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The Nexus between Terms of Trade Volatility and Output Growth Volatility: Evidence from Lower-Middle-Income Economies

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Abstract

Global economies are increasingly integrated through international trade, where favorable terms of trade determine the direction of nations towards sustainable economic growth. This study examines the nexus between volatilities in terms of trade and output growth for lower-middle-income countries. Using data for 12 low-middle-income nations, this study employs the Generalized Method of Moments (GMM) estimation technique. The empirical results of this study suggest positive association between terms of trade volatility and output volatility. To put it differently, terms of trade volatility lead to macroeconomic instability. Additionally, the introduction of institutional quality and its interaction with terms of trade volatility into the regression do not affect the findings of the study.

Keywords: Terms of Trade Volatility, Output Volatility, Institutions, Generalized Method of Moments

Jell Classifications: E41, E32, O40, C26

1. Introduction

Trade is an important tool in shaping nations' growth and prosperity. Economic integration is bringing the nations closer for the smooth flow of goods and services across nations by reducing trade barriers. Nations integrate into the global trade on the basis of comparative advantage and factors endowments principles, by specializing in the production of comparative advantage goods and services which contribute a lot in increasing welfare and efficiency (Ricardo, 1895). Trade among nations has increased enormously over the years and has touched the level of $33 trillion in 2024 according to UNCTAD. Although trade and associated benefits have increased globally, yet the gains from trade are not equally shared by all nations; for instance, taking the case of developing economies, it is noticed that volume of trade (particularly the export) for such economies has grown slower since 1950, i.e., 5% annually compared to 8% in developed nations. This is due to the fact that these economies mainly export primary commodities, which are relatively low-income elastic in the world market. In addition, these economies experience volatility or fluctuations in the terms of trade that further affect their trading potential and welfare level (Gómez-González & Rees, 2013).

The terms of trade (TOT) measure the relative trading strength of nations by comparing the receipts of nations through exports and payments through imports. Whereas, the volatility in the terms of trade refers to the unpredictable movements or the fluctuations in ratio of export prices to the import prices primarily caused by fluctuations in global prices by external or internal shocks. Terms of trade fluctuations play important role in shaping the macroeconomic dynamics of many economies over the years. In other words, these fluctuations are considered the driving force behind macroeconomic fluctuations in both developed and developing economies.[1]

The history is witness to events or shocks that has disrupted global supply and demand and affected economies profoundly through variations in terms of trade. For instance, the oil shock of 1970, the recession of 2008, commodity prices surge 2010-11, 2019 pandemic and most recent USA-Iran war has disrupted global supply chain and significantly caused volatility in the terms of trade of various advanced and emerging economies that resulted in certain economic consequences. It is generally believed that terms of trade volatility adversely affects developed and developing economies, however, the effects are three times larger than the adverse effects in developed economies (Hausmann, 1999). Developed economies have better mechanism in the shape of strong policy and institutional framework, while due to the weak or still evolving economic structure the terms of trade shocks are prominent and larger in developing and emerging economies (Mendoza, 1995) and (Adler *et al.*, 2018).

[1] Singer Prebisch Theorem states that countries with the export of primary commodities have unfavorable terms of trade in their favor.

The economic activities occur in cyclical manner in almost all the economies of the world; where phases of expansion are followed by phases of contraction in business activities. These sudden and unpredictable phases of economic activities are termed as business cycles. Volatility in business cycles is used as proxy for output volatility because of its direct link with output level; in other words, high business cycles volatility accelerates output volatility and lower volatility in business cycles do the opposite (Arias *et al.*, 2007) Volatility in terms of trade affect gross domestic product growth of the economies both in the short and long runs; nevertheless, the effects of terms of trade volatility on output are asymmetric across nations (De V. Cavalcanti *et al.*, 2015)

Driven from the discussion above, the nature and implications of terms of trade volatility are very complex and asymmetric across nations. Hence, it is necessary to understand its effects on the economic performance of nations. The main objective of the present study is to examine the nexus of volatility in terms of trade and output growth in lower middle- income economies. The present study utilizes a panel of 12 lower-middle income nations for the purpose and incorporates the role of institution into the analysis to find whether it affects the nexus significantly. The potential contribution of the present study to existing literature are multiple; for instance, firstly, this study analyzes the volatility in terms of trade instead of analyzing the impact of single shock. Secondly, the present study considers gross domestic product growth (output growth) volatility to assess economic performance of lower-middle income economies. Thirdly, the present study asses the role of institution quality on the link between the volatilities in terms of trade and output growth.

The findings of this study suggest positive link between terms of trade and output growth volatilities i-e rising terms of trade volatility tends to raise output growth volatility and falling terms of trade volatility tends to decrease output growth volatility (business cycles fluctuations). The findings further suggest that the introduction of institution quality and its interaction with terms of trade volatility does not change the positive association between the terms of trade and output growth volatilities.

2. Literature Review

This section of the study makes an overview of the available literature on the issue. A large number of studies are available where the relationships between terms of trade shocks and output have been investigated in level form; still there are few studies available in which the nexus of volatilities in trade terms and output growth are investigated. As the present study is focusing on the link between terms of trade volatility and output growth volatility, so the concern here is to make an overview of the most relevant literature to the present study. In this regard the following studies from the literature are highlighted.

The pioneer study in this regard was carried out by Mendoza (1995). The author analyzed the relationship between business cycle fluctuations and terms of trade fluctuations using data over the period 1955-1980 for G-7 and 23 developing economies. The author confirmed stringent effects of terms of trade volatility in developing nations than in advance nations. Alimi and Aflouk (2017) studied link over the period 1980-2015 in fifty-eight nations. The authors found non-linear and asymmetric relationship between terms of trade volatility and macroeconomic volatility across countries, depending upon the modes of production. Similarly, , Rodríguez *et al.* (2018) investigated the effects of terms of trade shocks and domestic productivity on macroeconomic fluctuations in Peru. The authors used data over the period 1994-2015 and confirmed external trend in macroeconomic activity is driven by terms of trade shocks while internal trend in economic activity is linked to domestic productivity. Similarly, examining the adjustment process to the commodity terms of trade shocks, Roch (2019) examined the 22 commodity exporting countries. The author used data over the period 1980-2017 and analyzed the data with panel SVAR estimation techniques. The results suggest that commodity terms of trade shocks are the main drivers of macroeconomic fluctuations and explain 30% of output fluctuations. In the same line using slightly different data and estimation techniques, Karim and Stoyanov (2020) investigated the transmission of shocks into the trading partners, using three kinds of data for 173 and 201 countries over the period 1976-2000 and 1976-2004, with system GMM panel estimation techniques. The results confirm that volatile supply in one country generate greater output volatility in trading partners by raising exports volatility to these countries.

Likewise (Kose & Riezman, 2001) explored the effects of external shocks on economic fluctuations. Using annual data over the period 1970-90 for African and G7 countries, the authors estimated volatility by the traditional standard deviation and Hordick Prescot filter (HP filter). The authors employed dynamic stochastic, multisector small open economy model for estimation. The results confirmed trade shocks as the main driving force of macroeconomic fluctuations in African countries. In the same line Combes and Guillaumont (2002) examined the impact of volatility of commodity prices on vulnerability of developing countries. They used data over the period 1965-1997 in four sub periods. The authors employed panel estimation techniques and investigated volatility on year-to-year basis. The results confirm that positive terms of trade growth promote economic growth and instability in terms of trade effect growth negatively. Similarly, Otto (2003) analyzed the link of terms of trade shocks and balance of trade in OECD and developing nations. Using data over the period 1960-1997, the results confirm that terms of trade shocks are more severe and occur in cycles in developing countries in comparison to OECD nations. Similarly, using variance decomposition analysis, Baxter and Kouparitsas (2006) investigated the components that cause terms of trade volatility. They used panel of 100 countries including 79 developing countries and 21 developed countries over the period 1969-1988 and confirmed 18.89 % variance in terms of trade volatility growth for developing countries and 8.89 % variance in terms of trade volatility growth for developed countries.

Similarly, using a database of 35 panels, Blattman *et al.* (2007) investigated the effects of terms of trade shocks in small periphery nations depending on the export of commodities. The authors used a database of 35 panels over the period 1839-1970 and used panel estimation techniques of fixed effects and simple OLS regressions for analysis, and confirmed1 standard deviation rise in terms of trade lead to reduction of income growth by 40% per year from the mean. In the same line, Kehoe and Ruhl (2008) examined the relationship between terms of trade shocks and productivity. The authors analyzed the data over the period 1970-2007 for United States of America and Mexico. The authors employed simple model and then generalize it with addition of more variables. The results confirmed no association of trade shocks and productivity; nevertheless, terms of trade produce effects on real income and consumption such that the deterioration of terms of trade reduce both consumption and income. Similarly, Eicher *et al.* (2008) analyzed the dynamic effects of terms of trade shocks on growth and debt an open economy. The authors used one sector non scale model for a small open economy exporting and importing a single commodity. The findings suggest that terms of trade shocks results into pro-cyclical debt which in turn is caused by the risk perception of creditors. In the same line, Andrews and Rees (2009) examined the link of terms trade shocks and macroeconomic fluctuations for a panel of 71 economies based on their development level. The authors analyzed the transmission path of terms of trade shocks through different policy frame works and market’s structure. The authors used panel data estimation techniques and

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confirmed that terms of trade's shocks impact on output growth volatility and inflation is positive and significant. The authors further confirmed that flexible exchange rate insulate the economies from the shocks while counter inflationary monetary policy decrease output volatility and inflation

To conclude, this section presented overview of studies related to the issue under consideration. It is clear that most of the studies investigated the relationship in level form of output or analyze the impact of single external shock on growth and output. Few studies analyzed the link of volatilities in terms of trade and output growth. The findings of most of these studies confirmed that increasing terms of trade volatility tends to increase volatility in output growth or in other words is causing business cycles fluctuations and macroeconomic instability. Moreover, these studies focused on investigating the link for developing and advance nations, no study in the literature investigated the link for lower-middle income economies to the best of our knowledge, therefore it is important to investigate the nexus for these nations and add to the existing literature in this area by exploring it.

3. Methodology

The present study analyzes the link between terms of trade volatility and output volatility, this section discusses the measurement, trends, model specification, definition of variables, data and sample selection and estimation techniques.

3.1. Measurement of Volatility

This study estimates the volatility of the variables concerned i-e terms of trade volatility and economic growth volatility. The volatilities of growth and terms of trade are estimated through three year moving average standard deviation method used by (Fatas and Mihoveas 2009: Albuquerquq 2011 and Ali and Khan 2020) by the following formula;

$$\delta_{TOT} = \sqrt{\frac{(TOT-\overline{TOT})^2}{n-1}} \qquad (1)$$

In the above equation, δ_{TOT} , TOT and $\overline{TOT}$ stands for terms of trade volatility, terms of trade and mean value of terms of trade respectively. Similarly for output or growth volatility the formula is used as;

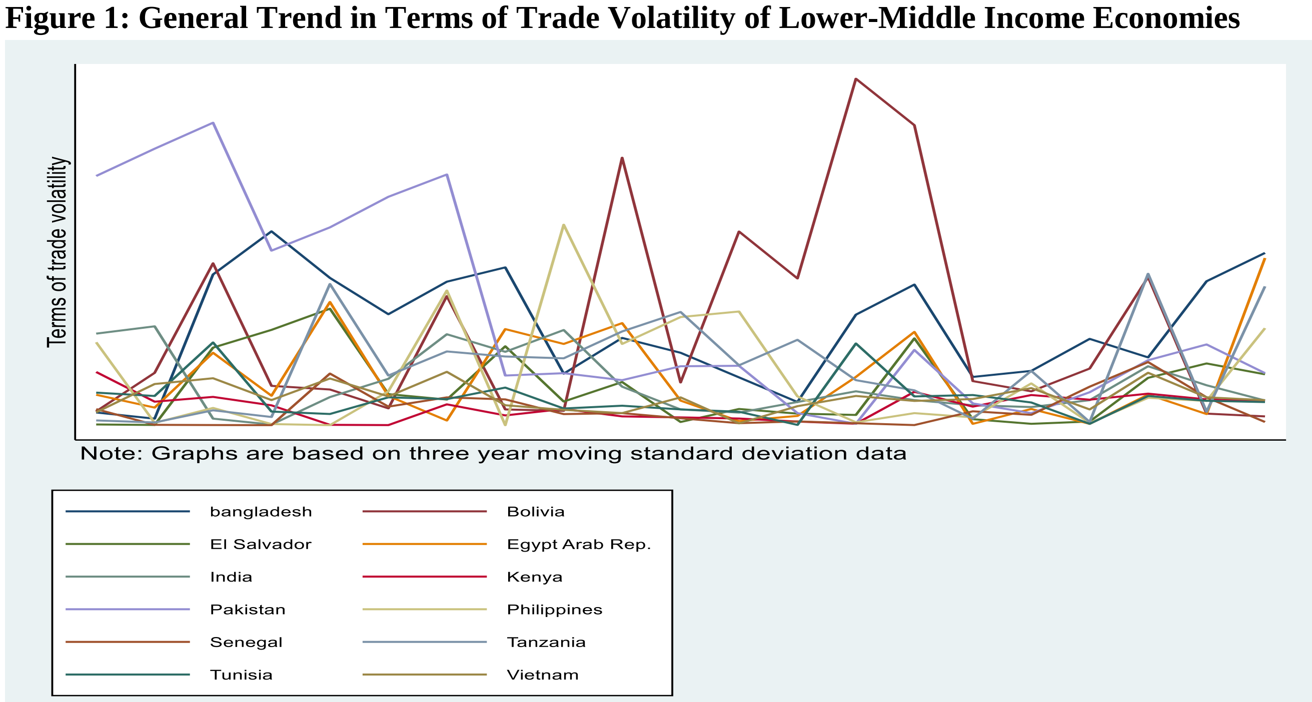
$$\delta_{EGr} = \sqrt{\frac{(Gr-\overline{Gr})^2}{n-1}} \qquad (2)$$

Where δ_{EGr}, Gr and $\overline{Gr}$ represent growth volatility, growth and mean value of growth respectively.

3.2. Trends in Volatility

This section discusses the trends in volatility of terms of trade and output growth for lower middle-income economies over the period 2000-2002.

Figure 1: General Trend in Terms of Trade Volatility of Lower-Middle Income Economies



The above overlay graphs based on three years moving average standard deviation data presents the general trend in terms of trade volatility and figure 3.2 below presents the general trend in gross domestic growth volatility of lower-middle income nations output over the period 2000-2022.

Figure 2: Overlay Trends in Output Growth Volatility of Lower Middle-Income Economies

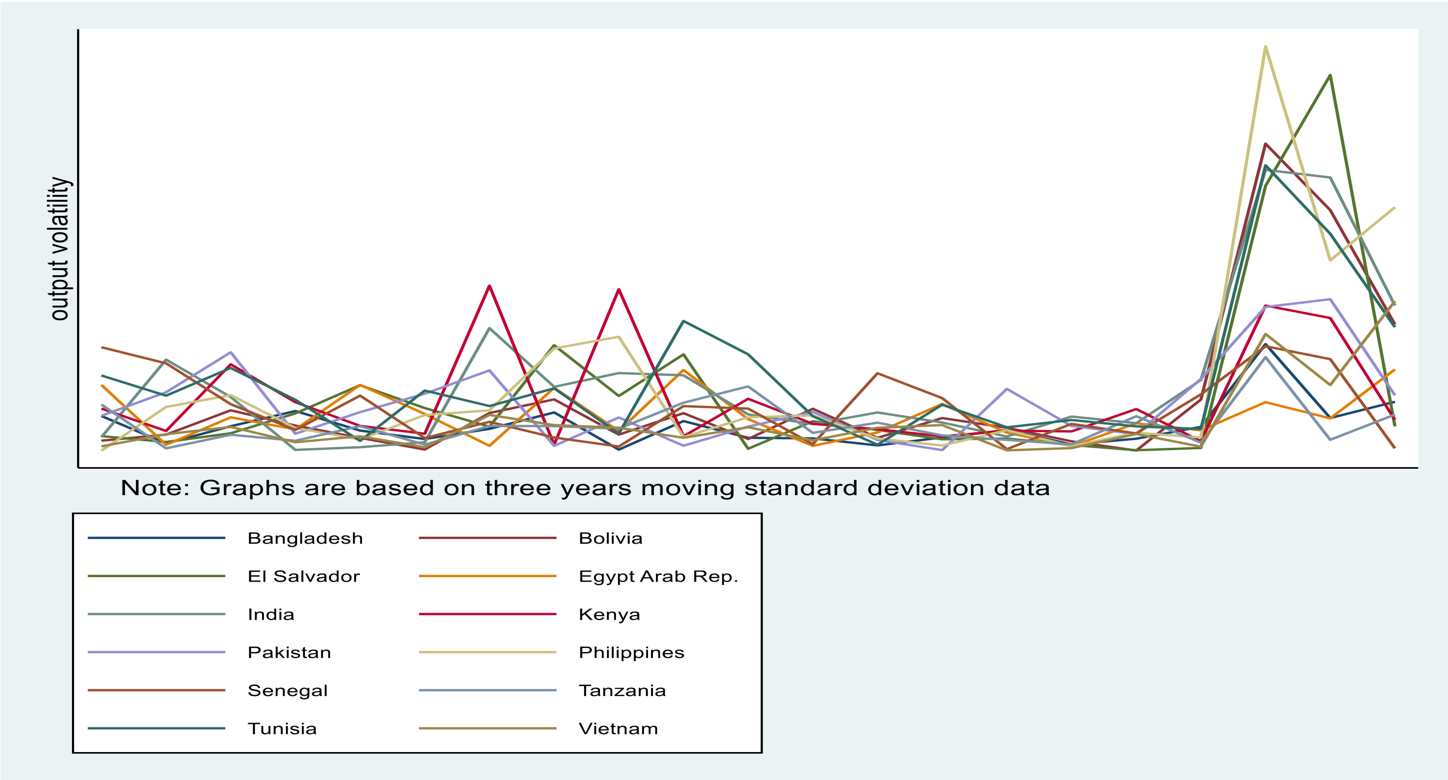


Figure 3: Country-Wise Terms of Trade Volatility of Lower Middle-Income Economies

Figure 4: Country-Wise Output Growth Volatility of Lower Middle-Income Economies

Figure 3.3 above depicts the country wise trends in terms of trade volatility, while figure 3.4 presents country wise trends in gross domestic growth volatility over the span of twenty-two years.

3.3. Model Specification

In the present study we examine the effect of terms of trade volatility on output growth volatility. Therefore, we first estimates the volatility of the variables concerned i-e terms of trade and economic growth through the standard approach of moving average standard deviation method by following the procedure employed by (Fatás & Mihov, 2013) and Ali and Khan (2020), then using terms of trade volatilities as independent variable and output growth (economic growth) as dependent variable, the study proceed to estimate the effects of these volatilities on gross domestic growth volatility using the following empirical model;

$$\delta_{EGr} = \propto_0 + \propto_1 \ \delta_{TOT} + \propto_i \ \sum_{i=1}^{n} X_i + u_i \qquad (3)$$

In the above equation δ_{EGr} stands for economic growth volatility, δ_{TOT} stands for terms of trade volatility, u_i is a random term and X_i represent a vector of potential controlled variables.

3.4. Definition of Variables

In the following table this study presents the definitions and sources of variables involved in the analysis.

Table 1: Definitions of Variables with Data Sources

Variable	Difinition	Source
Terms of trade	Terms of trade are measured from the index of net barter and the indices are taken relative to the base year 2015, such that 2015=100	WDI
Terms of trade volatility	The volatility in terms of trade is obtained by the method of three years moving average standard deviation.	Own Calculations

Gross capital formation	It includes gross fixed capital formation in the shape of buildings, machinery,equipment, infrastructure etc.	WDI
Institutional Quality	For institutional quality the PCA index of five variables i-e control over corruption, political stability, rule of law, regulation quality and government effectiveness are utilized in order to avoid co-linearity among the variables.	WGI / Own Calculations

3.5. Estimation Techniques

The present study employs panel data for 12 lower-middle income countries. Therefore, the selection of appropriate estimation is vital to avoid biasedness and inconsistency. The techniques of panel data estimation are numerous but due the presence of lag effects in the data of the present study, this study opts for generalized methods of moments (GMM). This technique is handy in handling a number of issues in the data such as endogeneity, dynamic bias and reverse causality. This techniques is very useful as it produce consistent and efficient estimates even in the presence of heteroscedasticity (Davidson & MacKinnon, 2004).

4. Estimation Results and Discussions

This study investigates the nexus of terms of trade volatility and output volatility (business cycles fluctuations) by extracting panel data for 12 lower-middle income economies over the period 2002-2022. This section discusses the results of the empirical model which covers descriptive statistics, unit root results and results of GMM model.

4.1. Descriptive Statistics

Table 3.2, below discusses the comparative statistics of the variables used in the model.

Table 2: Descriptive Statistics of Variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Gross Domestic product	252	4.621	2.828	-9.518	11.905
Output volatility	252	0.723	0.927	0	6.062
Terms of trade	252	99.31	14.775	61.636	165.9
Tems of Trade Volatility	252	2.17	2.53	0	14.357
Gross Capital Formation	252	6.729	10.843	-39.443	44.053

Source: Authors' own calculations

In the table above the highest mean value corresponds to terms of trade followed by gross cpital formation and gross domestic product successively. Similarly, in 4th column the lowest standard deviation value is associated to output volatility. In the final columns, the minimum value of gross domestic product is -9.518 and its maximum value is 11.905. Output volatility has 0 minimum value and 6.062 maximum value. The minimum and maximum values of terms of trade are 61.636 and 165.9 followed by terms of trade volatility (0, 14.357) and gross capital formation (-39.443, 44.053)

4.2. Unit root Tests

In table 3.3 the unit root results of Livein, Lin and Chu and Im-Pesaran-Shin for the variables are presented.

Table 3: Unit root Results of the Variables

Gross Domestic Product	Levin and Chu	Pesaran	0.0001	0.0000	I(0)	I(0)
Output Volatility	Levin and Chu	Pesaran	0.0072	0.0000	I(0)	I(0)
Terms of Trade	Levin and Chu	Pesaran	0.0042	0.0232	I(0)	I(0)
Terms of Trade Volatility	Levin and Chu	Pesaran	0.0000	0.000	I(0)	I(0)
Gross Capital Formation	Levin and Chu	Pesaran	0.0002	0.000	I(0)	I(0)

Source: Authors' Own Calculations

The table suggests that all the variables of the model are stationary at 5% level of significance with both tests.

4.3. Estimation Results and Discussion

Table 4 shows the estimated results of the model. Generalized method of moments (GMM) has the ability to deal the problem of endogeneity caused by lagged effects in the data. Besides it handles use as exogeneous not correlated with stochastic term and absence of autocorrelation.

Table 4: GMM Regression Results of Terms of Trade Volatility on Output Growth Volatility

Variables	Coefficients	Std. Error	Z-Statistic	Prob.	[95% Conf. Interval]	
Lag Output Volatility	0.6562595**	.0492948	13.31	0.000	0.5596435	.7528755
Terms of trade volatility	0.3089481**	0.1820708	1.70	0.090	-0.047904	.6658002
Gross Capital Formation	0.0618833**	0.0100523	-6.16	0.000	-0.081585	-.0421812
Institutions Quality	0.087367**	0.191084	0.46	0.648	-0.287150	.4618847
Institutional Quality*Terms of Trade Volatility	0.0592526**	.0746829	0.79	0.428	-0.087123	.2056285
Constants	0.5560372**	0.3941584	1.41	0.158	-0.216499	1.328574
Number of Countries= 12						
Arellano-Bond AR (2) Test Prob.-Value = 0.821						
Hansen Over Identification Restriction Test = 1.000						

Note: Author's Own Calculations based on GMM methodology. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Omitted variable bias, measurement errors and unobserved heterogeneity in data well as compare instruments to other panel data estimation techniques. In order to check the validity and appropriateness of model, this study performs Allerano-Bond AR2 test (Allerano and Bond,1991) and Hansen test of over identification (Hansen, 1982). The table shows that the probability values of Allerano-Bond and Hansen tests are 0.821 and 1.00, respectively; this result validates the model application as confirmed by the findings of the table 4. It can be observed that the coefficients related to lag output volatility is positive and significant. This result indicates that output volatility in previous year is carried to the current year showing the persistent nature of volatile behavior. This finding is supported from literature by the findings of Koren and Tenreyro (2007)) and Ilzetzki and Végh (2008), who investigated pro-cyclicality and persistence in output volatility due to weak economic structure in developing economies. Similarly, the co-efficient of terms of trade volatility appears with positive sign 5% level of significance, it implies that volatility in terms of trade increase volatility in output growth or in other words terms of trade volatility accelerates fluctuations in the output growth. This result of our finding is in line with findings of Kpodar *et al.* (2019).

Gross capital formation and institutional quality carry negative significant and positive insignificant coefficients respectively. The first result of negative significant impact of gross capital formation on output volatility signifies that more investment in infrastructure, machinery and capital stock improve productive capacity and brings stability against external shocks. The result is consistent with the findings of Aghion *et al.* (2010) and (Servén, 2003) who found investment plays stabilizing role in developing economies. The second finding of positive insignificant coefficient of institutional quality in lower middle-income countries implies that institutional improvement has not produced stabilizing effects. The weak structure of institutional framework in the panel suggests that these economies are not well prepared to handle the negative effects of external shocks may temporarily, but the empirical evidence suggests the relationship is nonsystematic across nations. This result can be justified from the findings of North (1993) and Acemoglu *et al.* (2003) in the literature.

The interactive term quality carries positive insignificant coefficient, but its coefficient is less in magnitude than the magnitude of terms of trade volatility coefficient. This means that enhanced quality of institutes has no significant impact on the link between two variables in lower-middle income economies of the panel, however it may reduce the magnitude of the adverse effects. This finding is supported from literature by the findings of Rodrik and Subramanian (2003) and Frankel *et al.* (2013).

5. Conclusion and Policy Recommendations

The economies around the world are integrated through international trade to attain the economic benefits. However, they are exposed to the volatilities and shocks associated with the international trade, which may affect their economic performance. In this study, we analyzed the nexus between volatilities in trade terms and output growth. The study utilized a data over the period of 2002 to 2022 for a panel of 12 lower-middle income economies. This study investigated volatilities in terms of trade and output by the standard approach of three years moving average standard deviation and employed the Generalized Method of Moments (GMM) to deal with the potential endogeneity in the models. The GMM estimates for panel of 12 nations showed direct significant link between volatilities in terms of trade and output growth, i.e., terms of trade volatility accelerate output volatility and may leads to macroeconomic instability. This study has incorporated institution quality interaction with terms of trade volatility in the model and found that although in the lower-middle income panel institution quality and its interaction has no significant impact on the link between the two yet the magnitude of terms of trade volatility coefficient is reduced.

Driven from the above discussion this study recommends the following recommendations;

Firstly, this study recommends that lower-middle income nations should focus on the diversification of their exports to handle external shocks in the shape of terms of trade volatility. Secondly, the policy makers should shift the focus from the export of primary goods to the export of industrial and value-added goods to provide basis for shocks absorbing capability. Thirdly, these nations need to improve the performance of institutions to make them prepare for external shocks.

References

Acemoglu, D., Johnson, S., Robinson, J., & Thaicharoen, Y. (2003). Institutional causes, macroeconomic symptoms: volatility, crises and growth. *Journal of monetary economics, 50*(1), 49-123.

Adler, G., Magud, N. E., & Werner, A. (2018). Terms-of-trade cycles and external adjustment. *International Review of Economics & Finance, 54*, 103-122.

Aghion, P., Angeletos, G.-M., Banerjee, A., & Manova, K. (2010). Volatility and growth: Credit constraints and the composition of investment. *Journal of monetary economics, 57*(3), 246-265.

Alimi, N., & Aflouk, N. (2017). Terms-of-trade shocks and macroeconomic volatility in developing countries: panel smooth transition regression models. *The Journal of International Trade & Economic Development, 26*(5), 534-551.

Andrews, D., & Rees, D. (2009). *Macroeconomic volatility and terms of trade shocks*. Retrieved from

Arias, A., Hansen, G. D., & Ohanian, L. E. (2007). Why have business cycle fluctuations become less volatile? *Economic theory, 32*(1), 43-58.

Baxter, M., & Kouparitsas, M. A. (2006). What can account for fluctuations in the terms of trade? *International Finance, 9*(1), 63-86.

Blattman, C., Hwang, J., & Williamson, J. G. (2007). Winners and losers in the commodity lottery: The impact of terms of trade growth and volatility in the Periphery 1870–1939. *Journal of Development Economics, 82*(1), 156-179.

Combes, J. L., & Guillaumont, P. (2002). Commodity price volatility, vulnerability and development. *Development Policy Review, 20*(1), 25-39.

Davidson, R., & MacKinnon, J. G. (2004). *Econometric theory and methods* (Vol. 5): Oxford University Press New York.

De V. Cavalcanti, T. V., Mohaddes, K., & Raissi, M. (2015). Commodity price volatility and the sources of growth. *Journal of Applied Econometrics, 30*(6), 857-873.

Eicher, T. S., Schubert, S. F., & Turnovsky, S. J. (2008). Dynamic effects of terms of trade shocks: The impact on debt and growth. *Journal of International Money and Finance, 27*(6), 876-896.

Fatás, A., & Mihov, I. (2013). Policy volatility, institutions, and economic growth. *Review of Economics and Statistics, 95*(2), 362-376.

Frankel, J. A., Vegh, C. A., & Vuletin, G. (2013). On graduation from fiscal procyclicality. *Journal of Development Economics, 100*(1), 32-47.

Gómez-González, P., & Rees, D. (2013). *Stochastic Terms of Trade Volatility in Small Open Economies*: Economic Research Department, Reserve Bank of Australia.

Hausmann, R. (1999). Managing terms of trade volatility.

Ilzetzki, E., & Végh, C. A. (2008). *Procyclical fiscal policy in developing countries: Truth or fiction?* Retrieved from

Karim, R., & Stoyanov, A. (2020). Output volatility, composition of trade, and transmission of economic shocks across countries. *Review of International Economics, 28*(3), 626-655.

Kehoe, T. J., & Ruhl, K. J. (2008). Are shocks to the terms of trade shocks to productivity? *Review of Economic Dynamics, 11*(4), 804-819.

Koren, M., & Tenreyro, S. (2007). Volatility and development. *The quarterly journal of economics, 122*(1), 243-287.

Kose, M. A., & Riezman, R. (2001). Trade shocks and macroeconomic fluctuations in Africa. *Journal of Development Economics, 65*(1), 55-80.

Kpodar, K., Le Goff, M., & Singh, R. J. (2019). *Financial Deepening, Terms of Trade Shocks and Growth in Low-Income Countries*. Retrieved from

Mendoza, E. G. (1995). The terms of trade, the real exchange rate, and economic fluctuations. *International Economic Review*, 101-137.

North, D. C. (1993). Institutions and credible commitment. *Journal of Institutional and Theoretical Economics (JITE)/Zeitschrift für die gesamte Staatswissenschaft*, 11-23.

Otto, G. (2003). Terms of trade shocks and the balance of trade: there is a Harberger-Laursen-Metzler effect. *Journal of International Money and Finance*, *22*(2), 155-184.

Ricardo, D. (1895). *The first six chapters of the principles of political economy and taxation of David Ricardo, 1817*: Macmillan and Company.

Roch, F. (2019). The adjustment to commodity price shocks. *Journal of Applied Economics*, *22*(1), 437-467.

Rodríguez, G., Villanueva Vega, P., & Castillo Bardalez, P. (2018). Driving economic fluctuations in Peru: The role of the terms of trade. *Empirical Economics, 55*, 1089-1119.

Rodrik, D., & Subramanian, A. (2003). The primacy of institutions. *Finance and development, 40*(2), 31-34.

Servén, L. (2003). Real-exchange-rate uncertainty and private investment in LDCs. *Review of Economics and Statistics, 85*(1), 212-218.