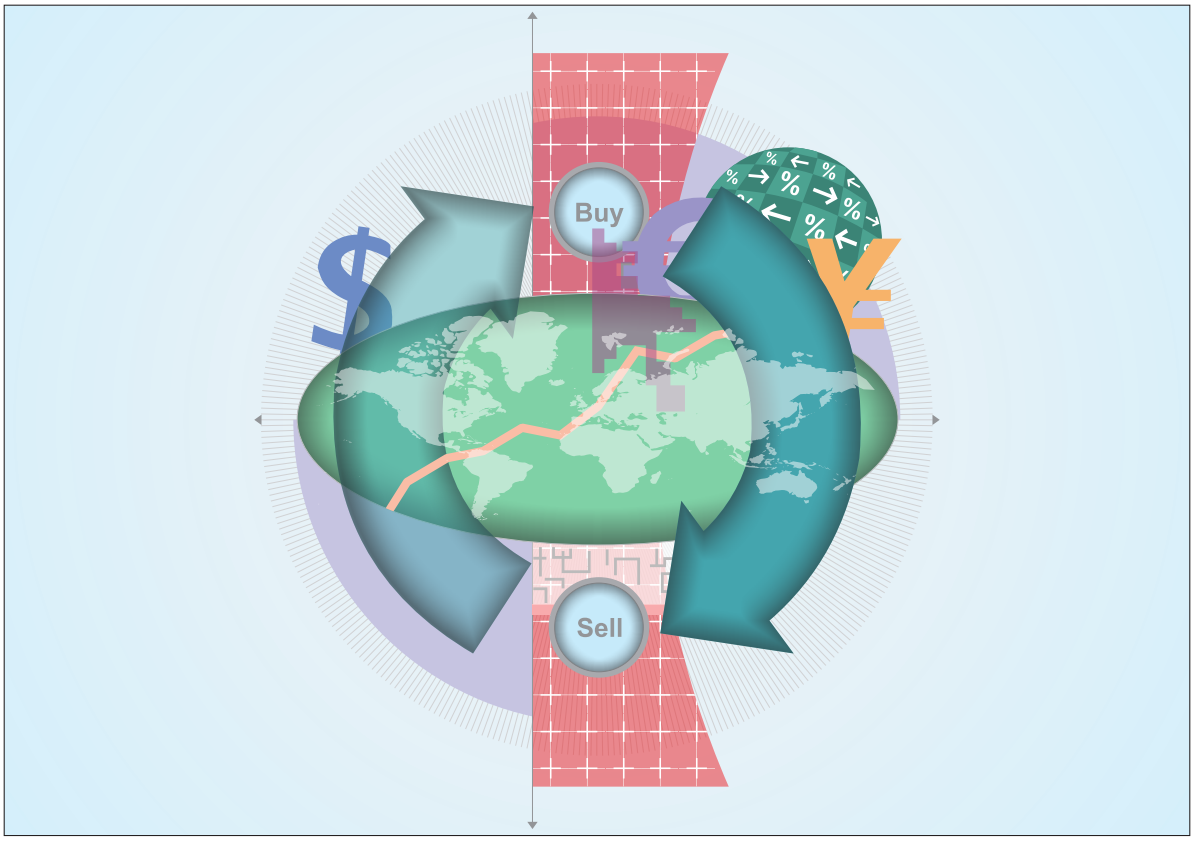

The International Journal of Applied Economics & Finance

ISSN 1991-0886

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The International Journal of Applied Economics and Finance 8 (1): 17-28, 2014
ISSN 1991-0886 / DOI: 10.3923/ijaef.2014.17.28

Assessing the Feasibility of Common Currency Area among D-8 Group Members: Structural VAR Model Approach

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ABSTRACT

According to economic theories, forming a common currency area can help countries to have a sustainable and stable economic growth by keeping their currency values stable. Therefore, adopting a common currency among D-8 group members can help them to ensure their economic growth stability. The main objective of this study is to assess the feasibility of common currency area among members of D-8 group. For this purpose, the study examines the symmetry of structural shocks among mentioned countries by using a three-variable Structural Vector Auto Regression (SVAR) model. According to the empirical results, structural shocks are positively correlated and symmetric in Turkey, Pakistan, Nigeria and Malaysia. In addition, the impulse response functions show that the magnitude and speed of adjustment to shocks are the same in 4 mentioned countries. According to variance decomposition analysis, the contribution of supply shocks and demand shocks to gross domestic production variability and real exchange rate variability are the same in Turkey, Pakistan and Malaysia. So, based on above analysis, it can be concluded that establishing a common currency area among the subgroup of Turkey, Pakistan, Nigeria and Malaysia would be feasible.

Key words: Optimum currency area, symmetry of structural shocks, SVAR model, D-8 group

INTRODUCTION

One of the most important criteria in creating a common currency in a region is the trend of intra-regional trade. The large amount of intra regional trade can encourages countries to remove some trade barriers by using a common currency. According to statistical data, the value of bilateral trade between D-8[1] group members has raised from 24.527 billion US dollar in the year of 2006-71 billion US dollar in 2011 (WTO, 2012). With this significant amount of trade among these countries, eliminating trade barriers and reduction of transaction costs is an important issue. Where, adopting a common currency reduces transaction costs by cutting costs of exchanging one currency into another. Moreover, the exchange rate volatility among currencies is a trade barrier that forming a common currency area can reduce the uncertainty of currency volatility.

Some purposes of D-8 group members are to improve member's statues globally and create the new opportunities among them. Adopting a common currency can accelerate the process of trade and financial market integrations and economic convergence among members. Consequently, it increases member's power in international decision-making and improve member position globally.

[1]The Developing 8 (D-8) is a group of developing countries that have formed an economic development arrangement in 1997. It consists of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey

In addition, D-8 group members are developing countries that suffer some economic problems such as lack of investment. The flows of foreign direct investment into these countries can help them to accelerate the process of development. However, the flow of capital and foreign direct investment needs an integrated and efficient capital and financial markets. From this view, forming a common currency area can diminish currency risks and encourage long run investment.

The purpose of this study is to examine the feasibility of forming a common currency area among D-8 group members by using structural VAR[2] model and investigating the symmetry of macroeconomic shocks between mentioned countries in the period of 1980-2011.

THEORETICAL FRAMEWORK

The theory of Optimum Currency Area (OCA) presented by Mundell (1961) for the first time and then developed by Mckinnon (1963) and Kenen (1969). Optimum currency area is a group of nations, which fix their currencies against each other currencies, but they can change their currencies jointly with respect to nonmember currencies (Salvatore, 2010). Theory of OCA is concerned about advantages and disadvantages of forming a common currency area. Some of these features are discussed here. The advantages of forming a common currency area are disappearing of nominal exchange rate uncertainty that encourage bilateral trade and cross country foreign direct investment (Mongelli, 2002). Moreover, the more efficient allocation of production factors within the area, economizing of foreign exchange reserves and seigniorage benefits, greater liquidity, rationalization of financial markets and greater price transparency are the other advantages of forming common currency area. However, set up a common currency has some disadvantages. For example, the countries lose their independency in monetary and macroeconomic policies. Furthermore, they cannot use exchange rate policies as an adjustment instrument (Pilbeam, 2013).

In addition of explaining advantages and disadvantages of adopting a common currency. The OCA theory also assesses the feasibility of forming common currency area. According to Mundell (1961) theory of OCA, the correlation of structural shocks, the same magnitude and speed of adjustment to shocks across countries are important criteria to judge which countries are suitable to form a common currency area (Ahan *et al*., 2005; Lee and Azah, 2012). Therefore, countries with positively correlated economic shocks are suitable to adopt a common currency, because these countries can use common policies to adjust any imbalances across countries.

In order to measure the correlation of shocks, for the first time, Bayoumi and Eichengreen (1993) used SVAR[3] model with two variables of only one supply shock and one demand shock. A series of studies applied SVAR model to examine the correlation and symmetry of macroeconomic shocks between countries to figure out whether formation a common currency area is possible or not. Some of these studies reported here. Buigut and Valev (2005) using SVAR model show that supply and demand shocks are generally asymmetric in East Africa countries. Therefore formation a common currency area in these countries would be heavy costly. Sin and Ku (2006) use a three-variable SVAR in an open economy model to examine the similarity of shocks among ASEAN countries. The relevant variables are domestic output, bilateral real exchange rate and domestic price level. The results indicate that demand shocks and monetary shocks are symmetric between these countries and formation a common currency area is suitable. Huang and Guo (2006) use a four-variable structural VAR model to investigate the feasibility of forming

[2]Vector autoregression

[3]Structural vector autoregression

currency area in East Asian countries. The relevant variables include world GDP, domestic GDP, real exchange rate and domestic price level. The symmetry of various structural economic shocks across countries shows that forming a common currency area for mentioned countries is a beneficial policy. Lee and Azali (2012) assess the desirability of common currency area in East Asian economies by examining the symmetry of demand shocks and supply shocks by SVAR model. The results prove possibility of forming OCA among these countries. Zhao and Kim (2009) explored the possibility of forming common currency area in CFA France zone by using a three-variable structural vector auto-regression model and considering three kinds of global output, regional output and domestic output shocks. The results show that these countries are not a suitable group to establish a common currency area. Quah and Crowley (2010) use a hierarchical clustering approach to examine the feasibility of monetary union in East Asian countries. The results show a significant rise in the degree of regional symmetry in these countries. Achsani and Partisiwi (2010) test the possibility of forming a common currency area for ASEAN+3 group members by using two different models of exchange rate variability based on OCA index and a hierarchical clustering approach. The results showed that Singapore currency is the most stable one, so the single currency area should start with Singapore, Malaysia, Japan, and Thailand relatively. Using SVAR model, Soo and Choong (2010) investigate whether selected European countries are suitable to form a currency area by focusing on three different shocks of global, regional and country-specific shocks. The results of variance decomposition show that these countries have made rapid progress toward becoming an integrated economy. Rafiq (2011) investigates the optimality of currency union in Gulf Cooperation Council countries by focusing on idiosyncrasies and commonalities of only output fluctuations between these countries. The results show that the commonality of output fluctuations between these countries have increased significantly at business cycle frequencies and Bahrain, Oman and UAE are suitable countries to start forming a common currency area.

METHODOLOGY

A common currency area requires common policies through countries. If shocks were similar and correlated across countries, they would respond to structural shocks in a similar way and use unique policies. Firstly, Bayoumi and Eichengreen (1993) used SVAR model to examine the similarity of shocks. A VAR model is a statistical method that allows us to estimate how an unpredictable shock affects other variables in the economy. A weakness of VAR model is that it does not based on economic theories so it cannot be used in analyzing the policies as structural models. In order to solve this problem, Sims (1980) have presented a structural VAR model which uses some economic theories by including some restrictions on long-run effects of shocks on macroeconomic variables. So, the structural VAR model takes into account the economic theory in modeling countries behavior and identify shocks for a better interpretation of results. In addition, the impulse response functions and variance decompositions are analyses in a SVAR model. Impulse response functions isolate the disturbances and compare the response of the economies to the shocks in terms of magnitude and speed of adjustment. The larger the size of shocks, the more disruptive its effect will be on the economy. On the other hand, if the size of shocks were similar to each other among countries then they are suitable to form a currency union. Also, the slower is the adjustment after disturbances, the larger will be the cost of maintaining a common currency (Buigut and Valev, 2005). In variance decomposition analysis, the forecast error variance shows the contribution of each shock to the movements in the variables and shows which shocks are more effective.

This study uses a three-variable SVAR model as used by Sin and Ku (2006) to examine the symmetry of shocks and investigate the feasibility of OCA between D-8 members. The considered variables are Gross Domestic Production (GDP_t), Real Exchange Rate (REX) and Consumer Price index (CPI). According to this model, macroeconomic variables affected by three kinds of structural shocks including: Supply shocks (e_{st}), demand shocks (e_{dt}) and monetary shocks (e_{mt}). So when GDP, REX and CPI are stationary, the mentioned process can be written as follow by an infinite moving average representation:

$$X_t = A_0\varepsilon_t + A_1\varepsilon_{t-1} + A_2\varepsilon_{t-2} + \ldots = \sum_{i=0}^{1} L^i A_i \varepsilon_{t-i} \quad (1)$$

Where, X_t is the vector:

$$\begin{bmatrix} \Delta gdp_t \\ \Delta rex_t \\ \Delta cpi_t \end{bmatrix}$$

ε_t is the vector of:

$$\begin{bmatrix} \varepsilon st \\ \varepsilon dt \\ \varepsilon mt \end{bmatrix}$$

where, L is the lag operator determined by shoartz beyzian criteria, A_i shows the response of variables to the structural shocks and ε_{t-i} shows the structural shocks which we assume that structural shocks are serially uncorrelated with a variance-covariance matrix normalized to the identity matrix: Var (u_t) = I. According to economic theories, supply curve is a vertical one in the long-run and prevents demand shocks to have long term real effects on output but changes price levels permanently. But the demand curve is a downward sloping both in long run and short run. Therefore, a positive supply shock shifts AS curve and increase in output and decrease in price permanently. Thus, we can consider the following restrictions that just supply shocks affect relative output in the long-run. Also, according to related empirical studies, both supply and demand shocks can affect real exchange rates in long run and monetary shocks have no long run effect on output and real exchange rate (Huang and Guo, 2006; Ng, 2002; Sin and Ku, 2006). So, by considering following restrictions the model is as follow:

$$\begin{bmatrix} \Delta gdp_t \\ \Delta rex_t \\ \Delta cpi_t \end{bmatrix} = \sum_{i=0}^{1} \begin{bmatrix} b_1 1_i & b_1 2_i & b_1 3_i \\ b_2 1_i & b_2 2_i & b_2 3_i \\ b_3 1_i & b_3 2_i & b_3 3_i \end{bmatrix} \begin{bmatrix} \varepsilon_{s,t-i} \\ \varepsilon_{d,t-i} \\ \varepsilon_{m,t-i} \end{bmatrix}$$

subjebt to:

$$b_{12i} = b_{13i} = b_{23i} = 0 \quad (2)$$

Specifying structural shocks: When it is unclear that whether a variable is exogenous or not, a natural extension of transfer function analyses is to treat each variable symmetrically. In a three

variable case, suppose that the time path of gross domestic production (gdp_t) is affected by current and past realization of real exchange rate (rex_t) and consumer price index (cpi_t) sequence. The time path of rex_t is affected by current and past realization of gdp_t and cpi_t sequence. Also, the time path of cpi_t is affected by current and past realization of gdp_t and rex_t sequence. Consider the system as follow:

$$\begin{aligned} gdp_t &= b_{10}-b_{12}rex_t-b_{13}cpi_t+\gamma_{11}gdp_{t-1}+\gamma_{12}rex_{t-1}+\gamma_{13}cpi_{t-1}+\varepsilon_{gdpt} \\ rex &= b_{20}-b_{21}gdp_t-b_{23}cpi_t+\gamma_{21}gdp_{t-1}+\gamma_{22}rex_{t-1}+\gamma_{23}cpi_{t-1}+\varepsilon_{gdpt} \\ cpi_t &= b_{30}-b_{21}gdp_t-b_{32}rex_t+\gamma_{31}gdp_{t-1}+\gamma_{32}rex_{t-1}+\gamma_{33}cpi_{t-1}+\varepsilon_{cpit} \end{aligned} \tag{3}$$

In order to have a reduced form of VAR, above system can be written as follow:

$$\begin{aligned} gdp_t+b_{12}rex_t+b_{13}cpi_t &= b_{10}+\gamma_{11}gdp_{t-1}+\gamma_{12}rex_{t-1}+\gamma_{13}cpi_{t-1}+\varepsilon_{gdpt} \\ rex_t+b_{21}gdp_t+b_{23}cpi_t &= b_{20}+\gamma_{21}gdp_{t-1}+\gamma_{22}rex_{t-1}+\gamma_{23}cpi_{t-1}+\varepsilon_{rext} \\ cpi_t+b_{31}gdp_t+b_{23}rex_t &= b_{30}+\gamma_{31}gdp_{t-1}+\gamma_{32}rex_{t-1}+\gamma_{33}cpi_{t-1}+\varepsilon_{cpit} \end{aligned} \tag{4}$$

Represented at matrix form as follow:

$$\begin{bmatrix} 1 & b_{12} & b_{13} \\ b21 & 1 & b_{23} \\ b31 & b_{32} & 1 \end{bmatrix}\begin{bmatrix} gdp_t \\ rex_t \\ cpi_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \\ b_{30} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} \end{bmatrix}\begin{bmatrix} gdp_{t-1} \\ rex_{t-1} \\ cpi_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{gdpt} \\ \varepsilon_{rext} \\ \varepsilon_{cpit} \end{bmatrix} \tag{5}$$

Or:

$$Bx_t = \Gamma_0+\Gamma_1x_{t-1}+\varepsilon_t \tag{6}$$

Where:

$$B = \begin{bmatrix} 1 & b_{12} & b_{13} \\ b_{21} & 1 & b_{23} \\ b_{31} & b_{32} & 1 \end{bmatrix}, x_t = \begin{bmatrix} gdpt \\ rex_t \\ cpi_t \end{bmatrix}, \Gamma_0 = \begin{bmatrix} b_{10} \\ b_{20} \\ b_{30} \end{bmatrix}, \Gamma_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} \end{bmatrix}, \varepsilon_t = \begin{bmatrix} \varepsilon_{gdpt} \\ \varepsilon_{rext} \\ \varepsilon_{cpit} \end{bmatrix}$$

Premultiplication by B^{-1}, the vector autoregressive VAR model in standard form is derived:

$$x_t = A_0+A_1x_{t-1}+e_t \tag{7}$$

Where:

$$A_0 = B^{-1}\Gamma_0,\ A_1 = B^{-1}\Gamma_1,\ e_t = B^{-1}\varepsilon_t \tag{8}$$

For our purpose, the important point to note is that the three error terms of e_{1t}, e_{2t} and e_{3t} are actually composites of the underlying shocks ε_{gdpt}, ε_{rext}, ε_{cpit} and which we call them supply shocks, demand shocks and monetary shocks, respectively. According to the Eq. 8, we have $e_t = B^{-1}\varepsilon_t$ so, in order to obtain the structural shocks we do as follow:

$$\begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \end{bmatrix} = \frac{1}{|B|} \times \begin{bmatrix} 1-b_{23}b_{32} & -b_{12}+b_{13}b_{32} & b_{12}b_{23}-b_{13} \\ -b_{21}+b_{23}b_{31} & 1-b_{13}b_{31} & -b_{23}+b_{12}b_{21} \\ b_{21}b_{32}-b_{31} & -b_{32}+b_{12}b_{31} & 1-b_{12}b_{21} \end{bmatrix} \begin{bmatrix} \varepsilon_{gdpt} \\ \varepsilon_{rext} \\ \varepsilon_{cpit} \end{bmatrix}, \quad |B| = 1+b_{12}b_{23}b_{31}+b_{21}b_{32}b_{13}-(b_{13}b_{31}+b_{23}b_{32}+b_{12}b_{21}) \tag{9}$$

Considering the restrictions of $b_{12} = b_{13} = b_{23} = 0$, on matrix B, the structural shocks can be obtained by following Eq:

$$e_{1t} = \varepsilon_{gdpt} \tag{10}$$

$$e_{2t} = b_{21}\varepsilon_{gdpt} + \varepsilon_{rext} \tag{11}$$

$$e_{3t} = b_{21}b_{32} - b_{31}\varepsilon_{gdpt} - b_{32}\varepsilon_{rext} + \varepsilon_{cpit} \tag{12}$$

Thus, at first, the restricted VAR model must be estimated and then by obtaining the residuals of, we can obtain supply shocks, demand shocks and monetary shocks using Eq. 10, 11 and 12.

Data description: In this study, the annual data for GDP, CPI and real exchange rates in the period of 1980-2011 for D-8-group members have been collected from World Development Indicator (WDI, 2012).

RESULTS

The empirical results are presented in three sections including correlation of structural shocks, impulse response function and variance decomposition analysis.

Correlation of the structural shocks among the countries: A positive correlation between structural shocks (supply, demand and monetary shocks) shows the symmetry of shocks while negative correlations show asymmetric shocks. As the correlations get positive and high, for these economies would be more feasible to establish an OCA. In assessing the symmetry and asymmetry of correlations of structural shocks following Huang and Guo (2006) approach, if the correlation is positive then the shocks are consider as symmetric. The results of structural shocks correlation among D-8 group members are presented in Table 1.

The results show that supply shocks are highly correlated across countries such as Iran, Malaysia, Indonesia, Nigeria, Turkey and Pakistan. On the other hand, there are no correlation between supply shocks in Bangladesh, Egypt and Indonesia. In addition, Turkey, Pakistan, Nigeria and Malaysia exhibit highly correlated demand shocks. In evaluating the correlation of monetary shocks between countries, the results show that, Turkey has no correlation with other countries. Also, monetary shocks are found to be strongly correlated between Nigeria, Iran, Pakistan and Malaysia. These results indicate that there is a core group of four countries comprises Turkey, Pakistan, Nigeria and Malaysia seems most suitable Countries to form currency union. It means that there exist highly correlated shocks such that the contemporaneous shocks among mentioned countries are mostly symmetric. In addition, supply and demand and monetary policies can affect the degree of correlation between these countries. Also panel A, B and C shows that Pakistan has a positive correlation in terms of supply, demand and monetary shocks with almost all countries of D-8 group. Thus if these countries would establish a common currency area, it is appropriate step

Table 1: Correlation of supply, demand and monetary shocks among D-8 group members

D-8 members	BGD*	EGY	IRN	IDN	MYS	NGA	PAK	TUR
Panel A: Correlation of snpply shocks among D-8 countries								
BGD	1.00							
EGY	-0.10	1.00						
IRN	0.31	0.17	1.000					
IDN	-0.20	-0.12	-0.020	1.000				
MYS	-0.18	-0.24	0.004	0.640	1.00			
NGA	-0.33	-0.03	0.060	0.002	-0.12	1.00		
PAK	0.16	0.13	0.023	0.070	0.15	0.29	1	
TUR	0.03	-0.08	0.015	0.080	0.14	-0.08	0.20	1
Panel B: Correlation of demand shocks among D-8 countries								
BGD	1.00							
EGY	0.25*	1.00						
IRN	0.24	0.46*	1.00					
IDN	0.12	-0.15	-0.14	1.000				
MYS	0.04	0.16	-0.02	0.630*	1.00			
NGA	0.06	-0.15	-0.33	-0.030	-0.02	1.00		
PAK	0.37*	0.10	0.10	0.390*	0.32*	0.17	1.00	
TUR	0.23	-0.07	-0.16	0.060	0.05	0.08	0.39*	1
Panel C: Correlation of monetary shocks among D-8 countries								
BGD	1.00							
EGY	0.45*	1.00						
IRN	-0.03	0.23	1.00					
IDN	0.19	-0.04	0.08	1.000				
MYS	0.07	0.13	0.31*	-0.110	1.00			
NGA	0.16	0.32*	0.36*	-0.080	0.15	1.00		
PAK	0.31*	0.29*	0.10	-0.120	0.27*	0.32*	1.00	
TUR	-0.38*	-0.22	-0.15	-0.170	-0.08	0.039	-0.06	1

*Codes of BGD, EGY, IRN, IDN, MYS, NGA, PAK and TUR shows Bangladesh, Egypt, Iran, Indonesia, Malaysia, Nigeria, Pakistan and Turkey, respectively

for Pakistan to be a beginner of forming OCA. Also, according to those criteria, there is no common ground for Bangladesh, Egypt, Indonesia and Iran to support formation a currency union.

Impulse response functions analysis: The influence of shocks on economies can be inferred from the SVAR impulse response function analysis that show the effects of a unit shock on output, real exchange rates and prices. It is important to examine the pattern of real GDP, real exchange rate and CPI responses to a unit shock in GDP, real exchange rate and CPI. Because the similar response patterns of variables across economies indicate that these variables become a less barrier instruments and consequently decrease the cost of forming OCA. Moreover, if the magnitude of the responses of the variables to the structural shocks converge across economies it will be ideal to form OCA. In addition, the slower is the speed of adjustment after disturbances, the higher would be the cost of maintaining a single currency.

As the response of the variables to the supply, demand and monetary shocks in terms of the pattern and speed of adjustment are comparing over a range of 10 periods for each D-8 countries. But as mentioned in previous sections, there are some restrictions on SVAR model. Then we just compared the response of GDP to supply shock in Fig. 1, response of real exchange rates to supply

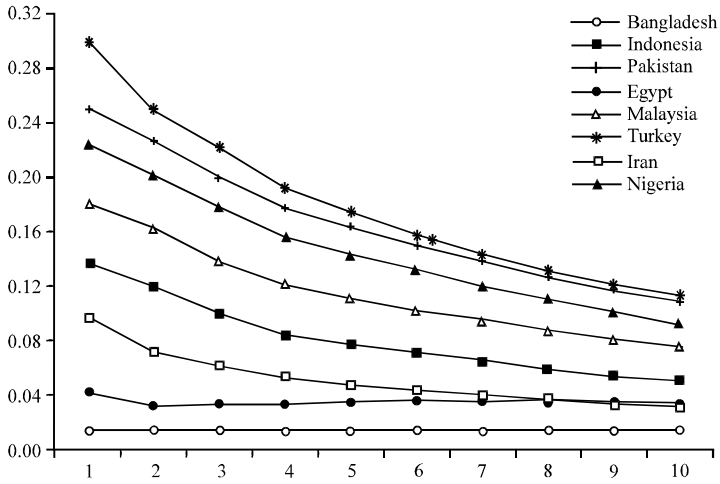

Fig. 1: Response of GDP to a positive supply shocks

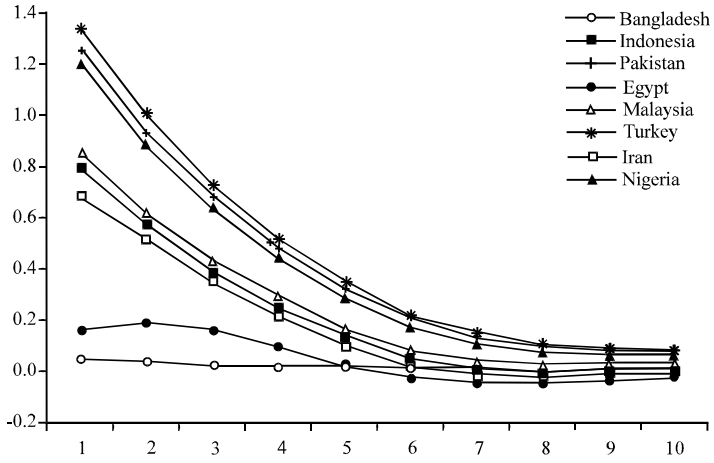

Fig. 2: Response of real exchange rate to a positive supply shocks

and demand shocks in Fig. 2 and 3 and response of CPI to supply, demand and monetary shocks in Fig. 4, 5 and 6, respectively. In Fig. 1-6, the horizontal axis shows the period of time and vertical axis shows response of variables to structural shocks.

As the result shows in Fig. 1, the patterns of response functions of GDP to supply shocks and the speed of adjustments are the same across D-8 counties. Also, the magnitude of response functions for Turkey, Pakistan, Nigeria and Malaysia are higher than that of the other countries. The analysis of impulse response function in Fig. 2 indicates that the patterns of responses of real exchange rates to supply shocks are similar except for Bangladesh and Egypt. The magnitudes of response functions for Turkey, Pakistan and Nigeria are in a same range and higher than that of others. Figure 3 shows that the response functions of real exchange rates to demand shocks and speed of adjustments are the same in Turkey, Pakistan, Nigeria and Malaysia. The response of CPI to supply shocks in Fig. 4 shows that the response of CPI in Turkey is quite different from that of the other countries. But the magnitude and speed of adjustment for Pakistan, Nigeria, Malaysia and Indonesia are the same. The impulse response functions for the CPI to a positive demand shock

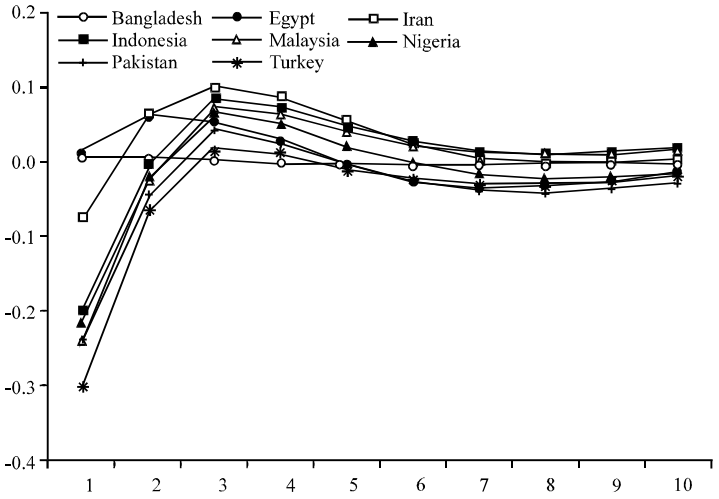

Fig. 3: Response of real exchange rate to a positive demand shocks

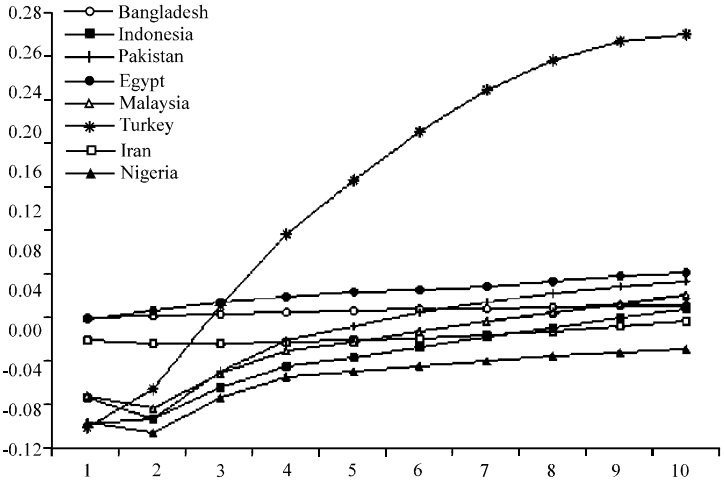

Fig. 4: Response of CPI to a positive supply shocks

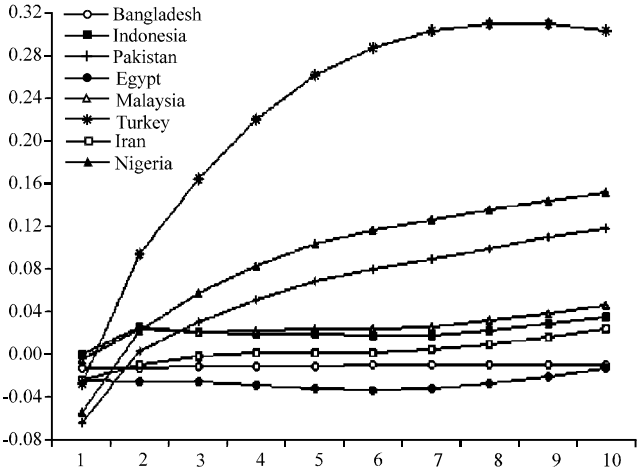

Fig. 5: Response of CPI to a positive demand shocks

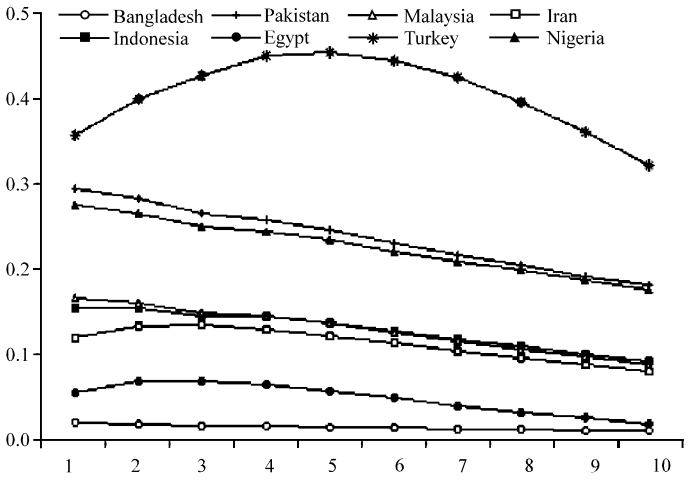

Fig. 6: Response of CPI to a positive monetary shocks

Table 2: Variance decomposition of GDP (for 10 periods)

	Sources of shocks		
Country	Supply shocks	Demand shocks	Monetary shocks
Bangladesh	92.34	0.34	7.32
Egypt	92.53	2.69	4.78
Iran	20.32	2.75	76.93
Indonesia	92.45	4.34	3.21
Malaysia	68.62	31.10	0.28
Nigeria	55.90	3.89	40.21
Pakistan	97.90	1.55	0.54
Turkey	50.34	35.61	14.05

Author's computations

in Fig. 5 shows a different response pattern for Turkey but the response pattern and speed of adjustment for Pakistan and Nigeria are similar. Also, Fig. 6 shows that Pakistan, Nigeria, Malaysia and Indonesia has the same pattern of response functions but the magnitude of responses for countries are different in the way that Pakistan and Nigeria are in the same higher range and Malaysia, Indonesia and Iran are in a lower range.

In general, impulse response functions reveal that in most cases the shape and magnitude of the responses of variables to structural shocks converge across Turkey, Pakistan, Nigeria and Malaysia. So for these countries formation a common currency area would be desirable.

Variance decomposition analysis: Forecast error variance decompositions show the contribution of each shock to the movements in the variables. In other word, it indicates which shock is more predominant in the variability of variables. If the cause of variability is different between countries then the transmission mechanism in countries would be different and they have to follow different policy strategies. Thus, the chance of establishing a common currency area among the countries deems. The results of variance decomposition of GDP are presented in Table 2.

The results indicate supply shocks have contributed mainly to GDP variability in Bangladesh, Egypt, Indonesia, Malaysia, Pakistan and Turkey. In some cases, the role of supply shocks in GDP

Table 3: Variance decomposition of real exchange rates (for 10 periods)

	Sources of shocks		
Country	Supply shocks	Demand shocks	Monetary shocks
Bangladesh	17.67	38.61	43.71
Egypt	33.83	34.81	31.36
Iran	22.06	73.87	4.07
Indonesia	24.65	47.77	27.58
Malaysia	43.80	55.20	1.00
Nigeria	71.58	20.48	7.94
Pakistan	27.41	71.23	1.36
Turkey	9.36	84.44	6.20

Author's computations

Table 4: Variance decomposition of CPI (for 10 periods)

	Sources of shocks		
Country	Supply shocks	Demand shocks	Monetary shocks
Bangladesh	60.67	3.80	35.53
Egypt	8.86	5.64	85.50
Iran	96.68	2.44	0.88
Indonesia	44.28	2.22	53.50
Malaysia	59.34	32.21	5.45
Nigeria	76.86	11.42	11.72
Pakistan	65.76	26.93	7.31
Turkey	81.64	7.76	10.60

Author's computations

variability is more than 90%. Therefore, the supply shocks are predominant factor for the variability of GDP in comparison with demand and monetary shocks. Moreover, according to Table 3 the demand shocks are predominant factor in explaining the real exchange rate variability in Egypt, Iran, Indonesia, Malaysia, Pakistan and Turkey.

The results of variance decomposition for consumer price index in Table 4 shows that supply shocks play an outstanding role in consumer price index variability in Bangladesh, Iran, Malaysia, Nigeria, Pakistan and Turkey.

In general, the results show that the sources of variations in macroeconomic variables (GDP, real exchange rate and consumer price index) in Turkey, Pakistan and Malaysia are the same. For example, supply shocks play predominant role in GDP and CPI variability. Also, demand shocks play major role in real exchange rate variability in the countries.

CONCLUSION

The main objective of this study has been to examine the feasibility of forming an optimum currency area among D-8 group members. According to empirical results, the structural shocks in Malaysia, Nigeria, Turkey and Pakistan are positively correlated and symmetric. Also, the impulse response functions reveal that the response function patterns and speed of adjustment in the above countries are the same. According to variance decomposition analyzes, the main resource of variabihty in GDP, real exchange rate and consumer price index in Malaysia, Nigeria, Turkey and

Pakistan are the same. Based on empirical evidence we can conclude that the formation a common currency area among the subgroup of Turkey, Pakistan, Nigeria and Malaysia seems feasible and desirable.

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