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Causal Relationship Between Islamic Bonds, Oil Price and Precious Metals: Evidence From Asia Pacific

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Abstract. *Sukuk or Islamic bonds as new "Halal" securities had wildly expanded in Muslim and non-Muslim capital markets. So, this study aims to investigate the causal relationship between Islamic bonds (sukuk), oil and precious metals "silver and gold" prices in Asia pacific. This study used VAR model relying on daily data. The findings of Granger causality test and impulse-responses analysis results provide substantial evidence in favor of the relation between sukuk and the commodity market variables (oil, gold, and silver) meanwhile and unlike many empirical studies, don't we have found that oil doesn't cause changes in precious metals prices. Therefore, the idea that Islamic financial markets provide diversification benefits and they are safe havens during oil crisis cannot be supported empirically.*

Keywords: *Islamic bonds, oil prices, precious metal, causal relation*

Abstrak. *Suku atau obligasi syariah sebagai sekuritas "halal" baru telah berkembang pesat di pasar modal Muslim dan non-Muslim. Tujuan dari penelitian ini adalah untuk mengetahui hubungan timbal balik antara harga obligasi syariah (sukuk), minyak dan logam mulia "perak dan emas" di Asia pasifik. Penelitian ini menggunakan model VAR yang mengandalkan data harian. Temuan uji kausalitas dan impuls Granger Hasil analisis memberikan bukti kuat yang mendukung hubungan antara sukuk dan variabel pasar komoditas (minyak, emas dan perak) sementara dan tidak seperti banyak penelitian empiris, kami menemukan bahwa harga minyak tidak menyebabkan perubahan harga logam mulia. Oleh karena itu, gagasan tersebut bahwa pasar keuangan Islam memberikan manfaat diversifikasi dan merupakan aset yang aman selama krisis minyak tidak dapat didukung secara empiris.*

Kata Kunci: *obligasi syariah, harga minyak, logam mulia, hubungan timbal balik.*

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Introduction

Finance is an organizational part of exchanges between resources and projects (Pellerin and Casimiro, 2009), is in perpetual change. These changes such as boom and slump periods are also present in the financial markets. Over the boom periods, the investors are carrying out their operations in a stable frame. Although during the crisis period, business world becomes characterized by high instability and a loss of confidence leading to immoral practices. However, in the financial market, ethics has materialized through the establishment of an alternative class of financial tools for all investors. Both Muslim and non-Muslim, found on Islamic law (Bacha et al., 2013), overall called Shariah-compliant equity. This product must be free from the elements of Riba (interest), Gharar (uncertainty), Maysir (speculation) and Haram (unethical) business activities. One of the growing sharia finance instruments is Islamic bond.

Islamic bonds are securities or certificate that contains the contract between funders with a given fund (Fauzulhaq, 2013). These unconventional financial tools have proved their efficiency facing the global financial crisis (Akhtar et al., 2017). Despite that, these new generations of investment instrument are not immune against numerous fluctuations of the macroeconomic variables. The past few years have seen a surge in research about oil, precious metal and interest rate, and their impact on the stock market performance. Oil, one of the most commonly traded commodities in the world, knew scores price changes which have not only been linked to significant world development but also as a set off for economic inflation or recession, as shown by an earlier study conducted by Hamilton (1983). Further, gold and silver are as well a non-neglected market for hundreds of years. As known, investors look at metal markets as the safe haven. Baur and Lucey (2010) found that gold serves as a safe alternative against stocks in the UK, Germany, and the US mainly follow severe adverse shocks on stock markets.

We noticed that the majority of the researchers had used the return much more than the asset prices, what makes the difference in our study is that we look at the problem from a different perspective. Firstly, by using the amounts without transforming them into yield. We also study the relationship of traded bond prices in an emerging market (Asia Pacific) and not developed market as we are used to seeing in most of the studies.

This choice is related to the fact that almost all Asian Pacific markets know a remarkable growth. However, any emerging market remains sensitive to crises and macroeconomics changes that's why we want to see if even an ethical investment tool far from suspicious activities and based on a real economic value traded in these markets are also sensitive to commodities prices changes?

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This paper meant to narrow the literature gap in the discussion of determining the causal relation between three essential variables, which are Islamic bonds, oil, and precious metal prices; a subject, which has not been extensively explored. Moreover, to achieve a dynamic result contrast to previous studies, this paper utilizes a heap of time series econometric methods to attain deep analysis that aims to reveal the objective truth far from any religious, cultural or societal tendency.

Literature review

Studying assets prices movements continues to be a dynamic area in financial research; many researchers carried out across the globe about the dynamic relationship that exists between conventional stock market and macroeconomic variables. However, it should be noted that few studies analyzed the nature of the relationship between commodity markets such as oil, precious metals, and Islamic equity. Few types of research have been conducted on the precious metals-stock price relationship. Smith (2001) had studied the short-run correlation between gold and US stock price indices is small and negative and for some series and time periods insignificantly different from zero.

From a traditional perspective, oil and stock markets are inversely related. Therefore, commodities are considered to be good portfolio diversifiers (Kang, 2012). Nevertheless, the price of an individual commodity is not only determined by its supply and demand, but also by many financial factors and market maker (Creti et al., 2013). The study by Zhang and Li (2016) analyze the co-integration relationship and causality between gold and crude oil prices. The study finds that there are consistent trends in the crude oil price and gold price with significant positive correlation during the sampling period.

Fayyad and Daly (2011) empirically examined the long run relationship between the stock market and oil prices in the GCC countries. The primary result indicated that no significant relationship exists between the commodities in the first period. However, in the second period, a statistically significant correlation was found to exist between the stock market indexes and oil price movement in all the GCC countries except for UAE and Bahrain. Hussin et al. (2013) argued that among strategic commodities, only oil's price variables would affect the Islamic stock return in the short run in Malaysia. Delatte and Lopez (2013) have identified the dependence structure that exists between equity and commodity futures (metal, agriculture, and energy). The researchers concluded that the co-movement spreads to all commodity classes and becomes unambiguously stronger with the global financial crisis after Fall 2008. Broadstock and Filis (2014) find

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that oil shock of different types show substantial variation in the impact on stock market returns.

Khan and Masih (2014), concluded that the correlations between commodity and Islamic stock markets evolve and are highly volatile. This volatility, especially during the 2007-2008 financial crises has played a crucial role. Beside that Abdullah et al. (2015), indicates that the Singapore Islamic index is leading the other commodities. Akhtar et al. (2017) argued that there are benefits of Islamic stocks during the global financial crisis, especially during the early stage of the crisis.

Moreover, some recent studies such as Nagayev et al. (2016) investigation have concluded that crude oil possibly indicates a robust negative linkage with Islamic equity over the 2001–2003 period in the high scale (256 days). Besides that, Nagayev et al. (2016) also found that there is a robust positive relationship from 2007 to 2013 in the medium and high scales. The researchers also have concluded that is a negative correlation between gaze and Islamic equity. Zhang and Li (2016) have argued that hikes in the oil–equity correlations can be a long-run phenomenon.

Method

This study tried to illustrate the causal relation between Islamic bonds, oil prices, and precious metals during the recent oil crisis. Therefore, we have used daily variables, which were extracted from Reuter's Thomson database for the Sukuk and from Quandle database for the other variables, using a sample from 1st April 2009 to 1st April 2016.

The Islamic Asia Pacific stock market is getting improved, in our study we will use VAR model because it is one of the most successful, flexible and easy to use models for the analysis of multivariate time series. It is a natural extension of the univariate autoregressive model to dynamic multivariate time series.

The VAR model has proven to be especially useful for describing the dynamic behavior of economic and financial time series and for forecasting. Our model is represented as follow:

$$TRP_t = \sum_{i=1}^{P} \alpha_{1i} TRP_{t-i} + \sum_{i=1}^{P} \beta_{1i} PO_{t-i} + \sum_{i=1}^{P} \theta_{1i} PG_{t-i} + \sum_{i=1}^{P} \gamma_{1i} PS_{t-i} + + \varepsilon_{t1}$$

$$PO_t = \sum_{i=1}^{P} \alpha_{2i} PO_{t-i} + \sum_{i=1}^{P} \beta_{2i} TRP_{t-i} + \sum_{i=1}^{P} \theta_{2i} PG_{t-i} + \sum_{i=1}^{P} \gamma_{2i} PS_{t-i} + \varepsilon_{t2}$$

$$PG_t = \sum_{i=1}^{P} \alpha_{3i} PG_{it-i} + \sum_{i=1}^{P} \beta_{3i} TRP_{it-i} + \sum_{i=1}^{P} \theta_{3i} PO_{it-i} + \sum_{i=1}^{P} \gamma_{3i} PS_{it-i} + + \varepsilon_{it3}$$

$$PS_t = \sum_{i=1}^{P} \alpha_{4i} PS_{it-i} + \sum_{i=1}^{P} \beta_{4i} TRP_{it-i} + \sum_{i=1}^{P} \theta_{4i} PO_{it-i} + \sum_{i=1}^{P} \gamma_{4i} PG_{it-i} + + \varepsilon_{it4}$$

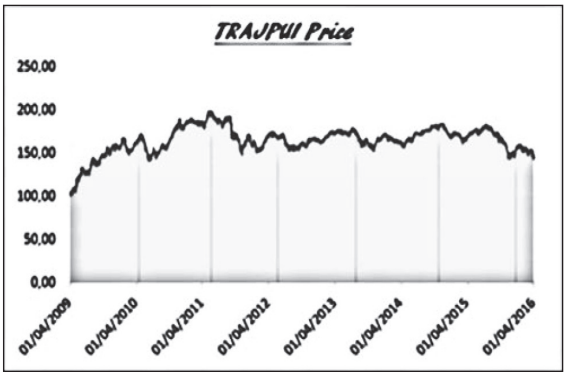
DOI: http://dx.doi.org/10.15408/aiq.v10i2.7171

First, we will examine the stationary of variables using ADF and PP unit root test to know if we have a unit root or any seasonal movements. Then, we will use Johanson co-integration test to figure out if we have long run relationship or not. After that, we must define lag for VAR by using Akaike and Schwarz Information criteria (AIC and SC) to estimate VAR model. Finally, we will investigate on impulse responses of each variable to another, and study the causal relationship between our variables.

Results and discussions

Figure 1 shows the evolution of TRAJPUI prices from 01/04/2009 to 01/04/2016. Overall we can notice that there is no abruptly a change on the chart line. Thought, we identify a visible growth on Sukuk prices 2009 to 2011, which could be explained by the effect of the financial crisis of 2008 on the behavior of the investors, who turned towards ethical equity, due to their performance during the market collapse. Besides that, there is a downfall of the Islamic bonds prices from 2011 to 2012 than from the second half of 2014 the prices are fluctuating and remain low again due to the news oil crisis and to the divertissement of oil prices.

Figure 1. Sukuk Fluctuations



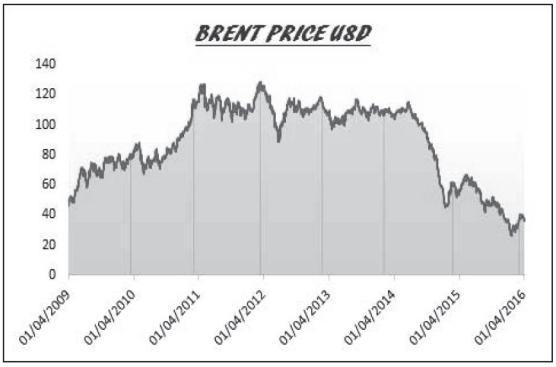
Source: Data Processed

From Figure 2, we notice numerous changes in the Brent price trend; at first, we see a graduate growth from 2009 to 2011, which is followed by irregular movements until 2012, when the prices reached a pick at 128 USD. That slight increase in oil prices was related to a weak dollar. In the usual case when USD weakens against other currencies, the amount of crude goes up sharply, But after the financial crash, the world was trying to recover, and the demand was slight, so the growth of the oil prices was small too. Also, the chart shows that from 2014 to 2016, the prices movements

DOI: http://dx.doi.org/10.15408/aiq.v10i2.7171

fluctuated erratically, until they bottom out in January 2016 at approximately 28 USD. The steady decline in Brent prices is mainly due to the OPEC trade offensive, and the weakness of Chinese demand, which is no longer acting as a locomotive.

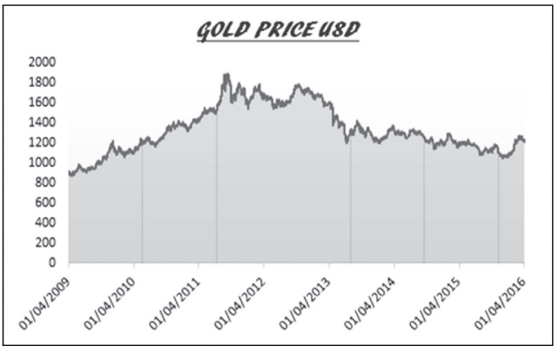
Figure 2. Oil Price Fluctuations



Source: Data Processed

From Figure 3 we sign that the primary trend of gold prices from 2009 to 2011 is rising. This trend that may link to the fact that investors are going far from stock market hoping, that precious metals are immune against crisis contagion since that precious metal considered like a safe refuge in time of financial disruption. Furthermore, from 2012 to 2016 the graph shows an apparent price drop, mainly correlated to the increase of interest rate, the opportunity cost from being invested in gold is high when the real interest rate on cash, bonds/stock is high, and this decreases the relative attraction of gold as an investment.

Figure 3. Gold Price Fluctuations



Source: Data Processed

DOI: http://dx.doi.org/10.15408/aiq.v10i2.7171

We can see from Figure 4 that the movements of silver prices are growing at the beginning (from 2009 to 2011). The movement of silver prices was peaked at 50 USD nearly. Also from 2011 over 2016, the graph shows a fluctuate downtrend, that motion can be linked to the depreciation of the precious metal market ahead enticing interest rate. It can be remarkable that both of gold and silver have the similar process significant trend it's also affected with the drop of oil prices since 2014.

Figure 4. Silver Price Fluctuations

Source: Data Processed

Table 1. Results of ADF Test Statistics

Variables	ADF stationarity test (prob)			Results
	Level	1st diff.	2nd diff.	
TRAJPUI price	0.7606	0.0000	-	Stationary at first difference
Oil price	0.5398	0.0000	-	Stationary at first difference
Gold price	0.7291	0.0001	-	Stationary at first difference
Silver price	0.5415	0.0001	-	Stationary at first difference

Source: Data Processed

Unit root test is an essential test to choose which model is appropriate for the study. To test the stationary in this research, we used ADF test. If the variables in the regression model are not stationary, then it can be proved that the standard assumptions for asymptotic analysis will not be valid. In other words, the usual "t-ratios" will not follow a t-distribution, so we cannot validly undertake hypothesis tests about the regression parameters. The result of stationary test represented in

Table 1. From Table 1, we notice that all variables are not stationary and have unit root because their probability is higher than the critical value, but at the first difference, all variables became stationary.

Table 2. Results of Johanson Co-integration Test Statistics

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.018043	53.05943	55.24578	0.0769
At most 1	0.005713	20.92358	35.01090	0.6469
At most 2	0.004331	10.81132	18.39771	0.4056
At most 3	0.001783	3.149973	3.841466	0.0759

Source: Data Processed

Secondly, we use Johanson co-integration test; this test does to decide if it is possible to use VAR model or not we must test if any long relationship between variables exists or not, for the reason that the VAR model is used only for short-run relations. The results based on Johanson co-integration test represented in Table 2. Trace test indicates no co-integration at the 0.05 levels since all probabilities are higher than 0.05. That means that there is no long-run relationship between our variables.

Table 3. Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-30577.86	NA	1.40e+10	34.71721	34.74206	34.72639
1	-15424.37	30203.77	484.7028	17.53504	17.60961	17.56260
2	-15393.10	62.19645	476.3711	17.51771	17.64198	17.56363
3	-15373.90	38.10061	474.6428	17.51407	17.68805	17.57836
4	-15342.05	63.03613	466.1841	17.49609	17.71978	17.57875
5	-14784.95	1100.295	252.2425	16.88189	17.15529*	16.98293
6	-14743.86	80.95728	245.1625	16.85342	17.17653	16.97282*
7	-14730.58	26.10666	245.9219	16.85651	17.22933	16.99428
8	-14697.26	65.35590*	241.1356*	16.83685*	17.25938	16.99299

Source: Data Processed

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Thirdly, we do the lag selection test. The VAR model conditions exist now we will select lag to VAR model because this is a critical step. The lag order of the VAR model is selected based on Akaike Information Criteria (AIC) and Schwarz Criteria (SC). The order of VAR Model shows in Table 3. From Table 3, we notice that we have lag order as 8th lag order (* indicates lag order selected by the criterion).

Fourthly, we do the impulse response function. After the definition of the lag order, we estimate VAR model, and one of the most important advantages of VAR specifications is the computation of Impulse Response Functions (IRF) of any endogenous variables to one standard deviation shock in any other endogenous variable in the system. (See appendix). To test how Sukuk (TRAJPUI PRICE), oil price and precious metals (gold and silver) respond to the short run temporary shocks, we employed impulse response function, which is derived from our VAR model.

First, What we notice for the Sukuk from the Figure in the appendix that their prices respond for the shocks of each variable but in different levels. Sukuk price has a negative responding to the gold price shocks during all the phases. Otherwise, When a shock occurs in the silver price, we observe a positive response for sukuk in the first two periods followed by a weak negative response for the following four periods to become a non-existing effect over the rest period. Finally, for oil prices shocks, Sukuk prices are not responding, only in the first quarter where we notice a weak negative response.

From another side, the visual examination shows that oil prices respond positively to silver price's shocks, similarly silver prices respond positively to the shocks of oil prices, but it's a weak response and almost insignificant. Also, during a shock of silver, we observe a weak positive response of gold prices for half period followed by positive and continuous respond over the period, but silver price have a very weak to non-existing response to gold shocks. Moreover, we see that there is a negative response of the price of gold in the first half of the period to oil shocks, but it remains to get the form of a positive response in the second.

The last test that done in this research is the Granger-causality test. Granger defined the causality relationship based on two principles: First, the cause happens before its effect. Second, the cause has unique information about the future values of its effect. Given these two assumptions about causality, Granger proposed to test the following results to identify the causal effect of X on Y in Table 4.

DOI: http://dx.doi.org/10.15408/aiq.v10i2.7171

Table 4. Granger Causality Test

Null Hypothesis	Obs	F-Statistic	Prob.
PO does not Granger Cause TRAJPUI_PRICE	1762	1.54265	0.1375
TRAJPUI_PRICE does not Granger Cause PO		0.89285	0.5216
PG does not Granger Cause TRAJPUI_PRICE	1762	0.86545	0.5451
TRAJPUI_PRICE does not Granger Cause PG		1.22909	0.2777
PS does not Granger Cause TRAJPUI_PRICE	1762	1.19188	0.2999
TRAJPUI_PRICE does not Granger Cause PS		0.98216	0.4480
PG does not Granger Cause PO	1762	2.51011	0.0103
PO does not Granger Cause PG		3.40712	0.0007
PS does not Granger Cause PO	1762	6.17402	7.E-08
PO does not Granger Cause PS		2.51153	0.0103
PS does not Granger Cause PG	1762	222.252	9E-260
PG does not Granger Cause PS		2.96740	0.0027

Source: Data Processed

From Table 4 and through the observation on probabilities and comparing them with the critical value (0.05) we notice that: First, a Causal relation between SUKUK, oil prices and precious metal (gold and silver) exists in two different directions. Another side, no causal relationship exists between oil prices and precious metals prices.

From the empirical results, we can show that Islamic bonds (Sukuk) in Asia Pacific markets are affected by commodities' prices (oil and precious metals). This relation may be explained as follow: First, Oil is a raw source of energy; it represents an essential composite to the company's activity (including electricity, heating, production, and transportation). Therefore as it's known Asia Pacific region has several oil producing countries in its rank (as China and India, the world's fourth and 20th biggest oil producing nations). Founded on the positive expectation effect investors presume that as long as oil prices are high, capital will continue to flow, and SUKUK related to the big oil production companies will still perform positively due to their positive link to the energy market. This result is consistent with Zhang and Li (2016), Fayyad and Daly (2011). However, Nagayev et al. (2016) argued that the nature of the relation between these two equities could be a paradox. They have found that there is a negative correlation between crude oil and Islamic equity over the 2001–2003 period.

Secondly, Sukuk has fewer risks and a more guaranteed return comparing with investment in precious metals. So a competitive race will be born between

DOI: http://dx.doi.org/10.15408/aiq.v10i2.7171

these two instruments where the interest rate is the point of separation between them, that means if an investor chooses precious metals (when they presume to get higher return due to higher interest rates) he will withdraw from investing on Sukuk market. However when interest rate dropdown; investors may prefer to put their money in safe by investing in Sukuk instead of precious metals. As a result, we ensure the existence of a reciprocal causal relationship between these two variables. Our findings are broadly coherent with previous studies (Smith, 2001)

Finally, what was remarkable is the absence of a relation between Oil and precious metals for the reason that these two commodities had and still have great importance in the world of economics. Oil is the world's most traded commodity market according to its big role in the industry. Meanwhile, precious metals are also used in industry where silver is used more largely in factoring comparing with gold thanks to its physical strength, malleability, brilliance, ductility and it is the highest of any element for electricity and heating. However, the gold stays the leader in precious metals due to its big historical value and for being such an important cash cover. Hence, previous investigations have proved the positive correlation between oil and gold prices (Zhang and Li, 2016). This contrast can be attributed to the fact that numerous studies have approached the subject differently, whether about the market, the period of the study or even the econometric method and statistic tests adopted, all these factors affect the results in one way or another. Therefore, what we notice is that each commodity (oil and precious metals) have a big independent role in the economic sector so they can affect the whole economic cycle together but they do not have effect between them.

There is no causal relationship between the prices of oil and gold during the period of the study (which is contrary to many empirical studies). This relationship may change if hidden hands involved, who are speculators where they raise gold prices to absorb the increase in the proceeds of oil revenues resulting from high oil prices.

Conclusion

Islamic bonds (Sukuk), oil and precious metals have witnessed significant changes over time, and hence, it is necessary to test the nature of the relationship between them. The diagnostic is not as easy as it seems, it is a big challenge for economists in general and investors in particular. Islamic bonds are the most important Islamic debt market financial instruments nowadays. They are investment certificates with both bond and stock specifications issued to found trade or the production of tangible assets. Oil, Gold, and silver, meanwhile, considered as macroeconomic variables, affect the global economy in general, and stock/bonds market in particular, and vice versa.

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The primary objective of this paper is to add value to the literature on the impact of the oil crisis and precious metals on Islamic equity, by analyzing the causal relation between Islamic bonds market and commodity market (oil, gold, and silver) in the Asia Pacific using VAR model. We conclude that all residuals of our variables are responding to oil price shocks in different levels and directions, but we noticed weak or insignificant responding between precious metals themselves. Oil and stock price smash at the rush of the financial crisis ensued in a tragic increase in correlation between oil and Islamic equity. However, causality test findings show that SUKUK and precious metals have a substantial negative relation. Otherwise, and unlike many empirical studies; oil and precious metals had no causal relationship due to their independence and essential role in economic activities even if their prices will lead to higher inflation rates, but they have no connection in our sample.

We encourage, researchers to investigate whether the relationship between these pillars of the economy, namely oil, gold, and silver is similar during the long term, or not? Since the literature is not satiate yet on this topic especially concerning emerging markets, and clarify the view of several macroeconomic variables that affect the Islamic capital market.

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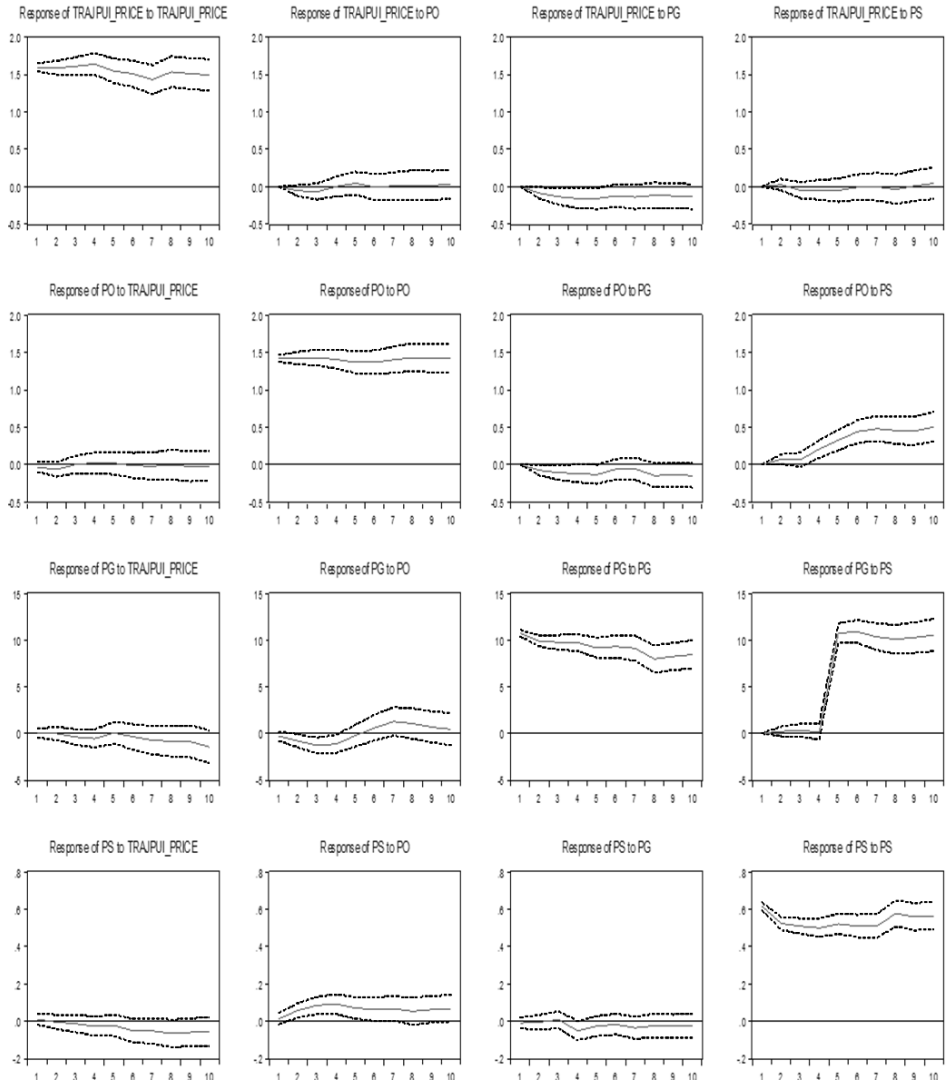
Appendix. Impulse Response Function Result



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