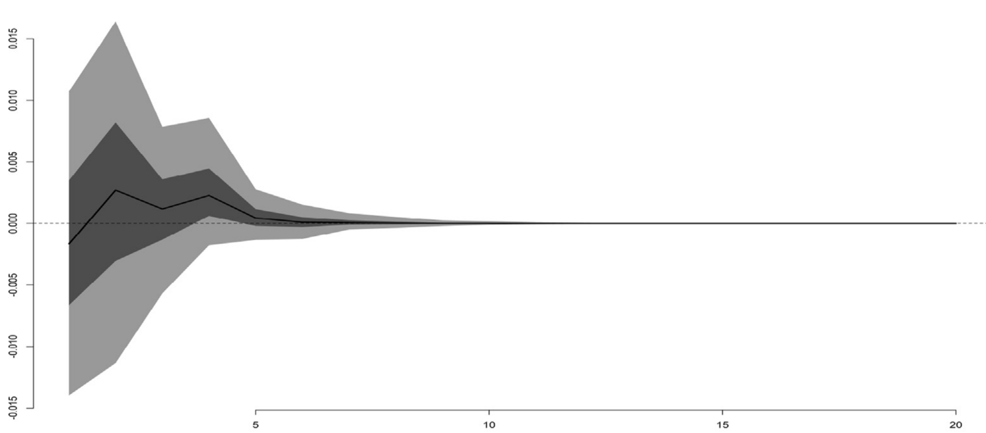

Fig. 5. Response of BIST returns to structural oil price shock.

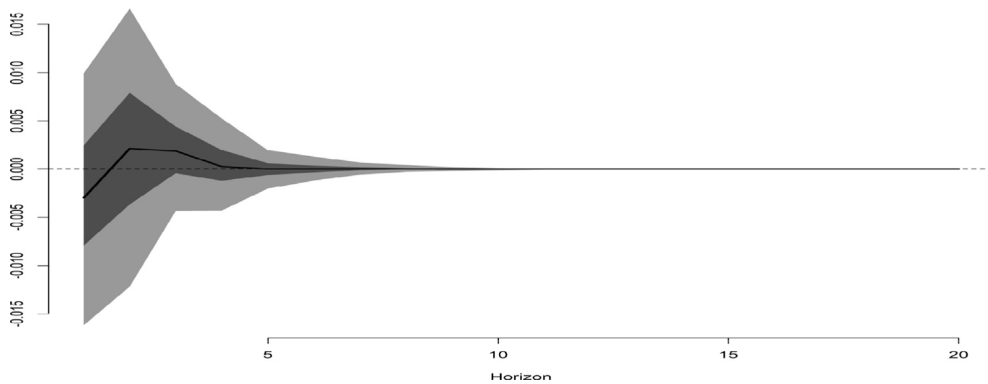

Fig. 6. Response of BIST returns to a structural real economic activity shock.

The impact response of the BIST returns to a one positive standard deviation real economic activity shock is initially negative, becomes positive after approximately two months, and then stabilizes from the fifth month. This empirical finding is consistent with the impact response of the BIST returns to a positive industrial production shock estimated in Toparlı et al. (2019). Thus, a recovery in real economic activity leads to an increase in short-term BIST returns.

5. Conclusion

In this study, we examine the time-varying transmissions of structural shocks built from the global oil market and real economic activity to the BIST by employing the TVP-VAR model. The volatility the BIST create proper signs to the well-known financial stress events over the investigation period. The dynamics of the impulse responses reveal that the initial response of the BIST is negative to a positive oil price shocks, yet it reverses back and flattens out in the long-term. This empirical finding is in line with the previous studies, e.g., Toraman et al. (2011), Eryiğit (2012), and Akgün et al. (2013). On the other hand, positive global economic activity shocks lead to an increase in the BIST returns.

Our study has important implications. Since oil price shocks have a significant impact on the BIST returns, policymakers need to build an effective regulatory framework to monitor oil price fluctuations. In this respect, modern commodity price risk management tools could be helpful. The results are also valuable for a potential stakeholder such as a global investor in an emerging market who can benefit from the short-term oil price movements, yet those type of capital flows might be speculative and in the long-term negative for the emerging country.

References

Akgün, A., Şahin, İ. E., & Yilmaz, B. (2013). The effect of variations in gold and oil prices on BIST 100 Index. *Mediterranean Journal of Social Sciences, 4*(10), 726.

Akkoc, U., & Civcir, I. (2019). Dynamic linkages between strategic commodities and stock market in Turkey: Evidence from SVAR-DCC-GARCH model. *Resources Policy, 62*, 231−239.

Akyüz, Y., & Boratav, K. (2003). The making of the Turkish financial crisis. *World Development, 31*(9), 1549−1566.

Aloui, C., Nguyen, D. K., & Njeh, H. (2012). Assessing the impacts of oil price fluctuations on stock returns in emerging markets. *Economic Modelling, 29*(6), 2686−2695.

Álvarez, L. J., Hurtado, S., Sánchez, I., & Thomas, C. (2011). The impact of oil price changes on Spanish and euro area consumer price inflation. *Economic Modelling, 28*(1), 422−431.

Apergis, N., & Miller, S. M. (2009). Do structural oil-market shocks affect stock prices? *Energy Economics, 31*(4), 569−575.

Arouri, M. E. H., & Nguyen, D. K. (2010). Oil prices, stock markets and portfolio investment: Evidence from sector analysis in Europe over the last decade. *Energy Policy, 38*(8), 4528−4539.

Barsky, R. B., & Kilian, L. (2004). Oil and the macroeconomy since the 1970s. *The Journal of Economic Perspectives, 18*(4), 115−134.

Basher, S. A., & Sadorsky, P. (2006). Oil price risk and emerging stock markets. *Global Finance Journal, 17*(2), 224−251.

Basnet, H. C., & Upadhyaya, K. P. (2015). Impact of oil price shocks on output, inflation and the real exchange rate: Evidence from selected ASEAN countries. *Applied Economics, 47*(29), 3078−3091.

Bildirici, M. (2019). The chaotic behavior among the oil prices, expectation of investors and stock returns: TAR-TR-GARCH copula and TAR-TR-TGARCH copula. *Petroleum Science, 16*(1), 217−228.

Blanchard, O. J., & Gali, J. (2007). *The macroeconomic effects of oil shocks: Why are the 2000s so different from the 1970s?* Cambridge, MA: National Bureau of Economic Research.

Brown, S. P., & Yucel, M. K. (1999). Oil prices and US aggregate economic activity: A question of neutrality. *Economic and Financial Review*, 16−23.

Bruno, M., & Sachs, J. D. (1985). *Economics of worldwide stagflation*. National Bureau of Economic Research, Inc.

Cavalcanti, T., & Jalles, J. T. (2013). Macroeconomic effects of oil price shocks in Brazil and in the United States. *Applied Energy, 104*, 475−486.

Chen, W., Hamori, S., & Kinkyo, T. (2014). Macroeconomic impacts of oil prices and underlying financial shocks. *Journal of International Financial Markets, Institutions and Money, 29*, 1−12.

Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. *Journal of Business*, 383−403.

Ciner, C. (2001). Energy shocks and financial markets: Nonlinear linkages. *Studies in Nonlinear Dynamics & Econometrics, 5*(3), 203−212.

Cong, R. G., Wei, Y. M., Jiao, J. L., & Fan, Y. (2008). Relationships between oil price shocks and stock market: An empirical analysis from China. *Energy Policy, 36*(9), 3544−3553.

Cuñado, J., & de Gracia, F. P. (2003). Do oil price shocks matter? Evidence for some European countries. *Energy Economics, 25*(2), 137−154.

Cunado, J., & de Gracia, F. P. (2014). Oil price shocks and stock market returns: Evidence for some European countries. *Energy Economics, 42*, 365−377.

Del Negro, M., & Primiceri, G. E. (2015). Time-varying structural vector autoregressions and monetary policy: A corrigendum. *The Review of Economic Studies, 82*(4), 1342−1345.

Enzler, J., & Pierce, J. (1974). The effects of inflationary shocks. *Brookings Papers on Economic Activity, 1*, 13−54.

Eryiğit, M. (2012). The dynamical relationship between oil price shocks and selected macroeconomic variables in Turkey. *Economic Research-Ekonomska istraživanja, 25*(2), 263−276.

Faff, R. W., & Brailsford, T. J. (1999). Oil price risk and the Australian stock market. *Journal of Energy Finance & Development, 4*(1), 69−87.

Ferderer, J. P. (1997). Oil price volatility and the macroeconomy. *Journal of Macroeconomics, 18*(1), 1−26.

Filis, G., Degiannakis, S., & Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. *International Review of Financial Analysis, 20*(3), 152−164.

Gisser, M., & Goodwin, T. H. (1986). Crude oil and the macroeconomy: Tests of some popular notions: Note. *Journal of Money, Credit, and Banking, 18*(1), 95−103.

Guo, H., & Kliesen, K. L. (2005). Oil price volatility and US macroeconomic activity. *Review-Federal Reserve Bank of Saint Louis, 87*(6), 669−684.

Hamilton, J. D. (1983). Oil and the macroeconomy since World War II. *Journal of Political Economy, 91*(2), 228−248.

Hamilton, J. D. (1996). This is what happened to the oil price-macroeconomy relationship. *Journal of Monetary Economics, 38*(2), 215−220.

Hamilton, J. D. (2011). *Historical oil shocks (No. w16790)*. National Bureau of Economic Research.

Hammoudeh, S., & Aleisa, E. (2004). Dynamic relationships among GCC stock markets and NYMEX oil futures. *Contemporary Economic Policy, 22*(2) (Contemporary Economic Policy).

Hooker, M. A. (1996). What happened to the oil price-macroeconomy relationship? *Journal of Monetary Economics, 38*(2), 195−213.

Huang, R. D., Masulis, R. W., & Stoll, H. R. (1996). Energy shocks and financial markets. *Journal of Futures Markets, 16*(1), 1−27.

Jammazi, R. (2012). Oil shock transmission to stock market returns: Wavelet-multivariate Markov switching GARCH approach. *Energy, 37*(1), 430−454.

Jiménez-Rodríguez, R., & Sánchez, M. (2005). Oil price shocks and real GDP growth: Empirical evidence for some OECD countries. *Applied Economics, 37*(2), 201−228.

Jones, C. M., & Kaul, G. (1996). Oil and the stock markets. *The Journal of Finance, 51*(2), 463−491.

Kang, W., Ratti, R. A., & Yoon, K. H. (2015a). The impact of oil price shocks on the stock market return and volatility relationship. *Journal of International Financial Markets, Institutions and Money, 34*, 41−54.

Kang, W., Ratti, R. A., & Yoon, K. H. (2015b). Time-varying effect of oil market shocks on the stock market. *Journal of Banking & Finance, 61*, S150−S163.

Kilian, L. (2009). Not all oil price shocks are alike: Disentangling demand and supply shocks in the crude oil market. *The American Economic Review, 99*(3), 1053−1069.

Koop, G., Leon-Gonzalez, R., & Strachan, R. W. (2009). On the evolution of the monetary policy transmission mechanism. *Journal of Economic Dynamics and Control, 33*(4), 997−1017.

Lee, B. R., Lee, K., & Ratti, R. A. (2001). Monetary policy, oil price shocks, and the Japanese economy. *Japan and the World Economy, 13*(3), 321−349.

Lee, K., Ni, S., & Ratti, R. A. (1995). Oil shocks and the macroeconomy: The role of price variability. *Energy Journal*, 39−56.

Loungani, P. (1986). Oil price shocks and the dispersion hypothesis, 1900−1980. In *Rochester Center for Economic Research Working Paper* (p. 33).

Miller, J. I., & Ratti, R. A. (2009). Crude oil and stock markets: Stability, instability, and bubbles. *Energy Economics, 31*(4), 559−568.

Mork, K. A. (1989). Oil and the macroeconomy when prices go up and down: An extension of Hamilton's results. *Journal of Political Economy, 97*(3), 740−744.

Mork, K. A., Olsen, Ø., & Mysen, H. T. (1994). Macroeconomic responses to oil price increases and decreases in seven OECD countries. *Energy Journal*, 19−35.

Nazlioglu, S., Soytas, U., & Gupta, R. (2015). Oil prices and financial stress: A volatility spillover analysis. *Energy Policy, 82*, 278−288.

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics, 23*(5), 511−532.

Park, J., & Ratti, R. A. (2008). Oil price shocks and stock markets in the US and 13 European countries. *Energy Economics, 30*(5), 2587−2608.

Polat, O., & Ozkan, I. (2019). Transmission mechanisms of financial stress into economic activity in Turkey. *Journal of Policy Modeling, 41*(2), 395−415.

Primiceri, G. E. (2005). Time-varying structural vector autoregressions and monetary policy. *The Review of Economic Studies, 72*(3), 821−852.

Rasche, R. H., & Tatom, J. A. (1977). *Energy resources and potential GNP* (Vol. 6, pp. 10−24). St. Louis Review: Federal Reserve Bank of.

Raymond, J. E., & Rich, R. W. (1997). Oil and the macroeconomy: A Markov state-switching approach. *Journal of Money, Credit, and Banking*, 193−213.

Sachs, J. D. (1982). *Aspects of the current account behavior of OECD economies*. NBER. Working Paper No. 859.

Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy Economics, 21*(5), 449−469.

Sattary, A., Temurlenk, M. S., Bilgiç, A., & Çelik, A. K. (2014). Volatility spillovers between world oil market and sectors of BIST. *Asian Social Science, 10*(8), 156.

Soytas, U., & Oran, A. (2011). Volatility spillover from world oil spot markets to aggregate and electricity stock index returns in Turkey. *Applied Energy, 88*(1), 354−360.

Tang, W., Wu, L., & Zhang, Z. (2010). Oil price shocks and their short-and long-term effects on the Chinese economy. *Energy Economics, 32*, S3−S14.

Toparlı, E. A., Çatık, A. N., & Balcılar, M. (2019). The impact of oil prices on the stock returns in Turkey: A TVP-VAR approach. *Physica A: Statistical Mechanics and Its Applications, 535*, 122392.

Toraman, C., Başarır, Ç., & Bayramoğlu, M. F. (2011). Effects of crude oil price changes on sector indices of Istanbul stock exchange. *European Journal of Economic and Political Studies, 4*(2).

Wang, Y., Wu, C., & Yang, L. (2013). Oil price shocks and stock market activities: Evidence from oil-importing and oil-exporting countries. *Journal of Comparative Economics, 41*(4), 1220−1239.