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Full Length Research Paper

Trade liberalization, economic size and macroeconomic volatility: Empirical evidence from Pakistan

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The purpose of this study is to investigate the link between trade liberalization, government size and the macroeconomic volatility in case of Pakistan. For this purpose, study used time series data from 1967-2010 and employed co integration technique to find long run relationship. The results proposed that in long run trade liberalization and economic size create volatility in output. However consumption and investment volatilities are directly link with trade liberalization and government size has direct relationship with output and investment volatilities. It is proposed that increase in economic size may increase the investment and output volatilities in long run. Furthermore error correction model suggested that in short run output volatility, trade liberalization, and economic size are negatively linked whereas government size directly linked with output, consumption and investment volatility in the short run.

Keywords: Government Spending, Income, Macroeconomic Volatility, Population, Trade Liberalization

JEL Classification: E21, F41, F62, H59

INTRODUCTION

Long run growth can't be achieved without stable economy i.e. economy has constant growth. It is generally believed that trade liberalization is positively connected with economic growth. But does this appear at the cost of increase in growth volatility due to a greater vulnerability to total shock? After all, one may realistically expect a liberal economy to face a larger number of adverse shocks compare to less dependent countries on trade. Besides, the disciplining nature of global competition and the incidence of formal international contracts could potentially limit the risk of policy mistakes. Therefore it is uncertain whether the effect of trade liberalization on economic volatility should be positive or negative.

In Pakistan the association of trade liberalization and macroeconomic volatility haven been ignored. Although, the link between trade liberalization and economic size has been investigated in detail, Bajwa and Siddqui (2011), Siddiqui and Iqbal (2005), Wacziarg and Welch (2003), Din and Siddique (2003), Hussian(2003). However, the link between trade liberalization and volatility is less well understood. The purpose of this research is to discover the link between trade liberalization, economic size and the macroeconomic volatility in case of Pakistan. Cameron (1978) estimated the link between Globalization integrated trade liberalization with country size and government size and since then it's one of the debatable topics. The link draw the attention because of several studies conducted globally in different regions and different result has found. Most of the studies exhibit the positive relationship with trade liberalization and government size also with economic volatility. Recent contribution of Jetter and Paramerter (2012), Haddad and Saborowski (2010), Pancaro (2010), Dawson (2010), Giovanni and Levchenko (2010), Epifani and Gancia (2008), Benarroch and Pandey (2008), Furceri and Karras (2008), Karras

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(2006), Loayza and Ventura (2007), Raddatz (2007), Down (2007) Fiaschi (2003), Easterly and Kraay (2000) Allen (1995) and Gali (1993), Molana and Violato (2004), Alesina and Wacziarg's (1998, 2005), Rodrik (1998) discussed trade liberalization and its link with the country size and economic size. The reason reported, small countries has advantage of trade liberalization supplement as they spend more on the provision on public good and more international jolts related to trade liberalization, government spending and polices play vital role to stabilize the liberalization and to avoid volatility. Empirical evidence from different studies suggests small countries have benefit to open more.

However, risk and insecurities relates with the trade liberalization across the region, subsequently government polices and free trade can cop the sick industries. The study discusses how the government spending, trade liberalization and size of the country proposition on the economic activities. In Pakistan, there are far more to explore, numerous literature concerning the trade liberalization and economic growth exhibit recently have been conducted by Bajwa and Siddqui (2011), Din and Siddique (2003), Berg and Krueger (2003), Hussian (2003), Jin (2000) and Frankel and Romer (1996) but no researches has conducted research on the subject of trade liberalization and macroeconomic volatilities. This study helps to fill the gap; explains how much the macroeconomic volatilities affected by trade liberalization and economic size also up to what extent? The main objective is to determine relationship among macroeconomic volatilities consisted on Income, Investment, Consumption and Exchange rate; with Trade Liberalization, Economic size and Government size. Moreover, the study finds long run as well as short run relationship among macroeconomic volatilities with trade liberalization, economic size and government size. This study would be organized as flows: Section 2 would present the review of previous literature. Section 3 would discuss theoretical framework of research issues. Section 4 includes the Data and Sources, Section 5 contains the Econometric Methodology and Section 6 would presents conclusion and policy implication.

LITERATURE REVIEW

The macroeconomic volatilities are important determinants of economic growth and trade liberalization. The impact of trade liberalization on macroeconomics volatilities differs with great deal depending on country distinctiveness. However, it's generally assumed that small countries are more volatile for the reason of high level of dependency on trade liberalization. Haddad and Saborowski (2010), Pancaro (2010), Dawson (2010), Giovanni and Levchenko (2010), Epifani and Gancia (2008), Benarroch and Pandey (2008), Furceri and Karras (2008), Karras (2006), Loayza and Ventura (2007), Raddatz (2007), Down (2007) Fiaschi (2003), Easterly and Kraay (2000) Allen (1995) and Gali (1993) Economic theory proposes that volatility is a role of the size and depth of markets, consequently trade is an engine of growth. Recently, there are wide range of literature that proposes positive relationship of trade and economic size like Bajwa and Siddqui (2011), Siddiqui and Iqbal (2005), Wacziarg and Welch (2003), Din and Siddique (2003), Berg and Krueger (2003), Hussian (2003), Jin (2000) and Frankel and Romer (1996). In Pakistan the relationship between trade liberalization and growth has been investigated thoroughly, the link between trade liberalization and volatility is less well understood. Various studies have argued that trade liberalization increases macroeconomic volatilities (Loayza and Ventura, 2007; Fiaschi, 2003; Rodrik ,1997 and Gali,1993), yet there is no clear consensus in the literature to date specifically in case of Pakistan.

Trade liberalization and Economic size: The literature on trade liberalization and economic size is vast which is beyond the scope of this study. This study simply sums up some of the salient results from recent studies in this literature. Some recent contributions are done by Bajwa and Siddqui (2011) who investigated the relationship between trade liberalization and economic growth for SAARC. During the period 1972-85, short run unidirectional causality of economic growth and trade liberalization was prevalent, but bi directional causality long run relationship exist. Siddiqui and Iqbal (2005) analyzed the causality impact of trade liberalization policy of Pakistan on GDP growth for the span of 1972- 2002 and found the negative relationship between trade and GDP growth. Din and Siddique (2003), Hussain (2003), Frankel and Romer (1996), found the positive link between trade liberalization and growth. Hussain (2003) examined that because of poor polices, Pakistan is losing the potential benefit which it can achieve. Berg and Krueger (2003) found the positive impact trade policy and trade liberalization played a vital role in the growth. Wacziarg and Welch (2003) found trade policy under the regime of 1990's not significantly part of growth. Jin (2000) discovered that the concept of long run growth is not effected by trade liberalization he added the fiscal and international shocks has greater impact on growth.

Trade liberalization and Macroeconomic Volatility: The link between trade liberalization and macroeconomic volatilities has been completely neglected in case of Pakistan specifically. On the theoretical front, there are few exceptions; Haddad and Saborowki (2010) exhibited product diversification which played important role to protect economy from volatility while opening economy for trade. They further explained policies made in such a manner to improve the product diversification. Product diversification could improve by developing infrastructure of trade related items, removal of crimson tide which

affected trade also service sector played important role to manage the export diversification. Giovanni and Levchenko (2010) discussed that the country size and trade liberalization affect the volatility, also trade liberalization required large numbers of firms in countries which create macroeconomic volatility also elaborate the positive relationship between trade liberalization and economic volatility. Dawson (2010) proposes the relationship of business cycle and economic freedom and found negative link between volatility and economic freedom; economic freedom includes index of government size, legal structure of property rights, free trade, business regulations and money access; government size has positive relationship with volatility. Benarroch and Pandey (2008) outcome was the trade volatility decreased by increase the size of government. Furceri and Karras (2008) found the relationship of business cycle, country size and volatility of 25 countries on quarterly based data and the country size and business cycle volatility negatively related. Also documented large countries are less volatile and include 167 countries to remove the missing link on Rose (2006) studies and found country that size is important part of business cycle fluctuations which favored Karras (2006) as the small countries are more volatile than large countries.

Down (2007) has documented the relationship of trade liberalization and economic volatility. He used cross sectional data on developed countries and explains the size and depth of market depends on the economic volatility. The small countries are more volatile because of greater market integration and liberation. He analyzed the relationship of trade openness, country size and economic volatility. Down (2007) suggested that large share of trade liberalization creates great internal volatility. Therefore smaller countries are more open (Rodrik 1996, Alesina, spolare and wacziarg 1998) and likely to be more economically volatized, and more insecure. Loayza and Ventura (2007) suggested that macroeconomic volatility is fundamental problem of developing countries indication of underdevelopment. These countries attain instability for the reason of external shocks, unstable macroeconomic policies, inflexible microeconomics and frail institutions, exhibited that growth and development ultimately affected by economic volatility but directly to the income of risk-averse individual and found that over last four decade not only small countries are volatile but also large countries; among them some are urbanized economies.

Raddatz (2007) showed external shocks which transmitted on the volatility of real activity in less developed economies, applied a VAR methodology and found prices, foreign growth, and real interest rates has significant impact. Karras (2006) Macroeconomic volatility is measured by cyclical output, consumption investment and the exchange rate. Ilhan (2006) found the mix result of exchange rate instability respect to the sample size, model specification and countries taken. Also ambiguous result found on growths in volatility reduces volume of trade.

At the total level, Easterly and Kraay (2000) found for small economies term of trade is significant driver for increase in volatility. Moreover they argued that small economies typically experienced the high income volatility is due mainly to their trade liberalization and small role of the export concentration. Ramey (1995) has taken ninety two countries to find the impact of macroeconomic volatility on growth and documented greater the volatility lower the growth. However, government spending is inversely related with growth. Allen (1995) explained that economic volatility varies with the country size, large countries more expands their output from different sectors, and consequently can stay away from the average volatility and because of less share of international risk; less open than small countries. Also, large size trading countries, had the bigger shock transfer to partner countries, small countries are more volatile because of high dependency on the trading partners. Gali (1993) found the association of economic volatility with government size; suggested government size act like a automatic stabilizers support the real business cycle model proposed by Keynesian. And co movement of sectors has significant effect on volatility.

MATERIALS AND METHODS

Theoretical Models: In this part, this study will sketch theoretical model to illustrate how trade liberalization can affect the macroeconomic volatility through the conduct of monetary policy. The process is more resemble with Karas(2006) which is based on model of monetary policy reliability; initiated by Kydland and Prescott(1977) and then expanded to open economy by Rogoff(1985) and Obstfeld and Rogoff(1996); they supposed that government loss could function as:

$$GL = \tfrac{1}{2} f[\beta(¥ - ¥^{*})^{2} + \pi^{2}] \quad \text{..... (1)}$$

Where F is the mathematical expectation, ¥ is (log) real GDP, $¥^{*}$ is GDP targeted by government, inflation is denoted by π and β confine the significance of the GDP targeted relative to inflation; act like a parameter which supposed to be zero. Expectation augmented Phillips curve is define relationship of GDP and unemployment.

$$¥ = \alpha(\pi - \pi^{e}) + \mu \quad \text{..... (2)}$$

Where this study assumed the natural rate of output is normalized to zero, π^{e} shows the expected inflation which also considered as normalized $\mu \sim iid(0, \sigma^{2})$ and α is parameter which measures the Philip curve tradeoff between GDP and inflation. With help of Eq. (2) this study

can considered trade liberalization as, because of the assumption "Philips curve trade off is better in closed economy than in open economy"; this study make α a decreasing function of liberalization (Obstfeil and Rogoff, 1996) same point made by Romer(1993) and Karass(1999). So this study assumes that;

$\alpha = \alpha$ *(Trade liberalization)*..... (3)

With $\alpha = \eth \alpha / \eth$(trade liberalization) < 0, and now this study add the purchasing Power Parity according to (Obstfeil and Rogoff, 1996) therefore;

$\pi = \Delta er + s = \acute{\epsilon} + s$ .....…..,,… (4)

where er is the exchange rate as nominal log, ε is the depreciation rate, the stochastic error term s~ iid(0, σ^2) measure deviation from PPP, also taking foreign price level as exogenous variable and normalized to 1. The strategy is to choose ε for the sake to minimize (1) with respect to (2), (3) and (4). To solve ε it's assumed that policy maker observe μ for that they should observed s, so that first order condition implies that the optimum depreciation rate persuade as:

$$\acute{\epsilon}^u = \frac{\beta \alpha \acute{\epsilon}^l - \beta \alpha \mu + \beta \alpha ¥^*}{\beta \alpha^2 + 1}$$

Where $\acute{\epsilon}^l$ is expected depreciation and the superscript "U" is discretion. $\acute{\epsilon}^l = f(e^u)$ at equilibrium which gives $\acute{\epsilon}^l = \beta \alpha ¥^*$ so,

$$\acute{\epsilon}^u = \beta \alpha ¥^* - \frac{\beta \alpha \mu}{\beta \alpha 2 + 1} \quad \text{..... (5)}$$

Substituting (5) into (4) at equilibrium, then into (2), so this study gets the values of inflation and GDP as:

$$\pi^U = \beta \alpha ¥^* - \frac{\beta \alpha \mu}{\beta \alpha 2 + 1} + s \quad \text{..... (6)}$$

Also,

$$¥^U = \frac{1}{\beta \alpha^2 + 1} \mu + \alpha s \quad \text{..... (7)}$$

Equation 6 means the inflation on average $\pi^U = \beta \alpha ¥^*$ and $d\pi^U / d\ tradelib < 0$, which is identical to Romer's (1993) outcome; more trade liberalization when the average inflation is lower. According to equation (3.5) the average depreciation rate is $\acute{\epsilon}^u = \beta \alpha ¥^*$ and $d\acute{\epsilon}^u / d\ tardelib < 0$. The model predicts that more lower depreciation rate the greater trade liberalization will appear. Which proves Karas(2006) and Romer's results, the large amount of trade liberalization get less benefit of monetary expansions, Philip's curve trade off is conical and average inflation bias and reduces the depreciation of exchange rate. Therefore the GDP volatility from equation as follows:

$$Var(¥^U) = \frac{1}{\beta \alpha 2 + 1} \sigma^2_u + \frac{2\alpha}{\beta \alpha 2 + 1} \rho_{us} \sigma_u \sigma_s + \alpha^2 \sigma^2_s \quad \text{..... (8)}$$

Where ρ_{us} denotes the correlation coefficient between u and s, and the sign of $\frac{dVar(¥*)}{dtradelib}$ is unclear. The sign will depend on the variation from PPP. If the variations are small $\sigma^2_s \rightarrow 0$ and $\frac{dVar(¥*)}{dtradelib} > 0$, the variance will effectively depend equation (3.8) on the first right hand side term. The limiting case is as follows: the higher GDP volatility generated through trade liberalization; decrease advantage of monetary intervention which means inducement respond of output shock is decrease also, which become the reason of higher GDP volatility. The total effect is still unclear it depends the other terms of equation 8.

In the end, the exchange rate volatility can be measure from the equation (5) implies that $Var(\acute{\epsilon}^u) = \frac{\beta \alpha \mu}{\beta \alpha 2 + 1} \sigma^2_u$ *so* $d\acute{\epsilon}^u / d\ tradelib$ and the sign also unclear.

This study are classifying the macroeconomic volatility by taking measures of GDP, Investment, consumption and exchange rate, therefore, with little extension the function to examine the impact of trade liberalization and economic size on macroeconomic volatility is:

$\sigma_¥ = f$ *(Trade liberalization, Economic size, Government size) …(9)*

$\sigma_{ln} = f$ *(Trade liberalization, Economic size, Government size) …(10)*

$\sigma_{con} = f$ *(Trade liberalization, Economic size, Government size) …(11)*

From the above theoretical framework research specific models are:

$\sigma_¥ = \gamma_0 + \gamma_1 \log TL + \gamma_2 \log ES + \gamma_3 \log GS + \ddot{E}_1$ ..... (*12*)

$\sigma_{ln} = \Pi_0 + \Pi_1 \log TL + \Pi_2 \log ES + \Pi_3 \log GS + \ddot{E}_2$ .....*(13*)

$\sigma_{con} = \varphi_0 + \varphi_1 \log TL + \varphi_2 \log ES + \varphi_3 \log GS + \ddot{E}_3$.....*(14*)

Above equations capture the economic macroeconomic volatility, explanation discuss in empirical section.

Data and Variable definition: The study covers annual time series data from 1967 to 2010. The study used GDP and also examine two of its major components one is aggregate consumption and another is gross fixed capital formation the most volatile variables. The data for the variables of consumption, investment, Gross domestic product, import and export are collected from Hand book of statistic; published by state bank of Pakistan. Government size is measured as the government

consumption in percentage of GDP and it's taken from World Bank. Trade liberalization is the sum of import plus import divided by GDP and economic size is the ratio of Pakistan GDP to US GDP. The expected sign for trade liberalization and economic size is negative with different forms of macroeconomic volatilities. And government consumption is anticipated positive with macroeconomic volatilities.

The macroeconomic volatility can be estimated with standard generalized autoregressive heteroscedasticity (GARCH method which is suggested by Bollserslev (1986). All variables involved series are transformed into natural log form; to reduce the problem of hetero skedasticity (Gujrati; 2003). This study is testing 3 equations which identify the macroeconomic volatility affected from trade liberalization (TL) and economics size (Size) and government size (GC).

Economic methodology: This study use ADF unit root test, Johenson co integration technique and Error correction mechanism.

Unit root test: Unit root test were used critically by Augmented Dickey Fuller coefficient; Dickey Fuller (1979) and Fuller's (Enders, 2004). For the lags selection in ADF unit root test was selected according to Akaike and Schwarz criteria (Verbeek, 2004). The model in unit root tested with constant, with constant and trend and without constant and trend respectively. The test for stationary of series is based on following equation:

$$\Delta z_t = \zeta_0 + \zeta_1 z_{t-1} + \zeta_2 t + \zeta_3 \Delta z_{t-1} + \ldots + \zeta_{p-1} \Delta z_{t-p+1} + I_t \ldots\ldots\ldots\ldots\ldots (15)$$

The model with constant and trend null hypothesis H_0:(ζ_0, ζ_1,ζ_2)=(0,0,0), for the model with constant only null hypothesis was H_0:(ζ_0,ζ_1)=(0,0) and the model without constant and trend null hypothesis was H_0:(ζ_1)=(0). Moreover stationary possibility check consist on I (0) or I (1) for co integration.

Johansen Co integration and VEC technique: Dickey-Fuller test used for unit root test and for long run relationship Juselius Johansen co integration technique; actually represents nothing more than a multivariate (Enders, W., 2004). Instead of z on behalf of a single variable, there is y and E representing (n*1) vectors, A denotes (n*n) matrix and O is (n*n) identity matrix.

$$V_t = \lambda + \sum_{t-1}^{P} \psi V_{t-1} + E_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

Where V_t is the vector of both X_t and Y_t dependent variables respect to the equation examining and X_t represents explanatory variables, trend variable is t, ψ_t is a matrix of lag I, VEC parameter. Also this study generated a vector error correction model as follows:

$$V_t = \lambda + \sum_{i=1}^{P} \alpha_1 \Delta y_{t-1} + \sum_{i=0}^{P} \alpha_2 \Delta X_{t-1} + E_t \ldots\ldots\ldots\ldots\ldots\ldots (17)$$

Where Δ is first difference operator, t is the time trend and X is a vector of explanatory variables namely, log of trade liberalization and GDP for initial four equation and log of pop, log of GDP, log Trade liberalization and some vector variables for the last equation, λ_2 is speed of adjustment. This study tests $for\ ECM\ (short\ run\ relationship)$ and equations for vector error correction are as follows:

In case of output volatility:

$$\Delta\sigma_{¥} = \chi_0[\gamma_1 TL_{t-1} - \gamma_2 ES_{t-1} - \gamma_3 GS_{t-1} - \gamma_4\sigma¥_{t-1} - \gamma_5] + e_1 \ldots\ldots\ldots\ldots\ldots\ldots (18)$$

$$\Delta TL = \chi_1[\gamma_6 TL_{t-1} - \gamma_7 ES_{t-1} - \gamma_8 GS_{t-1} - \gamma_9\sigma¥_{t-1} - \gamma_{10}] + e_2 \ldots\ldots\ldots\ldots\ldots\ldots (19)$$

$$\Delta ES = \chi 2[\gamma_{11} TL_{t-1} - \gamma_{12} ES_{t-1} - \gamma_{13} GS_{t-1} - \gamma_{14}\sigma¥_{t-1} - \gamma 15 + e_3 \ldots\ldots\ldots\ldots\ldots (20)$$

$$\Delta GC = \chi_3[\gamma_{16} TL_{t-1} - \gamma_{17} ES_{t-1} - \gamma_{18} GS_{t-1} - \gamma_{19}\sigma¥_{t-1} - \gamma 20 + e_4 \ldots\ldots\ldots\ldots\ldots (21)$$

In case of Consumption volatility:

$$\Delta\sigma_{con} = \theta_0[\rho_1 TL_{t-1} - \rho_2 ES_{t-1} - \rho\gamma_3 GS_{t-1} - \rho_4\sigma_{con\,t-1} - \rho 5 + e_5 \ldots\ldots\ldots\ldots\ldots (22)$$

$$\Delta TL = \theta_1[\rho_6 TL_{t-1} - \rho_7 ES_{t-1} - \rho_8 GS_{t-1} - \rho_9\sigma_{con\,t-1} - \rho 10 + e_6 \ldots\ldots\ldots\ldots\ldots (23)$$

$$\Delta ES = \theta 2[\rho_{11} TL_{t-1} - \rho_{12} ES_{t-1} - \rho_{13} GS_{t-1} - \rho 14\sigma_{con\,t-1}\text{-}\rho 15 + e_7 \ldots\ldots\ldots\ldots (24)$$

$$\Delta GC = \theta_3[\rho_{16} TL_{t-1} - \rho\gamma_{17} ES_{t-1} - \rho_{18} GS_{t-1} - \rho 19\sigma_{con\,t-1}\text{-}\rho 20 + e_8 \ldots\ldots\ldots\ldots (25)$$

In case of Investment volatility:

$$\Delta\sigma_{in} = \omega_0[\alpha\rho_1 TL_{t-1} - \alpha\rho_2 ES_{t-1} - \alpha_3 GS_{t-1} - \alpha 4\sigma_{in\,t-1}\text{-}\alpha 5 + e_9 \ldots\ldots\ldots\ldots\ldots (26)$$

$$\Delta TL = \omega_1[\alpha_6 TL_{t-1} - \alpha_7 ES_{t-1} - \alpha_8 GS_{t-1} - \alpha\sigma_{in\,t-1} - \alpha 10 + e_{10} \ldots\ldots\ldots\ldots\ldots (27)$$

$$\Delta ES = \omega 2[\alpha_{11} TL_{t-1} - \alpha_{12} ES_{t-1} - \alpha_{13} GS_{t-1} - \alpha 14\sigma_{in\,t-1}\text{-}\alpha 15 + e_{11} \ldots\ldots\ldots\ldots\ldots (30)$$

$$\Delta GC = \omega_3[\alpha_{16} TL_{t-1} - \alpha_{17} ES_{t-1} - \alpha\rho_{18} GS_{t-1} - \alpha\rho 19\sigma_{in\,t-1}\text{-}\alpha 20 + e_4 \ldots\ldots\ldots\ldots\ldots (31)$$

RESULT AND DISCUSSION

The study identified the order of integration because most of the time series are found non stationary at level which leads to misleading results even with simple OLS. The

Table 1. Unit root test ADF

	Intercept		Intercept & trend	
	Level	**First Difference**	**Level**	**First Difference**
$\sigma_{¥}$	-2.52	-4.142*	-2.39	-4.11*
σ_{con}	-2.06	-4.23*	-2.65	-4.17**
σ_{in}	-2.55	-4.49*	-2.54	-4.46*
TL	-2.49	-4.73*	-1.13	-5.15*
ES	-1.55	-5.43	-1.28	-5.55*
GC	-1.92	-8.61*	-2.12	-8.69*

Note : critical values are: -3.59, -2.93, -2.60 significant level is 1%, 5% , 10% respectively when first difference is constant and when -4.18 ,-3.51, -3.18 (significant level is 1%, 5% , 10% respectively when level & first difference is constant & trend) where *,**and *** represents the level of significance at 1%, 5% and 10% respectively.

Table 2. Johenson Co Integration for Output Volatility

Null Hypothesis H0	**Trace Statisti**	**Critical Value**	**Null Hypothesis H0**	**Max-Eigen**	**Critical Value**
r=0	102.066	47.8561	r=0	56.2930	27.5843
r≤1	45.7738	29.7971	r≤1	25.5669	21.1316
r≤2	20.2069	15.4947	r≤2	19.0106	14.2646
r≤3	1.1963	3.8415	r≤3	1.1963	3.8415
Variables		**TL**	**GC**	**ES**	
Coefficients		-1.1321*	0.3655*	0.1169*	
Standard Error		0.1320	0.0443	0.0148	
t-statistics		8.5769	8.2494	7.9239	

Note: Trace test & Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level, * represent significant at 1% level * represent significant at 1% level.

study used Augmented Dickey Fuller test for unit root analysis results are reported in table 1. Both at level and first difference test carried out on assumption of intercept also intercept with trend. The results suggested that unit root hypothesis can't be rejected at levels, and all the series are found non stationary at level in both cases – with intercept and with intercept and trend however unit root hypothesis rejected at 1 percent level of significance at first difference, indicating all variables integrated at I(1). The second part of empirical finding of this study is to analyze the long run relationship of variables under consideration with the help of JJ co integration test. The results are reported in table 2, 3 and 4 respectively for output, consumption and investment volatilities.

In table 2, JJ co integration for output volatility suggests that there are three co integrating equations and null hypothesis can be rejected at 5% level of significance. The normalized equation depicted that income and government consumption has significant and positive relationship with output volatility. The results suggest that increase by 100 percent in government spending can increase 0.36 percent in output volatility; increase in government consumption cause more economy volatility due to reduce the public trust. Moreover one hundred percent increase in income also increases 0.11 percent in output volatility; increase in income of country also increases the demand for import therefore more output fluctuation appears. Further the evidence suggests that trade liberalization has negative and significant effect on output volatility, one hundred percent increase in trade liberalization reduces the output volatility by 1.13 percent.

JJ co integration in Table 3 suggests that in case of consumption volatility there are three equations which are co integrated; normalized equation explains that trade liberalization has positive and significant effect on consumption volatility. The results propose that one hundred percent increase in trade liberalization increase can also increases consumption volatility by 3.39 percent. It is due to increase in import demand and poor management of balance of trade cause more macroeconomic fluctuations. However, increase in income and government spending has negative and significant effect on consumption volatility. Furthermore, 100% percent increase of government consumption

Table 3. Johenson co integration for Consumption volatility

Null Hypothesis	Trace	Critical	Null	Max-Eigen	Critical Value
H0	Statistic	ValueStats	H0	Statistic	Value
r=0	98.8858	47.8561	r=0	44.1719	27.5843
r≤1	54.7139	29.7971	r≤1	38.8281	21.1316
r≤2	15.8858	15.4947	r≤2	15.8788	14.2646
r≤3	0.0070	3.8415	r≤3	0.0070	3.8415
Variables	**TL**		**GC**		**ES**
Coefficients	3.3997*		-1.6941*		-0.4741*
Standard Error	0.6450		0.2761		0.0927
t-statistics	5.2710		-6.1364		-5.1125

Note: Trace test & Max eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level, * represent significant at 1% level.

Table 4. Johenson co integration for Investment volatility

Null Hypothesi	Trace	Critical Value	Null	Max-Eigen	Critical Value
H0	Statistic	ValueStats	H0	Statistic	Value
r=0	170.7746	54.0790	r=0	106.7758	28.5881
r≤1	63.9988	35.1928	r≤1	42.0867	22.2996
r≤2	21.9121	20.2618	r≤2	13.6111	15.8921
r≤3	8.3010	9.1645	r≤3	8.3010	9.1645
Variables	**TL**	**GC**		**ES**	
Coefficients	0.0354*	0.0366*		0.0006*	
Standard Error	0.0090	0.0034		0.0014	
t-statistics	3.9527	10.648		0.4681	

Note: Trace & Max Eigen test indicates 2 cointegrating eqn(s) at the 0.05 level, * represent significant at 1% level.

reduces consumption volatility by 1.7% similarly one hundred percent increase income reduces consumption volatility by 0.5%.

JJ co integration in Table 4 represents in case of investment volatility there are only two co integrated equation. The normalized equation depicted that trade liberalization and government spending positive and significant effect on investment volatility but income has insignificant effect on investment volatility. The results explains that increase in trade liberalization by one hundred percent can increases investment volatility by 0.03% means high degree of trade liberal investment volatility increases in country. In addition one hundred percent increase in government consumption can increases the investment volatility by 0.04%, it's due to increase insecurity by individuals.

The third part of empirical finding is to check the short run relationships among variables through ECM. The ECM for output, consumption and investment volatilities represented in table 5, 7 and 9 respectively. Table 5 shows that speed of adjustment of output volatility has significant effect in short run and adjust 9% annually. However Wald statistics (Table 6) has also applied to capture the mutual effects of variable lags which suggest that trade liberalization, economic size and government consumption has significant effect on output volatility. But lags of trade liberalization, economic size and government consumption have insignificant effect on trade liberalization. Furthermore lags of economic size and government consumption have significant effect on government spending but output volatility and trade liberalization has insignificant effect on government spending. In addition lags of output volatility, trade liberalization, economic size and government consumption have insignificant effect on economic size.

Table 7 illustrate that speed of adjustment of consumption volatility has significant effect and adjusted 2.57% annually. According to Wald test results in Table 8, lags of consumption volatility, trade liberalization and income has significant effect on consumption volatility but lags of government spending has insignificant effect on consumption volatility. However, lags of consumption volatility, trade liberalization, income and government spending have insignificant effect on trade liberalization.

Table 5. Vector Error correction for Output Volatility

	D(VOLG)	D(TL)	D(GC)	D(ES)
ECM1	0.0906*	-0.4974	1.1974	0.3272
D(VOLG(-1))	-0.4450*	1.1430	-3.8519	-2.6498
D(VOLG(-2))	-0.1225	0.2459	-6.9824	-0.1779
D(VOLG(-3))	0.1981	0.7109	-5.6076	2.5574
D(VOLG(-4))	0.1626	-3.6668*	2.6773	2.1023
D(TL(-1))	-0.0751*	0.4185	-0.6351	-0.2451
D(TL(-2))	-0.0307	0.1548	-0.7875	0.0339
D(TL(-3))	-0.0081	0.3480	-0.1834	0.0723
D(TL(-4))	-0.0080	0.2001	-0.5395	0.2372
D(GC(-1))	0.0323*	-0.2090	0.0076	0.0261
D(GC(-2))	0.0317*	-0.2358*	0.6369	0.0952
D(GC(-3))	0.0333*	-0.2267	0.1302	0.2519
D(GC(-4))	0.0281	-0.0541	0.2520	0.0910
D(ES(-1))	-0.0796*	-0.0688	-0.7001	0.1024
D(ES(-2))	-0.0157	-0.2791	0.3902	-0.4790
D(ES(-3))	-0.0146	0.0183	-0.6962	-0.0151
D(ES(-4))	0.0278	-0.2409	-1.2505	-0.0314
C	0.0030*	0.0132	0.0699	0.0489*
R-squared	0.7930	0.5384	0.5711	0.3786
Adj. R-squared	0.6171	0.1460	0.2065	-0.1496

Note:* representing significant values.

Table 6. Wald test for Output Volatility

	DEPENDENT VARIABLES (P VALUES)			
INDEPENDENT VARIABLES	**VOLG**	**TL**	**GC**	**ES**
VOLG	0.1666	0.3411	0.4921	0.5933
TL	0.022**	0.4496	0.6298	0.7474
ES	0.0044*	0.2842	0.0283**	0.6953
GC	0*	0.723	0.0348**	0.6734

Note: *significant at 0.01, ** significant at 0.05 & ***significant at 0.10 level of significance.

Table 7. Vector Error correction for Consumption Volatility

	D(VOLC)	D(TL)	D(GC)	D(ES)
ECM2	-2.5782*	0.1913	-2.0497	-1.3380
D(VOLC(-1))	0.9910	-0.2393	2.1437	0.7106
D(VOLC(-2))	0.1929	-0.2308	2.2187	0.4061
D(VOLC(-3))	-0.1940	-0.2042	1.3275	0.0741
D(VOLC(-4))	0.0111	-0.1620	0.9343	-0.1356
D(TL(-1))	-0.7185*	0.1494	-0.3881	-0.3813
D(TL(-2))	-0.3133	0.0633	-0.5101	-0.2071
D(TL(-3))	-0.2354	0.2438	0.1435	-0.0548
D(TL(-4))	-0.1056	0.2850	-0.8532	0.1056
D(GC(-1))	0.3631*	-0.1111	-0.0016	0.0587
D(GC(-2))	0.2820*	-0.1234	0.5524	0.1822
D(GC(-3))	0.1129	-0.1361	0.0075	0.3712
D(GC(-4))	0.1878	0.0316	0.0537	0.0188
D(ES(-1))	0.2593	-0.1780	-0.5162	0.2142
D(ES(-2))	0.1087	-0.4456	0.5805	0.0419
D(ES(-3))	-0.1118	-0.0780	-0.4269	0.0726
D(ES(-4))	0.0094	-0.2811	-0.6713	-0.3167
C	-0.0023	0.0287*	0.0311	0.0362
R-squared	0.9731	0.3488	0.5842	0.3844
Adj. R-squared	0.9502	-0.2047	0.2308	-0.1388

Note:* representing significant values.

Table 8. Wald test for Consumption volatility

	DEPENDENT VARIABLES (P VALUES)			
INDEPENDENT VARIABLES	**VOLC**	**TL**	**GC**	**ES**
VOLC	0*	0.9845	0.27	0.8342
TL	0.029**	0.8109	0.3181	0.7758
ES	0.0313*	0.9071	0.0778***	0.3712
GC	0.2769	0.3085	0.3329	0.5532

Note: *significant at 0.01, ** significant at 0.05 & ***significant at 0.10 level of significance.

Table 9. Vector Error correction for Investment Volatility

	D(VOLI)	D(TL)	D(GC)	D(ES)
ECM3	-1.5103	-4.2992	-9.5271	9.6369*
D(VOLI(-1))	0.6791	5.2065*	8.3291	-8.4840*
D(VOLI(-2))	-0.0432	4.2940*	7.1918	-6.0687*
D(VOLI(-3))	-0.0782	3.5755*	4.5875	-3.7112*
D(VOLI(-4))	0.1597	1.8848	2.7757	-1.1647
D(VOLI(-5))	-0.1597	0.2952	1.2632	0.0643
D(TL(-1))	0.1731	0.4754	1.0803	-0.8889*
D(TL(-2))	-0.0439	0.1994	0.5470	-0.6294*
D(TL(-3))	0.0636	0.6080*	0.9580	-0.4488*
D(TL(-4))	0.0946	0.4475	-0.1061	0.1396
D(TL(-5))	-0.0912	-0.3474	0.2840	0.1437
D(GC(-1))	0.0135	0.0347	-0.0659	-0.3109*
D(GC(-2))	-0.0066	0.0312	0.4713*	-0.1329
D(GC(-3))	-0.0629	-0.1288	-0.2230	0.1088
D(GC(-4))	0.0360	0.2519	-0.1744	-0.0700
D(GC(-5))	0.0130	-0.1599	-0.3805	0.0915
D(ES(-1))	0.3098*	0.1886	-0.2062	-0.4935*
D(ES(-2))	-0.2005	-0.7417*	1.1398	-0.6199*
D(ES(-3))	0.2060	0.6645	0.0403	-1.0616*
D(ES(-4))	-0.0250	-0.0189	-0.4342	-0.8495*
D(ES(-5))	0.0744	0.5871	0.5163	-0.8139*
C	-0.0124	-0.0229	-0.0455	0.1560*
R-squared	0.9508	0.5503	0.6456	0.7195
Adj. R-squared	0.8820	-0.0793	0.1494	0.3268

Note:* representing significant values.

Table 10. Wald test for Investment Volatility

	DEPENDENT VARIABLES (P VALUES)			
INDEPENDENT VARIABLES	**VOLI**	**TL**	**ES**	**GC**
VOLI	0.0000*	0.8135	0.7465	0.7420
TL	0.0153**	0.1753	0.3937	0.0856***
ES	0.0495**	0.6089	0.9834	0.3553
GC	0.0659***	0.9870	0.5799	0.0221**

Note: *significant at 0.01, ** significant at 0.05 & ***significant at 0.10 level of significance.

In addition lags of consumption volatility, trade liberalization and government spending has insignificant effect on government spending but income has significant effect on government spending at 10 percent level of significance. Furthermore, lags of given variables has insignificant effect on income in case of consumption volatility.

Table 9 demonstrates that speed of adjustment of income has significant effect and adjusted by 963% annually. Although the Wald tests suggest that in table 10, lags of investment volatility, trade liberalization, income and government spending have significant effect on investment volatility at 1%, 5% and 10 % level of significant respectively. But lags of investment volatility,

trade liberalization, income and government spending have insignificant effect on trade liberalization as well as on income. Moreover, trade liberalization and government spending have significant effect on government spending but lags of investment volatility and income has insignificant effect on government spending.

CONCLUSION

The present study investigated the link between trade liberalization and macroeconomic volatilities. It generally believes that greater trade liberalization cause greater volatility in small countries but there are some other factors which can also be the reason of higher macroeconomic fluctuations. The study found out that income and government size has positive relationship with output volatility and negative with trade liberalizations, as more income more demand for import and more government spending causes more output volatility (Alesina and Wacziarg, 1998, 2005). However, in long run income and government size has negative effect on consumption volatility but positive on trade liberalization. There is a need to formulate such policies that can decrease the fluctuation in consumption and expand trade.

On the other hand in long run investment volatility is more affected by trade liberalization and government spending positively. Macroeconomic volatilities causes by trade liberalization can cope through product diversification. However there is unpretentious difficulty for the policy makers to change polices for economy's relative size in short run, but some instruments are still there, by which volatility can reduces. Pakistan has been facing domestic and international threats which can be avoided through, improved trade liberalization, improved national and international polices and stable government spending. Trade liberalization is not only the reason which generates macroeconomic volatility but also government policies and economic structure play significant role to reduce volatility.

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