RELATIONSHIP BETWEEN STOCK MARKET AND REAL ESTATE MARKET: EVIDENCE IN THAILAND

BY

MISS CHIDCHANOK SUVICHACHERDCHOO

AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE PROGRAM IN FINANCE (INTERNATIONAL PROGRAM) FACULTY OF COMMERCE AND ACCOUNTANCY THAMMASAT UNIVERSITY ACADEMIC YEAR 2016

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THAMMASAT UNIVERSITY
FACULTY OF COMMERCE AND ACCOUNTANCY

INDEPENDENT STUDY

BY

MISS CHIDCHANOK SUVICHACHERDCHOO

ENTITLED

RELATIONSHIP BETWEEN STOCK MARKET AND REAL ESTATE MARKET: EVIDENCE IN THAILAND

was approved as partial fulfillment of the requirements for
the degree of Master of Science (Finance)

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ABSTRACT

This paper study about relationship between stock market, which represented by SET Index, and real estate market, which represented by price index of land, condo, townhouse, and single detach house. Based on two theories which are wealth effect and credit price effect. This paper using bivariate VAR model, also granger causuality, and forecast error varience decomposition. The result was found support both theories. To explain, return of land price index has affect return of SET index which the result support credit price effect. While return of SET index was found support return of price index of townhouse and single detach house, which the result support credit price effect.

Keywords: Real Estate Market, Stock Market, Wealth Effect, Credit Price Effect

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To all my classmates who taught life lesson that will never be forgotten.

Miss Chidchanok Suvichacherdchoo

Ref. code: 25595802042324WOG

TABLE OF CONTENTS

	Page
ABSTRACT	(1)
ACKNOWLEDGEMENTS	(2)
LIST OF TABLES	(4)
LIST OF FIGURES	(5)
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 REVIEW OF LITERATURE	3
CHAPTER 3 DATA	6
CHAPTER 4 RESEARCH METHODOLOGY	8
CHAPTER 5 RESULT	12
CHAPTER 6 CONCLUSION	19
REFERENCES	20
APPENDICES	
APPENDIX A	23
APPENDIX B	30
APPENDIX C	37
BIOGRAPHY	53

Ref. code: 25595802042324WOG

LIST OF TABLES

Tables		Page
5.1	Descriptive Statistic	12
5.2	Unit root test	12
5.3	Appropriate Lag	13
5.4	VAR Result	14
5.5	Granger causality Test	15
5.6	FEVD Result	17

Ref. code: 25595802042324WOG

LIST OF FIGURES

Figures		Page
3.1	Price Index of Real Estate	7
3.2	Price Index of SET	7
5.1	Return of Price Index of Each Variable	13
5.2	IRF Result	16

Ref. code: 25595802042324WOG

CHAPTER 1
INTRODUCTION

Real estate investment is another alternative investment that can be chosen to diversify investor's portfolio. Knowing relationship between stock price and real estate price can help investors as another possibility in order to consider future movement of the markets over historical data of one another.

Impact of wealth on consumption had been studied (green,2002; Piazzesi *et al.,* 2007; Chen,2001; Sutton,2002; Kakes and Van Den End,2004; Ibrahim,2010) and shows the mechanism that augment the relationship between stock and real estate price which is the wealth effect. Wealth effect states that when there is an increasing in the stock market. Investors with unanticipated gain will feel wealthier and more comfortable to purchase properties; this will push up demand on real estate. Hence the stock market will lead real estate market.

Another effect that had been studied call credit-price effect (Sim and chang,2006) shows that when real estate price is up, firms will effected first on the statement of balance sheet imply that when property value rise then there is an unreleased gain and will end up with rising in equity. Firm will have lower cost in case of reinvestment, which leads stock market to be increased also.

Earlier researches study about dynamic linkage between stock price and real estate price, most has examined the correlation of two asset returns and data is the evidence of U.S. and U.K. (Ibbotson and Siegel,1984; Hartzell,1986; Eichholtz and Hartzell,1996). Therefore this paper will be conduct in order to answer the question about how the two markets; stock market and real estate market, interrelate to one another.

Many studies have examined the linkage of these two markets, stock market and real estate market, but most the studies were evidence on developed countries, for example, the United State of America, United Kingdom, Turkey. While studies base on developing countries, which published, were limited in the small amount as well as the applicable of the research result.

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Therefore, objective of this study is to examine the relationship between stock market and real estate price using land price data available in BOT as real estate price, and using Stock Exchange of Thailand Index as stock market price. Data of this paper will be between 2008-2016, This research will apply Vector Autoregressive Model (VAR) as early research had been applied (Green,2002; Kapopoulos and Siokis,2005; Chen,2001; Ibrahim,2010). Moreover, Granger Causality, Impulse Response Function (IRF), and Forecast Error-Variance Decomposition (FEVD) will also be applied.

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CHAPTER 2
REVIEW OF LITERATURE

There are some researches found evidence supported wealth effect and credit-price effect as these two effects can descript the relationship of stock market and real estate of each particular data. For example of wealth effect, the study of (green,2002) applied concept of Granger causality using single-equation framework.. The paper was employed data of four different sources to represent real estate price in California and using Russel 2000 to represent Stock Market. The result according to the paper (green,2002), founds evidence shows that stock market value effects housing consumption.

Earlier researches study about dynamic linkage between stock price and real estate price, most has examined the correlation of two asset returns and evidence data shows both negative relation and positive relation. Researches based on United Kingdom evidence are (Worzala and Vandell, 1993), (Eichholtz and Hartzell, 1996), and (Ibbotson and Siegal, 1984) which mainly focus on correlation of the return between the stock market and real estate market. (Worzala and Vandell,1993) found positive correlation of 0.039 while (Eichholtz and Hartzell,1996) found negative correlation of -0.08

Another interested research of (Quan and Titman,1999) based on set of data that comprised of 17 developed and emerging markets in order to examine relationship of stock price and real estate price whether they move together under the condition of cross-sectional and panel regression. The result showed positive correlation under the cross-sectional regression. However, once controlled variable was added, the result of positive correlation had changed. (Chen, 2001) also have the result support wealth effect which found evidence support wealth effect by using bivariate VAR model. The paper based on quarterly data of Taiwan, data period from 1973 – 1992.

Relationship of the two markets wasn’t limited within the same country, there was a research studies the relationship of these two markets across country. (Sutton, 2002) studied the relationship between six economies of developed countries; UK, USA, Canada, Netherland, Ireland, and Australia under VAR framework which the

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result was support wealth effect that house price have response to change in stock price positively.

In the other hand, (Sim and Chang, 2006) using VAR model but they found the result in the opposite. Their research using VAR model and found the result supports credit-price effect. While (Miller,2014) shows that real estate and stock returns are correlated generally across lower frequencies but not for all the period of the sample. They use Vector Autoregressive model, Vector Error Correction model, and also threshold error correlation model to examine the linkage between these two markets. Another research that have been resulted both positive and negative effect (Chang, 2013) the paper shows positive relationship for the period of 1890-2012 and negative relation between 1998-2002. This paper using GDP growth as controlled variable and also found that stock price and real estate price are both having positive response to the GDP growth more than one another. Therefore, adding GDP growth will help the two markets avoid suffering some inaccuracy occurred by GDP growth.

One research, study relationship between these two markets, in southeast region (Lean and Smyth, 2012). The study using the standard augmented dickey fuller unit root test found evidence support wealth effect for some REITs. For the evidence of Thailand there is one research (Ibrahim, 2010) studies the relationship between these two market using the data from 1995-2006 and focus on using VAR model with two controlled variables, which are real GDP and aggregate price level. The paper found the evidence support wealth effect. Another research evidenced in Thailand using monthly data from 2008-2015 with controlled variable of interest rate, inflation, and real effective exchange rate under methodologies of bivariate VAR and DCC-GRACH. The paper proposed, “low correlation coefficients between the real estate and stock markets prevail and negative correlation between townhouse and stock indices as well as condominium and stock indices” as the result (Padungsaksawasdi and Jaroenjitrkam, 2016). Research of Nittayagasetwat, Aekkachai, and Jiroj Buranasiri was about the relationship between property fund and stock market which indicated that “property fund’s return is similar to the overall stock’s return by 26%, including value stock 0%, growth stock 4%, medium capitalization stock 9%, and small capitalization stock 13%”.

Recent researches find the relationship between stock and real estate price evidence in Turkey (Yuksel, 2016) using VAR model found evidence support wealth

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effect and credit price effect for the period of pre-crisis. During the crisis period, credit price effect was found but no wealth effect evidence for that period.

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CHAPTER 3
DATA

In this study, we use the Stock Exchange of Thailand (SET) set index, as a stock market price. For real estate sector, there are four different price indexes which are land price index, single detached house price index, townhouse price index, and condominium price index. This study investigates thesefour priceindexes as a real estate price index. These data is from the Bank of Thailand. Because of the availability of the real estate price index, the data are ranging from 2008 and 2016. The stock price index and real estate price indexes are monthly data. We also use the macroeconomic variables such as manufacturing index and interest rate, which is 1 year T-Billinterest rate, as controlled variables. Previous study on Thai data, such as (Ibrahim, 2010), employs GDP growth and consumer price index as controlled variables with quarterly frequency. Since this paper using monthly data, we use the percentage change of manufacturing production index to match monthly frequency with real estate price index and set index. By using percentage change of manufacturing production index can be reliable according to published research of (Mitchell, Smith, Weale, Wright, and Salazar, 2005). The research has refer that "A range of monthly series is currently available giving indications of short-term movements in output. As the only available information, they are already exploited in various ways: financial commentators routinely examine monthly data on retail sales, the trade figures, and the output of the production industries in order to assess the state of the economy and likely developments in monetary policy; academic researchers exploiting high frequency econometric techniques make use of one another of these series as the best available proxy for a broader measure of demand or output." Therefore, percentage change of manufacturing production index is appropriate to be used alone as GDP growth for monthly data.

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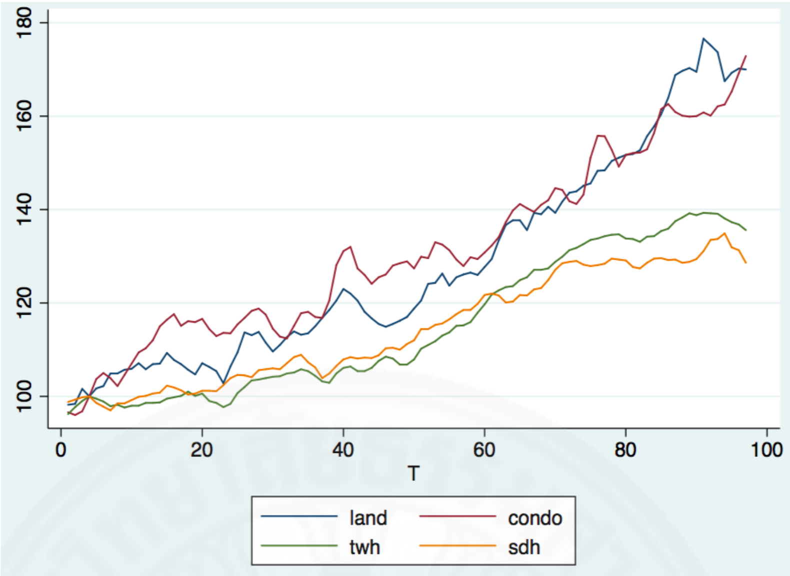
Figure 3.1: Price Index of Real Estate Indexes of Thailand



*Noted that land condo twh and sdh are price index.

Figure 3.2: Price Index of SET

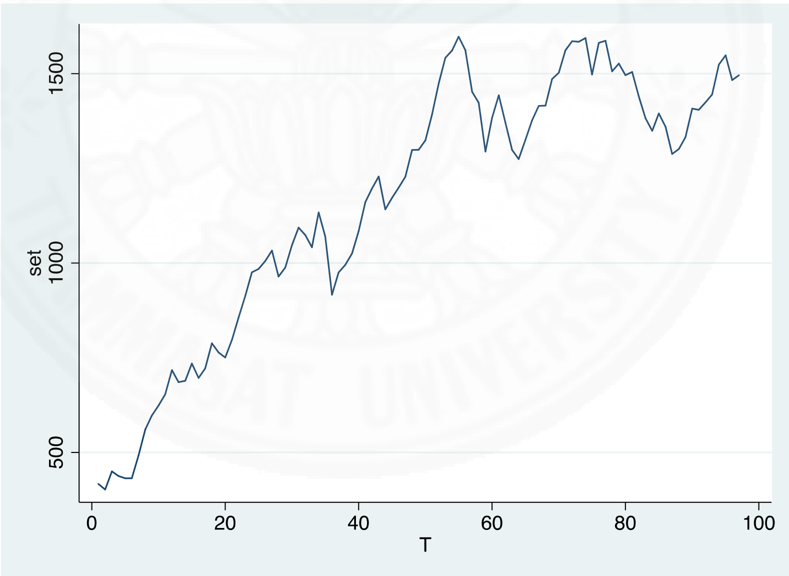
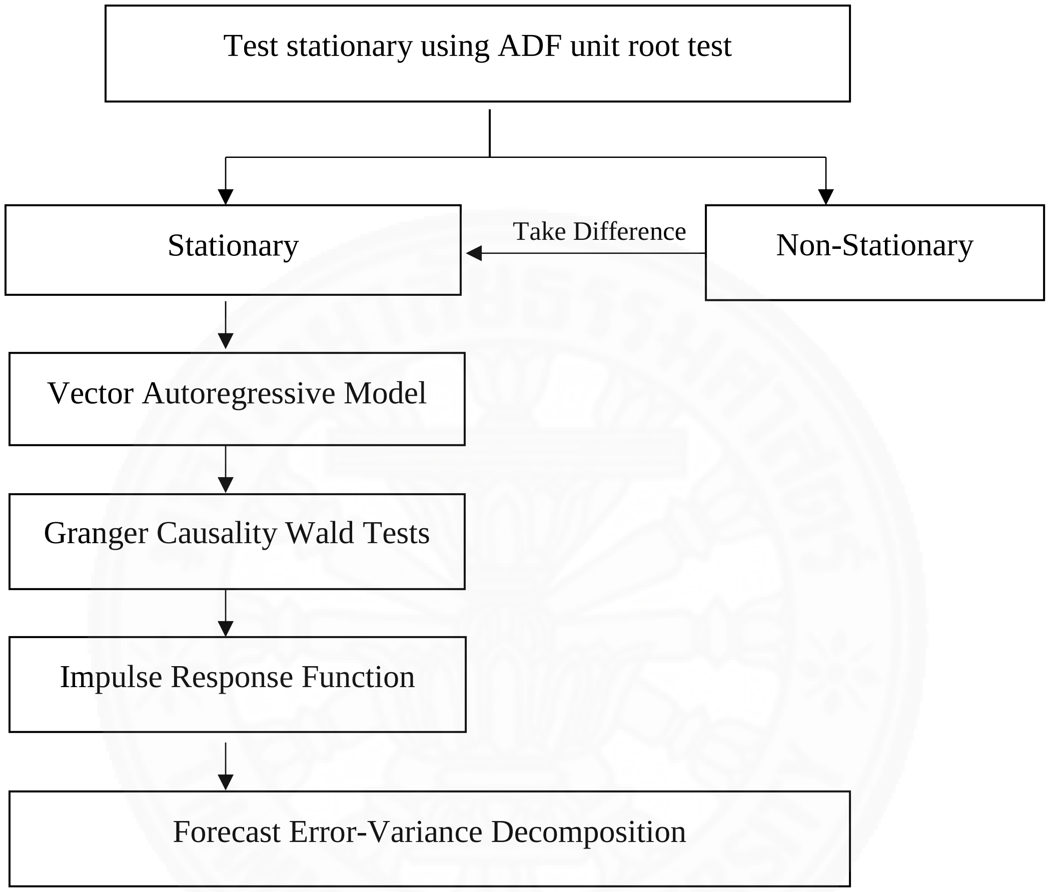


Figure 3.1 showed the illustration of four different kinds of real estate price index, which are land price index, condominium price index, town house price index, and single detach house price index. While the graph showed 97 periods of time begin from October 2008 to September 2016.

Figure 3.2 showed the illustration of Stock Price Index which both figure can tell that the data sets has trend which is not stationary.

CHAPTER 4
RESEARCH METHODOLOGY



In this study, we investigate the dynamic relationship between the stock price and real estate price using the Vector Autoregressive (VAR) model. After we estimate the VAR model, we will use the Granger Causality test, Impulse Response Function (IRF) and Variance decomposition to explain their relationship. Before we estimate the VAR we need perform the Augmented Dickey-Fuller unit root test on variables using in the model (Green,2002) (Chen,2001).

In the case that data is not stationary then we have to make the data stationary by taking the different follow the lag length and order of the model that has to be estimated before running any model. After making data stationary there are many tests that can be apply. In our case, we suspect that the price indexes are nonstationary and we need to transform them into return series which are stationary.

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In case the data is already stationary then granger causality can be apply next to see whether there is any relationship between stock market and real estate market and if the relationship exists then what direction the relationship is. Long-run Granger causality of stock market and real estate market can also be tested though the null hypothesis $\beta_{k,i} = \ldots = \beta_{k,j} = 0$ to see the relationship between the two market.

Before apply VAR test, the appropriate lag and order of the variables need to be determined. This paper considers appropriate lag and order by minimize of AIC, BIC, likelihood-ratio, and FPE. Reduce-form of VAR is widely use which is shown below. This paper will do the estimation using the bivariate form of VAR

$$R\_SET_t = \Gamma_{1t} + \sum_{p=1}^{P} \theta_{1p} SET_{t-p} + \sum_{g=0}^{G} \theta_{1g} X_{t-g} + \lambda_1 Z_t + \varepsilon_{st}$$

$$R\_X_t = \Gamma_{2t} + \sum_{j=0}^{J} \theta_{2j} SET_{t-j} + \sum_{k=1}^{K} \theta_{2k} X_{t-k} + \lambda_2 Z_t + \varepsilon_{jt}$$

where R_SET_t is changes in Return of stock price index at time t

R_X_t is changes in Return of real estate price index at time t ;(LAND, CONDO, SDH, TWH)

Γ_{1t} , Γ_{2t} are constants

θ_{1p} is parameters of auto regressive optimal at lag p

θ_{1g} is parameters of auto regressive optimal at lag g

θ_{1j} is parameters of auto regressive optimal at lag j

θ_{1k} is parameters of auto regressive optimal at lag k

λ_1 , λ_2 is parameters of controlled variables

Z_t is controlled variable ;(MPI, R)

ε_{st} , ε_{jt} is error term

This paper will test the relationship between the two markets with different set of controlled variables. In models 1-4 we include manufacturing production index

Ref. code: 25595802042324WOG

(MPI). In models 5 to 8, we include MPI and Interest rate. In models 9 to 12, we include Interest rate.

Noted that Model 1: Represents relationship between Return of SET Index and return of Land Price Index with MPI as controlled variable.

Model 2: Represents relationship between Return of SET Index and return of Condo Price Index with MPI as controlled variable.

Model 3: Represents relationship between Return of SET Index and return of TWH Price Index with MPI as controlled variable.

Model 4: Represents relationship between Return of SET Index and return of SDH Price Index with MPI as controlled variable.

Model 5: Represents relationship between Return of SET Index and return of Land Price Index with MPI and R as controlled variables.

Model 6: Represents relationship between Return of SET Index and return of Condo Price Index with MPI and R as controlled variables.

Model 7: Represents relationship between Return of SET Index and return of TWH Price Index with MPI and R as controlled variables.

Model 8: Represents relationship between Return of SET Index and return of SDH Price Index with MPI and R as controlled variables.

Model 9: Represents relationship between Return of SET Index and return of Land Price Index with R as controlled variable.

Model 10: Represents relationship between Return of SET Index and return of Condo Price Index with R as controlled variable.

Model 11: Represents relationship between Return of SET Index and return of TWH Price Index with R as controlled variable.

Model 12: Represents relationship between Return of SET Index and return of SDH Price Index with R as controlled variable.

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Then apply Granger Causality to see the relationship between the two markets then test for Impulse Response Function in order to analyze the reaction of a system to a shock. To see response of endogenous variables in the VAR model to one-time exogenous impulse with all other variable dated t or earlier held constant and it is better analyzed by using graph. Therefore this paper will also estimate a unit of shock to the system. Finally, FEVD will be applied in order to aid in the interpretation of a vector autoregression (VAR) model once it has been fitted.

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CHAPTER 5
RESULT

Table 5.1 displays the summary statistics for the SET index return (R_SET), the land price return (R_LAND), the condominium price return (R_CONDO), the townhouse price return (R_TWH) and the single-detached house price return (R_SDH). Table 5.1 also indicate that Set gives the highest return and highest risk while Single Detach house gives the lowest return but Town House gives the lowest risk. Moreover, the table shows that the data set (Return of price index) is stationary.

Table 5.1: Descriptive Statistic

VARIABLES	MEAN	STD. DEV.	MIN	MAX	Skewness	Kurtosis
R_SET	0.0146	0.0493	-0.4376	0.1397	0.4687	0.2338
R_LAND	0.0058	0.0148	-0.0357	0.0418	0.9241	0.8871
R_CONDO	0.0062	0.0166	-0.0348	0.0630	0.0793	0.0862
R_TWH	0.0036	0.0077	-0.0159	0.0233	0.8952	0.9776
R_SDH	0.0028	0.0086	-0.0222	0.0214	0.0328	0.2232

Begin with the augmented dickey fuller unit root test in order to test weather the data set is stationary or not. Data set was not stationary, thus, the first difference is needed to be applied. Resulted in Table 5.2 that all variables are significance at 1% level critical value, 5% level critical value, and 10% level critical value, respectively.

Table 5.2: Unit Root Test

Variables	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
R_SET	-8.528	-3.516	-2.893	-2.582
R_LAND	-8.967	-3.516	-2.893	-2.582
R_CONDO	-6.247	-3.516	-2.893	-2.582
R_TOWNHOUSE	-6.044	-3.516	-2.893	-2.582
R_SDH	-6.890	-3.516	-2.893	-2.582

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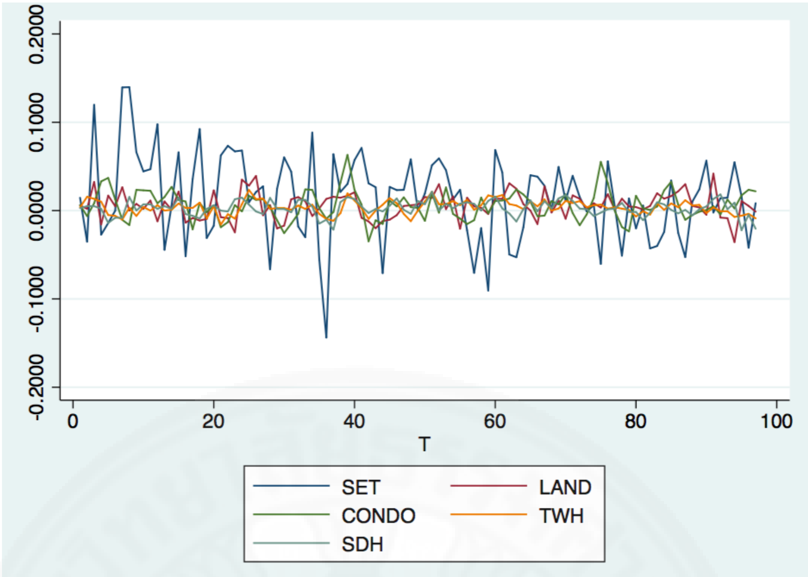
Figure 5.1: Return of Price Index of each variable



*Noted that SET LAND CONDO TWH SDH are return of price index

Figure 5.1 shows that the returns are stationary. Since data set using in VAR model is time-series data therefore appropriate lag length is needed. In this paper, the appropriate lags are chosen by the minimum of AIC. The suitable lags for each models are presented in Table 5.3.

Table 5.3: Appropriate Lag

Endogeneous Variable		Appropriate Lag
SET	LAND	4
SET	CONDO	3
SET	SDH	3
SET	TWH	3

Table 5.4: VAR Result

	R_SET		R_LAND	
	Coefficient	SD	Coefficient	SD
R_SET_{t-1}	0.2159*	0.1024	0.0052	0.0263
R_SET_{t-2}	-0.1565	0.1004	0.0382	0.0258
R_SET_{t-3}	0.1822	0.1013	-0.0244	0.0260
R_SET_{t-4}	-0.0053	0.1010	-0.0858	0.0261
R_LAND_{t-1}	-0.2129	0.3724	0.2572*	0.0956
R_LAND_{t-2}	0.3571	0.3401	0.1621	0.0873
R_LAND_{t-3}	0.0539	0.3323	-0.4434*	0.0853
R_LAND_{t-4}	-0.2533	0.3810	0.2272*	0.0980
CONS	0.0119*	0.0068	0.0053*	0.0017

	R_SET		R_CONDO	
	Coefficient	SD	Coefficient	SD
R_SET_{t-1}	0.1759	0.0987	0.0147	0.0277
R_SET_{t-2}	-0.1307	0.0992	0.0097	0.0278
R_SET_{t-3}	0.1566	0.0985	-0.0220	0.0276
R_CONDO_{t-1}	0.0491	0.3357	0.3883*	0.0942
R_CONDO_{t-2}	0.1701	0.3574	-0.0524	0.1003
R_CONDO_{t-3}	0.1351	0.3310	-0.4546*	0.0929
CONS	0.0090	0.0059	0.0067*	0.0016

	R_SET		R_TWH	
	Coefficient	SD	Coefficient	SD
R_SET_{t-1}	0.1623	0.0957	0.0001	0.0137
R_SET_{t-2}	-0.1581	0.0962	-0.0137	0.0138
R_SET_{t-3}	0.1482	0.0951	0.0029	0.0136
R_TWH_{t-1}	-0.7392	0.6680	0.4876*	0.0959
R_TWH_{t-2}	0.3478	0.7183	0.1848	0.1032
R_TWH_{t-3}	-1.5992*	0.6722	-0.3897*	0.8965
CONS	0.0194*	0.0062	0.0028*	0.0008

	R_SET		R_SDH	
	Coefficient	SD	Coefficient	SD
R_SET_{t-1}	0.1620	0.0970	0.0259	0.0164
R_SET_{t-2}	-0.1265	0.0977	0.0040	0.0166
R_SET_{t-3}	0.1882	0.0965	0.0018	0.0164
R_SDH_{t-1}	1.2023*	0.5782	0.2335*	0.0982
R_SDH_{t-2}	-0.4822	0.6075	0.0843	0.1032
R_SDH_{t-3}	-1.1629	0.6144	-0.4170*	0.1044
CONS	0.0125*	0.0055	0.0027*	0.0009

According to the methodology discussed above, this paper estimates bivariate VAR with controlled variable of MPI or Manufacturing Production Index (Mitchell, Smith, Weale, Wright, and Salazar, 2005). We estimate the bivariate VAR with different proxies for real estate price. The results are presented in Table 5.4. Then, we use the Granger causality to explore dynamic relationship between stock return and real estate return.

Table 5.5: Granger Causality Test

Model No.	Control Variable	Granger Causality	df	Prob > chi2
Model 1	MPI	$R_{SET} \nrightarrow R_{LAND}$	4	0.054
	MPI	$R_{LAND} \rightarrow R_{SET}$	4	0.003
Model 2	MPI	$R_{SET} \nrightarrow R_{CONDO}$	3	0.833
	MPI	$R_{CONDO} \nrightarrow R_{SET}$	3	0.774
Model 3	MPI	$R_{SET} \rightarrow R_{SDH}$	3	0.025
	MPI	$R_{SDH} \nrightarrow R_{SET}$	3	0.446
Model 4	MPI	$R_{SET} \rightarrow R_{TWH}$	3	0.047
	MPI	$R_{TWH} \nrightarrow R_{SET}$	3	0.799

*Noted that $\rightarrow$ means granger causality, $\nrightarrow$ means not granger causality.

From Table 5.5, the return of LAND Granger causes the return of SET for all types of controlled variables, while the return of SET Granger causes the return of Townhouse and the return of Single-Detached House for all types of controlled variables condition. The result supports credit price effect in model that LAND is the representative of Real Estate Market and Wealth effect was supported by model of SDH and TWH which are the representative of Real Estate Market. However, there’s no relationship between SET and CONDO which might be because that most of purchasers of LAND, TWH, and SDH were end-user which caused the price of these variables to reflect the rational price of the market, while CONDO price appeared under many types of purchasers (inspectors, investors, and end-user) which are not able to reflect market price rationally.

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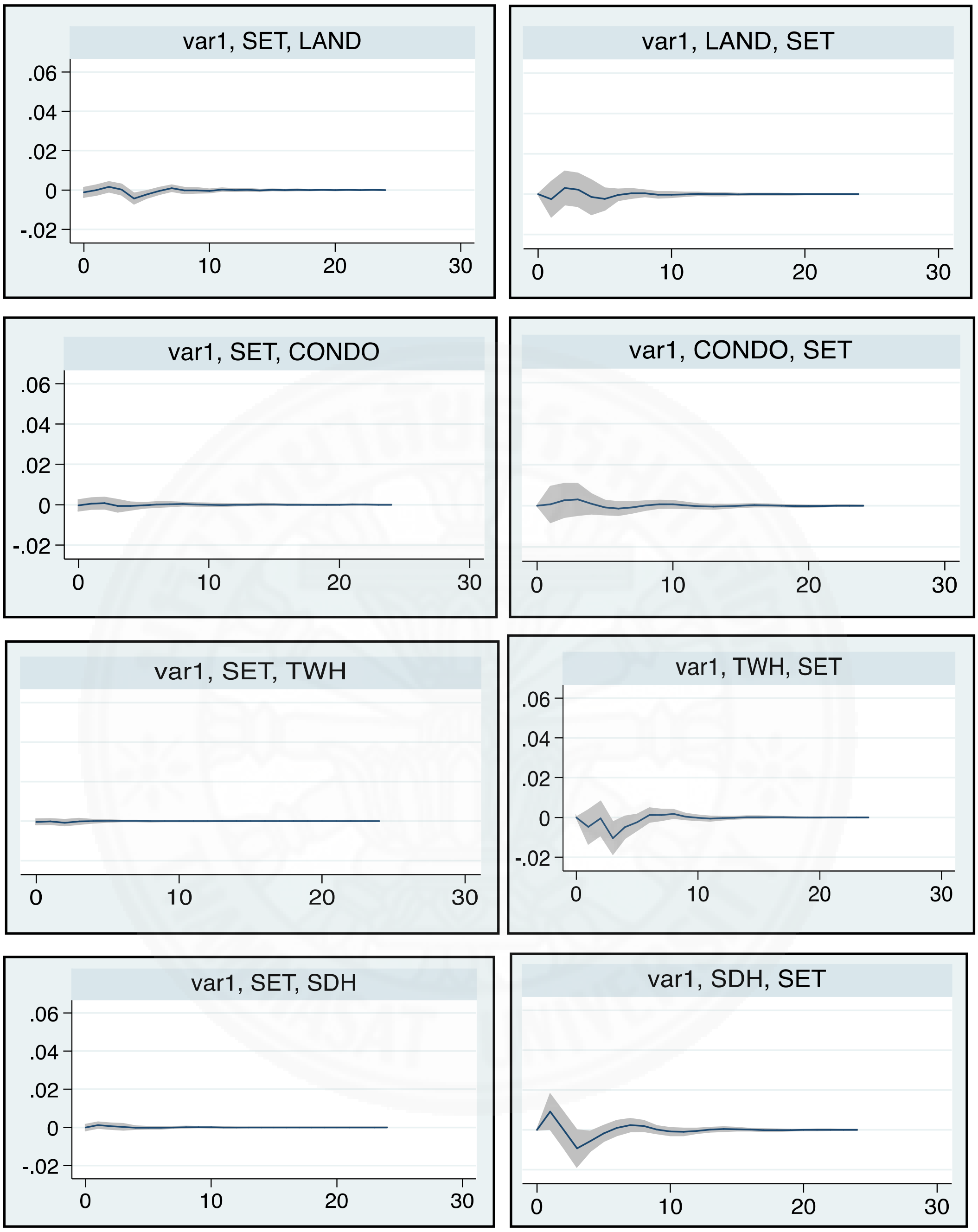
Figure 5.2: IRF Result



*Noted that SET is Return of Stock price index, CONDO is Return of condo price index, TWH is return of town-house price index, SDH is return of Single Detach house price index.

The IRF graph (Refer to Figure 5.2) which are the relationship of two markets with controlled variable of MPI. The graph shows the impulse by row and response by column with 24 monthly periods. For model1, the graph shows that effect of one S.D. impulse to LAND, SET was response by the small fluctuation in both directions less than 0.01% changes and move back to normal with 8 periods, while response of LAND when impulse on SET show the similar result. For model2, the effect of one S.D. impulse to CONDO, SET was response with very small change, while response on CONDO was close to unchanged when impulse on SET. For model3, the effect of one S.D. impulse to TWH, SET show negatively fluctuate response less than 0.02% and move back to normal within 12 periods of time, while response on TWH when impulse on SET doesn't show any significant changing. For model4, response of SET when impulse on SDH show rising in SET less than 0.02% for the first 2 periods then decline to -0.01% at the fourth period and move back to normal for within 12 periods approximately. While SDH haven't showed any significant response when impulse on SET.

For Model 5-8, which has controlled variables of MPI and R gives the similar response to the set of model 1-4, respectively. As well as, the set of model 9-12 which has controlled variables of R gives the similar result of direction, magnitude, and effect period

Table 5.6: FEVD Result

FEVD	**Forecast Errors Variance of SET**		**Forecast Errors Variance of LAND**	
Period ahead	**Due to SET**	**Due to LAND**	**Period ahead**	**Due to SET**
1	1	0	1	1
2	0.9962	0.0037	2	0.9962
3	0.9953	0.0046	3	0.9953
4	0.9953	0.0046	4	0.9953
5	0.9940	0.0059	5	0.9940
10	0.9922	0.0077	10	0.9922
20	0.9922	0.0077	20	0.9922

FEVD	**Forecast Errors Variance of SET**		**Forecast Errors Variance of CONDO**	
Period ahead	**Due to SET**	**Due to CONDO**	**Due to SET**	**Due to CONDO**
1	1	0	0.0002	0.9997
2	0.9999	2.4e-06	0.0017	0.9982
3	0.9988	0.0011	0.0030	0.9969
4	0.9955	0.0044	0.0060	0.9939
5	0.9949	0.0050	0.0078	0.9921
10	0.9940	0.0059	0.0085	0.9914
20	0.9937	0.0062	0.0087	0.9912

Ref. code: 25595802042324WOG

FEVD	Forecast Errors Variance of SET		Forecast Errors Variance of SDH	
Period ahead	**Due to SET**	**Due to SDH**	**Period ahead**	**Due to SET**
1	1	0	1	1
2	0.9648	0.0351	2	0.9648
3	0.9649	0.0350	3	0.9649
4	0.9319	0.0680	4	0.9319
5	0.9206	0.0793	5	0.9206
10	0.9162	0.0837	10	0.9162
20	0.9155	0.0844	20	0.9155

FEVD	Forecast Errors Variance of SET		Forecast Errors Variance of TWH	
Period ahead	**Due to SET**	**Due to TWH**	**Due to SET**	**Due to TWH**
1	1	0	0.0121	0.9878
2	0.9855	0.0144	0.0123	0.9876
3	0.9839	0.0160	0.0199	0.9800
4	0.9284	0.0715	0.0196	0.9803
5	0.9185	0.0014	0.0196	0.9803
10	0.9135	0.0864	0.0202	0.9797
20	0.9131	0.0868	0.0202	0.9797

Forecast Error Variance Decomposition (Refer to Table 5.6), which it reveals the proportion of the movements in a sequence due to its own shocks versus shocks to the other variable given the result that similarly to IRF. Change on SET for one standard deviation was from the combination of SDH price had changed and combination of TWH price had changed. Therefore, the fluctuation of return on SET Index was determined by the fluctuation of return on SDH and the fluctuation of return on TWH.

Ref. code: 25595802042324WOG

CHAPTER 6
CONCLUSION

This paper tries to investigate the relationship between stock market and real estate market supporting by theories of wealth effect and credit-price effect. The paper had applied the VAR model to monthly data on SET index return and real estate return.

The result was support both wealth effect and credit-price effect that the return of SET Index has significant effect the return of Land price. In the other hand, the return of LAND granger causes the return of SET for all types of controlled variables condition, while the return of SET granger causes the return of Townhouse and the return of Single-Detached House for all types of controlled variables condition. The result shows positive relationship between return of stock index and return of single detach house price index while relationship between return of set index and return of town house price index was negative.

The result of relationship between return of SET index and return of land price index was support wealth effect that an anticipate gain in rising of stock price will causes higher purchasing power to invest in land as alternative investment.

Moreover, granger causality and IRF has support the result of VAR model with different controlled variables. This prove the result of the relationship between stock market and real estate market as mentioned.

However, the same data set of real estate price was contain from year 2008 to 2016, which affect sample size to be quite small. Further paper can apply by using longer period of data set.

Ref. code: 25595802042324WOG

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Ref. code: 25595802042324WOG

APPENDICES

Ref. code: 25595802042324WOG

APPENDIX A
EXOGENOUS VARIABLE OF MPI

VAR Result with exogeneous variable of MPI

```
. var SET LAND,lags(1/4) exog(MFP)

Vector autoregression

Sample:  5 - 97                               No. of obs      =        93
Log likelihood =   435.162                    AIC             = -8.928214
FPE            =  4.55e-07                    HQIC            = -8.708302
Det(Sigma_ml)  =  2.96e-07                    SBIC            = -8.383569
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
SET	10	.048822	0.0944	9.694391	0.3758
LAND	10	.012542	0.3447	48.92266	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
SET						
SET						
L1.	.2159205	.1024102	2.11	0.035	.0152002	.4166407
L2.	-.1565149	.1004821	-1.56	0.119	-.3534562	.0404265
L3.	.1822858	.1013045	1.80	0.072	-.0162673	.3808389
L4.	-.0053088	.1018051	-0.05	0.958	-.2048431	.1942255
LAND						
L1.	-.2129968	.3724501	-0.57	0.567	-.9429856	.5169919
L2.	.357136	.3401556	1.05	0.294	-.3095567	1.023829
L3.	.0539135	.3323032	0.16	0.871	-.5973888	.7052157
L4.	-.2533679	.3818215	-0.66	0.507	-1.001724	.4949885
MFP	-.0284127	.0286076	-0.99	0.321	-.0844826	.0276572
_cons	.0119936	.0068659	1.75	0.081	-.0014632	.0254504
LAND						
SET						
L1.	.0052788	.0263087	0.20	0.841	-.0462854	.056843
L2.	.0382966	.0258134	1.48	0.138	-.0122968	.08889
L3.	-.0244771	.0260247	-0.94	0.347	-.0754845	.0265304
L4.	-.0858456	.0261533	-3.28	0.001	-.1371052	-.0345861
LAND						
L1.	.2572905	.0956809	2.69	0.007	.0697594	.4448215
L2.	.1621639	.0873846	1.86	0.063	-.0091067	.3334345
L3.	-.4434693	.0853673	-5.19	0.000	-.6107862	-.2761525
L4.	.2272256	.0980884	2.32	0.021	.0349759	.4194753
MFP	.0105712	.0073492	1.44	0.150	-.0038329	.0249753
_cons	.0053783	.0017638	3.05	0.002	.0019212	.0088353

Ref. code: 25595802042324WOG

```
. var SET CONDO,lag(1/3) exog(MFP)

Vector autoregression

Sample:  4 - 97                                   No. of obs      =        94
Log likelihood =    428.97                        AIC             = -8.786596
FPE            =  5.24e-07                        HQIC            = -8.611736
Det(Sigma_ml)  =  3.73e-07                        SBIC            = -8.353695

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                  8     .048757   0.0715   7.239269   0.4044
CONDO                8      .01369   0.3926   60.76029   0.0000
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SET          |
         SET |
         L1. |   .1759054   .0987919     1.78   0.075    -.0177232     .369534
         L2. |  -.1307833   .0992956    -1.32   0.188     -.325399    .0638325
         L3. |   .1566259   .0985593     1.59   0.112    -.0365467    .3497985
             |
       CONDO |
         L1. |   .0491425   .3357457     0.15   0.884    -.6089069    .7071919
         L2. |   .1701816   .3574659     0.48   0.634    -.5304387    .8708019
         L3. |   .1351115   .3310648     0.41   0.683    -.5137635    .7839865
             |
         MFP |  -.0176011   .0283661    -0.62   0.535    -.0731975    .0379954
       _cons |   .0090927   .0059619     1.53   0.127    -.0025924    .0207778
-------------+----------------------------------------------------------------
CONDO        |
         SET |
         L1. |   .0147167   .0277383     0.53   0.596    -.0396494    .0690828
         L2. |   .0097337   .0278798     0.35   0.727    -.0449096     .064377
         L3. |  -.0220536    .027673    -0.80   0.425    -.0762917    .0321845
             |
       CONDO |
         L1. |   .3883572   .0942691     4.12   0.000     .2035932    .5731213
         L2. |  -.0524187   .1003676    -0.52   0.601    -.2491356    .1442982
         L3. |  -.4546071   .0929548    -4.89   0.000    -.6367952    -.272419
             |
         MFP |   .0057155   .0079645     0.72   0.473    -.0098946    .0213256
       _cons |   .0067449    .001674     4.03   0.000      .003464    .0100257
------------------------------------------------------------------------------
```

```
. var SET SDH,lag(1/3) exog(MFP)

Vector autoregression

Sample:  4 - 97                                  No. of obs      =        94
Log likelihood =  484.1489                       AIC             = -9.960615
FPE            =  1.62e-07                       HQIC            = -9.785754
Det(Sigma_ml)  =  1.15e-07                       SBIC            = -9.527713
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
SET	8	.046716	0.1476	16.27549	0.0227
SDH	8	.00794	0.2517	31.61457	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
SET						
SET						
L1.	.1620828	.0970078	1.67	0.095	-.028049	.3522147
L2.	-.1265413	.0977602	-1.29	0.196	-.3181477	.0650651
L3.	.1882429	.096539	1.95	0.051	-.0009701	.3774559
SDH						
L1.	1.202353	.5782273	2.08	0.038	.0690485	2.335658
L2.	-.4822306	.6075773	-0.79	0.427	-1.67306	.708599
L3.	-1.162967	.6144559	-1.89	0.058	-2.367278	.0413447
MFP	-.0060441	.0266607	-0.23	0.821	-.0582981	.0462099
_cons	.0125072	.0055937	2.24	0.025	.0015438	.0234706
SDH						
SET						
L1.	.025998	.0164886	1.58	0.115	-.006319	.058315
L2.	.004004	.0166165	0.24	0.810	-.0285637	.0365717
L3.	.0018399	.0164089	0.11	0.911	-.030321	.0340008
SDH						
L1.	.2335069	.0982823	2.38	0.018	.0408771	.4261366
L2.	.0843085	.103271	0.82	0.414	-.1180989	.2867159
L3.	-.4170599	.1044401	-3.99	0.000	-.6217588	-.212361
MFP	-.0038434	.0045316	-0.85	0.396	-.0127251	.0050383
_cons	.0027449	.0009508	2.89	0.004	.0008815	.0046084

```
. var SET TWH,lag(1/3) exog(MFP)

Vector autoregression

Sample:  4 - 97                              No. of obs      =         94
Log likelihood =  498.8152                   AIC             = -10.27266
FPE            =  1.19e-07                   HQIC            =  -10.0978
Det(Sigma_ml)  =  8.43e-08                   SBIC            = -9.839763
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
SET	8	.047037	0.1358	14.77624	0.0390
TWH	8	.006758	0.2972	39.75427	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
SET						
SET						
L1.	.1623455	.0957998	1.69	0.090	-.0254187	.3501097
L2.	-.1581798	.0962151	-1.64	0.100	-.3467579	.0303982
L3.	.1482545	.0951471	1.56	0.119	-.0382305	.3347394
TWH						
L1.	-.7392676	.6680702	-1.11	0.268	-2.048661	.5701258
L2.	.3478719	.7183442	0.48	0.628	-1.060057	1.755801
L3.	-1.599247	.672257	-2.38	0.017	-2.916847	-.2816479
MFP	-.0085424	.0268265	-0.32	0.750	-.0611215	.0440366
_cons	.0194319	.006222	3.12	0.002	.007237	.0316269
TWH						
SET						
L1.	.0001381	.013764	0.01	0.992	-.0268388	.027115
L2.	-.013718	.0138236	-0.99	0.321	-.0408118	.0133759
L3.	.0029859	.0136702	0.22	0.827	-.0238073	.029779
TWH						
L1.	.4076149	.0959845	4.25	0.000	.2194886	.5957411
L2.	.1848406	.1032076	1.79	0.073	-.0174426	.3871238
L3.	-.3897767	.0965861	-4.04	0.000	-.5790819	-.2004714
MFP	.0015914	.0038543	0.41	0.680	-.0059628	.0091457
_cons	.0028726	.0008939	3.21	0.001	.0011205	.0046247

GRANGER CASUALITY Result with exogenous variable of MPI

```
. vargranger
```

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
SET	LAND	1.3406	4	0.854
SET	ALL	1.3406	4	0.854
LAND	SET	16.036	4	0.003
LAND	ALL	16.036	4	0.003

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
SET	CONDO	.86814	3	0.833
SET	ALL	.86814	3	0.833
CONDO	SET	1.111	3	0.774
CONDO	ALL	1.111	3	0.774

Granger causality Wald tests

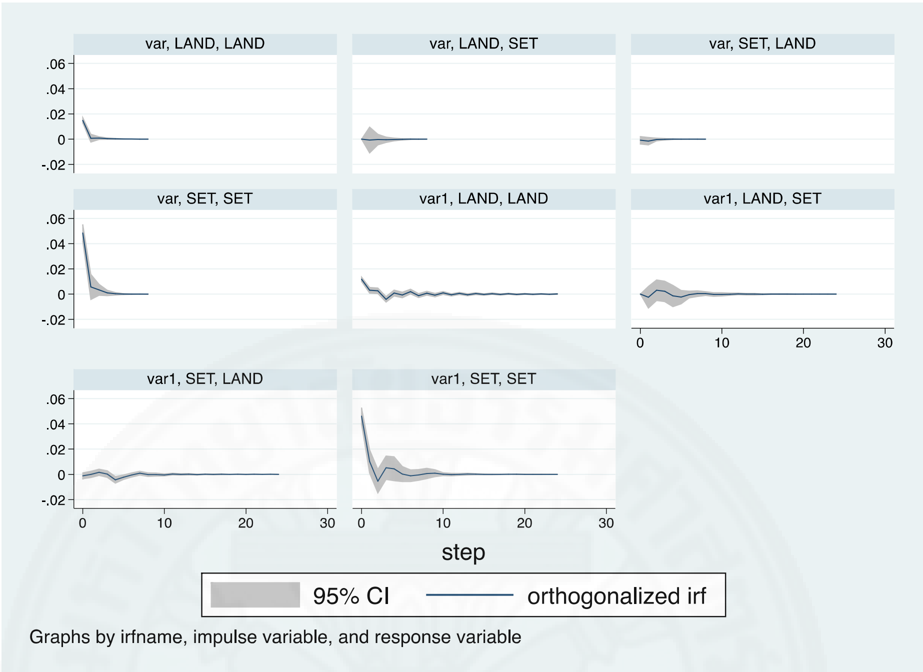
Equation	Excluded	chi2	df	Prob > chi2
SET	SDH	9.3357	3	0.025
SET	ALL	9.3357	3	0.025
SDH	SET	2.6645	3	0.446
SDH	ALL	2.6645	3	0.446

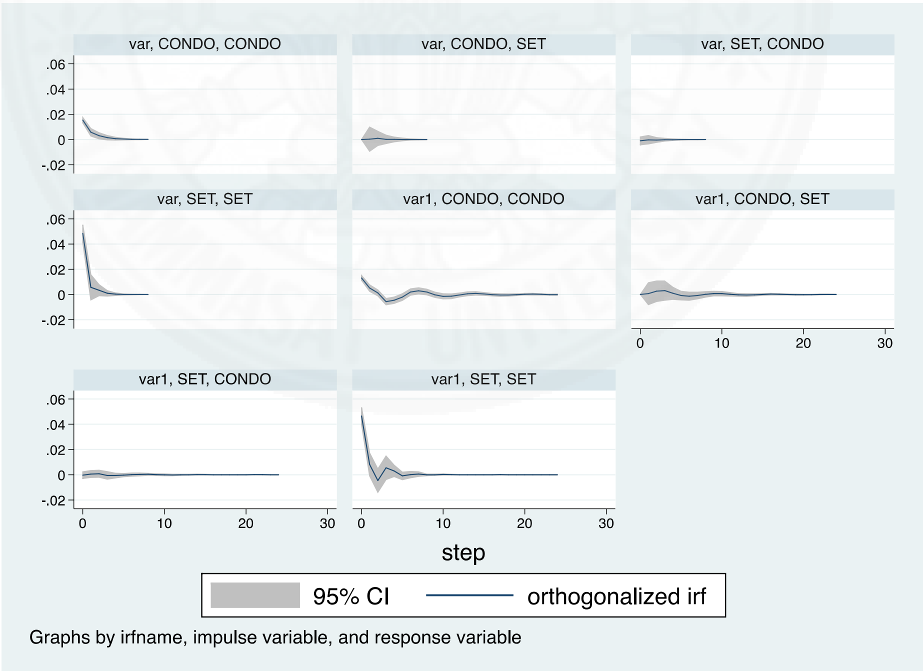
Granger causality Wald tests

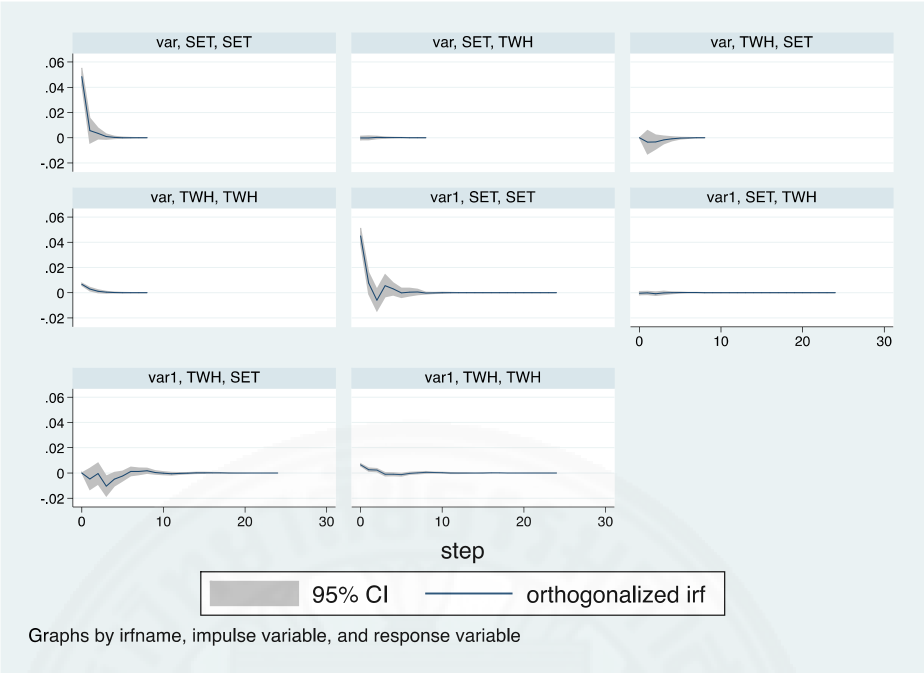
Equation	Excluded	chi2	df	Prob > chi2
SET	TWH	7.9308	3	0.047
SET	ALL	7.9308	3	0.047
TWH	SET	1.0073	3	0.799
TWH	ALL	1.0073	3	0.799

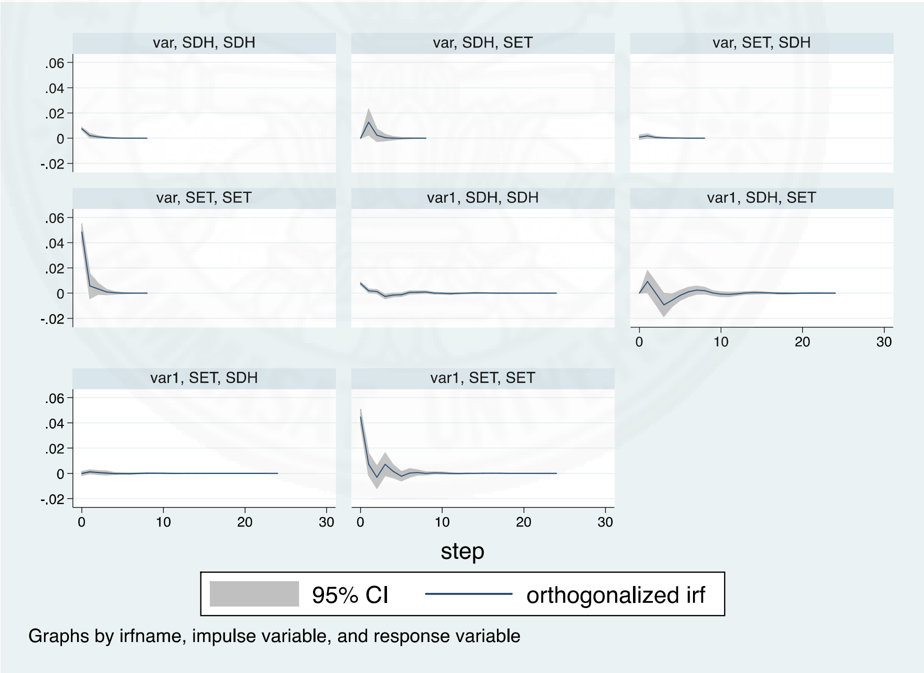
Ref. code: 25595802042324WOG

IRF Result with exogenous variable of MPI






var, SET, SET
var, SET, TWH
var, TWH, SET
var, TWH, TWH
var1, SET, SET
var1, SET, TWH
var1, TWH, SET
var1, TWH, TWH
step
95% CI
orthogonalized irf
Graphs by irfname, impulse variable, and response variable


var, SDH, SDH
var, SDH, SET
var, SET, SDH
var, SET, SET
var1, SDH, SDH
var1, SDH, SET
var1, SET, SDH
var1, SET, SET
step
95% CI
orthogonalized irf
Graphs by irfname, impulse variable, and response variable

APPENDIX B

EXOGENOUS VARIABLE OF MPI AND R

VAR Result with exogenous variable of MPI and R

```
. var SET LAND,lag(1/4) exog(MFP R)

Vector autoregression

Sample:  5 - 97                              No. of obs      =        93
Log likelihood =  439.0477                   AIC             = -8.968768
FPE            =  4.37e-07                   HQIC            = -8.726865
Det(Sigma_ml)  =  2.72e-07                   SBIC            = -8.369659

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                  11     .048682   0.1104   11.54393   0.3167
LAND                 11     .012264   0.3810   57.24564   0.0000
----------------------------------------------------------------
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
SET						
SET						
L1.	.2161972	.1015005	2.13	0.033	.01726	.4151345
L2.	-.1402215	.1003819	-1.40	0.162	-.3369665	.0565235
L3.	.1903392	.100597	1.89	0.058	-.0068273	.3875056
L4.	.0023403	.1010735	0.02	0.982	-.1957601	.2004407
LAND						
L1.	-.2561711	.3706451	-0.69	0.489	-.9826222	.47028
L2.	.2857135	.3416203	0.84	0.403	-.38385	.9552769
L3.	-.0146157	.33358	-0.04	0.965	-.6684206	.6391892
L4.	-.3122862	.3811575	-0.82	0.413	-1.059341	.4347687
MFP	-.0270375	.0283733	-0.95	0.341	-.0826482	.0285732
R	-.0827225	.0639181	-1.29	0.196	-.2079997	.0425547
_cons	.0139406	.0069692	2.00	0.045	.0002813	.0276
LAND						
SET						
L1.	.0054046	.0255697	0.21	0.833	-.0447112	.0555203
L2.	.0457033	.0252879	1.81	0.071	-.0038602	.0952668
L3.	-.0208162	.0253421	-0.82	0.411	-.0704858	.0288535
L4.	-.0823685	.0254622	-3.23	0.001	-.1322734	-.0324635
LAND						
L1.	.2376641	.0933719	2.55	0.011	.0546585	.4206698
L2.	.1296964	.0860601	1.51	0.132	-.0389782	.2983711
L3.	-.4746215	.0840346	-5.65	0.000	-.6393263	-.3099168
L4.	.2004423	.0960202	2.09	0.037	.0122462	.3886384
MFP	.0111963	.0071477	1.57	0.117	-.002813	.0252056
R	-.0376043	.0161021	-2.34	0.020	-.0691638	-.0060448
_cons	.0062633	.0017557	3.57	0.000	.0028223	.0097044

```
. var SET CONDO, lag(1/3) exog(MFP R)

Vector autoregression

Sample:  4 - 97                                    No. of obs      =        94
Log likelihood =  430.4176                         AIC             = -8.774842
FPE            =  5.31e-07                         HQIC            = -8.578124
Det(Sigma_ml)  =  3.61e-07                         SBIC            = -8.287828
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
SET	9	.048666	0.0857	8.812041	0.3584
CONDO	9	.01366	0.4023	63.26131	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
SET						
SET						
L1.	.1770932	.0980383	1.81	0.071	-.0150583	.3692447
L2.	-.1148474	.0994117	-1.16	0.248	-.3096908	.0799959
L3.	.1675078	.0982162	1.71	0.088	-.0249923	.360008
CONDO						
L1.	.0458181	.3331791	0.14	0.891	-.6072009	.6988371
L2.	.1134562	.3578137	0.32	0.751	-.5878457	.814758
L3.	.1545065	.3289146	0.47	0.639	-.4901543	.7991672
MFP	-.0156963	.0281923	-0.56	0.578	-.0709523	.0395597
R	-.0751702	.0622047	-1.21	0.227	-.1970891	.0467488
_cons	.0097961	.0059447	1.65	0.099	-.0018553	.0214475
CONDO						
SET						
L1.	.0143766	.0275183	0.52	0.601	-.0395582	.0683115
L2.	.0051715	.0279038	0.19	0.853	-.0495189	.0598619
L3.	-.0251689	.0275682	-0.91	0.361	-.0792016	.0288637
CONDO						
L1.	.389309	.0935197	4.16	0.000	.2060137	.5726042
L2.	-.0361792	.1004343	-0.36	0.719	-.2330269	.1606685
L3.	-.4601595	.0923227	-4.98	0.000	-.6411087	-.2792104
MFP	.0051702	.0079133	0.65	0.514	-.0103396	.0206799
R	.0215199	.0174602	1.23	0.218	-.0127014	.0557413
_cons	.0065435	.0016686	3.92	0.000	.0032731	.0098139

Ref. code: 25595802042324WOG

```
. var SET SDH,lag(1/4) exog(MFP R)

Vector autoregression

Sample:  5 - 97                               No. of obs      =         93
Log likelihood =   483.153                    AIC             = -9.917269
FPE            =  1.69e-07                    HQIC            = -9.675366
Det(Sigma_ml)  =  1.05e-07                    SBIC            =  -9.31816

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                  11     .046307   0.1951   22.54315   0.0126
SDH                  11     .007952   0.2844   36.95774   0.0001
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SET          |
         SET |
         L1. |   .1620331   .1003752     1.61   0.106    -.0346986    .3587648
         L2. |  -.1282607   .0984714    -1.30   0.193    -.3212611    .0647398
         L3. |   .2080906   .0958168     2.17   0.030      .020293    .3958881
         L4. |   .0829104   .0968944     0.86   0.392    -.1069991      .27282
             |
         SDH |
         L1. |    .837311   .6063118     1.38   0.167    -.3510383     2.02566
         L2. |  -.4074391   .5942867    -0.69   0.493     -1.57222    .7573415
         L3. |  -.9707124   .6342785    -1.53   0.126    -2.213875    .2724506
         L4. |  -.9568599   .6591811    -1.45   0.147    -2.248831    .3351113
             |
         MFP |  -.0147613   .0264124    -0.56   0.576    -.0665287    .0370061
           R |  -.0484502    .058824    -0.82   0.410    -.1637431    .0668426
       _cons |   .0158519   .0059136     2.68   0.007     .0042615    .0274424
-------------+----------------------------------------------------------------
SDH          |
         SET |
         L1. |   .0273755   .0172363     1.59   0.112    -.0064071    .0611581
         L2. |   .0082168   .0169094     0.49   0.627    -.0249251    .0413586
         L3. |  -.0007174   .0164536    -0.04   0.965    -.0329658     .031531
         L4. |   .0210017   .0166386     1.26   0.207    -.0116094    .0536128
             |
         SDH |
         L1. |   .2448795   .1041153     2.35   0.019     .0408172    .4489418
         L2. |   .0968474   .1020504     0.95   0.343    -.1031677    .2968625
         L3. |  -.4573558   .1089178    -4.20   0.000    -.6708307   -.2438809
         L4. |   .0801302    .113194     0.71   0.479     -.141726    .3019863
             |
         MFP |  -.0045049   .0045355    -0.99   0.321    -.0133944    .0043845
           R |  -.0133279   .0101012    -1.32   0.187    -.0331259      .00647
       _cons |   .0024144   .0010155     2.38   0.017      .000424    .0044047
------------------------------------------------------------------------------
```

Ref. code: 25595802042324WOG

```
. var SET TWH,lag(1/4) exog(MFP R)

Vector autoregression

Sample:  5 - 97                                   No. of obs      =        93
Log likelihood =  500.4197                        AIC             =  -10.2886
FPE            =  1.17e-07                        HQIC            = -10.04669
Det(Sigma_ml)  =  7.27e-08                        SBIC            = -9.689486

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                  11     .046635   0.1837   20.92313   0.0216
TWH                  11     .006591   0.3575   51.73977   0.0000
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SET          |
         SET |
         L1. |   .1862463   .1011448     1.84   0.066    -.0119939    .3844864
         L2. |  -.1565188   .0965793    -1.62   0.105    -.3458107    .0327732
         L3. |   .1606453   .0956372     1.68   0.093    -.0268001    .3480907
         L4. |   .0301467   .0948527     0.32   0.751    -.1557611    .2160545
             |
         TWH |
         L1. |  -.8819281    .722625    -1.22   0.222    -2.298247    .5343909
         L2. |   .3534488   .7194618     0.49   0.623     -1.05667    1.763568
         L3. |  -1.647912   .7205298    -2.29   0.022    -3.060124   -.2356993
         L4. |  -.2062271   .7678735    -0.27   0.788    -1.711232    1.298777
             |
         MFP |  -.0154918   .0273271    -0.57   0.571     -.069052    .0380684
           R |  -.1144654   .0607811    -1.88   0.060    -.2335941    .0046633
       _cons |   .0221642   .0071516     3.10   0.002     .0081473    .0361811
-------------+----------------------------------------------------------------
TWH          |
         SET |
         L1. |   .0074804   .0142938     0.52   0.601    -.0205349    .0354958
         L2. |   -.009249   .0136486    -0.68   0.498    -.0359998    .0175018
         L3. |   .0110694   .0135155     0.82   0.413    -.0154204    .0375593
         L4. |  -.0109013   .0134046    -0.81   0.416    -.0371739    .0153712
             |
         TWH |
         L1. |   .4613589   .1021216     4.52   0.000     .2612042    .6615135
         L2. |   .1272869   .1016746     1.25   0.211    -.0719916    .3265654
         L3. |  -.4751199   .1018255    -4.67   0.000    -.6746942   -.2755456
         L4. |   .1907651   .1085161     1.76   0.079    -.0219226    .4034528
             |
         MFP |   .0038273   .0038619     0.99   0.322    -.0037419    .0113964
           R |  -.0188111   .0085896    -2.19   0.029    -.0356464   -.0019758
       _cons |   .0025207   .0010107     2.49   0.013     .0005399    .0045016
------------------------------------------------------------------------------
```

Ref. code: 25595802042324WOG

GRANGER CASUALITY Result with exogenous variable of MPI and R

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
SET	LAND	1.2582	4	0.868
SET	ALL	1.2582	4	0.868
LAND	SET	16.723	4	0.002
LAND	ALL	16.723	4	0.002

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
SET	CONDO	.66236	3	0.882
SET	ALL	.66236	3	0.882
CONDO	SET	1.2352	3	0.745
CONDO	ALL	1.2352	3	0.745

Granger causality Wald tests

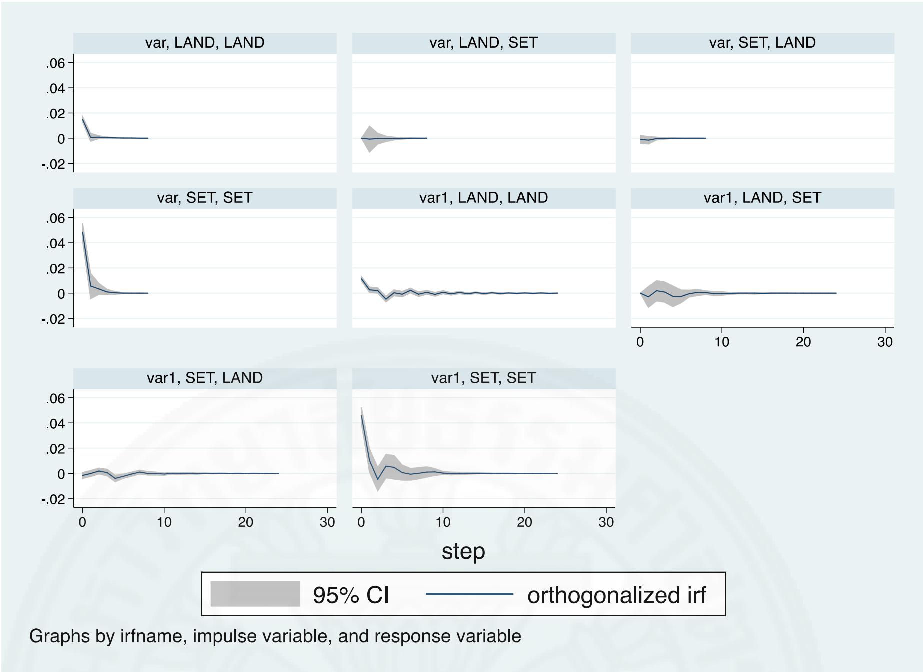
Equation	Excluded	chi2	df	Prob > chi2
SET	SDH	8.4158	3	0.038
SET	ALL	8.4158	3	0.038
SDH	SET	2.9202	3	0.404
SDH	ALL	2.9202	3	0.404

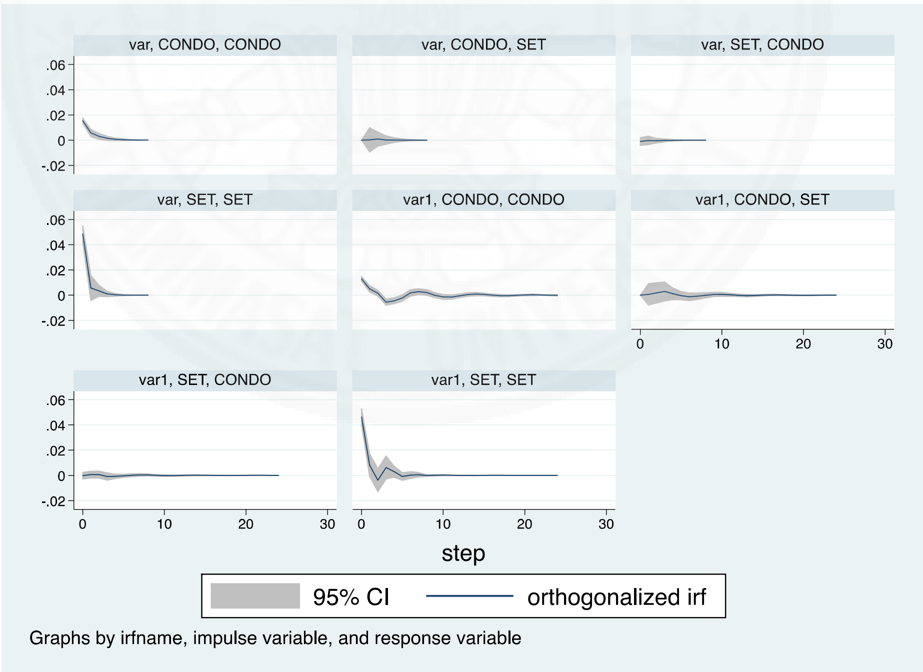
Granger causality Wald tests

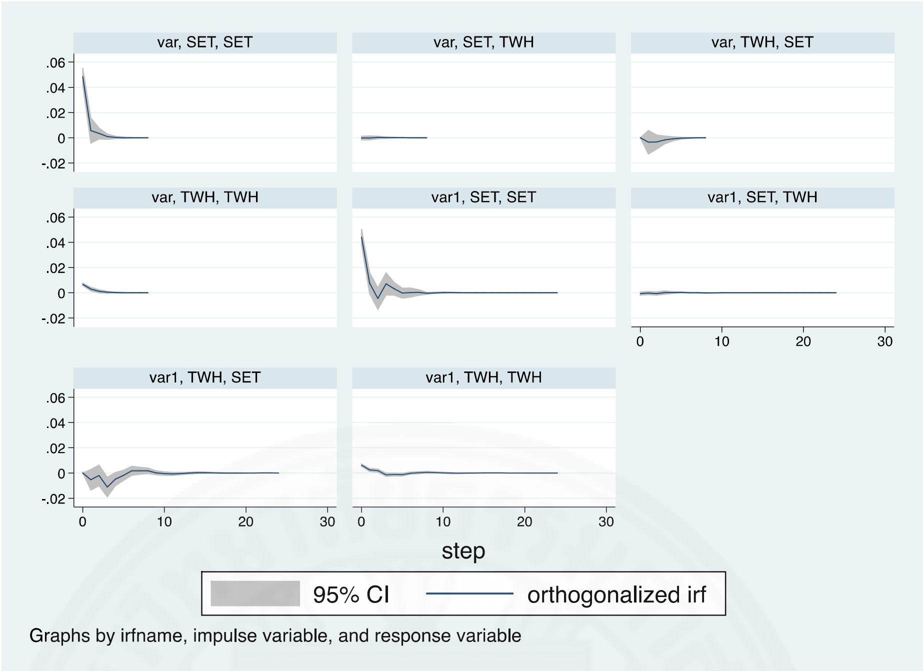
Equation	Excluded	chi2	df	Prob > chi2
SET	TWH	9.9973	3	0.019
SET	ALL	9.9973	3	0.019
TWH	SET	.61094	3	0.894
TWH	ALL	.61094	3	0.894

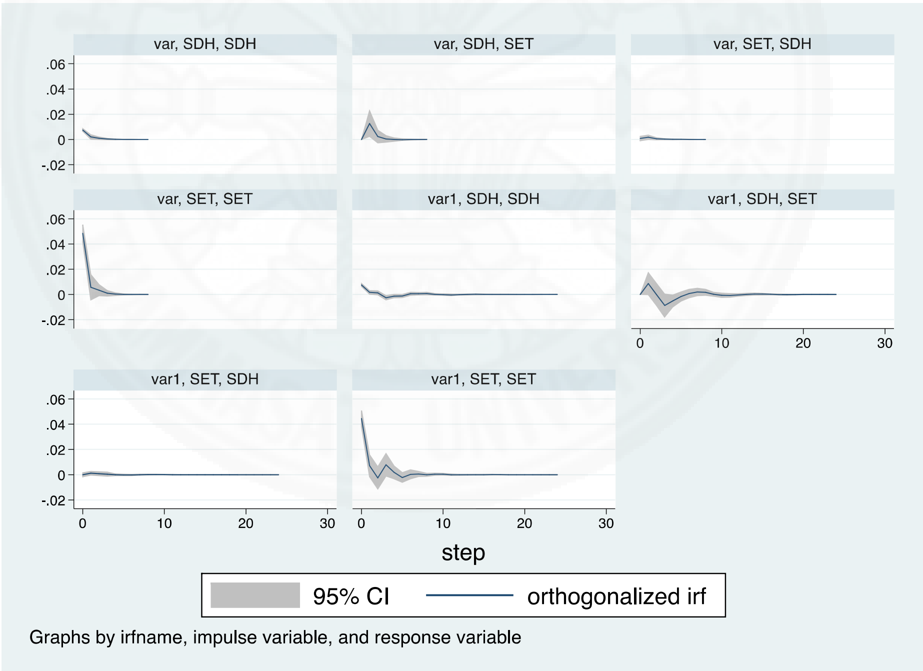
Ref. code: 25595802042324WOG

IRF Result with exogenous variable of MPI and R






var, SET, SET
var, SET, TWH
var, TWH, SET
var, TWH, TWH
var1, SET, SET
var1, SET, TWH
var1, TWH, SET
var1, TWH, TWH
step
95% CI
orthogonalized irf
Graphs by irfname, impulse variable, and response variable


var, SDH, SDH
var, SDH, SET
var, SET, SDH
var, SET, SET
var1, SDH, SDH
var1, SDH, SET
var1, SET, SDH
var1, SET, SET
step
95% CI
orthogonalized irf
Graphs by irfname, impulse variable, and response variable

APPENDIX C
EXOGENOUS VARIABLE OF R

VAR Result with exogenous variable of R

```
. var SET LAND,lag(1/4) exog(R)

Vector autoregression

Sample:  5 - 97                                    No. of obs      =        93
Log likelihood =  437.5665                         AIC             = -8.979924
FPE            =  4.32e-07                         HQIC            = -8.760012
Det(Sigma_ml)  =  2.81e-07                         SBIC            = -8.435279
```

Equation	Parms	RMSE	R-sq	chi2	P>chi2
SET	10	.048624	0.1017	10.53303	0.3091
LAND	10	.01235	0.3647	53.38353	0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
SET						
SET						
L1.	.2158618	.1019942	2.12	0.034	.0159569	.4157667
L2.	-.1328243	.1005687	-1.32	0.187	-.3299354	.0642868
L3.	.1875342	.1010436	1.86	0.063	-.0105077	.385576
L4.	-.001988	.1014631	-0.02	0.984	-.2008521	.196876
LAND						
L1.	-.2510017	.3724103	-0.67	0.500	-.9809126	.4789091
L2.	.2355854	.3391897	0.69	0.487	-.4292142	.9003849
L3.	-.0139839	.335204	-0.04	0.967	-.6709716	.6430038
L4.	-.2426977	.3759183	-0.65	0.519	-.9794841	.4940886
R	-.0850036	.0641844	-1.32	0.185	-.2108026	.0407954
_cons	.0133813	.0069782	1.92	0.055	-.0002958	.0270584
LAND						
SET						
L1.	.0055435	.0259047	0.21	0.831	-.0452287	.0563158
L2.	.0426401	.0255427	1.67	0.095	-.0074226	.0927028
L3.	-.0196546	.0256633	-0.77	0.444	-.0699537	.0306445
L4.	-.0805761	.0257698	-3.13	0.002	-.131084	-.0300682
LAND						
L1.	.2355235	.0945855	2.49	0.013	.0501392	.4209077
L2.	.1504547	.0861481	1.75	0.081	-.0183924	.3193018
L3.	-.4748832	.0851358	-5.58	0.000	-.6417462	-.3080201
L4.	.1716254	.0954765	1.80	0.072	-.015505	.3587559
R	-.0366596	.0163017	-2.25	0.025	-.0686103	-.004709
_cons	.006495	.0017723	3.66	0.000	.0030212	.0099687

Ref. code: 25595802042324WOG

```
. var SET CONDO,lag(1/3) exog(R)

Vector autoregression

Sample:  4 - 97                                 No. of obs      =        94
Log likelihood =  430.0553                      AIC             = -8.809688
FPE            =  5.12e-07                      HQIC            = -8.634828
Det(Sigma_ml)  =  3.64e-07                      SBIC            = -8.376787

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                  8     .048462   0.0827   8.474118   0.2926
CONDO                8     .013611   0.3996   62.55039   0.0000
----------------------------------------------------------------


------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SET          |
         SET |
         L1. |   .1788918   .0981465     1.82   0.068    -.0134718    .3712554
         L2. |  -.1104976   .0992675    -1.11   0.266    -.3050583    .0840631
         L3. |   .1665501   .0983629     1.69   0.090    -.0262377    .3593378
             |
       CONDO |
         L1. |   .0055578   .3257731     0.02   0.986    -.6329456    .6440613
         L2. |   .1220249   .3580715     0.34   0.733    -.5797823     .823832
         L3. |   .1373596    .328009     0.42   0.675    -.5055263    .7802455
             |
           R |  -.0771065   .0622097    -1.24   0.215    -.1990353    .0448223
       _cons |   .0098483   .0059537     1.65   0.098    -.0018208    .0215174
-------------+----------------------------------------------------------------
CONDO        |
         SET |
         L1. |   .0137842   .0275657     0.50   0.617    -.0402436     .067812
         L2. |   .0037387   .0278805     0.13   0.893    -.0509061    .0583836
         L3. |  -.0248535   .0276265    -0.90   0.368    -.0790004    .0292935
             |
       CONDO |
         L1. |   .4025702   .0914975     4.40   0.000     .2232383    .5819021
         L2. |  -.0390016    .100569    -0.39   0.698    -.2361132    .1581099
         L3. |  -.4545116   .0921255    -4.93   0.000    -.6350743   -.2739488
             |
           R |   .0221577   .0174724     1.27   0.205    -.0120875     .056403
       _cons |   .0065263   .0016722     3.90   0.000     .0032489    .0098037
------------------------------------------------------------------------------
```

```
. var SET SDH,lag(1/3) exog(R)

Vector autoregression

Sample:  4 - 97                              No. of obs      =        94
Log likelihood =  484.8961                   AIC             = -9.976513
FPE            =  1.59e-07                   HQIC            = -9.801652
Det(Sigma_ml)  =  1.13e-07                   SBIC            = -9.543612

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                   8     .046525   0.1546   17.18684   0.0162
SDH                   8     .007911   0.2573   32.56255   0.0000
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SET          |
         SET |
         L1. |   .1641067   .0965798     1.70   0.089    -.0251863    .3533997
         L2. |  -.1126213    .097921    -1.15   0.250    -.3045429    .0793004
         L3. |   .1941802   .0963717     2.01   0.044      .005295    .3830653
             |
         SDH |
         L1. |   1.137584   .5804069     1.96   0.050     7.25e-06     2.27516
         L2. |  -.4424961   .6066783    -0.73   0.466    -1.631564    .7465715
         L3. |  -1.145455   .6082711    -1.88   0.060    -2.337645    .0467343
             |
           R |  -.0544389   .0598028    -0.91   0.363    -.1716502    .0627725
       _cons |   .0127729   .0055768     2.29   0.022     .0018426    .0237032
-------------+----------------------------------------------------------------
SDH          |
         SET |
         L1. |   .0267164   .0164217     1.63   0.104    -.0054695    .0589023
         L2. |   .0078802   .0166497     0.47   0.636    -.0247527    .0405131
         L3. |   .0031134   .0163863     0.19   0.849    -.0290031      .03523
             |
         SDH |
         L1. |    .219676   .0986879     2.23   0.026     .0262513    .4131007
         L2. |    .093065   .1031549     0.90   0.367    -.1091148    .2952449
         L3. |  -.4203822   .1034257    -4.06   0.000    -.6230928   -.2176715
             |
           R |  -.0121774   .0101684    -1.20   0.231    -.0321071    .0077524
       _cons |   .0027823   .0009482     2.93   0.003     .0009238    .0046408
------------------------------------------------------------------------------
```

```
. var SET TWH,lag(1/3) exog(R)

Vector autoregression

Sample:  4 - 97                                 No. of obs      =        94
Log likelihood =  503.6808                      AIC             = -10.37619
FPE            =  1.07e-07                      HQIC            = -10.20133
Det(Sigma_ml)  =  7.60e-08                      SBIC            = -9.943286

Equation           Parms      RMSE     R-sq      chi2     P>chi2
----------------------------------------------------------------
SET                  8     .046175   0.1672   18.87665   0.0086
TWH                  8     .006566   0.3365   47.68347   0.0000
----------------------------------------------------------------

------------------------------------------------------------------------------
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
SET          |
         SET |
         L1. |   .1616104   .0939809     1.72   0.086    -.0225888    .3458096
         L2. |  -.1329093   .0951231    -1.40   0.162    -.3193471    .0535285
         L3. |   .1622023   .0936933     1.73   0.083    -.0214331    .3458377
             |
         TWH |
         L1. |  -.8696395   .6588531    -1.32   0.187    -2.160968    .4216889
         L2. |   .1745914   .7089447     0.25   0.805    -1.214915    1.564097
         L3. |   -1.68564   .6570304    -2.57   0.010    -2.973396   -.3978836
             |
           R |  -.1158745   .0606629    -1.91   0.056    -.2347715    .0030226
       _cons |   .0216196   .0062156     3.48   0.001     .0094373    .0338019
-------------+----------------------------------------------------------------
TWH          |
         SET |
         L1. |  -.0004165   .0133644    -0.03   0.975    -.0266102    .0257771
         L2. |   -.009805   .0135268    -0.72   0.469     -.036317     .016707
         L3. |   .0057198   .0133235     0.43   0.668    -.0203937    .0318333
             |
         TWH |
         L1. |   .3863489   .0936908     4.12   0.000     .2027182    .5699795
         L2. |   .1452869    .100814     1.44   0.150    -.0523049    .3428787
         L3. |  -.3968911   .0934316    -4.25   0.000    -.5800137   -.2137684
             |
           R |   -.020691   .0086264    -2.40   0.016    -.0375985   -.0037835
       _cons |   .0033058   .0008839     3.74   0.000     .0015734    .0050381
------------------------------------------------------------------------------
```

GRANGER CASUALITY Result with exogenous variable of R

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
SET	LAND	.93176	4	0.920
SET	ALL	.93176	4	0.920
LAND	SET	15.328	4	0.004
LAND	ALL	15.328	4	0.004

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
SET	CONDO	.5704	3	0.903
SET	ALL	.5704	3	0.903
CONDO	SET	1.1708	3	0.760
CONDO	ALL	1.1708	3	0.760

Granger causality Wald tests

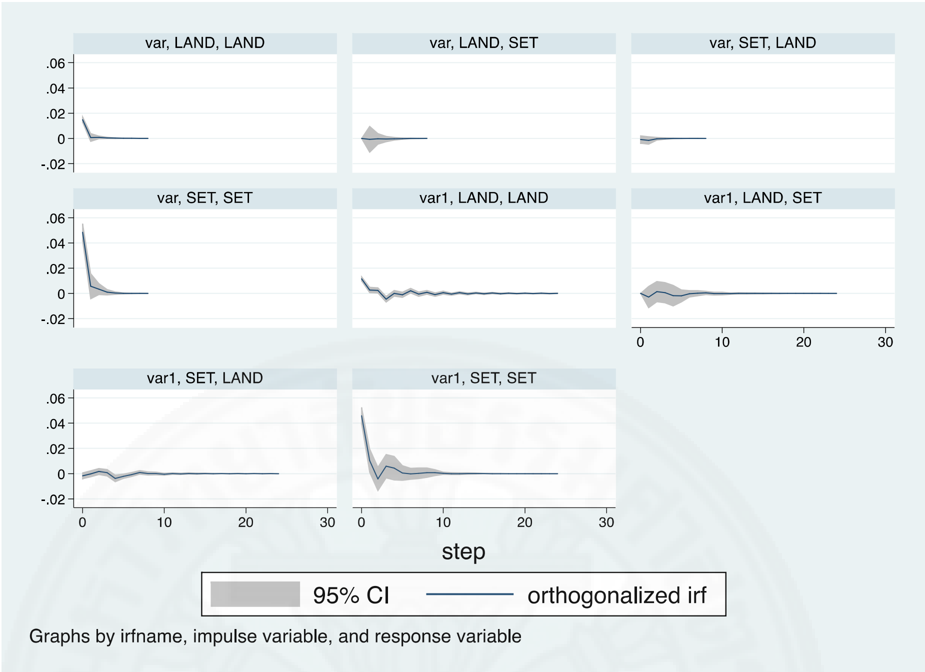
Equation	Excluded	chi2	df	Prob > chi2
SET	SDH	8.6111	3	0.035
SET	ALL	8.6111	3	0.035
SDH	SET	3.0803	3	0.379
SDH	ALL	3.0803	3	0.379

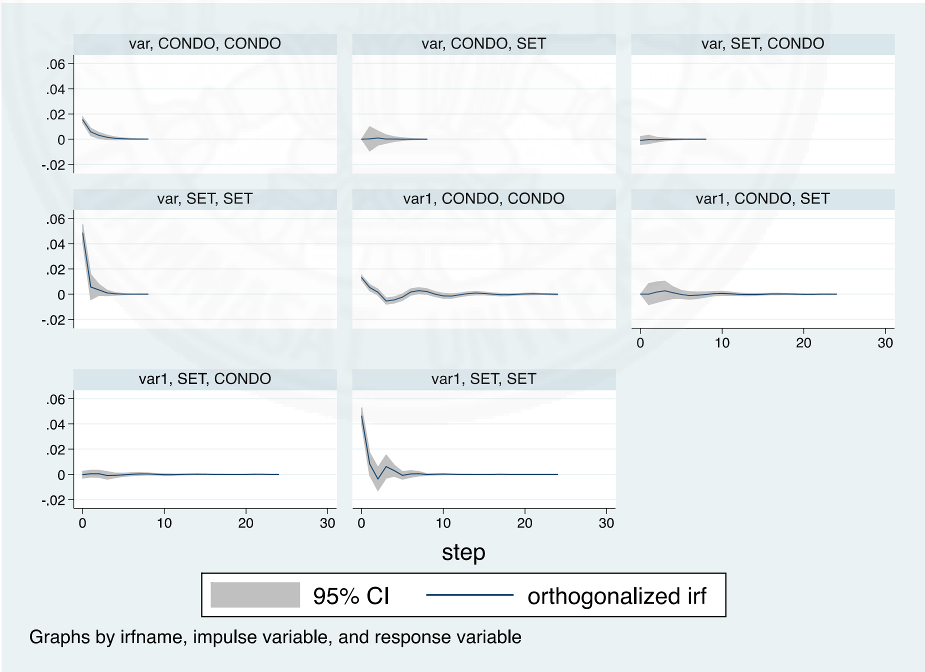
Granger causality Wald tests

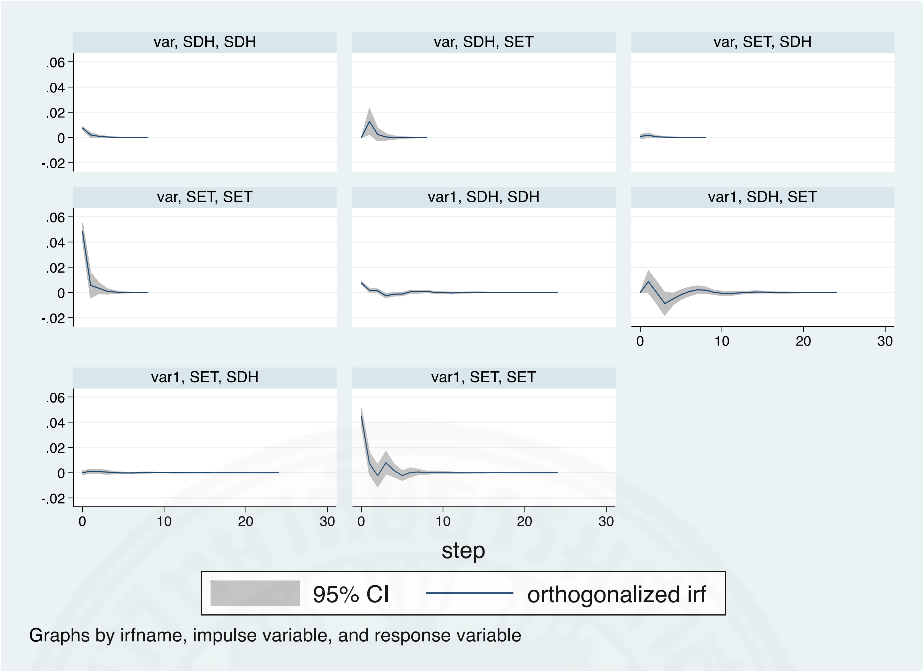
Equation	Excluded	chi2	df	Prob > chi2
SET	TWH	10.171	3	0.017
SET	ALL	10.171	3	0.017
TWH	SET	.66613	3	0.881
TWH	ALL	.66613	3	0.881

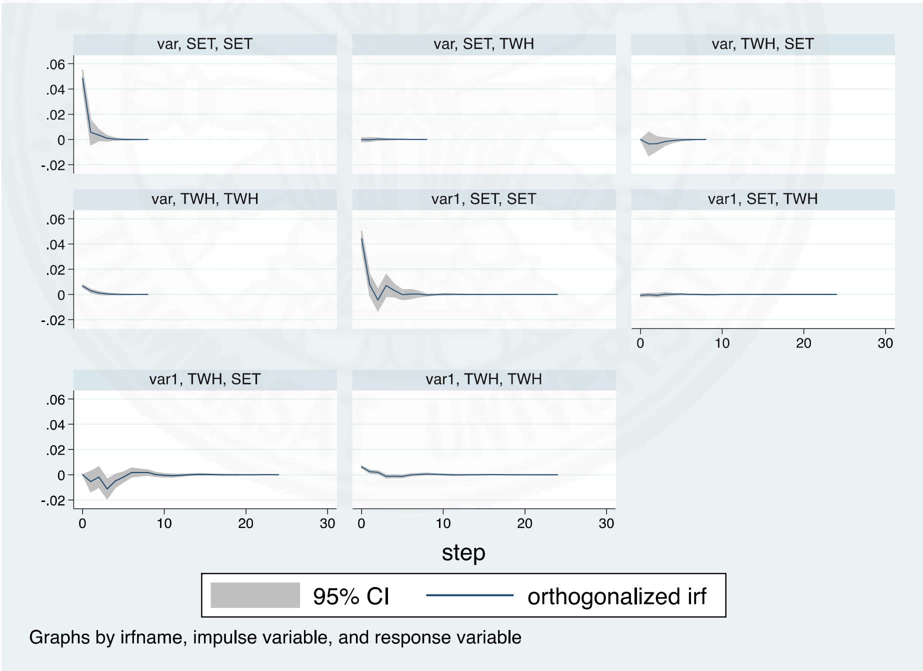
Ref. code: 25595802042324WOG

IRF Result with exogenous variable of R






var, SDH, SDH
var, SDH, SET
var, SET, SDH
var, SET, SET
var1, SDH, SDH
var1, SDH, SET
var1, SET, SDH
var1, SET, SET
.06
.04
.02
0
-.02
0
10
20
30
step
95% CI
orthogonalized irf
Graphs by irfname, impulse variable, and response variable


var, SET, SET
var, SET, TWH
var, TWH, SET
var, TWH, TWH
var1, SET, SET
var1, SET, TWH
var1, TWH, SET
var1, TWH, TWH
.06
.04
.02
0
-.02
0
10
20
30
step
95% CI
orthogonalized irf
Graphs by irfname, impulse variable, and response variable

```
. irf table fevd, impulse (SET LAND) response (SET LAND)
```

Results from var var1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper	(3) fevd	(3) Lower	(3) Upper
0	0	0	0	0	0	0	0	0	0
1	1	1	1	.003849	-.020876	.028574	0	0	0
2	.918649	.815714	1.02158	.014591	-.033206	.062389	.000194	-.005408	.005795
3	.910793	.800043	1.02154	.014766	-.033784	.063315	.000244	-.005799	.006286
4	.909594	.797269	1.02192	.014804	-.034048	.063655	.000341	-.006232	.006915
5	.909276	.796491	1.02206	.014803	-.034078	.063684	.000384	-.006347	.007115
6	.909208	.796318	1.0221	.014803	-.034082	.063687	.000394	-.006372	.007161
7	.909194	.796282	1.02211	.014802	-.034082	.063687	.000396	-.006377	.00717
8	.909192	.796275	1.02211	.014802	-.034082	.063687	.000397	-.006378	.007172
9	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.

step	(4) fevd	(4) Lower	(4) Upper	(5) fevd	(5) Lower	(5) Upper	(6) fevd	(6) Lower	(6) Upper
0	0	0	0	0	0	0	0	0	0
1	.996151	.971426	1.02088	1	1	1	.022469	-.037092	.08203
2	.945617	.860275	1.03096	.996234	.974372	1.0181	.021482	-.036477	.079441
3	.939494	.845663	1.03332	.995381	.974678	1.01608	.039647	-.027974	.107268
4	.937925	.841061	1.03479	.995306	.973503	1.01711	.037675	-.033469	.108818
5	.937588	.839953	1.03522	.994057	.968985	1.01913	.113192	.001959	.224424
6	.937511	.839672	1.03535	.992367	.960246	1.02449	.132873	.007822	.257925
7	.937494	.839602	1.03539	.992328	.95991	1.02475	.132034	.008215	.255852
8	.93749	.839585	1.03539	.992312	.959731	1.02489	.135518	.006902	.264135
9	.	.	.	.992256	.959513	1.025	.135021	.006796	.263246
10	.	.	.	.992252	.959496	1.02501	.134523	.006652	.262395
11	.	.	.	.992247	.959435	1.02506	.135259	.006583	.263936
12	.	.	.	.992234	.959404	1.02506	.135061	.006511	.263612
13	.	.	.	.992233	.959404	1.02506	.135006	.006465	.263548
14	.	.	.	.992233	.959402	1.02506	.134984	.006468	.2635
15	.	.	.	.992232	.959407	1.02506	.134948	.006406	.263489
16	.	.	.	.992231	.959405	1.02506	.134916	.006378	.263455
17	.	.	.	.992231	.959405	1.02506	.134905	.006375	.263435
18	.	.	.	.992231	.959406	1.02506	.134888	.006357	.26342
19	.	.	.	.992231	.959406	1.02506	.134881	.006345	.263417
20	.	.	.	.992231	.959405	1.02506	.134873	.006341	.263405
21	.	.	.	.99223	.959406	1.02506	.134868	.006335	.263401
22	.	.	.	.99223	.959406	1.02506	.134864	.00633	.263398
23	.	.	.	.99223	.959406	1.02506	.134861	.006328	.263395
24	.	.	.	.99223	.959406	1.02505	.134859	.006326	.263393

```
. irf table fevd, impulse (SET LAND) response (SET LAND)
```

Results from var var1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper	(3) fevd	(3) Lower	(3) Upper
0	0	0	0	0	0	0	0	0	0
1	1	1	1	.003849	-.020876	.028574	0	0	0
2	.918649	.815714	1.02158	.014591	-.033206	.062389	.000194	-.005408	.005795
3	.910793	.800043	1.02154	.014766	-.033784	.063315	.000244	-.005799	.006286
4	.909594	.797269	1.02192	.014804	-.034048	.063655	.000341	-.006232	.006915
5	.909276	.796491	1.02206	.014803	-.034078	.063684	.000384	-.006347	.007115
6	.909208	.796318	1.0221	.014803	-.034082	.063687	.000394	-.006372	.007161
7	.909194	.796282	1.02211	.014802	-.034082	.063687	.000396	-.006377	.00717
8	.909192	.796275	1.02211	.014802	-.034082	.063687	.000397	-.006378	.007172
9	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.

step	(4) fevd	(4) Lower	(4) Upper	(5) fevd	(5) Lower	(5) Upper	(6) fevd	(6) Lower	(6) Upper
0	0	0	0	0	0	0	0	0	0
1	.996151	.971426	1.02088	1	1	1	.022469	-.037092	.08203
2	.945617	.860275	1.03096	.996234	.974372	1.0181	.021482	-.036477	.079441
3	.939494	.845663	1.03332	.995381	.974678	1.01608	.039647	-.027974	.107268
4	.937925	.841061	1.03479	.995306	.973503	1.01711	.037675	-.033469	.108818
5	.937588	.839953	1.03522	.994057	.968985	1.01913	.113192	.001959	.224424
6	.937511	.839672	1.03535	.992367	.960246	1.02449	.132873	.007822	.257925
7	.937494	.839602	1.03539	.992328	.95991	1.02475	.132034	.008215	.255852
8	.93749	.839585	1.03539	.992312	.959731	1.02489	.135518	.006902	.264135
9	.	.	.	.992256	.959513	1.025	.135021	.006796	.263246
10	.	.	.	.992252	.959496	1.02501	.134523	.006652	.262395
11	.	.	.	.992247	.959435	1.02506	.135259	.006583	.263936
12	.	.	.	.992234	.959404	1.02506	.135061	.006511	.263612
13	.	.	.	.992233	.959404	1.02506	.135006	.006465	.263548
14	.	.	.	.992233	.959402	1.02506	.134984	.006468	.2635
15	.	.	.	.992232	.959407	1.02506	.134948	.006406	.263489
16	.	.	.	.992231	.959405	1.02506	.134916	.006378	.263455
17	.	.	.	.992231	.959405	1.02506	.134905	.006375	.263435
18	.	.	.	.992231	.959406	1.02506	.134888	.006357	.26342
19	.	.	.	.992231	.959406	1.02506	.134881	.006345	.263417
20	.	.	.	.992231	.959405	1.02506	.134873	.006341	.263405
21	.	.	.	.99223	.959406	1.02506	.134868	.006335	.263401
22	.	.	.	.99223	.959406	1.02506	.134864	.00633	.263398
23	.	.	.	.99223	.959406	1.02506	.134861	.006328	.263395
24	.	.	.	.99223	.959406	1.02505	.134859	.006326	.263393

FEVD Result with Exogenous Variable of R

step	(7) fevd	(7) Lower	(7) Upper	(8) fevd	(8) Lower	(8) Upper
0	0	0	0	0	0	0
1	0	0	0	.977531	.91797	1.03709
2	.003766	-.018096	.025628	.978518	.920559	1.03648
3	.004619	-.016085	.025322	.960353	.892732	1.02797
4	.004694	-.01711	.026497	.962325	.891182	1.03347
5	.005943	-.019129	.031015	.886808	.775576	.998041
6	.007633	-.024489	.039754	.867127	.742075	.992178
7	.007672	-.024746	.04009	.867966	.744148	.991785
8	.007688	-.024892	.040269	.864482	.735865	.993098
9	.007744	-.024999	.040487	.864979	.736754	.993204
10	.007748	-.025007	.040504	.865477	.737605	.993348
11	.007753	-.025059	.040565	.864741	.736064	.993417
12	.007766	-.025063	.040596	.864939	.736388	.993489
13	.007767	-.025062	.040596	.864994	.736452	.993535
14	.007767	-.025063	.040598	.865016	.7365	.993532
15	.007768	-.025057	.040593	.865052	.736511	.993594
16	.007769	-.025058	.040595	.865084	.736545	.993622
17	.007769	-.025057	.040595	.865095	.736565	.993625
18	.007769	-.025056	.040594	.865112	.73658	.993643
19	.007769	-.025056	.040594	.865119	.736583	.993655
20	.007769	-.025056	.040595	.865127	.736595	.993659
21	.00777	-.025055	.040594	.865132	.736599	.993665
22	.00777	-.025055	.040594	.865136	.736602	.99367
23	.00777	-.025055	.040594	.865139	.736605	.993672
24	.00777	-.025055	.040594	.865141	.736607	.993674

95% lower and upper bounds reported
(1) irfname = var, impulse = SET, and response = SET
(2) irfname = var, impulse = SET, and response = LAND
(3) irfname = var, impulse = LAND, and response = SET
(4) irfname = var, impulse = LAND, and response = LAND
(5) irfname = var1, impulse = SET, and response = SET
(6) irfname = var1, impulse = SET, and response = LAND
(7) irfname = var1, impulse = LAND, and response = SET
(8) irfname = var1, impulse = LAND, and response = LAND

. irf table fevd, impulse (SET CONDO) response (SET CONDO)

Results from var var1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper	(3) fevd	(3) Lower	(3) Upper
0	0	0	0	0	0	0	0	0	0
1	1	1	1	.004917	-.022998	.032831	0	0	0
2	.918649	.815714	1.02158	.004312	-.021604	.030228	.000034	-.002148	.002215
3	.910793	.800043	1.02154	.004659	-.023011	.03233	.000332	-.005206	.005869
4	.909594	.797269	1.02192	.00475	-.023544	.033045	.000335	-.005422	.006092
5	.909276	.796491	1.02206	.004787	-.023726	.0333	.000337	-.005515	.006188
6	.909208	.796318	1.0221	.004798	-.023776	.033373	.000337	-.005526	.006199
7	.909194	.796282	1.02211	.004802	-.023789	.033393	.000337	-.005527	.006201
8	.909192	.796275	1.02211	.004803	-.023793	.033398	.000337	-.005527	.006201
9	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.

step	(4) fevd	(4) Lower	(4) Upper	(5) fevd	(5) Lower	(5) Upper	(6) fevd	(6) Lower	(6) Upper
0	0	0	0	0	0	0	0	0	0
1	.984318	.935003	1.03363	1	1	1	.000294	-.006637	.007225
2	.935363	.832733	1.03799	.999998	.999455	1.00054	.001781	-.012145	.015707
3	.92933	.817973	1.04069	.998807	.986955	1.01066	.003093	-.020318	.026505
4	.927917	.813932	1.0419	.995585	.972266	1.0189	.006067	-.019686	.03182
5	.927565	.812844	1.04229	.994973	.968923	1.02102	.007832	-.026356	.042021
6	.927479	.812558	1.0424	.994939	.968687	1.02119	.008133	-.027469	.043735
7	.927458	.812482	1.04243	.994457	.965677	1.02324	.008121	-.027556	.043798
8	.927452	.812462	1.04244	.99413	.963718	1.02454	.008313	-.028626	.045251
9	.	.	.	.994112	.963621	1.0246	.008543	-.029515	.046602
10	.	.	.	.99402	.963051	1.02499	.008551	-.029527	.046628
11	.	.	.	.993862	.962097	1.02563	.008591	-.029757	.046939
12	.	.	.	.993819	.961843	1.0258	.008675	-.030121	.04747
13	.	.	.	.993815	.961817	1.02581	.008698	-.030199	.047595
14	.	.	.	.993772	.961555	1.02599	.008698	-.03021	.047605
15	.	.	.	.993741	.961373	1.02611	.008719	-.030313	.047751
16	.	.	.	.99374	.961367	1.02611	.008735	-.030377	.047847
17	.	.	.	.993733	.961322	1.02614	.008736	-.030378	.04785
18	.	.	.	.99372	.961245	1.02619	.008739	-.030396	.047874
19	.	.	.	.993717	.961225	1.02621	.008746	-.030425	.047916
20	.	.	.	.993716	.961223	1.02621	.008748	-.030431	.047926
21	.	.	.	.993713	.961201	1.02622	.008748	-.030432	.047927
22	.	.	.	.99371	.961186	1.02623	.008749	-.03044	.047939
23	.	.	.	.99371	.961186	1.02623	.008751	-.030446	.047947
24	.	.	.	.993709	.961182	1.02624	.008751	-.030446	.047947

step	(7) fevd	(7) Lower	(7) Upper	(8) fevd	(8) Lower	(8) Upper
0	**0**	**0**	**0**	**0**	**0**	**0**
1	**0**	**0**	**0**	**.999706**	**.992775**	**1.00664**
2	**2.4e-06**	**-.00054**	**.000545**	**.998219**	**.984293**	**1.01215**
3	**.001193**	**-.010659**	**.013045**	**.996907**	**.973495**	**1.02032**
4	**.004415**	**-.018904**	**.027734**	**.993933**	**.96818**	**1.01969**
5	**.005027**	**-.021023**	**.031077**	**.992168**	**.957979**	**1.02636**
6	**.005061**	**-.021192**	**.031313**	**.991867**	**.956265**	**1.02747**
7	**.005543**	**-.023237**	**.034323**	**.991879**	**.956202**	**1.02756**
8	**.00587**	**-.024541**	**.036282**	**.991687**	**.954749**	**1.02863**
9	**.005888**	**-.024604**	**.036379**	**.991457**	**.953398**	**1.02952**
10	**.00598**	**-.024989**	**.036949**	**.991449**	**.953372**	**1.02953**
11	**.006138**	**-.025627**	**.037903**	**.991409**	**.953061**	**1.02976**
12	**.006181**	**-.025796**	**.038157**	**.991325**	**.95253**	**1.03012**
13	**.006185**	**-.025813**	**.038183**	**.991302**	**.952405**	**1.0302**
14	**.006228**	**-.025988**	**.038445**	**.991302**	**.952395**	**1.03021**
15	**.006259**	**-.026109**	**.038627**	**.991281**	**.952249**	**1.03031**
16	**.00626**	**-.026114**	**.038633**	**.991265**	**.952153**	**1.03038**
17	**.006267**	**-.026143**	**.038678**	**.991264**	**.95215**	**1.03038**
18	**.00628**	**-.026195**	**.038755**	**.991261**	**.952126**	**1.0304**
19	**.006283**	**-.026209**	**.038775**	**.991254**	**.952084**	**1.03042**
20	**.006284**	**-.02621**	**.038777**	**.991252**	**.952074**	**1.03043**
21	**.006287**	**-.026224**	**.038799**	**.991252**	**.952073**	**1.03043**
22	**.00629**	**-.026234**	**.038814**	**.991251**	**.952061**	**1.03044**
23	**.00629**	**-.026234**	**.038814**	**.991249**	**.952053**	**1.03045**
24	**.006291**	**-.026237**	**.038818**	**.991249**	**.952053**	**1.03045**

95% lower and upper bounds reported
(1) irfname = var, impulse = SET, and response = SET
(2) irfname = var, impulse = SET, and response = CONDO
(3) irfname = var, impulse = CONDO, and response = SET
(4) irfname = var, impulse = CONDO, and response = CONDO
(5) irfname = var1, impulse = SET, and response = SET
(6) irfname = var1, impulse = SET, and response = CONDO
(7) irfname = var1, impulse = CONDO, and response = SET
(8) irfname = var1, impulse = CONDO, and response = CONDO

. irf table fevd, impulse (SET SDH) response (SET SDH)

Results from var var1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper	(3) fevd	(3) Lower	(3) Upper
0	0	0	0	0	0	0	0	0	0
1	1	1	1	.007968	-.027459	.043395	0	0	0
2	.918649	.815714	1.02158	.042502	-.042285	.12729	.060932	-.03284	.154704
3	.910793	.800043	1.02154	.045596	-.045769	.136961	.062197	-.033998	.158391
4	.909594	.797269	1.02192	.046267	-.046718	.139252	.062157	-.034275	.158588
5	.909276	.796491	1.02206	.046364	-.046855	.139584	.062138	-.034205	.15848
6	.909208	.796318	1.0221	.046377	-.046869	.139622	.062141	-.034172	.158455
7	.909194	.796282	1.02211	.046378	-.046869	.139625	.062144	-.034165	.158453
8	.909192	.796275	1.02211	.046378	-.046869	.139625	.062145	-.034164	.158453
9	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.

step	(4) fevd	(4) Lower	(4) Upper	(5) fevd	(5) Lower	(5) Upper	(6) fevd	(6) Lower	(6) Upper
0	0	0	0	0	0	0	0	0	0
1	.786279	.640853	.931705	1	1	1	.000159	-.004938	.005256
2	.749729	.593628	.90583	.964827	.895367	1.03429	.022372	-.032462	.077206
3	.748168	.59054	.905797	.964927	.895726	1.03413	.031373	-.040594	.10334
4	.747743	.589983	.905503	.931991	.843111	1.02087	.031001	-.040388	.102389
5	.747631	.589881	.90538	.920612	.81863	1.02259	.030338	-.039139	.099815
6	.747599	.589852	.905346	.919569	.816453	1.02268	.030215	-.039152	.099583
7	.747591	.589844	.905339	.919336	.815856	1.02282	.031004	-.040488	.102495
8	.74759	.589841	.905338	.917547	.811358	1.02374	.030888	-.040441	.102218
9	.	.	.	.916232	.80788	1.02458	.030687	-.040116	.101491
10	.	.	.	.916225	.807851	1.0246	.03089	-.040375	.102155
11	.	.	.	.916021	.807347	1.0247	.030932	-.040495	.102359
12	.	.	.	.915726	.806516	1.02494	.030878	-.04044	.102195
13	.	.	.	.91565	.80628	1.02502	.030893	-.040438	.102224
14	.	.	.	.915649	.806281	1.02502	.030911	-.040469	.10229
15	.	.	.	.915604	.80615	1.02506	.030909	-.040478	.102295
16	.	.	.	.91557	.806044	1.0251	.030906	-.040471	.102283
17	.	.	.	.915567	.806029	1.0251	.030908	-.040472	.102287
18	.	.	.	.915564	.806023	1.02511	.03091	-.040477	.102297
19	.	.	.	.915557	.806002	1.02511	.030909	-.040477	.102295
20	.	.	.	.915554	.80599	1.02512	.030909	-.040476	.102294
21	.	.	.	.915554	.805989	1.02512	.03091	-.040476	.102295
22	.	.	.	.915553	.805987	1.02512	.03091	-.040477	.102296
23	.	.	.	.915552	.805984	1.02512	.030909	-.040477	.102296
24	.	.	.	.915552	.805983	1.02512	.03091	-.040477	.102296

Ref. code: 25595802042324WOG

step	(7) fevd	(7) Lower	(7) Upper	(8) fevd	(8) Lower	(8) Upper
0	0	0	0	0	0	0
1	0	0	0	.999841	.994744	1.00494
2	.035173	-.034287	.104633	.977628	.922794	1.03246
3	.035073	-.034128	.104274	.968627	.89666	1.04059
4	.068009	-.02087	.156889	.968999	.897611	1.04039
5	.079388	-.022594	.18137	.969662	.900185	1.03914
6	.080431	-.022684	.183547	.969785	.900417	1.03915
7	.080664	-.022817	.184144	.968996	.897505	1.04049
8	.082453	-.023736	.188642	.969112	.897782	1.04044
9	.083768	-.024583	.19212	.969313	.898509	1.04012
10	.083775	-.024598	.192149	.96911	.897845	1.04038
11	.083979	-.024696	.192653	.969068	.897641	1.0405
12	.084274	-.024936	.193484	.969122	.897805	1.04044
13	.08435	-.02502	.19372	.969107	.897776	1.04044
14	.084351	-.025018	.193719	.969089	.89771	1.04047
15	.084396	-.025057	.19385	.969091	.897705	1.04048
16	.08443	-.025097	.193956	.969094	.897717	1.04047
17	.084433	-.025104	.193971	.969092	.897713	1.04047
18	.084436	-.025105	.193977	.96909	.897703	1.04048
19	.084443	-.025113	.193998	.969091	.897705	1.04048
20	.084446	-.025119	.19401	.969091	.897706	1.04048
21	.084446	-.025119	.194011	.96909	.897705	1.04048
22	.084447	-.02512	.194013	.96909	.897704	1.04048
23	.084448	-.025121	.194016	.969091	.897704	1.04048
24	.084448	-.025122	.194017	.96909	.897704	1.04048

95% lower and upper bounds reported
(1) irfname = var, impulse = SET, and response = SET
(2) irfname = var, impulse = SET, and response = SDH
(3) irfname = var, impulse = SDH, and response = SET
(4) irfname = var, impulse = SDH, and response = SDH
(5) irfname = var1, impulse = SET, and response = SET
(6) irfname = var1, impulse = SET, and response = SDH
(7) irfname = var1, impulse = SDH, and response = SET
(8) irfname = var1, impulse = SDH, and response = SDH

Ref. code: 25595802042324WOG

. irf table fevd, impulse (SET TWH) response (SET TWH)

Results from var var1

step	(1) fevd	(1) Lower	(1) Upper	(2) fevd	(2) Lower	(2) Upper	(3) fevd	(3) Lower	(3) Upper
0	0	0	0	0	0	0	0	0	0
1	1	1	1	.0012	-.012644	.015045	0	0	0
2	.918649	.815714	1.02158	.001181	-.013216	.015578	.004875	-.020756	.030506
3	.910793	.800043	1.02154	.001586	-.010285	.013457	.009299	-.028597	.047194
4	.909594	.797269	1.02192	.001884	-.009844	.013611	.010452	-.03095	.051854
5	.909276	.796491	1.02206	.001979	-.009855	.013813	.010725	-.031462	.052911
6	.909208	.796318	1.0221	.002002	-.009869	.013874	.010776	-.031548	.053101
7	.909194	.796282	1.02211	.002007	-.009873	.013887	.010785	-.031559	.053128
8	.909192	.796275	1.02211	.002007	-.009874	.013889	.010786	-.031559	.053131
9	.	.	.	.	.	.	.	.	.
10	.	.	.	.	.	.	.	.	.
11	.	.	.	.	.	.	.	.	.
12	.	.	.	.	.	.	.	.	.
13	.	.	.	.	.	.	.	.	.
14	.	.	.	.	.	.	.	.	.
15	.	.	.	.	.	.	.	.	.
16	.	.	.	.	.	.	.	.	.
17	.	.	.	.	.	.	.	.	.
18	.	.	.	.	.	.	.	.	.
19	.	.	.	.	.	.	.	.	.
20	.	.	.	.	.	.	.	.	.
21	.	.	.	.	.	.	.	.	.
22	.	.	.	.	.	.	.	.	.
23	.	.	.	.	.	.	.	.	.
24	.	.	.	.	.	.	.	.	.

step	(4) fevd	(4) Lower	(4) Upper	(5) fevd	(5) Lower	(5) Upper	(6) fevd	(6) Lower	(6) Upper
0	0	0	0	0	0	0	0	0	0
1	.919646	.81535	1.02394	1	1	1	.012125	-.031855	.056106
2	.838825	.697258	.980392	.985554	.943021	1.02809	.012347	-.03429	.058984
3	.826623	.673665	.979581	.983999	.937084	1.03091	.019909	-.044286	.084105
4	.823554	.667516	.979592	.928444	.83944	1.01745	.019687	-.041764	.081138
5	.822937	.666269	.979606	.918522	.817986	1.01906	.019647	-.041463	.080758
6	.822829	.66606	.979598	.91708	.814383	1.01978	.02015	-.042362	.082662
7	.822812	.666031	.979593	.915863	.812599	1.01913	.020217	-.042581	.083016
8	.82281	.666028	.979592	.914723	.810079	1.01937	.020202	-.042545	.082949
9	.	.	.	.913574	.807587	1.01956	.020224	-.042568	.083017
10	.	.	.	.913565	.807535	1.0196	.020252	-.042641	.083145
11	.	.	.	.913476	.807409	1.01954	.020271	-.042675	.083217
12	.	.	.	.913231	.806937	1.01952	.020267	-.042666	.0832
13	.	.	.	.913162	.806761	1.01956	.020266	-.042668	.0832
14	.	.	.	.913158	.806745	1.01957	.020271	-.042677	.083219
15	.	.	.	.913142	.806727	1.01956	.020272	-.042679	.083223
16	.	.	.	.913123	.806689	1.01956	.020272	-.042678	.083221
17	.	.	.	.913114	.806668	1.01956	.020272	-.042678	.083222
18	.	.	.	.913114	.806667	1.01956	.020272	-.042679	.083223
19	.	.	.	.913113	.806666	1.01956	.020272	-.042679	.083224
20	.	.	.	.913111	.806662	1.01956	.020272	-.042679	.083224
21	.	.	.	.91311	.80666	1.01956	.020272	-.042679	.083224
22	.	.	.	.91311	.80666	1.01956	.020272	-.042679	.083224
23	.	.	.	.91311	.80666	1.01956	.020272	-.042679	.083224
24	.	.	.	.91311	.806659	1.01956	.020272	-.042679	.083224

step	(7) fevd	(7) Lower	(7) Upper	(8) fevd	(8) Lower	(8) Upper
0	**0**	**0**	**0**	**0**	**0**	**0**
1	**0**	**0**	**0**	**.987875**	**.943894**	**1.03186**
2	**.014446**	**-.028087**	**.056979**	**.987653**	**.941016**	**1.03429**
3	**.016001**	**-.030914**	**.062916**	**.980091**	**.915895**	**1.04429**
4	**.071556**	**-.017448**	**.16056**	**.980313**	**.918862**	**1.04176**
5	**.081478**	**-.019058**	**.182014**	**.980353**	**.919242**	**1.04146**
6	**.08292**	**-.019777**	**.185617**	**.97985**	**.917338**	**1.04236**
7	**.084137**	**-.019128**	**.187401**	**.979783**	**.916984**	**1.04258**
8	**.085277**	**-.019367**	**.189921**	**.979798**	**.917051**	**1.04254**
9	**.086426**	**-.019562**	**.192413**	**.979776**	**.916983**	**1.04257**
10	**.086435**	**-.019596**	**.192465**	**.979748**	**.916855**	**1.04264**
11	**.086524**	**-.019544**	**.192591**	**.979729**	**.916783**	**1.04268**
12	**.086769**	**-.019525**	**.193063**	**.979733**	**.9168**	**1.04267**
13	**.086838**	**-.019562**	**.193239**	**.979734**	**.9168**	**1.04267**
14	**.086842**	**-.019571**	**.193255**	**.979729**	**.916781**	**1.04268**
15	**.086858**	**-.019558**	**.193273**	**.979728**	**.916777**	**1.04268**
16	**.086877**	**-.019557**	**.193311**	**.979728**	**.916779**	**1.04268**
17	**.086886**	**-.019561**	**.193332**	**.979728**	**.916778**	**1.04268**
18	**.086886**	**-.019561**	**.193333**	**.979728**	**.916777**	**1.04268**
19	**.086887**	**-.01956**	**.193334**	**.979728**	**.916776**	**1.04268**
20	**.086889**	**-.01956**	**.193338**	**.979728**	**.916776**	**1.04268**
21	**.08689**	**-.01956**	**.19334**	**.979728**	**.916776**	**1.04268**
22	**.08689**	**-.01956**	**.19334**	**.979728**	**.916776**	**1.04268**
23	**.08689**	**-.01956**	**.19334**	**.979728**	**.916776**	**1.04268**
24	**.08689**	**-.01956**	**.193341**	**.979728**	**.916776**	**1.04268**

95% lower and upper bounds reported
(1) irfname = var, impulse = SET, and response = SET
(2) irfname = var, impulse = SET, and response = TWH
(3) irfname = var, impulse = TWH, and response = SET
(4) irfname = var, impulse = TWH, and response = TWH
(5) irfname = var1, impulse = SET, and response = SET
(6) irfname = var1, impulse = SET, and response = TWH
(7) irfname = var1, impulse = TWH, and response = SET
(8) irfname = var1, impulse = TWH, and response = TWH

Ref. code: 25595802042324WOG

BIOGRAPHY

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Ref. code: 25595802042324WOG