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The Influence of FOMC Minutes for Asset Prices in BRICS Countries and Turkey through GARCH Volatility Modeling

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Abstract

This study aims to analyze the effect of releases of FOMC minutes on the BRICS countries' asset prices and Turkey's asset prices. The novel data from minutes, which is set by the Federal Open Market Committee, is taken into account for the FOMC announcements. The sample data for the study also includes asset prices of these countries. In order to measure the volatility, the methodology of GARCH modeling is used in this study. The empirical findings provide important impacts of those FOMC announcements on the mean and volatility of asset prices. The GARCH volatility modeling offers remarkable results in decision-making for financial institutions, investors and policymakers.

Keywords: FOMC minutes, asset markets, GARCH volatility
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1. Introduction

The study examines the influences of the releases of minutes from the US Federal Open Market Committee (FOMC) of the Federal Reserve (Fed) on the high frequency asset prices in BRICS countries and Turkey. Apergis (2014) emphasizes that FOMC minutes are prominent to understand the shifts in the central bank's emphases. The emphases of the central bank are not only based on the short-run response of asset prices, but also based on the economic outlook and risks involved with the long-run path of the state of the a country in terms of the production and consumption of goods and services and the supply of money. Since these concerns are influential on the investors' decisions for the economy in these countries, the study offers remarkable results for the market participants and policymakers while making adjustments to the dynamics of monetary policy, output, growth and inflation.

Asset prices respond in a particular way when there are unexpected changes in monetary policy implications. Since asset prices act in response to these changes, the reactions are progressive when they include innovation and development. According to Bernanke and Kuttner (2005), the decisions, which are made about monetary policy, enable the market participants to reconsider their expectations. In this respect, they have a great influence on the volatility of financial market prices.

Blinder, Ehrmann, et al. (2008) emphasize that communication is a key to development and a prominent part of the central bank's activities for a certain purpose. Through the use of effective communication, the financial markets can go in a specified direction to manage the economic objectives of central banks. When there are high expectations for the future central bank behaviors, the linkage between short-term interest rates and long-term interest rates can be easily assessed. Therefore, there is an important impact of the interest rates on the real economy while making decisions about investment, consumption and economic output. There are important studies, which examine the asset market reactions to news about the monetary policy and changes in monetary policy decisions coming from the expectations.

Gurkaynak, Sack and Swanson (2005) and Wongswan (2006) contend that the asset markets in the US respond significantly to news about the actions undertaken by the Fed. In addition, Anderson, Bollerslev, et al. (2005) find that the volatility of US long-term bond yields increases because of the monetary policy decisions.

Apergis (2014) defends that the FOMC is responsible for offering transparency to increase the well-being of markets in the US. When the transparency is maintained, the policy actions can be easily anticipated in the future. According to Apergis (2014), the FOMC announcements consist of three main steps. The first announcement is determined for the policy practices accepted at the end of each FOMC meeting. The second formal announcement is based on nominal targets for the federal funds rate. Lastly, the third announcement is about the release of the minutes of the FOMC meetings that can be accomplished more quickly (Apergis, 2014). In light of the articulations above, financial markets can receive an advantage and a profit through the use of releases of FOMC minutes that determines the nature of expectations about the interest rates in the future. In other words, individuals taking part in financial markets can reconsider their expectations about the effect of interest rates on asset prices if they are aware of the releases of FOMC minutes. Rosa's (2013) survey on the effect of the releases of FOMC minutes on the asset prices in the US shows that the asset price response to the minutes has shrunk since 2008 whereas asset price volatility increases because of the FOMC minutes.

Researchers examining not only the impact of central banks' decisions, but also asset price responses to FOMC announcements provide remarkable results in the literature. However, a few limited studies have been done based on the influences of the releases of FOMC minutes on asset prices. Frino and Hill (2001) carry out a conditional volatility analysis. Their results show that there have been eight monetary policy announcements that affect the Australian asset market. Bernanke and Kuttner (2005) contend that there is an inevitable impact of monetary policy announcements on equity prices. When Craine and Martin's (2008) study based on spillovers of monetary policy shocks between the US and Australia is taken into consideration, the results confirm that the monetary policy shocks in the US significantly affect the Australian asset prices.

Moreover, there exists another research path in the literature, which analyzes the impact of monetary policy announcements. The monetary policy announcements including target and path surprises are defined as a two-factor model for the analyses. In this respect, Andersson (2010) articulates that if there is a change in short-term interest

rates, it is associated with the target factor. On the other hand, when there is a change in long-term interest rates, it is identified with changes in expectations.

Additionally, Apel and Blix-Grimaldi (2012) contend that the future trends for bank operations can be anticipated through the use of central bank's minutes in Sweden. According to Forest (2012), the unexpected monetary policy decisions significantly have an influence on the Treasury rates in the developed countries. There is also a study based on the interest rate response to the changes in the monetary policy of Australian Reserve Bank. The results confirm that the interest rate features respond significantly to the announcements (Smales, 2012).

When the studies based on the BRICS and Turkey are taken into consideration in the literature, there are a few studies examining the effects of the releases of FOMC minutes on asset prices. According to Danker and Luecke (2005), the FOMC minutes consist of the emphasis on economic conditions and rational ideas for the policy decision in emerging markets. Rosa (2013) contends that the releases of FOMC minutes not only influence the volatility of asset prices but also trading volume in the US. According to Santos, Garcia and Medeiros (2011), there is an impact of the macroeconomic announcements on price changes in Brazil. Their results confirm that the price reactions depend on both the side of economy and bid-ask spreads in Brazil (Santos, Garcia, and Medeiros, 2011).

Travis, Berge and Cao (2014), in their study based on the global effects of US monetary policy, show that a change in monetary policy in the US is involved with changes in asset prices both in the US and abroad, including European countries and Latin American countries.

When the emerging market economies are analyzed Travis and Cao (2014) find that Mexico, Brazil and Turkey react significantly to the monetary policy announcements in terms of the releases of FOMC minutes. Moreover, Divakaran and Gireeshkumar (2014) emphasize that the release of FOMC minutes is one of the major reasons for the rupee fall in India and the adverse influences within the Indian economy.

Mishra, Moriyama, et al. (2014) note that there is a little significant linkage between equity prices and country characteristics around the releases of FOMC announcements for 21 emerging markets, including Brazil, China, India, Russia, South Africa and Turkey, too.

This study takes a wider approach to the role of FOMC minutes for the asset prices in BRICS countries and Turkey by using a General Autoregressive Conditional Heteroskedastic (GARCH) volatility modeling. In this respect, the study contributes to the wide literature by providing remarkable results regarding the influences of FOMC minutes. The study is organized as follows: Section 2 introduces the characteristics of data used and identifies the particular methodology of GARCH modeling; Section 3 presents the research findings; and Section 4 provides a brief conclusion.

2. Data and Methodology

2.1. Data

The study examines high frequency data on asset prices for the countries including BRICS and Turkey. Sample data for these countries are obtained from Thomson Reuters DataStream to analyze the impact of the releases of FOMC minutes on asset prices. The indexes are available on a daily basis and the analyses are performed properly.

Between January 1973 and March 2015, the releases of FOMC minutes are used in the study. While examining the effects of FOMC minutes on asset prices in Brazil, data cover the period between 1.08.1992 and 12.06.2014. For the analyses based on Russia, the high frequency data include 5527 adjustments for the period between 9.07.1995 and 11.05.2015. When India is considered, the period between 1.05.1990 and 11.06.2015 is used for the analyses. In case of China, the study deals with the period between 8.02.1993 and 11.07.2015. When South Africa is taken into account, the study carries out the period between 1.08.1973 and 11.05.2015. Finally, the sample data cover the period between 1.07.1988 and 11.11.2016 for Turkey while using the particular econometric procedure called GARCH volatility modeling.

2.2. Methodology

Examining volatility has been one of the most important issues in the literature of economics. Bollerslev (1986) enables researchers to measure volatility through the use of GARCH modeling. The methodology of GARCH modeling makes it possible for the study to form a regression identification for a function of the mean including a variance. Since the variance varies stochastically over the sample period, heteroskedasticity takes

place as a variance in the model. In this respect, the methodology offers a time-series approach while analyzing the sample data.

There are two prominent steps followed by the researchers in the GARCH (1,1) modeling. The initial step is based on creating a model for the series of the mean whereas the second step employs a model for the residuals' conditional variance (Apergis, 2014). To obtain the mean equations, the ARMA modeling is used in this study. There are two components in the ARMA models. The first part is identified as the autoregressive (AR) element of the modeling, which demonstrates the relationship between the present values and past values of the sample data. The second element called the moving average (MA) which is used to show the time during the effect of an unknown shock. In addition, the omitted variables bias is removed in this study because of the inclusion of high frequency data. According to Fleming and Piazzesi (2005), the macroeconomic variables, which are at high frequencies, cannot be influential over the decisions made in monetary policy in the methodology of the study.

In light of the articulations above, the methodology is based on a model proposed by Apergis (2014). The model provides:

$$\phi(L)\, r_t=\mu+\theta(L)\varepsilon_t+a_1 MIN+\varepsilon_t \qquad (1)$$

where $\phi(L)=(1-\phi_1 L-\phi_2 L^2-...-\phi_p L^p)$, $\theta(L)=1+\theta_1 L+\theta_2 L^2+\ldots+\theta_q L^q$

The AR part is associated with lag p, the moving average part is identified with lag q, $\varepsilon_t \sim N(0, h_t)$.

h_t indicates the conditional variance at time t. It is obtained through the use of identifications in equation (2):

$$h_t = c_0+c_1 h_{t-1}+c_2 \varepsilon^2_{t-1}+c_3 MIN \qquad (2)$$

where ε^2_{t-1} shows the lagged value. In equation (2), $c_0 \geq 0$, and c_1 is the GARCH coefficient. C_2 is the coefficient on the lagged value of the squared prediction error. The MIN is the dummy variable to check the volatility impact of releases of FOMC minutes. The constraints, which are $c_1 \geq 0$ and $c_2 \geq 0$, automatically enable h_t to be positive in the methodology.

3. Empirical Findings

The high frequency data for asset prices in BRICS countries and Turkey are used to indicate the state of being a unit root for these prices at the 1% significance level. After employing the efficient unit root test, the ARMA models for asset prices in these countries are obtained. According to the estimation results of the GARCH (1, 1), the models of the study for these countries are presented in Table 1. The results based on the description statistics are presented in the Appendix. There are different ARMA models, which are obtained in this study. For example, the ARMA model is specified as ARMA–GARCH (1,1) for Brazil, ARMA (2,4)-GARHC (1,1) for Russia, ARMA (2,4)-GARCH (1,1) for India, ARMA (3,3)-GARCH (1,1) for China, ARMA (3,3)-GARCH (1,1) for South Africa and ARMA(1,3)-GARCH(1,1) for Turkey. The study aims to show the impact of the releases of FOMC minutes on both the mean and the volatility of across asset prices. The estimates across the asset prices, which are stock prices of the countries, show the influence of releases of FOMC minutes in terms of the volatility of asset prices and the mean. The coefficients, which belong to the mean and the conditional volatility, are statistically significant at the 1% level for the BRICS countries and Turkey.

As stated above, the releases of FOMC minutes are influential over the mean and the volatility of asset prices in this study. In this respect, the financial markets can benefit from the releases of FOMC minutes announcements. In other words, they can use information based on releases of FOMC minutes not only to make a proper decision, but also to modify their decision about the real economy.

Due to the existence of different time zones across regions, the releases of FOMC announcements are taken into account in 2 different forms in this study. For, the countries which are Russia, India, South Africa, China and Turkey, the releases of FOMC minutes are specified as FOMC (-1) in the model whereas the releases of FOMC minutes are identified as FOMC for Brazil.

The study employs LM tests that is used to evaluate the arch effects that can replace in the residuals. The information based on the Q statistics is also taken into consideration while evaluating the serial correlation in the variance equation. The results confirm that serial correlation and the arch effect don’t exist in the model.

Table 1

GARCH (1,1) Estimates for BRICS and Turkey

Brazil			**Russia**		
Variable	Coefficient	p-value	Variable	Coefficient	p-value
C	0.093696	[0.0000]	C	-0.456918	[0.0000]
FOMC	0.382179	[0.0019]	FOMC(-1)	1.055493	[0.0000]
AR(1)	0.268503	[0.0000]	AR(1)	0.172038	[0.1730]
AR(2)	0.444583	[0.0000]	AR(2)	0.110312	[0.1417]
AR(3)	0.136102	[0.0011]	MA(1)	0.129024	[0.2815]
AR(4)	-0.918057	[0.0000]	MA(2)	0.170955	[0.0888]
MA(1)	-0.262489	[0.0000]	MA(3)	0.120456	[0.0767]
MA(2)	-0.453723	[0.0000]	MA(4)	-0.292255	[0.0000]
MA(3)	-0.136369	[0.0009]			
MA(4)	0.921357	[0.0000]			
C	0.05332	[0.0000]	C	1.572541	[0.0000]
RESID(-1)^2	0.083966	[0.0000]	RESID(-1)^2	0.574774	[0.0000]
GARCH(-1)	0.906087	[0.0000]	GARCH(-1)	0.542665	[0.0000]
FOMC	0.487455	[0.0320]	FOMC(-1)	3.20214	[0.0000]
India			**South Africa**		
Variable	Coefficient	p-value	Variable	Coefficient	p-value
C	0.036657	[0.3378]	C	0.062527	[0.0000]
FOMC(-1)	-0.036594	[0.6434]	FOMC(-1)	0.14979	[0.0023]
AR(1)	0.009673	[0.9943]	AR(1)	0.511367	[0.1250]
AR(2)	0.013584	[0.9883]	AR(2)	-0.759395	[0.0000]
MA(1)	0.097406	[0.9427]	AR(3)	0.556511	[0.0703]
MA(2)	0.011131	[0.9895]	MA(1)	-0.399839	[0.2315]
MA(3)	0.010262	[0.9032]	MA(2)	0.708721	[0.0000]
MA(4)	0.012737	[0.5858]	MA(3)	-0.470346	[0.1279]
C	1.63303	[0.0000]	MA(4)	-0.04579	[0.2455]
RESID(-1)^2	0.051689	[0.0000]	C	0.06286	[0.0000]
GARCH(-1)	0.574335	[0.0000]	RESID(-1)^2	0.119216	[0.0000]
FOMC(-1)	2.441127	[0.0000]	GARCH(-1)	0.839887	[0.0000]

FOMC(-1)	0.168355	[0.0000]

Table 1 (Continued)

China			**Turkey**		
Variable	Coefficient	p-value	Variable	Coefficient	p-value
C	0.043284	[0.0333]	C	0.075139	[0.0006]
FOMC(-1)	-0.042224	[0.6707]	FOMC	-0.150293	[0.0870]
AR(1)	0.360815	[0.4580]	AR(1)	0.023587	[0.9860]
AR(2)	0.324329	[0.5800]	MA(1)	0.052164	[0.9690]
AR(3)	-0.209273	[0.1730]	MA(2)	0.009903	[0.9231]
MA(1)	-0.253025	[0.6025]	MA(3)	0.006285	[0.7542]
MA(2)	-0.341932	[0.5602]	C	0.029509	[0.0000]
MA(3)	0.180294	[0.1406]	RESID(-1)	0.085928	[0.0000]
C	0.044893	[0.0000]	GARCH(-1)	0.914564	[0.0000]
RESID(-1)	0.08412	[0.0000]	FOMC(-1)	0.378232	[0.0000]
GARCH(-1)	0.905449	[0.0000]			
FOMC	0.352066	[0.0075]			

According to Table 1, the asset price responses vary from one country to another country. There is a significant positive impact on both return and volatility in Brazil, Russia, South Africa and Turkey. The results belonging to Turkey also demonstrate that there is a negative return effect in Turkey. Finally, there exists a volatility effect not only in India but also in China.

4. Concluding Remarks

The study analyzes the high frequency data set including asset prices and the releases of FOMC minute's announcements. The purpose is to demonstrate the influence of FOMC minutes over the asset prices in BRICS and Turkey. Since there are a few studies examining the effects of the releases of FOMC minutes on asset prices in these

countries, this study aims to focus on the emphases on economic conditions and rational ideas for the policy decision in emerging markets such as BRICS and Turkey. The methodology of GARCH modeling makes it possible for the study to form prominent regression identification for a function of the mean including a variance. In this respect, the coefficients, which belong to the mean and the conditional volatility, are statistically significant at the 1% level for the BRICS countries and Turkey. This finding is very important because of the effect of asset prices on the real economy. In other words, the decisions about investment, consumption, and aggregate demand are influenced by this situation in these countries. As stated before, the effect of FOMC releases is very strong in Brazil, Russia, South Africa and Turkey. In addition, there is a negative return effect in Turkey when there exists a severe volatility effect in two countries such as India and China. The study limits itself to the relationship between FOMC minutes and asset prices (stock market prices) of BRICS countries and Turkey. Thus, the further study may include more variables such as the inclusion of different types of asset prices such as housing price index, treasury bond prices and exchange rates in sample data. Therefore, interesting findings can be obtained at the end of the analysis for market participants, policymakers and financial institutions.

Appendix

The Description Statistics of Brazil:

Statistics	RETURN
Mean	0.177035
Median	0.028102
Maximum	28.81763
Minimum	-17.22924
Std. Dev.	2.413566
Skewness	0.477515
Kurtosis	11.70862
Jarque-Bera	20799.83
Probability	0.000000
Sum	1151.437
Sum Sq. Dev.	37881.93
Observations	6504

The Description Statistics of Russia

Statistics	RETURN
Mean	0.041090
Median	0.019235
Maximum	191.3384
Minimum	-200.2904

Std. Dev.	4.509830
Skewness	-2.118271
Kurtosis	1291.110
Jarque-Bera	3.82E+08
Probability	0.000000
Sum	227.2281
Sum Sq. Dev.	112451.9
Observations	5530

The Description Statistics of India

Statistics	RETURN
Mean	0.049442
Median	0.000000
Maximum	25.72027
Minimum	-18.25474
Std. Dev.	1.599627
Skewness	0.026530
Kurtosis	23.69458
Jarque-Bera	125072.3
Probability	0.000000
Sum	346.5373
Sum Sq. Dev.	17932.12
Observations	7009

The Description Statistics of China

Statistics	RETURN
Mean	0.025204
Median	0.001722
Maximum	15.71236
Minimum	-14.28757
Std. Dev.	1.924687
Skewness	0.113906

Kurtosis	9.514636
Jarque-Bera	10762.96
Probability	0.000000
Sum	153.2146
Sum Sq. Dev.	22515.47
Observations	6079

The Description Statistics of South Africa

Statistics	RETURN
Mean	0.049415
Median	0.026810
Maximum	13.57458
Minimum	-14.52794
Std. Dev.	1.269317
Skewness	-0.617019
Kurtosis	11.66815
Jarque-Bera	36553.87
Probability	0.000000
Sum	565.5084
Sum Sq. D.	18436.57
Observations	11444

The Description Statistics of Turkey

Statistics	RETURN
Mean	0.123670
Median	0.016255
Maximum	17.02575
Minimum	-19.46

Std. Dev.	2.422095
Skewness	0.001169
Kurtosis	7.937732
Jarque-Bera	7648.587
Probability	0.000000
Sum	931.1114
Sum Sq. De.	44163.35
Observations	7529

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