Econometric Analysis Aggregate Demand and Supply Shocks on Output in Pakistan

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Abstract: The current research investigates the Econometric Analysis Aggregate Demand and Supply Shocks on Output in Pakistan. Data were collected from various secondary sources. It was revealed that the supply shocks and inflation response is in the right direction. The demand shocks appear to have a permanent negative effect on the output level, with positive aggregate demand shock should increase the aggregate output but here the reverse situation occurs in case of Pakistan. With positive Aggregate Demand shocks output decrease. The possible explanation for this opposite to conventional wisdom result may be the phenomenon of “Expansionary Fiscal Contraction”. The response of output to the Aggregate Demand shocks might be due to the continuous fiscal deficit. In Pakistan it shows that government investment decisions rather than government consumption decisions are more critical for the growth of economy. The situation shows the behavior in the long run existence of the fiscal deficit reduces the national savings, which affects significantly on the economic growth and economic performance.

Key Words: Econometric Analysis, Aggregate Demand, Supply Shocks

Introduction: The assumption that aggregate demand has temporary effect on the employment and output level; many prominent empirical studies have been done under this assumption. First time this assumption had applied within SVAR model by Blanchard and Quah (1989) to isolate the demand shocks from the supply shocks. This approach has been followed by many research studies to identify these macroeconomic shocks. This approach cannot be called as perfect because the question has been put on this approach by the cover at el (2006) and it was observed that the shocks which identified in this way may not bear any reasonable relationship to actual shift in aggregate demand and aggregate supply curve because such shifts are likely to be correlated. They used the data of United States used in the basic BQ model; the result showed that the aggregate supply has the effect on the output and inflation by the aggregate demand shocks. The study showed the high correlation between the aggregate demand and aggregate supply and when AS shocks are allowed to be affected by the aggregate demand shocks then there seems large variations in the output level resulted from the aggregate demand shocks.

This study is based on identifying the aggregate demand and aggregate supply shocks in the Pakistan using the technique which has been applied in the Blanchard and Quah (1989). After examining the dynamics of Aggregate Demand and Aggregate Supply shocks in the Pakistan it will be helpful to explain the crisis and economic fluctuations that are results of these shocks.

Rest of the study proceeds as follows: contains the review of Pakistan economy since 1947. The chapter 3 contains literature review. Chapter 4 deals with the theory, econometric methodology proposed by BQ, and VAR analysis. Chapter 5 presents results of the study and finally chapter 6 concludes the study and gives some policy suggestions.

Barnett & Hinich (1986) in this paper role of monetary policy is defined. The Barnett has used the neoclassical demand side aggregation theory in the monetary economics. It defines that the reserve requirements on some monetary assets have affect the economy broadly. The income tax paid implicitly by the financial intuitions is very large so the interest payment on create the highly redistribution within the economy. The reserve requirements produce the wedge between the aggregate monetary assets and services produced by financial institutions both in empirical and theoretical evidences. The wedge creates the divergence between the

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monetary supply aggregate and demand aggregates. The divergence is very small. The regulatory wedge causes the dynamics effects in the money market, but these effects are small at all frequencies.

Ahmed and Pentocost (2012) examine and their studies by using tri-variate VAR and BQ techniques analyze the external and internal aggregate demand and aggregate shocks. Under studies are 22 African countries since 19080 to 2005. Studies show that internal shocks playsa vital role in their economy while external have only a minor role played in the African countries. The supply shock response is between 70 to 95% to the output. There are some African countries who have lot of solid minerals like Egypt and Gabon etc, in those countries foreign supply shocks due to international trade dependency. While on other side aggregate demand does not affect the output significantly but only Benin and Senegal. Inflation seemed to be in positive to the demand shocks. The result shows that there is small correlation between the aggregate demand and aggregate supply. Finally overall results show that there is vital role of aggregate supply shocks in the economic growth of these countries. There is need to more concentrate on the aggregate supply side to increase the economic growth of these countries.

Shively (2004) presents in his paper about the aggregate supply and aggregate demand disturbances in the contractionary and expansionary regime it proves that s. By research there are evidences of existence of these disturbances. It estimates the structural bivariate model which exploits the joint behavior of output and unemployment. This model provides the information that the short run aggregate demand fluctuations dominates in contractionary regimes, on other hand long run aggregate supply fluctuations dominates the output in expansionary regimes. This provides that policymakers should focus on the minimizing the variance of aggregate demand disturbances and increase the level of aggregate supply. In this paper it is also found that the aggregate supply dominates the unemployment in contractionary regimes but aggregate demand dominates it in both regimes.

Dutt and Skott (2006) argue that older Keynesian has worked and defined on the aggregate supply and aggregate demand than current kenysians. They argue about the internally consistent traditional aggregate demand and aggregate supply in both Marhallian and Keynesians framework. Other point is that it has great explicitly potential to include the markets and other sectors of the economy to examine their interactions. It gives the broad view as the general theory instead of partial theory, but it has also behavioral foundations. Third the last thing is that . This does not insist on the optimizing micro foundations. The aggregate demand and aggregate supply is thereof elastic behavior, it is not necessary that it must be inconsistent with the optimizing behavior. For the successful defense it is not necessary that optimization should be sufficient or necessary. The New-Keynesian model is flawed because they have insisted on the optimization and micro foundation means that they have ignored the issue of stability.

Al-e-Hasham et al (2011) in this paper they have presented the robust multi-objective aggregate production planning (RMAPP). Model’s d. Many things has been discussed in the model by considering the supply chain cost as, inventory holding cost, shortage cost, production cost and human related cost has been considered. Regarding the human related costs it includes the productivity, employment cost, staff trainings cost including time cost. Keeping in mind that cost and demand fluctuations are due to uncertainty. First to solve this problem of uncertainty this model was run through nonlinear integers programming and then by the making it linear to minimize the risk. The result indicate that model provide efficient production planning. Aggregate supply and aggregate demand framework has missed the real aspects because it is the mechanical framework due to that it has ignored the role of aggregate demand in medium to long run analysis.

Cover et al (2006) this paper is extension on suggests that aggregate demand and supply shocks are positively correlated by using G-7 industrialized countries by VAR technique. It defines that BQ deviate to understand the macro shocks if it not allows that AS & AD shocks are correlated. Deviations in the BQ model are because that AS & AD shocks are correlated. It shows that supply shocks include the demand driven components therefore
inflation rate goes up. This results that shift in aggregate demand will cause to shift in aggregate supply curve it combats recession if no policy is applied. Demand management policy will not be harmful to overcome the recession.

Fackler and McMillint (1998) Describes that aggregate demand shocks have short to medium term effects while aggregate supply including resource and technology have both long run and short run effects. In AS shocks have mainly three shocks balance growth shock, inflation shock and real interest shock, there is confusion about the real interest rate either it has effect on AS or on Ad it is not clear.

Heilemann et al (1995) defines that the macro econometric fluctuations are not matching with macroeconomic theory such as AS-AD and IS, LM. This paper followed Hickman's approach and analyzed the RWI Business Cycle Model, a medium-sized quarterly macro econometric model for Germany. This approach matches the elasticities of the model and also founds the specialties of the model here income effect dominates the price effect which shows the negative reaction in the labor market.

Merleve de et al(2003) this paper is related with small macroeconomic model of CEECs to analyze different sides of integration with EU and role of monetary and exchange rate strategies. Macroeconomic policy evaluation of cross country comparison needs that macroeconomic model should be with the explained framework of labor, goods and financial markets and transnational interlinked. It studies that there is macroeconomic relations of CEEC countries with EU particularly high effects with trade in these countries. This never makes sense that these all countries be treated as same but all of these must be treated differently. We analyzed the effects on the CEECs of different growth scenarios in the EU and the role of the exchange rate against the euro. In this way a fairly good insight can be obtained on the interaction between the CEECs and the EU-economy.

Jaun (2012) has studied and constructed the VAR model with sectorial linkages. There has been found three results in aggregate demand and aggregate supply fluctuations. In the research paper Chinese economy has been kept in focused. In the case of china here is the economic diversity therefore no one market has dominance over the economic sector, so the system has the anti risk ability. The fixed investment is seen to be the prominent force over the aggregate output. This is also real factor that china's economic performance is relying on the investment in short run. Second this is that when negative shock of aggregate demand and aggregate supply occurs and that affects the real output then volatility comes from the manufacturing sector. When negative shock occurs on manufacturing sector then policy action should be taken then the negative shocks disturbances can be aggregated.

Results and Discussion

The output response in Pakistan approaches zero within a few years of the demand shocks as well as supply shock. Here the supply shocks appear to cause increases in the output level at initial time but it decreases with respect to time and approaches to zero within 6 lags of time approximately as shown in above fig.1. The supply shocks and inflation response is in the right direction. The demand shocks appear to have a permanent negative effect on the output level, with positive aggregate demand shock should increase the aggregate output but here the reverse situation occurs in case of Pakistan. With positive Aggregate Demand shocks output decrease. The possible explanation for this opposite to conventional wisdom result may be the phenomenon of “Expansionary Fiscal Contraction”. The response of output to the Aggregate Demand shocks might be due to the continuous fiscal deficit. In Pakistan it shows that government investment decisions rather that the government consumption decisions are more critical for the growth of economy. The situation shows the behavior in the long run existence of the fiscal deficit reduces the national savings, which affects significantly on the economic growth and economic performance. This clearly means the “Expansionary Fiscal Contraction” exists in the Pakistan.
Null Hypothesis: LN_GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

<table>
<thead>
<tr>
<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2.827011</td>
<td>0.0635</td>
<td></td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -3.605593
- 5% level: -2.936942
- 10% level: -2.606857


Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LN_GDP)
Method: Least Squares
Date: 06/19/14  Time: 16:35
Sample (adjusted): 1973 2012
Included observations: 40 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LN_GDP(-1)</td>
<td>-0.013695</td>
<td>0.004844</td>
<td>-2.827011</td>
<td>0.0075</td>
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<tr>
<td>C</td>
<td>0.067934</td>
<td>0.016558</td>
<td>4.102881</td>
<td>0.0002</td>
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</tbody>
</table>

R-squared 0.173769  Mean dependent var 0.021249
Adjusted R-squared 0.152026  S.D. dependent var 0.008260
S.E. of regression 0.007606  Akaike info criterion -6.871091
Sum squared resid 0.002198  Schwarz criterion -6.786647
Log likelihood 139.4218  F-statistic 7.991990
Durbin-Watson stat 1.507182  Prob(F-statistic) 0.007454

Ist Difference:

Null Hypothesis: D(LN_GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

<table>
<thead>
<tr>
<th>Augmented Dickey-Fuller test statistic</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4.238657</td>
<td>0.0018</td>
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</tbody>
</table>

Test critical values:
- 1% level: -3.610453
- 5% level: -2.938987
- 10% level: -2.607932

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LN_GDP,2)

Method: Least Squares

Date: 06/19/14   Time: 16:36

Sample (adjusted): 1974 2012

Included observations: 39 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LN_GDP(-1))</td>
<td>-0.643896</td>
<td>0.151910</td>
<td>-4.238657</td>
<td>0.0001</td>
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<td>C</td>
<td>0.013449</td>
<td>0.003475</td>
<td>3.870597</td>
<td>0.0004</td>
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</table>

R-squared         0.326859  Mean dependent var -0.000290
Adjusted R-squared 0.308666  S.D. dependent var 0.009402
S.E. of regression 0.007818  Akaike info criterion -6.814917
Sum squared resid   0.002261  Schwarz criterion -6.729607
Log likelihood      134.8909  F-statistic 17.96621
Durbin-Watson stat  2.099181  Prob(F-statistic) 0.000144

Level:

Null Hypothesis: LN-INF has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)
Augmented Dickey-Fuller test statistic -2.891068  0.0555

Test critical values:

<table>
<thead>
<tr>
<th>Level</th>
<th>Critical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>-3.610453</td>
</tr>
<tr>
<td>5%</td>
<td>-2.938987</td>
</tr>
<tr>
<td>10%</td>
<td>-2.607932</td>
</tr>
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</table>


Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LN_INF)

Method: Least Squares

Date: 06/19/14  Time: 16:37

Sample (adjusted): 1974 2012

Included observations: 39 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>LN_INF(-1)</td>
<td>-0.315010</td>
<td>0.108960</td>
<td>-2.891068</td>
<td>0.0064</td>
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<td>C</td>
<td>0.281545</td>
<td>0.103862</td>
<td>2.710752</td>
<td>0.0101</td>
</tr>
</tbody>
</table>

R-squared: 0.184272, Adjusted R-squared: 0.162226, S.E. of regression: 0.158044, Sum squared resid: 0.924181, Log likelihood: 17.63837, Durbin-Watson stat: 1.984553
1st Difference:

Null Hypothesis: D(LN_INF) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=3)

<table>
<thead>
<tr>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-6.726223</td>
</tr>
</tbody>
</table>

Test critical values:
- 1% level: -3.615588
- 5% level: -2.941145
- 10% level: -2.609066


Augmented Dickey-Fuller Test Equation

Dependent Variable: D(LN_INF,2)

Method: Least Squares

Date: 06/19/14   Time: 16:38

Sample (adjusted): 1975 2012

Included observations: 38 after adjustments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
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</thead>
<tbody>
<tr>
<td>D(LN_INF[-1])</td>
<td>-1.114340</td>
<td>0.165671</td>
<td>-6.726223</td>
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<tr>
<td>C</td>
<td>-0.012439</td>
<td>0.028550</td>
<td>-0.435687</td>
<td>0.6657</td>
</tr>
</tbody>
</table>

R-squared     | 0.556880    | Mean dependent var | -0.004013 |
Adjusted R-squared | 0.544571 | S.D. dependent var | 0.260535 |
S.E. of regression | 0.175823 | Akaike info criterion | -0.587478 |
Sum squared resid | 1.112898 | Schwarz criterion | -0.501290 |
Log likelihood  | 13.16209    | F-statistic | 45.24207 |
Durbin-Watson stat | 1.991385 | Prob(F-statistic) | 0.000000 |
Table 01

Structural VAR Estimates

Date: 05/30/14   Time: 11:48
Sample (adjusted): 1974 2012
Included observations: 39 after adjustments
Estimation method: method of scoring (analytic derivatives)
Convergence achieved after 2 iterations
Structural VAR is just-identified

Model: $Ae = Bu$ where $E[u'u'] = I$
Restriction Type: long-run text form
Long-run response pattern:

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>z-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(1)</td>
<td>66916779</td>
<td>7576833.</td>
<td>8.831761</td>
<td>0.0000</td>
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<tr>
<td>C(2)</td>
<td>-54174430</td>
<td>9958504.</td>
<td>-5.440017</td>
<td>0.0000</td>
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<tr>
<td>C(3)</td>
<td>48992506</td>
<td>5547309.</td>
<td>8.831761</td>
<td>0.0000</td>
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</table>

Log likelihood -1228.017

Estimated A matrix:

<table>
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<tr>
<th></th>
<th>1.000000</th>
<th>0.000000</th>
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<tbody>
<tr>
<td></td>
<td>0.000000</td>
<td>1.000000</td>
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</table>

Estimated B matrix:

<table>
<thead>
<tr>
<th></th>
<th>1.98E+08</th>
<th>-1.52E+08</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>-7850360.</td>
<td>5982353.</td>
</tr>
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</table>
Table 02

Vector Autoregression Estimates

Date: 05/30/14   Time: 11:48
Sample (adjusted): 1974 2012
Included observations: 39 after adjustments
Standard errors in ( ) & t-statistics in [ ]

<table>
<thead>
<tr>
<th></th>
<th>D(GDP)</th>
<th>D(INF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(GDP(-1))</td>
<td>0.549552</td>
<td>0.018460</td>
</tr>
<tr>
<td></td>
<td>(0.13618)</td>
<td>(0.00549)</td>
</tr>
<tr>
<td></td>
<td>[ 4.03543]</td>
<td>[ 3.36426]</td>
</tr>
<tr>
<td>D(INF(-1))</td>
<td>3.104054</td>
<td>0.877892</td>
</tr>
<tr>
<td></td>
<td>(1.77091)</td>
<td>(0.07135)</td>
</tr>
<tr>
<td></td>
<td>[ 1.75280]</td>
<td>[ 12.3036]</td>
</tr>
<tr>
<td>C</td>
<td>49.88614</td>
<td>-1.397434</td>
</tr>
<tr>
<td></td>
<td>(20.0434)</td>
<td>(0.80758)</td>
</tr>
<tr>
<td></td>
<td>[ 2.48890]</td>
<td>[-1.73040]</td>
</tr>
</tbody>
</table>

R-squared | 0.432889   | 0.857633   |
Adj. R-squared | 0.401383   | 0.849724   |
Sum sq. resids | 139691.8   | 226.7760   |
S.E. equation | 62.29229   | 2.509847   |
F-statistic | 13.73981   | 108.4338   |
Log likelihood | -214.9194  | -89.66642  |
Akaike AIC | 11.17536   | 4.752124   |
Schwarz SC | 11.30332   | 4.880090   |
Mean dependent | 139.3932   | 5.508205   |
S.D. dependent | 80.51181   | 6.474439   |
Determinant resid covariance (dof adj.) 21625.14
Determinant resid covariance 18426.16
Log likelihood -302.1970
Akaike information criterion 15.80497
Schwarz criterion 16.06091

VAR 01

Vector Autoregression Estimates
Date: 05/30/14   Time: 11:48
Sample (adjusted): 1974 2012
Included observations: 39 after adjustments
Standard errors in ( ) & t-statistics in [ ]

<table>
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<tr>
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<td>D(INF(-1))</td>
<td>3.104054</td>
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<td></td>
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<td>[-1.73040]</td>
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</table>

R-squared 0.432889    0.857633
Adj. R-squared 0.401383 0.849724
Conclusions

Our data set comprises real GDP and inflation rate for the period 1974-2012 and data source has been used International financial Statistics. We used the data from the developing country Pakistan and utilize the structural Vector Auto regressive model. The main finding of the paper is that positive supply shock has positive effect on GDP while negative on prices. On the other hand aggregate demand shocks positively affect prices but the effect on aggregate demand is negative.

References


