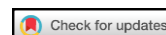




## REMITTANCE AND INFLATION – AN EMPIRICAL STUDY FOR VIETNAM



**Nguyen Thi Hong  
Hai<sup>1+</sup>  
Thang Doan<sup>2</sup>**

<sup>1,2</sup>*International Business Faculty Banking Academy of Vietnam*



(+ Corresponding author)

### ABSTRACT

#### Article History

Received: 11 August 2015

Revised: 30 March 2017

Accepted: 9 May 2017

Published: 5 June 2017

#### Keywords

Macroeconomic

Inflation

Remittance

VAR

Reduced-form.

Remittances have recently received such a great attention as private monetary flows that its monetary nature seems to be disregarded. The issue that whether remittance flows are inflationary, resulting in a change in relative price, remains controversial. This study utilizes a reduced-form VAR model to investigate the inflation's response to a positive shock to the remittance based on [Ball et al. \(2009\)](#)'s study. We use a quarterly data from 1st quarter 1996 to 3rd quarter 2012. The main findings are that first, there exists a positive effect of remittance on inflation in Vietnam and this effects prolong up to three quarters; second others main macroeconomic factors also affect inflation but at a lower magnitude compared with remittances.

**Contribution/ Originality:** This study is one of very few studies which have investigated the impact of remittance on inflation in Vietnam. We found that remittance is a key driving factor of inflation during the past twenty years. This finding suggests that Vietnam's government should manage remittance to fight inflation.

## 1. INTRODUCTION

The remittance flows play an important role in many developing countries due to the positive effects. However, these flows, simultaneously, have the negative impact on economies, say, increasing the inflation. This paper will use the VAR method to analyze the impact of remittance on inflation in Vietnam from 1996 to 2012.

Economists are interested in the impacts of remittance flow on inflation. Theoretically, these impacts lead to three different results: an appreciation of local currency, an increase in money supply and a change in BOP. Salter-Swan-Corden-Dornbusch model explains the relationship between the inflow (remittance in this case), price level, and real exchange rate in developing countries. The remittance will affect the consumption, leading the price increase, then home currency appreciates. However, the final impacts depend on the exchange rate regime. In fixed exchange rate regime, the inflows will cause inflation and the nominal money supply increase. It causes the home currency

appreciate. In the float exchange rate regime, the remittance seems not to impact the inflation as well as nominal money supply.

An increase in remittance flow will rise the foreign currency supply, leading home currency appreciation and foreign currency depreciation. In fixed exchange rate regime, central bank must intervene the market by buying foreign currency to prevent home currency from appreciation. This intervention increases the nominal supply. At the same time, central bank, normally, sterilize the increase of money supply through the open market. However, this sterilization is not as efficient as desired, which causes inflation. By contrast, central bank does not intervene the foreign market, therefore both nominal money supply and inflation remain unchanged.

In theory, [Ball \*et al.\* \(2009\)](#) used the money model to prove the above conclusions about the impact of the remittance on inflation. He also found out the empirical evidence for these conclusions when using the data in Brazil, Colombia, Costa Rica, Dominica Republic, Ecuador, El Salvador and Mexico from 1980 to 2006. Before that, [Caceres and Saca \(2006\)](#) indicated that large remittance flow caused inflation in El Salvador increase while this country seeks the fixed exchange rate regime. Others findings conducted by [Amuedo-Dorantes and Pozo \(2004\)](#); [Bourdet and Falck \(2006\)](#); [Lopez \*et al.\* \(2007\)](#) show the same results about the effects of the remittance on inflation under the fixed exchange rate regime. However, the empirical evidence of those effects under the float exchange rate regime is not clear.

There is no official research about the impact of the remittance on inflation in Vietnam. Previous research only focused on the effect of the remittance on economy under microeconomic view. For example, [Viet \(2008\)](#) investigated the impact of remittances on poverty and inequality. [Pfau and Giang \(2009\)](#) studied the effects of remittance on household welfare in Vietnam. [Niimi and Reilly \(2011\)](#) analyzed how the gender affect the remittance behavior. Therefore, this paper is new at this time.

### 1.1. Overview on Vietnam's Remittance

With about 5 million Vietnamese living and working in around 90 different nations and territories, Vietnam is one of the world's top 10 remittance-receiving countries, with remittances from overseas Vietnamese in 2013 recorded at US\$10.6 billion that is equivalent to about 6.5 per cent compared with previous year, according to the World Bank.

Remittance is one of two foreign inflow capitals (the other is FDI) which accounts for the largest share in Vietnam and tends to increase over years. In period 2003-2006, the value of remittance exceeded the FDI's. Compared to ODA, remittance always surpasses. (Figure 1, 2, and 3, see Appendix)

### 1.2. Variables and Data Description

Our VAR model uses four endogenous variables, which are adequate in explain the remittance framework of a small open economy like Vietnam. We choose variables based on the variables used by [Ball \*et al.\* \(2009\)](#). In their model, they use quarterly data for the CPI, nominal money supply (M2), real GDP, real exchange rate (RER) and remittances (REM). In our VAR model, we use the consumer price index (CPI), nominal money supply (M2), real effective exchange rate (REER) and remittances (REM). The data set is obtained from several various sources. The data of Vietnam's CPI, Vietnam's money supply is obtained from the International Financial Statistics (IFS). Remittance (REM) is obtained from General Statistics Office of Vietnam (GSO) and International Financial Statistics (IFS). The REER is calculated as a weighted average of real exchange rates of the Vietnamese currency to the currencies of Vietnam's main trading partners. The original data is adjusted seasonally by Census 11 method and then, transformed into logarithms. The period considered is 1996:1 to 2012:3.

A preliminary investigation of the variables demonstrates that all of our variables are non-stationary. Hence, our analysis focuses on the continuously compounded growth rates of CPI, M2, REER, and REM. The quarterly percentage changes reported are annualized percentage changes (Table 2, see Appendix).

## 2. METHODOLOGY

The empirical behavior of the variables is modeled using the Vector Autoregressive approach. The initial econometric model has the reduced form as following:

$$Y_{i,t} = \Gamma(L)Y_{i,t} + u_{i,t} \quad (1)$$

where  $Y_{i,t}$  is the  $4 \times 1$  dependent and endogenous vector of variables with  $Y_{i,t} = [\Delta \ln(\text{REM})_{i,t}, \Delta \ln(\text{M2})_{i,t}, \Delta \ln(\text{CPI})_{i,t}, \Delta \ln(\text{REER})_{i,t}]'$ .  $\Gamma(L)$  is matrix polynomial in the lag operator (with  $\Gamma(L) = \Gamma_1(L) + \Gamma_2(L)^2 + \Gamma_3(L)^3 + \dots$ ).  $u_{i,t}$  is the error term. We then derive the impulse response functions from equation (1) relying on the Cholesky decomposition to orthogonalize the residuals. For this purpose, "the variables must be ordered such that variables placed higher in the ordering have a contemporaneous impact on all variables lower in the ordering" (Ball *et al.*, 2009). Hence, the first variables should be the most exogenous. A careful ordering of the variables allows identifying the response of inflation to a positive shock on remittances.

The theoretical model considers remittances as the most independent of the internal conditions of a country while it has an impact on other variables. Empirical studies, such as Schiantarelli (2005) corroborate this assumption and show that remittances respond to external factors such as a reduction in transaction costs in the country where migrants live. Hence, remittances are the first variable, while ordering the remaining variables differs depending on the exchange rate regime considered.

Under fix exchange rate regime, the central bank must intervene to keep the nominal exchange rate stable. Hence, a change in remittance leads to a change real money demand and in the nominal money demand, then in inflation and, finally, in the REER. The resulting orderings are written as following:

Model:  $\Delta \ln(\text{REM})_{i,t}, \Delta \ln(\text{M2})_{i,t}, \Delta \ln(\text{CPI})_{i,t}, \Delta \ln(\text{REER})_{i,t}$

### 2.1. Results of the Unit Root Tests and the Optimal Lag

We basically employ the Augmented Dickey-Fuller (ADF) test to exam whether the times series have a unit root. The null hypothesis is that there is a unit root in our series. In this paper, 1% is chosen to be the significance level. Thus, if test statistic reported by the ADF test is greater than critical value at 1%, the series is said to have no unit root; otherwise, it has a unit root. Accordingly, the ADF test shows that all of the series, except real GDP, have no unit test at 1% significance level. The Johansen cointegration test shows that there is no cointegration, therefore we can use the VAR model (Table 4, see Appendix).

Table-3. Unit roots test results

Variables	Critical values			Test-stat	Decision
	1%	5%	10%		
lnCPI	-3.5366	-2.9077	-2.5914	1.5822	Accept H0
D(lnCPI)	-3.5366	-2.9077	-2.5914	-3.8478***	Reject H0
lnGDP	-3.5482	-2.9126	-2.5940	-0.6694	Accept H0
D(lnGDP)	-3.5482	-2.9126	-2.5940	-2.7604	Accept H0
lnM2	-3.5441	-2.9109	-2.5931	-1.8209	Accept H0
d(lnM2)	-3.5441	-2.9109	-2.5931	-7.6493***	Reject H0
lnREER	-3.5441	-2.9109	-2.5931	0.6446	Accept H0
d(lnREER)	-3.5441	-2.9109	-2.5931	-6.0257***	Reject H0
lnREM	-3.5441	-2.9109	-2.5931	-2.2778	Accept H0
d(lnREM)	-3.5441	-2.9109	-2.5931	-6.2965***	Reject H0

Note: (\*\*\*) reject null hypothesis (H0) at 1% level of significance.

There are couple of information criteria for selecting the optimal lag number. LR, FPE, AIC, and HQ criteria select one lag as an optimal lag (Table 6, see Appendix). Thus, we choose one lag to estimate the VAR. To double

check the optimal lag and stability of the VAR, we test for autocorrelation among residuals and examine the roots of characteristic polynomial. The autocorrelation LM test shows that there is no autocorrelation among residuals (Table 7, see Appendix). All inverse roots of characteristic are less than 1, which implies that the VAR satisfies the stability condition (Table 5, see Appendix). In addition, the Residual Heteroskedasticity. Tests shows that model variance is homoscedasticity (Table 8, see Appendix). Thus, we are highly confident to run the VAR model with one lag. In the following parts, we will discuss the impulse response functions of inflation with respect to positive shocks of other endogenous variables, specially focusing on the positive shock of remittance.

## 2.2. Responses of the Inflation to Positive Shocks

Figure 4 (see Appendix) shows that, the inflow of remittance causes inflation in Vietnam increase immediately and it lasts 2-3 quarters. It means that an increase in inflow remittance lead inflation tend to increase and vice versa. This phenomenon derives from following reason:

First, although State Bank of Vietnam (SBV) announced that Vietnam has pursued the managed floating exchange rate regime, the actual regime (de facto) is the exchange rate peg regime with dollars with relatively little volatility, especially after the world financial crisis 2007-2009 (Takagi and Pham, 2011). There was a huge remittance flowing in (with FDI and FII flow) in the second half of 2007 caused VND appreciate. In order to prevent an appreciation of local currency, SBV bought USD to raise foreign exchange reserves up to 26 billion USD (about 9 billion USD only in 2007). Despite selling a large amount of bills and bonds through open market operations to collect money from circulation, this neutralizing activity was not as effective as desired making a total means of payment in 2007 increased to 47, 2%, pushing inflation higher. As the central bank pursues a stable exchange rate policy (applicable exchange rate peg regime), the strong remittance inflows plus the ineffectiveness of neutralization interventions (sterilization) has led to Vietnam's inflation increase. This conclusion is entirely consistent with the previous studies as Amuedo-Dorantes and Pozo (2004); Bourdet and Hans (2006); Lopez *et al.* (2007); Ball *et al.* (2009). Secondly, research also indicates that M2 money supply has a positive impact on inflation in Vietnam. More specifically, the impact persists for 7-8 quarters after the shock with an impact remaining positive.

Thirdly, real effective exchange rate has a positive impact on inflation in Vietnam. The impact becomes more clearly after quarter 2<sup>th</sup>. In theory, the real exchange rate increases (foreign currency revaluation and local currency devaluation) will make the price of exports cheaper and of imports more expensive, which causes the price level increase. This effect becomes greater because Vietnam has a large import demand. Hence, even though the price of imported goods is quite expensive, it is difficult to reduce the import volumes.

Briefly, remittance, money supply and real effective exchange rate have positive impacts on inflation in Vietnam. It means that positive shocks of these variables will lead an increase in inflation with different lags. However, from Table 9 (see Appendix) we can see that the expectation of inflation contributes about 90% of change in inflation in Vietnam.

## 3. CONCLUSION

With the quarterly data from 1996 to 2012 and VAR model, this paper investigates the impact of remittance on inflation in Vietnam. There are two main findings:

First, remittance inflows increase inflation in Vietnam. Empirical evidence has contributed to reinforce the theory of the impact of remittances on inflation in the peg exchange rate regime. It suggests for the policy makers that to minimize the negative impact of remittances on inflation, the central bank should reconsider the exchange rate regime.

Second, both money supply and real effective exchange rate affect inflation, however, they account for mere 2-3%. Inflation expectations is a major factor explaining the volatility of inflation in Vietnam.

**Funding:** This study received no specific financial support.

**Competing Interests:** The authors declare that they have no competing interests.

**Contributors/Acknowledgement:** Both authors contributed equally to the conception and design of the study.

## REFERENCES

- Amuedo-Dorantes, C. and S. Pozo, 2004. Workers' remittances and the real exchange rate: A paradox of gifts. *World Development*, 32(8): 1407-1417. [View at Google Scholar](#) | [View at Publisher](#)
- Ball, C.P., M. Crux-Zuniga, C. Lopez and J. Reyes, 2009. Remittances, inflation and exchange rate regimes in small open economies. Retrieved from [www.ssrn.com](http://www.ssrn.com).
- Bourdet, Y. and H. Falck, 2006. Emigrants' remittances and Dutch disease in Cape Verde. *International Economic Journal*, 20(3): 267-284. [View at Google Scholar](#) | [View at Publisher](#)
- Caceres, L.R. and N.N. Saca, 2006. What do remittances do? Analyzing the private remittance transmission mechanism in El Salvador (No. 6-250). International Monetary Fund.
- Lopez, H., M. Luis and B. Maurizio, 2007. Remittances and the real exchange rate. World Bank Policy Research Working Paper, No. WPS 4213, April.
- Niimi, Y. and B. Reilly, 2011. Gender differences in remittance behavior: Evidence from Vietnam. *Singapore Economic Review*, 56(02): 215-237. [View at Google Scholar](#) | [View at Publisher](#)
- Pfau, W.D. and L.T. Giang, 2009. Determinants and impacts of international remittances on household welfare in vietnam. *International Social Science Journal*. 60(197-198): 431-443. [View at Google Scholar](#) | [View at Publisher](#)
- Schiantarelli, F., 2005. Global economic prospects 2006: Economic implications of remittances and migration. The World Bank.
- Takagi, S. and T.H.A. Pham, 2011. Responding to the global financial crisis: Vietnamese exchange rate policy, 2008-2009. *Journal of Asian Economics*, 22(6): 507-517. [View at Google Scholar](#) | [View at Publisher](#)
- Viet, C.N., 2008. Do foreign remittances matter to poverty and inequality? Evidence from Vietnam. *Economics Bulletin*, 15(1): 1-11. [View at Google Scholar](#)

## APPENDIX

**Table-1.** Definition of variables and their data sources

Variable	Abbreviation	Source
Real Effective Exchange Rate	REER	IFS
Money supply	M2	IFS
Remittance	REM	IFS
Consumer Price Index	CPI	IFS

Source: IFS

**Table-2.** Statistics Summary of Data

	DREER	DM2	DREM	DCPI
Mean	-3.603162	25.35545	19.54856	6.822710
Median	-4.647274	22.99552	5.650192	5.582550
Maximum	94.11329	1640.010	761.2623	32.81905
Minimum	-70.69736	-1587.045	-365.2880	-4.937537
Std. Dev.	23.65260	283.7081	143.3583	7.293665
Skewness	0.647255	0.012450	1.932423	1.446797
Kurtosis	7.135314	32.68668	12.81422	5.581355
Jarque-Bera	51.63560	2423.574	305.9537	41.34976
Probability	0.000000	0.000000	0.000000	0.000000
Sum	-237.8087	1673.460	1290.205	450.2988
Sum Sq. Dev.	36363.95	5231869.	1335854.	3457.841
Observations	66	66	66	66

**Table-4.** Johansen Cointegration Test

Sample (adjusted): 1996Q4 2012Q3

Included observations: 64 after adjustments

Trend assumption: Linear deterministic trend

Series: M2 REM REER CPI

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.317296	42.77958	47.85613	0.1380
At most 1	0.150702	18.35120	29.79707	0.5402
At most 2	0.103833	7.897106	15.49471	0.4765
At most 3	0.013670	0.880901	3.841466	0.3480

Trace test indicates no cointegration at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\* p-values

**Table-5.** Stability Condition Test

Roots of Characteristic Polynomial

Endogenous variables: DCPI DM2 DREER DREM

Exogenous variables: C

Lag specification: 1 2

Root	Modulus
0.556190	0.556190
0.439750 - 0.326563i	0.547744
0.439750 + 0.326563i	0.547744
-0.225662 - 0.320733i	0.392165
-0.225662 + 0.320733i	0.392165
-0.362606	0.362606
0.065382 - 0.331338i	0.337727
0.065382 + 0.331338i	0.337727

No root lies outside the unit circle.

VAR satisfies the stability condition.

**Table-6.** Lag length criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1277.170	NA	2.06e+13	42.00556	<b>42.14398*</b>	42.05981
1	-1245.050	<b>58.97331*</b>	<b>1.21e+13*</b>	<b>41.47706*</b>	42.16915	<b>41.74829*</b>
2	-1231.718	22.73018	1.33e+13	41.56453	42.81029	42.05275
3	-1219.083	19.88451	1.52e+13	41.67486	43.47429	42.38007
4	-1207.403	16.84974	1.81e+13	41.81650	44.16961	42.73870
5	-1188.080	25.34247	1.72e+13	41.70753	44.61431	42.84672

Source: self-calculation

**Table-7.** Autocorrelation LM test for the residuals

Lags	LM-Stat	Prob
1	21.94030	0.1451
2	21.33813	0.1659
3	17.95584	0.3265
4	21.55757	0.1581
5	8.346023	0.9379

Source: self-calculation

Table-8. Residual Heteroskedasticity Tests

Joint test:					
Chi-sq	df	Prob.			
152.7234	160	0.6464			

Source: self-calculation

Table-9. Variance decomposition of the inflation

Period	S.E.	DCPI	DM2	DREER	DREM
1	4.957282	90.58073	3.306284	0.000000	6.112983
2	6.909789	94.76969	1.767298	0.032429	3.430583
3	7.635258	95.28564	1.758565	0.128192	2.827607
4	7.802627	95.07912	2.085975	0.126613	2.708292
5	7.826235	94.95705	2.220200	0.126380	2.696368
6	7.828152	94.92278	2.252631	0.128404	2.696182
7	7.828545	94.91628	2.257494	0.129765	2.696456
8	7.828697	94.91561	2.257682	0.130271	2.696441
9	7.828712	94.91547	2.257673	0.130430	2.696430
10	7.828719	94.91544	2.257671	0.130463	2.696429

Source: Regression Results

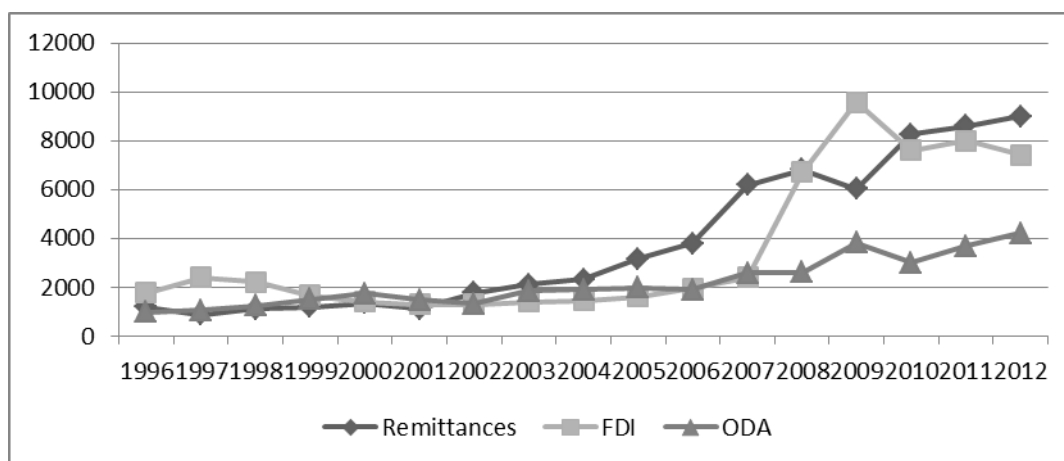


Figure-1. Inflow capital in Vietnam (million USD)

(Sources: World Bank database)

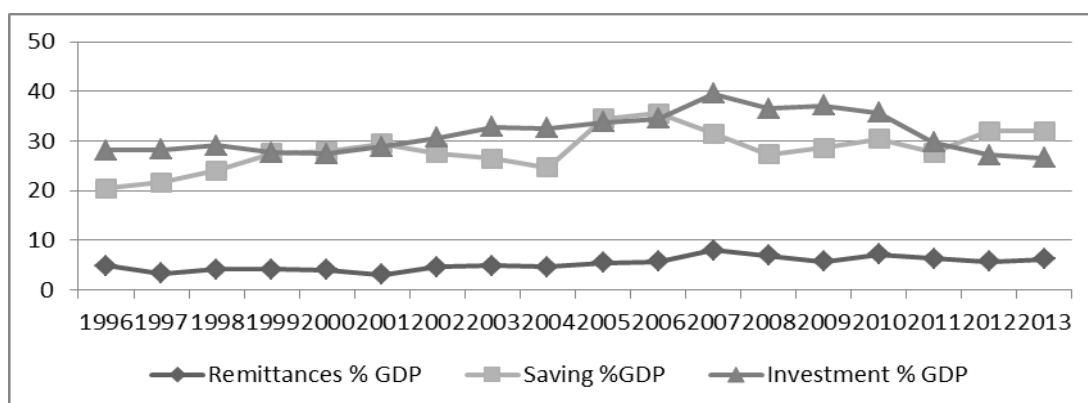


Figure-2. Remittance, Saving and Investment in Vietnam 1996-2013

(Sources: World Bank database)

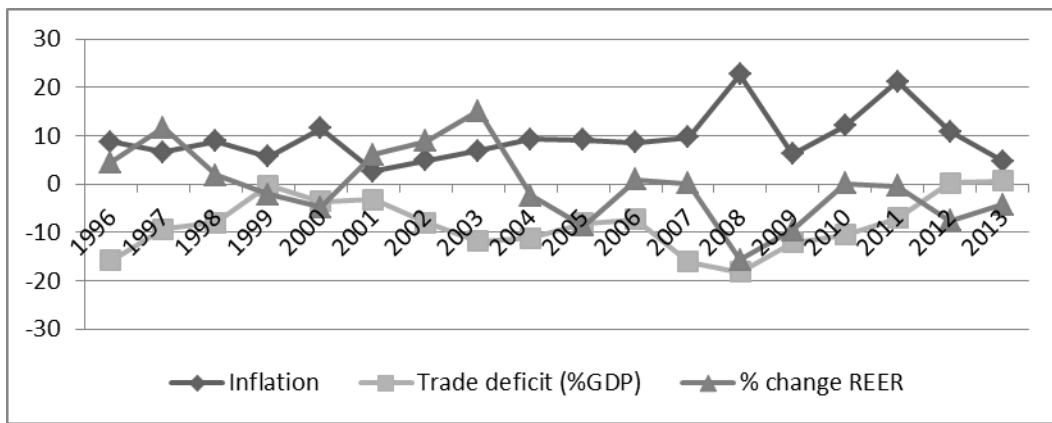


Figure-3. Vietnam macroeconomic indicator 1996-2013

(Sources: IMF and self-calculation)

Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.

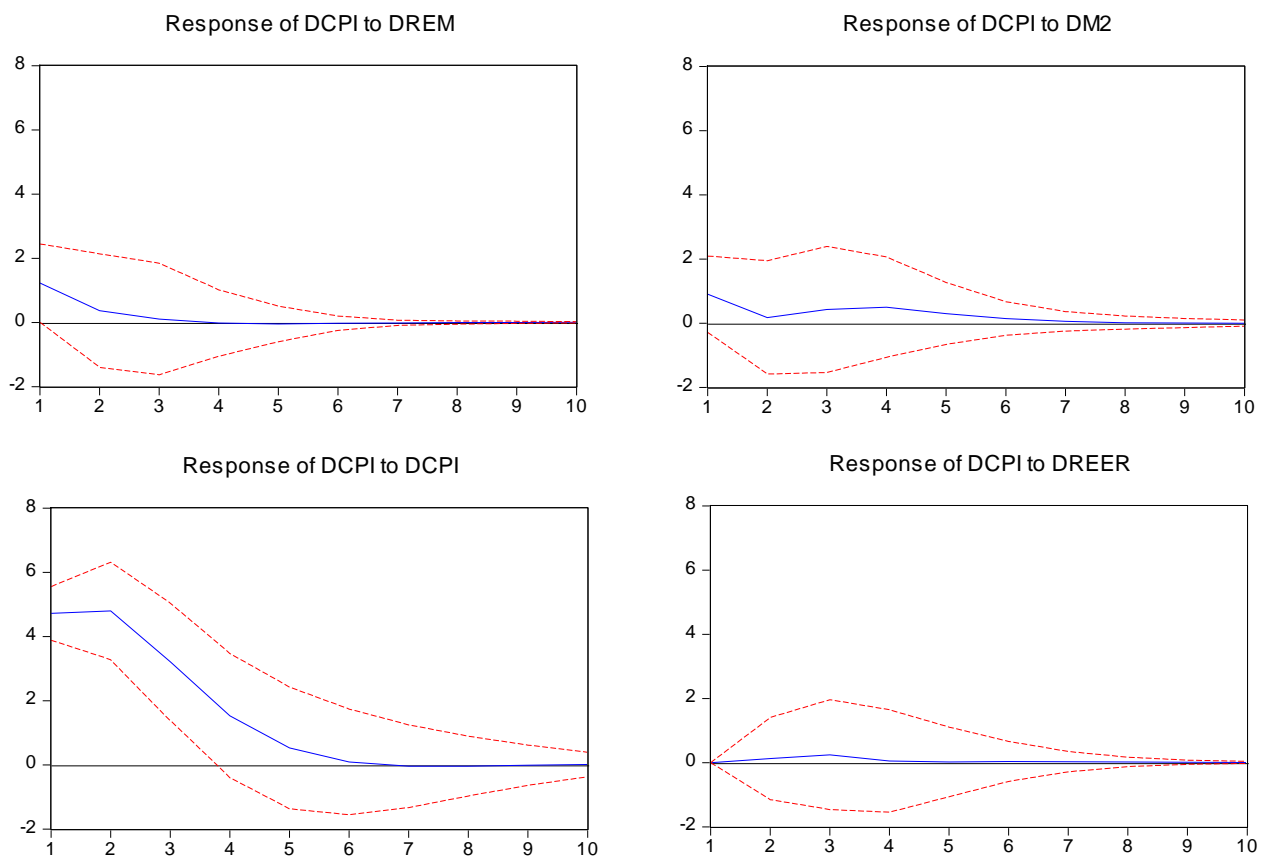


Figure-4. Impulse responses of inflation (Cholesky ordering: DREM, DM2, DCPI, DREER)

Sources: Regression Results

Views and opinions expressed in this article are the views and opinions of the author(s), Asian Journal of Economic Modelling shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.