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## Research Article

# External Shocks and the Macroeconomic Response of Small Open Economy: A Structural-VAR Approach for Pakistan

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## Abstract

**Objective:** This study examines the impact of external economic shocks on the macroeconomic variables of Pakistan. The external economic shocks consist of the world oil prices, productivity and financial conditions of the main trading partners of Pakistan. **Methodology:** The open economy structural vector autoregressive (SVAR) model is employed with block exogenous assumption. The identification of the SVAR model is done by imposing non-recursive zero restrictions on the contemporaneous interaction of the variables. **Results:** The results from structural impulse response functions and forecast error variance decomposition reveal that the impact of adverse external shocks is significantly negative on the economy of Pakistan. In addition to this, we find that external variables are more important in accounting the variability in domestic macroeconomic variables. **Conclusion:** This study concludes that external economic factors are equally important for the macroeconomic performance of small open economy of Pakistan.

**Key words:** External shocks, small open economy, Pakistan, SVAR

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Since the 2008 global economic crises the world economy has been facing challenges to enhance the growth, either these challenges are in the form of slump in oil prices or the transitions taking place in the economic structure of large economies. The unfolding of these rapid events in the world economy has been the primary concern for policy makers. It has also pushed the International Monetary Fund (IMF) to downgrade its growth outlook twice recently for the global economy. The sudden changes in the global economic events or shocks cause a greater threat to the emerging market economies in particular, because the external economic conditions are considered as the driving force to their economic performance. The economy of Pakistan is not an exception to these changes.

The IMF has listed Pakistan into the emerging market economies until recently after it was recovered from 2008 crises (<sup>1</sup>World economic outlook report 2015). The small open economy of Pakistan had witnessed the worst impact of 2008 commodity prices, driving the economy into the stagflation. Although the economy recovered but still the growth has not been impressive. The central bank of Pakistan is pushing the discount rate downwards to 6% in 2016 from 15% in 2008, with the target to boost the growth, albeit the growth did not make it to the 5% annual target (<sup>2</sup>Source: International Monetary Fund's Statistics). There are several internal factors causing a slow growth for Pakistan including the weak economic and financial structure of the economy, but the external factors cannot be ruled out as well. There are two important external factors that link Pakistan economy with rest of the world, trade and remittances. Pakistan heavily relies on the imports of crude oil and commodities. Secondly, Pakistan is also a larger recipient of remittances around the world. However, the share of its international trade has remained one-third of its GDP since 1990, but the share of

foreign remittances has been more than double in these years (<sup>3</sup>World bank economic indicators 2015). Any change in the oil prices, productivity and financial conditions of the global economy will pass through these factors into the domestic economy.

The frequent turbulences in the world economy in recent years, there are outpouring studies on the issues of external shocks influencing the small open economies. With regard to Pakistan, the previous studies have ignored the external shocks of productivity and financial conditions world over. The previous research has extensively relied on the linkages between oil prices shock to the domestic growth of Pakistan. Whereas, the time series plot of the output, price level and interest rate variables in Fig. 1, 2 and 3 shows that the domestic variables also move along with their counterparts. Thus, besides the impact of oil prices shocks, this paper also studies the impact of productivity and financial shocks.

The present study addresses the gap in existing literature by contributing in the following manner. This study has used a robust open economy model incorporating productivity and financial shocks in the model beside supply shocks. In addition to this, the external shocks are represented by the trade weighted external variables in order to avoid the single country misspecification problem. The external variables and domestic variables are incorporated in the structural vector autoregressive (SVAR) model with the assumption that external variables can influence the domestic macroeconomic variables but not otherwise. The short run restrictions on SVAR model are imposed following the non-recursive identification scheme. The underline identification relies on the economic structure of a small open economy rather than the ordering of the variables.

There is a strong consensus in the literature about the influence of developed and industrialized economies on the performances of small open economies. The small open developing economies are prone to external shocks due to

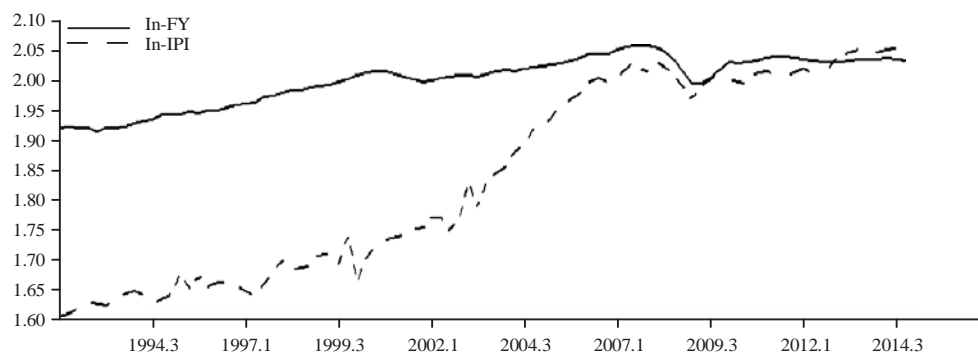


Fig. 1: Domestic and foreign output



Fig. 2: Domestic price level and world oil prices

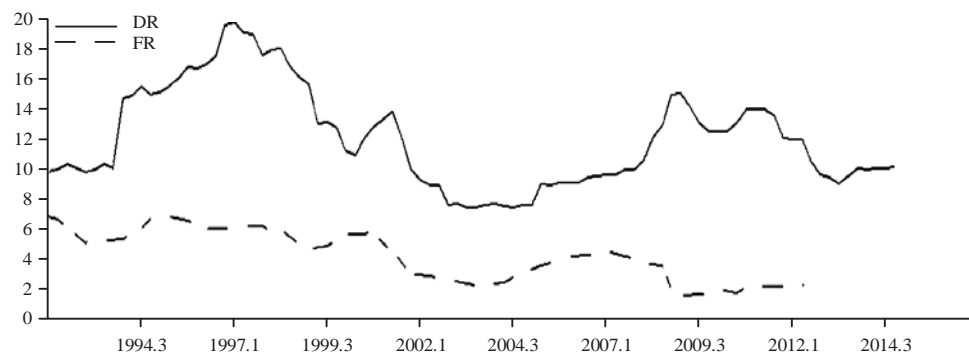


Fig. 3: Domestic and foreign interest rates

their dependency on the large economies<sup>1</sup>. The most prominent external shocks are adverse supply shocks, productivity and the financial shocks. The negative impacts of the rise in oil prices are regarded as supply shocks and number of studies has found the adverse effects of such shocks on developing economies<sup>2</sup>. Oil is one of the crucial inputs for the local industry and most of the developing countries rely on the imports of oil, so any positive change will certainly affect the input cost in those countries. The financial shocks mainly consist of a rise in interest rate world over, which can influence the interest rates and exchange rates in developing markets<sup>3,4,5</sup>.

The evidence from recent literature also suggests similar findings. For example, a study has shown that countries in Central and Eastern Europe possess strong reaction to foreign shocks of production, commodity prices and interest rate, using a near VAR models on the monthly data from 1990 to 2009<sup>6</sup>. Another study employed the structural-VAR model with block exogeneity assumption and found that external shocks have a significant impact on the output, price level and exchange rate on a group of selected East Asian Countries<sup>7</sup>. Similarly, a research also found that external variables are responsible for larger fluctuations in selected ASEAN

countries<sup>8,9</sup>. For a small open economy, it has been found that foreign shocks bring significant variations for the domestic variables employing a sign-restricted SVAR model<sup>10</sup>. In the case of emerging market economies it has been reported that external shocks account for up to half of the variations in key macroeconomic variables<sup>11</sup>.

In the case of Pakistan, a limited research has been carried out. Recently, a brief study on the effects of oil and global food prices on the macroeconomic variables of Pakistan has been conducted<sup>12</sup>. The analysis was based on the generalized impulse response functions and generalized variance decomposition estimated from SVAR model. Although their findings unveiled that oil and food price shocks affect the macroeconomic variables in Pakistan, there is a drawback of using Generalized Impulse Response Functions (GIRF) instead of Structural Impulse Response Functions (SIRF). Because the former does not take care of the contemporaneous order of restrictions in the model as the later, which implies that the SIRF are robust than the GIRF. Much of studies on Pakistan have explored the link between oil prices and economic growth in Pakistan and found a significant negative link between both<sup>13</sup>. Whereas, another recent study on Pakistan have shown that foreign shocks consists of commodity prices

and foreign interest rate have contractionary effects on the economy of Pakistan<sup>14</sup>. Their study included U.S interest rate as to proxy foreign interest rate, which is not an appropriate proxy. There is a rapid development and integration taking place in financial markets world over. Therefore, the single country proxy can lead to misspecification problem. Hence, to overcome these shortcomings this study has employed more robust model with suitable proxies to represent the global economic conditions.

## MATERIALS AND METHODS

To study the dynamic interaction among the macroeconomic variables the Structural Vector Autoregressive (SVAR) models are the theoretically consistent for small open economies. The SVAR models rely on economic theory to impose restrictions on the contemporaneous causal relationship of the variables, so it makes them preferable over VAR to study the macroeconomic response<sup>15</sup>.

The small open economy of Pakistan can be represented by the structural form of VAR model as:

$$BY_t = \Gamma_0 D_0 + (\Gamma_1 L + \Gamma_2 L^2 + \dots + \Gamma_n L^n) Y_t + \varepsilon_{(t)} \quad (1)$$

B is a coefficients matrix of the structural contemporaneous variables.  $Y_t$  is a  $(n \times 1)$  vector of endogenous variables.  $\Gamma_0 D_0$  is a vector of deterministic variables including constant and dummy variable.  $\Gamma_1 L$  is a  $n$ 'th order polynomial matrix in the lag operator. The vector of structural shocks ( $\varepsilon_t$ ) satisfies the conditions of  $E(\varepsilon_t) = 0$  and  $E(\varepsilon_t \varepsilon_t') = \varepsilon = I$ .

Transforming '(1)' in to reduce form requires pre-multiplication with  $B^{-1}$ :

$$Y_t = B^{-1} \Gamma_0 D_0 + B^{-1} (\Gamma_1 L + \Gamma_2 L^2 + \dots + \Gamma_n L^n) Y_t + B^{-1} \varepsilon_{(t)} \quad (2)$$

The reduced form residual  $B^{-1} \varepsilon_t = e^t$  is represented as which satisfies the condition of  $E(e^t) = 0$  and  $E(e_t e_t') = \Sigma_e$  is a symmetric matrix. The variance-covariance matrix of the estimated residuals  $\Sigma_e$  and the variance-covariance matrix of the structural shocks  $\Sigma \varepsilon$  are related as:

$$\Sigma_e = E(e_t e_t') = E(B^{-1} \varepsilon_t \varepsilon_t' B^{-1}) = B^{-1} \Sigma \varepsilon (B^{-1})' \quad (3)$$

Hence:

$$\Sigma_e = B \Sigma \varepsilon B' \quad (4)$$

For a symmetric matrix  $\Sigma_e$ , consists  $n^2 + n/2$  unknown elements, which requires imposing  $n^2 - n/2$  additional restrictions to just identify the system, to recover all structural shocks ( $\varepsilon_t$ ) from the estimated residuals ( $e_t$ ). The '(5)' shows the restrictions imposed on the matrix of contemporaneous parameters B. In order to exactly identify the system, 28 coefficients must be restricted as zero, however the '(5)' consists of 7 additional zero restrictions, which are enough to over identify the system. The non-recursive zero restrictions in '(5)' are employed by following the previous studies on SVAR<sup>16</sup>:

$$BY_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \beta_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ \beta_{31} & \beta_{32} & 1 & 0 & 0 & 0 & 0 & 0 \\ \beta_{41} & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ \beta_{51} & 0 & 0 & \beta_{54} & 1 & 0 & 0 & \beta_{58} \\ \beta_{61} & 0 & 0 & \beta_{64} & \beta_{65} & 1 & \beta_{67} & 0 \\ \beta_{71} & 0 & 0 & \beta_{74} & \beta_{75} & 0 & 1 & 0 \\ \beta_{81} & \beta_{82} & \beta_{83} & \beta_{84} & \beta_{85} & \beta_{86} & \beta_{87} & 1 \end{bmatrix} \begin{bmatrix} \text{Ln - OIL} \\ \text{Ln - FY} \\ \text{FR} \\ \text{Ln - IPI} \\ \text{Ln - CPI} \\ \text{Ln - M2} \\ \text{DR} \\ \text{Ln - NEER} \end{bmatrix} \quad (5)$$

The above system '(5)' consists a total of eight variables divided into two blocks, external and domestic block. The external block includes the first three variables and the rest belong to the domestic block. As Pakistan being a small open economy the external block has been set as block exogenous to the domestic block<sup>7</sup>. The block exogenous assumption implies that the external variables can influence the domestic variables contemporaneously, but the domestic variables will have no effects on the external variables. The restrictions are also imposed on the lagged values of the domestic variables.

The external block includes oil prices (Ln\_OIL), foreign output (Ln\_FY) and the foreign interest rate (FR). Following the previous literature, the oil prices are set ahead of all variables to represent that oil prices are exogenous in the model<sup>17</sup>. Oil prices are followed by the foreign output and foreign interest rate<sup>18</sup>. The foreign block in the system '(5)' represents the world economy and any adverse shocks originating from it can affect the small open economy contemporaneously.

The domestic block comprises of key macroeconomic variables and their identifying restrictions are given as following. The domestic output (Ln\_IPI) and domestic price level (Ln\_CPI) represents the goods market equilibrium condition in a small open economy. Both of these variables are contemporaneously responding to oil prices and all other variables in the lag. As oil is one of the important inputs for the real economic sector and secondly Pakistan is a net importer of oil, so any change in the oil prices will certainly affect the

economic activity contemporaneously, following this assumption the oil prices are allowed to affect all the variables in the system. Secondly, the price level is also allowed to respond contemporaneously to the exchange rates. This assumption is undertaken due to the economic structure of Pakistan, being a net commodity importing country any change in exchange rate will directly pass on to the price level in the country.

The row six and seven in the '(5)' represents the money market equilibrium condition. Where, the money demand (Ln\_M2) equation depends on the income, price and interest rate. The row seven is assumed to be the reaction function of monetary policy, which follows the standard Taylor rule to set the short term interest rate (DR) in the economy. The exchange rate is represented by the nominal effective exchange rates (Ln\_NEER) in the last row and it is assumed to respond contemporaneously to all variables in external and domestic block due to the following reason. One, the exchange rate is the key source to link domestic economy with the world economy. Secondly, it is placed in the bottom because of being a fast moving variable, as the changes in the exchange rate are available on the higher frequency comparing to other variables in the system.

The '(2)' is estimated using the Seemingly Unrelated Regression (SUR) due to the block exogenous assumption, which results in dissimilar variables on the right hand side of the SVAR equations. The Structural parameters in B are estimated by maximum likelihood estimation, the log likelihood function is:

$$L = -\frac{T}{2} \ln |B^{-1} \Sigma_e B^{-1}| - \frac{1}{2} \sum_{t=1}^T T(e_t' B' \Sigma_e^{-1} B e_t) \quad (6)$$

If there are more than  $n^2-n/2$  restrictions on the SVAR system, then the test statistics given below in '(7)' is required to validate the additional restrictions on the system:

$$X^2 = |r_e| - |e| \quad (7)$$

$r$  is the degrees of freedom (in this case 7 additional restrictions on '(5)'). While,  $r_e$  is the restricted variance-covariance matrix and  $e$  is unrestricted variance-covariance matrix. This test statistic has a Chi-square distribution with degrees of freedom equal to the number of over identifying restrictions.

**Data:** This study employs a quarterly data spanning from the first quarter of 1992 to the fourth quarter of 2014. All the data have been gathered from IMF's international financial

statistics. The total of eight variables is divided into two blocks as explained in the previous section. The external block is leading with oil prices (Ln\_OIL) which represent the crude oil petroleum index provided by the IMF. The foreign output (Ln\_FY) and the foreign interest rate (FR) represent the trade weighted variables of major trading partners of Pakistan (<sup>4</sup>According to the data provided by the IMF's directions of trade, Pakistan shares more than 30% of its total trade with United States, United Kingdom, Germany and China). The foreign output is calculated as the trade weighted industrial production index of major trade partners (i.e USA, UK, Germany and China), similarly the foreign interest rate also represents the short term trade weighted interest rates of these countries.

The domestic macroeconomic variables consist of domestic output (Ln\_IPI) that is represented by the industrial production index of Pakistan. The price level (Ln\_CPI) is the consumer price index, money demand (Ln\_M2) is broad money measured as M2. The domestic short term interest rate (DR) is represented by the discount rate, which is a policy rate of the State Bank of Pakistan. The nominal effective exchange rates (Ln\_NEER) are used instead of the nominal exchange rate because the former rate shows the value of domestic currencies against the basket of currencies for all major trading countries of Pakistan. Any decrease in (Ln\_NEER) will show the depreciation of domestic currency against other currencies.

In addition to these eight variables, a dummy variable is also included in the SVAR model to capture the crises period of 2008. All the data have been seasonally adjusted using the X-12 procedure and all the variables are transformed into natural logs except the foreign and domestic interest rates.

## RESULTS

The dynamic analysis from SVAR model is done through the Structural Impulse Response Functions (SIRF) and Forecast Error Variance Decomposition (FEVD), this study provides both analyses in detail. The time series properties and the model selection procedure, including lag length criteria, serial correlation Lagrange Multiplier (LM) test and SVAR stability test have shown that the selected model of lag length two is valid and stable. In order to conserve space, the test results are not reported in this paper but available upon request.

The estimation results from the SVAR model are presented in Table 1. The value of the Likelihood Ratio (LR) test for the over identifying restrictions is given with the probability value of 0.3643, this shows that the null hypothesis of additional restrictions is valid, as it cannot be rejected at



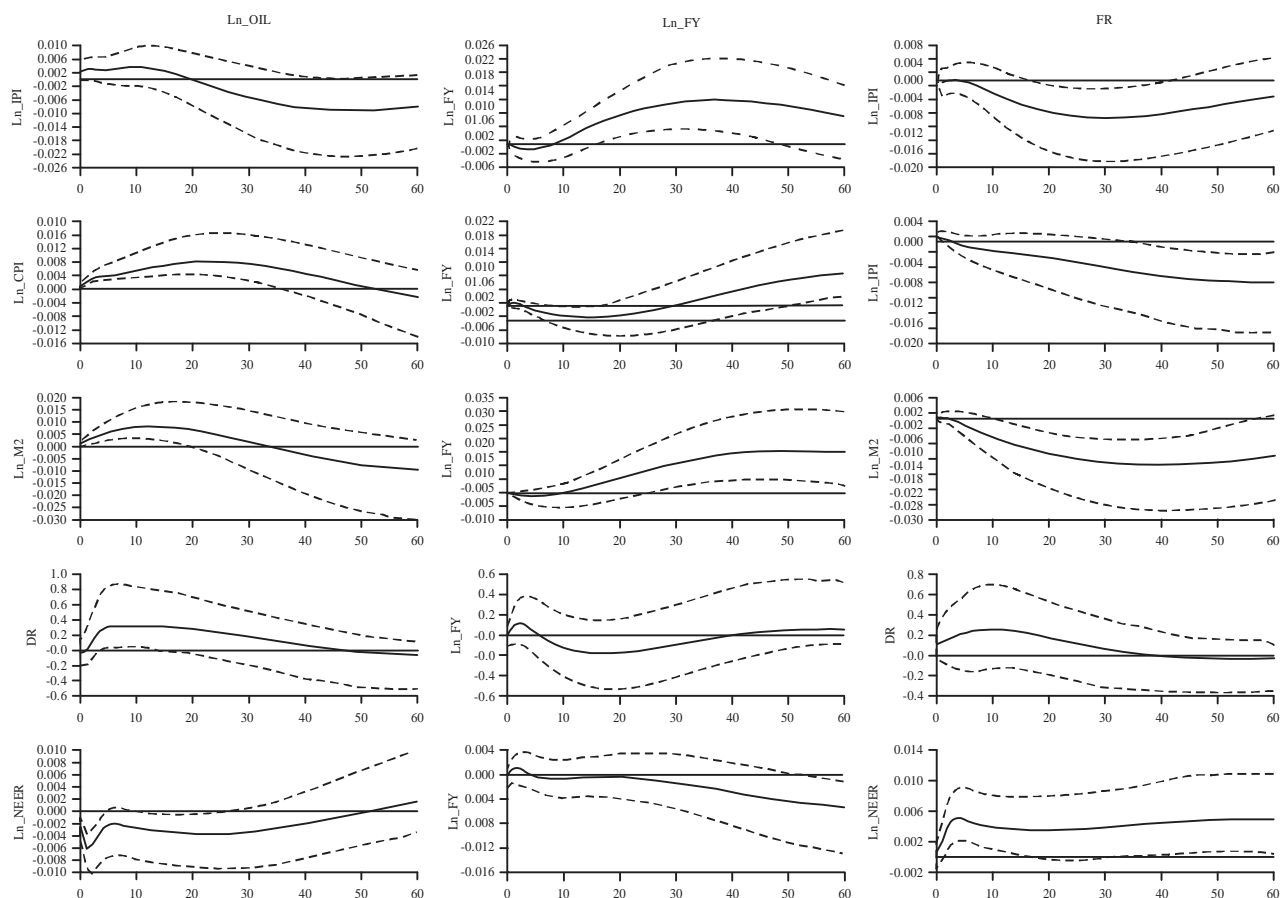


Fig. 4: Structural impulse response functions of domestic macroeconomic variables to external shocks

Table 1: Estimated coefficients of SVAR model

Ln_OIL	Ln_FY	FR	Ln_IPI	Ln_CPI	Ln_M2	DR	Ln_NEER
-0.0153	-29.1779	-0.0311	-0.0403	-0.0603	-0.3482	0.0007	-1.2458
-0.0057	-6.7152	-0.0153	-0.0983	-0.3118	-0.5459	-0.0008	-1.3396
-1.8133	0.7698		-0.0314	-121.9728		0.0033	
-0.3756	-0.6245		-0.0392	-46.2829		-0.0042	
-0.0367			-9.0143	4.9307			
-0.0255			-5.4411	-2.3853			
-0.0721			0.0846				
-0.0595			-0.1146				
-0.0132							
-0.0113							
3.0554							
-1.6108							
0.0097							
-0.0372							

Numbers in brackets are the estimated standard errors. The log likelihood: 2421.3846  $X^2(7) = 7.6518$  corresponding p-value = 0.3643

10% significance level. The impulse response functions from the SVAR model are presented in Fig. 4. The solid line in the middle shows the estimated response while the two dashed lines represent the confidence bands. These confidence bands are calculated from Hall's bootstrapping method, where 95% confidence interval and 2000 bootstrap replications were selected for estimation.

**Structural impulse response functions:** Figure 4 consists of three columns while each of them represents external shock. Each row in Fig. 4 shows the response of domestic variables to one-time positive shock to external variables. The first column shows the response of domestic variables to the rise in oil prices. The domestic output responds positively but it is barely significant, while the domestic output consistently goes down

in the long run and the negative effects of increased oil prices are long lived for the whole horizon. The negative effects on the domestic output are due to the fact that, Pakistan is a net importer of oil and oil is one of the crucial inputs for domestic industry, so any rise in the input prices will certainly affect the domestic demand. The response of domestic price level is significantly positive along the whole horizon, this indicates that world oil prices have significant pass through effects on the domestic price level.

The response of domestic money demand is also positive and significant through short run to medium run. This is an expected response from money demand as oil prices tend to increase the domestic price level which will result in higher money demand in the domestic economy. The response of domestic interest rate is significantly positive to the oil prices along the medium run horizon. The highest response is in the fourth quarter of 0.3 percentage point to one standard deviation shock to world oil prices. One possible explanation is that the monetary authorities in Pakistan devote priority to control inflation during the negative external supply shock. This is the one potential reason for implementing tight policy in the wake of increased world oil prices. The exchange rate forms an important link for the domestic economy with foreign economies. The domestic currency shows a significant negative response to positive shock in oil prices. This is due to the fact that being a net importing country, the rise in oil price increases the demand for foreign currencies relative to domestic currency, which asserts negative pressure on the domestic currency to depreciate against the basket of foreign currencies.

The foreign output shock in column two of Fig. 4 represents the increase in the world income level, which is associated with the rise of economic activity world over. However, the response of domestic output is positive and significant in the long run, but it is a delayed. The delayed response is due to the structural weakness of the domestic economy, but once the growth is picked up after a year and so on, the output shows a positive increase in preceding years. The response of domestic price level is negative till medium run but gradually the response shows increasing trend, this is in order to catch up with the rising economic activity in the country.

The response of money demand is similar to that of prices. While the domestic monetary policy initially rises the interest rate but the rise is not significant. But gradually the monetary policy follows the expansionary policy in response to rising foreign output world over. The response of exchange rate shows the appreciation of domestic currency in the short run. This is again the expected response from the exchange

rate because the rise in the output level of major trading partners will also increase the trade with a domestic economy that in return increases the demand for domestic currency. But gradually the exchange rates follow their historical path of depreciation in the long run.

The third column of Fig. 4 shows the response of domestic variables to the rise in the interest rate world over. The domestic output, price level and money demand show the negative response to the shock in world interest rate throughout the complete horizon. This shock is regarded as the slowdown in the world economic activity, the negative response of key macroeconomic variables shows that the domestic economic activity also slowdowns along with world economy. The positive response of domestic interest rate shows that the monetary policy in Pakistan follows the decisions of world economies during the period of contractionary policies in the world over. The response of exchange rate is positive, showing the appreciation in the domestic currency. This response of exchange rate can be linked with the slowdown in the economic activity world over, that can limit the outflow of foreign exchange from the domestic economy.

**Forecast error variance decomposition:** The variance decomposition provides the percentage variation in one variable caused by other variables and separates this variation and explains it into different steps ahead in time. In other words, it explains the relative contribution for each variable by providing forecast error variance of the desired variable in the system. Table 2 reports the forecast error variance decomposition for domestic variables up to five year horizon. The last two columns of each table show the Foreign-Contribution (FC) and domestic-contribution (DC), the FC is the sum of external variables (i.e. Ln\_OIL, Ln\_FY and FR) while DC corresponds to the sum of domestic variables.

The proportion of the forecast error in domestic output (Ln\_IPI) is largely explained by its own shock in the first quarter with 98%. The remaining variation of 2% is explained by foreign contribution. However, along the horizon the domestic and foreign contribution both increases and at the end of the fifth year, the variations from both are almost equal. For the domestic price level, the contribution from the foreign variables dominates the whole horizon. Where, world oil prices account for the major portion of variations in domestic prices, among other foreign variables. Similarly, the variations in the money demand are also largely explained by the foreign variables.

The proportion of the forecast error in domestic interest rate shows that, during the impact of the shock in first quarter,



Table 2: Forecast error variance decomposition for domestic macroeconomic variables

Step	Ln_OIL	Ln_FY	FR	Ln_IPI	Ln_CPI	Ln_M2	DR	Ln_NEER	FC	DC
<b>Proportions of forecast error in Ln_IPI</b>										
1	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.02	0.00
4	0.09	0.01	0.00	0.63	0.02	0.17	0.02	0.06	0.10	0.27
8	0.11	0.01	0.00	0.38	0.04	0.29	0.03	0.14	0.12	0.50
12	0.14	0.02	0.03	0.25	0.05	0.29	0.03	0.18	0.19	0.55
16	0.13	0.06	0.10	0.19	0.04	0.25	0.04	0.19	0.29	0.52
20	0.10	0.14	0.18	0.14	0.04	0.20	0.04	0.17	0.42	0.45
<b>Proportions of forecast error in Ln_CPI</b>										
1	0.13	0.00	0.10	0.00	0.20	0.01	0.02	0.54	0.23	0.57
4	0.42	0.01	0.02	0.00	0.16	0.02	0.01	0.36	0.45	0.39
8	0.47	0.04	0.03	0.00	0.12	0.04	0.04	0.26	0.54	0.34
12	0.49	0.08	0.04	0.00	0.09	0.06	0.05	0.19	0.61	0.30
16	0.53	0.10	0.05	0.00	0.07	0.07	0.05	0.13	0.68	0.25
20	0.57	0.10	0.06	0.00	0.05	0.08	0.05	0.10	0.73	0.23
<b>Proportions of forecast error in Ln_M2</b>										
1	0.03	0.00	0.00	0.00	0.00	0.96	0.01	0.00	0.03	0.01
4	0.19	0.01	0.00	0.00	0.00	0.78	0.01	0.01	0.20	0.02
8	0.36	0.01	0.05	0.00	0.00	0.56	0.00	0.01	0.42	0.01
12	0.42	0.01	0.14	0.00	0.00	0.41	0.00	0.01	0.57	0.01
16	0.42	0.01	0.23	0.00	0.00	0.32	0.00	0.01	0.66	0.01
20	0.38	0.03	0.31	0.00	0.00	0.26	0.00	0.01	0.72	0.01
<b>Proportions of forecast error in DR</b>										
1	0.00	0.00	0.03	0.02	0.05	0.00	0.76	0.14	0.03	0.21
4	0.03	0.01	0.04	0.01	0.09	0.01	0.59	0.21	0.08	0.32
8	0.12	0.01	0.08	0.01	0.08	0.02	0.50	0.18	0.21	0.29
12	0.18	0.02	0.12	0.00	0.07	0.02	0.43	0.15	0.32	0.24
16	0.22	0.03	0.14	0.00	0.06	0.03	0.38	0.13	0.39	0.22
20	0.26	0.05	0.15	0.00	0.05	0.03	0.34	0.12	0.46	0.20
<b>Proportions of forecast error in Ln_NEER</b>										
1	0.09	0.00	0.01	0.01	0.84	0.00	0.00	0.05	0.10	0.85
4	0.28	0.01	0.15	0.01	0.50	0.03	0.01	0.02	0.44	0.55
8	0.23	0.01	0.29	0.01	0.37	0.02	0.02	0.04	0.53	0.42
12	0.23	0.01	0.33	0.01	0.30	0.02	0.03	0.06	0.57	0.36
16	0.24	0.01	0.35	0.01	0.26	0.03	0.04	0.07	0.60	0.34
20	0.26	0.01	0.35	0.01	0.22	0.03	0.05	0.07	0.62	0.31

the variations mostly explained by its own shock. But 14% variations are explained by the exchange rates. While in the medium and long run, the contribution from the foreign variables is persistently higher. Again, among all external variables, the oil prices are responsible for much of the variations in the domestic interest rate. The variations in the exchange rates are also dominated by the foreign variables; foreign interest rate plays an important role in this variation.

## DISCUSSION

This study examine the influence of external economic factors on the small open economy of Pakistan. The block exogenous SVAR model is employed to study the effects of oil prices, economic and financial conditions of the global economy on Pakistan. The proposed model is consistent and valid in the case of a small open economy that also imposes the non-recursive restrictions and it work better than

traditional methods<sup>19,20</sup>. The economic and financial condition variables are formed as the trade weighted combinations of major trading partners of Pakistan.

Furthermore, this study finds that the external variables are relatively important in accounting the variability in domestic macroeconomic variables. The variations are equally important in short run and in the long run as well. The oil prices are important among other external variables for domestic output and price level and the foreign interest rate is relatively important for exchange rates<sup>14</sup>. Thus, for the small open economy of Pakistan, the external economic factors are equally important for the macroeconomic performance and the policy makers are required to monitor these external factors on a regular basis.

## CONCLUSION

The results from the structural impulse response functions and the forecast error variance decompositions have revealed

following findings. The adverse supply shock originating from the global economy as a rise in the oil prices have significant negative effects on the macroeconomic performance of Pakistan's economy, the negative effects are traceable over the long run horizons. The second negative shock from global economy is in the form of a rise in the interest rate, which represent a slowdown in the economic activity world over. This study has found that the response of Pakistan's economy is also significantly negative to this shock. The third and the final shock is a positive shock to the global output and the domestic economy responded positively, which implies a rise in the economic activity in Pakistan.

### **SIGNIFICANT STATEMENT**

This study has empirically examined the effects of external economic shocks on the small developing economy of Pakistan. Previously it was believed that the external factors were not important for the economy of Pakistan, mainly due to its limited openness to the global economy. But since the global crises, the macroeconomic instability in Pakistan has motivated to undertake investigation to the earlier notion. Hence, this study has found the significant negative effects of external factors on the economy of Pakistan.

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