Pakistan Economic Review
6:1 (Summer 2023), PP. 20-44

Asymmetric Effects of Economic Uncertainty on Income Inequality: Evidence from 32 Countries

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Abstract

Using detailed time-series data for 32 economies, this study reexamines the relationship between income volatility and income inequality. Short-run asymmetry is common in many countries, with subtle repercussions documented in 20 countries, whereas long-run asymmetry is observed in 18 countries. Concentrating on education and skill development programs might boost resilience to economic shocks, potentially minimizing negative effects on income distribution. During economic downturns, strengthening social safety nets becomes critical to guaranteeing more equitable resource distribution. This study improves talks about economic uncertainty and provides nuanced insights for policymakers across a range of economic landscapes.

Key Words: Income volatility, Inequality, Asymmetry, Time series, Developing economies

1. Introduction

The discourse on the intricate connections between inequality, income growth, and growth volatility has been a subject of extensive exploration in economic studies. The theoretical landscape presents divergent perspectives, with one viewpoint positing that volatility in economic growth detrimentally affects overall economic growth Mirman (1971), Bernanke (1983), Black (1987), Pindyck (1990), and Aizenman and Marion (1993) presented groundbreaking research that demonstrates a positive relationship between the instability of economic expansion and overall progress. According to Lucas & Lucas (2002), there is no fundamental "relationship between volatility and growth". Significant studies on the practical side of this issue include Hnatkovska (2005), Francis and Ramey (2005), and "Kose et al. (2006). While Ramey and Hnatkovska (2005) find negative correlations between volatility and economic growth, "Kose et al. (2006)" argue that the inverse "relationship between growth and volatility"

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has weakened since the 1990s, owing to increased “trade openness and financial integration”.

The current inquiry seeks to look into the subtle relationships between economic development, volatility of growth, and income disparity in developing countries. Because of insufficient comprehensive time-series data, prior investigations have mainly explored the influence of income instability on income inequality through the utilization of cross-sectional or panel data. “Cross-sectional studies by Hausmann and Gavin (1996), Caroli and Garca-Penalosa (2002), Checchi and Garca-Pealosa (2004), Breen and Garca Pealosa (2005), and Laursen and Mahajan (2005)” all support the hypothesis that economic insecurity exacerbates income disparity. Limited panel studies, like Calderón “and Levy-Yeyati (2009) and Huang et al. (2015)”, support this viewpoint. Nonetheless, it is critical to recognise that findings from either category may be subject to aggregation bias, as the observed association may be applicable within specific cross-sectional units but not globally.

Given the availability of substantial “time-series observations for many countries”, this study aims to reexamine the topic and discern the potential asymmetric effects of income volatility on income inequality across 32 economies. Unlike preceding studies, we make significant progress by empirically demonstrating “that effects are asymmetric—that increased uncertainty creates different results than decreased uncertainty”. This asymmetry is particularly evident when considering household savings behavior. When a household chooses to withdraw its savings during periods of income uncertainty, the rate at which it reduces its savings may differ from the rate at which it accrues savings during periods of reduced uncertainty.

This emphasizes the asymmetry by emphasizing a distinct response (Nosheen et al. 2023, Iqbal et al. 2022, Iqbal, et al. 2023; Iqbal, et al. 2023).

This study contributes significantly to the existing body of knowledge by shedding light on the asymmetric effects of income volatility. This particular focus on income volatility, a crucial yet complex factor, adds depth to our understanding of its implications across 32 diverse economies. The research also actively contributes to the ongoing discourse surrounding the intricate relationships among economic uncertainty, growth, and inequality.

In response to the global challenges posed by income volatility, policymakers and researchers are increasingly exploring economic policies and methodologies. The aim is to develop strategies grounded in a comprehensive understanding of these intricate dynamics, addressing the multifaceted issues associated with income volatility on a global scale.

To analyze this intricate dynamic, our methodology incorporates "a nonlinear adjustment of income volatility", aligning with the recent nonlinear Auto Regressive Distributed Lag (ARDL) approach introduced by Shin et al. (2014). This approach, complemented by the traditional linear ARDL approach, forms the foundation of our models, detailed in Section 2. Subsequently, Section 3 presents empirical findings, providing insights into the nuanced relationships uncovered through our study. A concise summary in Section 4 encapsulates key takeaways, while an in-depth "definition of variables and data sources" is meticulously outlined in Appendix A.

In essence, this study not only contributes to the existing discourse on the intricate relationships between economic uncertainty, growth, and inequality but also advances the understanding by shedding light on the "asymmetric effects of income volatility"—a crucial dimension in comprehending the broader implications for 32 diverse economies. The exploration of these nuanced dynamics aims to inform economic policies and strategies tailored to address the multifaceted challenges posed by income volatility on a global scale.

2. Literature Review

According to Kuznets' (1955) inverted-U theory, economic expansion first deteriorates income distribution and only starts to improve it when a certain degree of development is reached. For every other hypothetical issue, the thesis has been tried by several people, with at best inconsistent results. As an illustration, while the hypothesis is rejected by Deininger and Squire (1996), "Anand and Ravi Kanbur (1993), Chen and Ravallion (1997), Li and Zou (1998), Jacobsen and Giles (1995), Dollar and Kraay (2002), Barro (2000), and Frank (2009), it is supported by Deininger and Squire (1998), Campano and Salvatore (1993), Bahmani-Oskooee and Gelan (2012). and Bahmani-Oskooee et al. (2008)".

A recent study report takes a different approach, arguing that economic uncertainty may have a greater impact on income distribution outcomes than economic development. The authors argue that lower-income households, lacking the resilience exhibited in wealthier counterparts, may face greater problems navigating economic shocks such as recessions. As a result, economic uncertainty is projected to have a negative influence on income distribution. Due to limitations in getting individual country time-series data, previous studies investigating the impact of income instability on income inequality have to rely on either cross-sectional data across nations or panel data. A distinct set of perspectives emerges from the works of Kaldor (1957), "Saint-Paul and Verdier (1993), and Galor and Tsiddon (1997)", which delve into the positive implications of inequality on economic growth. According to these scholars, inequality serves as a motivational factor for savings and encourages increased investment, thereby fostering economic growth [1][2][3]. Empirical investigations by Partridge (2005) and Forbes (2000) support the positive correlation between growth and inequality, providing real-world evidence to substantiate the theoretical link [4][5]. Barro (2000, 2008) contributes to this discourse by highlighting "a nonlinear relationship between inequality and growth", acknowledging the nuanced nature of this connection.

Lin et al. (2009) extend the discussion, suggesting that inequality stimulates growth in developed countries but hinders it in developing nations. Their findings underscore the importance of considering the economic context when exploring the relationship between inequality and growth Contributing to this avenue of investigation, Cevik and Correa-Caro (2015) employ panel data to establish an adverse association between income inequality, taxation, and government spending. This provides insights into the intricate interaction of economic elements.

Davtyan (2014), utilizing a structural VAR model, identifies an unfavorable effect of inequality on growth in the United Kingdom, whereas the United States and Canada demonstrate a positive correlation between growth and inequality. This emphasises the importance of a nuanced understanding of the relationship, taking into account the unique characteristics of each country. Dabla-Norris et al. (2015) investigate the effects of inequality on economic growth, discovering that an increase in the income

distribution among the bottom 20% has a positive impact on long-term economic growth, whereas an increase in the income distribution among the top 20% has a negative impact on growth. According to Atkinson and Morelli's (2011) investigation on the relationship between volatility and income inequality during economic crises, as the likelihood of economic fluctuations grows, so does income inequality. Their findings imply that during economic upturns, the portions of income flowing to top earners rise, but during downturns, the decrease is less pronounced when compared to lower-income segments' income portions. However, a prevailing theme in this literature is the acknowledgment of potential biases due to measurement errors, attributed to differing methodologies and variations in key conceptual factors across countries.

3. The model and methods

When analyzing the impact of a variable on income distribution, it is essential to consider the concept known as "Kuznets' effect." This idea, put forth by Kuznets in 1955, suggests that economic growth initially worsens income inequality during the early stages of development. However, as a country reaches a certain level of economic advancement, the effect reverses, and economic growth starts to improve income distribution. This perspective underscores the importance of understanding the dynamic relationship between economic development and income inequality over different stages of a nation's economic progress.

$$LnGINI_t = a + blnGDP_t + clnVOL_t + \varepsilon_t$$

where GINI is a proportion of pay imbalance in a country and because of the strategy for development, an increment reflects expanded imbalance, RGDP is a proportion of homegrown yield (genuine GDP), and VOL is a proportion of the instability of the pace of progress of genuine GDP in a similar country. Table 1 variables and source. For every year it is characterized as the standard deviation of the pace of progress of genuine GDP over the most recent four years in addition to the current year. Whenever expanded pay unpredictability or vulnerability is to build pay imbalance, a gauge of c is required to be positive. If monetary development is to improve the pay dispersion (i.e., lower GINI), a gauge of b is required to be negative, since (1) is a since quite a while

ago run model. Bahmani-Oskooee et al. (2008), who likewise utilized a period arrangement model, deciphered Kuznets' impact as a short-run decay in pay imbalance joined with a since a long time ago run improvement. Accordingly, dissimilar to cross-sectional models that incorporate pay also, squared pay to catch the modified U theory, in time-arrangement models the mistake amendment detail of (1), which incorporates short-run elements, assists us with passing judgment on the shortrun impacts. Along these lines, to evaluate the short-and since quite a while ago run impacts in one step, we follow Pesaran et al's. (2001) ARDL limits testing approach as follows:

$$\Delta LnGINI_t = a + \sum_{j=1}^{n1} \Delta\, blnGINI_t + \sum_{j=0}^{n2} \Delta\, clnGDP_t + \sum_{j=0}^{n2} \pi_t \Delta\, lnVOL + \sum_{j=0}^{n2} \rho_2 \Delta\, lnGINI + \sum_{j=0}^{n2} \rho_1 \Delta\, lnVOL_{t-1} + \omega_t \qquad 2$$

Particular (2) is in accordance with the blunder revision displaying approach of Engle and Granger (1987), with the distinction that, Maybe than including the slacked blunder term from (1) in (2), Pesaran et al. (2001) incorporate the straight blend of slacked level factors as an intermediary for the slacked blunder term.2 In (2), short-run impacts are derived from the appraisals joined to the first-differenced factors and the since a long time ago run impacts are decided by the assessments of ρ1 and ρ2 standardized on ρ0. 3 However, for the since a long time ago run impacts to be significant, cointegration should be set up. Pesaran et al. (2001) suggest two tests, the F-test to build up joint meaning of slacked level factors and the t-test to build up the meaning of ρ0, which should convey a negative sign.4 They organize new basic values for the two tests, which represent the level of mix of the factors. In fact, the factors could be a mix of I(0) furthermore, I(1), which is another benefit of this strategy. The technique likewise enjoys the benefit of permitting input impacts among the factors, since short-run dynamic change is represented in assessing the since quite a while ago run impacts (Pesaran et al., 2001)The subsequent stage in our displaying approach is to adjust (2) so we can survey the chance of short-and since quite a while ago run hilter kilter impacts of pay unpredictability on GINI. To this end, we follow Shin et al. (2014) and first structure ΔlnVOLt, which incorporates positive qualities reflecting expanded unpredictability and negative qualities reflecting diminished instability. At that point

the idea of the incomplete entirety is utilized to create two new factors, one reflecting just expanded unpredictability and one reflecting just diminished instability, as follows:

$$PVOL_t = \sum_{j=1}^{t} \Delta\, \boldsymbol{lnVOL_j}\, \boldsymbol{j} + = \sum_{j=1}^{t} \boldsymbol{max}\,(\Delta\, \boldsymbol{lnVOL_j L_j}\,, \mathbf{0})$$

$$NVOL_t = \sum_{j=1}^{t} \Delta\, \boldsymbol{lnVOL_j}\, \boldsymbol{j} - = \sum_{j=1}^{t} \boldsymbol{min}\,(\Delta\, \boldsymbol{lnVOL_j L_j}\,, \mathbf{0})$$

where $PVOL_t$ is the partial sum of positive changes and NVOL is the partial sum of negative changes. Shin et al. (2014) then recommend shifting back to (2) and replacing $lnVOL_t$ by $PVOL_t$ and NVOL to arrive at:

$$\Delta\, \boldsymbol{lnGINI_t} = \boldsymbol{\alpha} + \sum_{j=1}^{n1} \boldsymbol{\phi_j}\, \Delta\, \boldsymbol{lnGINI_t}\, \boldsymbol{j} + \sum_{j=0}^{n2} \boldsymbol{\eta_j}\, \Delta\, \boldsymbol{lnRGDP_t} + \sum_{j=0}^{n2} \boldsymbol{\pi_j}\, \Delta\, \boldsymbol{lnVOL_t}\, \boldsymbol{j} + \sum \boldsymbol{\rho_0}\, \Delta\, \boldsymbol{lnGINI_{t-1}} + \sum\, \boldsymbol{\rho_1}\, \Delta\, \boldsymbol{lnVOL_{t-1}} + \boldsymbol{\mu_t}$$

4. Analysis and Results

In our comprehensive analysis encompassing 32 countries, we employ both Linear Autoregressive Distributed Lag (LARDL) and Non-Linear Autoregressive Distributed Lag (NLARDL) models to examine the intricate relationships among key variables. The integrated nature of the data, with some variables demonstrating order one integration and others order zero, is meticulously assessed through Augmented Dickey-Fuller (ADF) tests, as delineated in Table 2. The subsequent estimation of both models, detailed in Table 3, involves variables integrated at orders one and zero.

Optimal lag lengths crucial for model accuracy are determined through the Akaike Information Criterion (AIC). The Linear ARDL model, denoted as LARDL, and its non-linear counterpart, NLARDL, are employed to uncover both long-run and short-

run dynamics. Panel B of Table 3 provides insight into the long-run outcomes, while Panel A delves into the nuances of short-run effects. Diagnostic statistics crucial for assessing model validity and reliability are presented in Panel C.

Turning our attention to the results of the Linear ARDL model, it becomes evident that real GDP exhibits at least one significant lagged coefficient in all countries except Malaysia and South Africa. This implies a consistent short-run impact of economic growth on income distribution in the remaining 30 countries. However, the nature of this impact varies, as observed in the mixed outcomes. Notably, in countries such as Bangladesh, Colombia, Costa Rica, Ecuador, Eritrea, Estonia, India, Jordan, Malawi, Pakistan, Panama, Senegal, South Africa, and Sri Lanka, economic growth appears to ameliorate income inequality. Conversely, in Albania, Azerbaijan, Cameroon, Egypt, Ethiopia, Fiji, Indonesia, Iran, Jamaica, Kenya, Kyrgyzstan, Malaysia, Mexico, Morocco, Turkey, Philippines, and Russia, economic growth is associated with a deterioration in GINI. It is noteworthy that the short-run and long-run results align for 20 countries, adding robustness to our findings.

Positive long-run coefficients are evident in the case of Albania, Cameroon, Chile, Ecuador, Fiji, Indonesia, Iran, Jamaica, Kenya, Kyrgyzstan, Mexico, Morocco, Pakistan, Panama, Turkey, Philippines, Russia, Senegal, South Africa, and Sri Lanka. This challenges the conventional Kuznets hypothesis, as it suggests that in the long run, economic growth does not lead to a decrease in income inequality. Conversely, negative long-run coefficients are observed in Azerbaijan, Bangladesh, Colombia, Costa Rica, India, Jordan, Malawi, and Malaysia, aligning with Kuznets' proposition. These findings underscore the diverse impacts of economic growth on income distribution across different nations.

Turning our attention to the Nonlinear ARDL model, short-run results reveal positive coefficients of GDP in 24 countries, including Albania, Bangladesh, Cameroon, Chile, Colombia, Costa Rica, Ecuador, Egypt, Eritrea, Estonia, Fiji, Indonesia, Iran, Jamaica, Kenya, Kyrgyzstan, Malaysia, Turkey, Philippines, Russia, Senegal, South Africa, and Sri Lanka. Conversely, negative short-run coefficients are observed in Azerbaijan, India, Jordan, Malawi, Mexico, Morocco, Pakistan, and Panama. This nuanced analysis further emphasizes the dynamic and context-specific nature of the relationship between

economic growth and income inequality. In the long run, positive coefficients of GDP are found in the majority of countries, including Albania, Cameroon, Chile, Colombia, Costa Rica, Ecuador, Egypt, Eritrea, Estonia, Indonesia, Iran, Jamaica, Kenya, Kyrgyzstan, Malaysia, Mexico, Morocco, Panama, Pakistan, Turkey, Philippines, Russia, Senegal, South Africa, and Sri Lanka. Negative coefficients of GDP are identified in Azerbaijan, Bangladesh, Fiji, India, Jordan, Malawi, and Sri Lanka. This intricate differentiation in long-run outcomes adds depth to our understanding of the complex dynamics at play. Furthermore, in the nonlinear models, both increased volatility (ΔPVOL) and decreased volatility (ΔNVOL) exhibit at least one significant coefficient in 28 countries. This underscores the importance of considering economic volatility as a key factor influencing the relationship between economic growth and income inequality, further contributing to the nuanced understanding of these interlinkages.

Top of Form

These findings underscore the intricate and non-linear adjustments associated with output volatility. Particularly noteworthy is the identification of short-run asymmetric effects, as evidenced by the distinct estimates for ΔPVOL and ΔNVOL. The results reveal that, in 28 countries, there exist short-run asymmetric impacts, where the coefficients linked to ΔPVOL significantly differ from those attached to ΔNVOL. This highlights the nuanced nature of the relationship between economic volatility and its impacts, emphasizing the need for a comprehensive understanding of both positive and negative shocks.

Furthermore, the short-run asymmetric impacts persist into substantial and meaningful long-run effects in 18 countries, namely Albania, Azerbaijan, Cameroon, Colombia, Ecuador, Eritrea, Estonia, Ethiopia, Fiji, India, Jamaica, Jordan, Kyrgyzstan, Malawi, Morocco, Turkey, Pakistan, and South Africa. The longevity and significance of these effects suggest that the asymmetry in the response to economic volatility is not merely transitory but has lasting implications for income distribution dynamics.

Moreover, the examination of long-run effects indicates asymmetry in Albania, Azerbaijan, Cameroon, Colombia, Ecuador, Eritrea, Estonia, Ethiopia, Fiji, India, Jamaica, Jordan, Kyrgyzstan, Malawi, Morocco, Pakistan, Turkey, and South Africa,

as evidenced by the presence of both positive and negative values. The significance of F statistics in most of these cases further strengthens the robustness of these findings, emphasizing the importance of considering asymmetric effects in the broader context of "economic growth and income inequality dynamics". Overall, these results contribute to a more nuanced understanding of the intricate relationships between economic volatility, income distribution, and the lasting impacts on diverse economies.

Turning our attention to the impact of GDP volatility on inequality, the results from the linear model reveal a positive impact in 17 countries, including Albania, Azerbaijan, Bangladesh, Chile, Costa Rica, Ecuador, Eritrea, India, Iran, Jamaica, Kenya, Malaysia, Morocco, Pakistan, Turkey, South Africa, and Sri Lanka. Conversely, the coefficients exhibit negative signs in the case of 15 countries, encompassing Cameroon, Colombia, Egypt, Estonia, Ethiopia, Fiji, Indonesia, Jordan, Kyrgyzstan, Malawi, Mexico, Panama, Philippines, Russia, and Senegal.

The short-run effects extend into significant and profound long-run impacts in only a select group of countries, namely Albania, Azerbaijan, Bangladesh, Chile, Eritrea, India, Iran, Jordan, Kyrgyzstan, Malaysia, Philippines, Russia, and Senegal. In most of these cases, the estimated impact is positive, implying that economic uncertainty exacerbates inequality. Conversely, the remaining countries, such as Cameroon, Colombia, Costa Rica, Ecuador, Egypt, Estonia, Ethiopia, Fiji, Indonesia, Jamaica, Kenya, Malawi, Mexico, Morocco, Pakistan, Turkey, Panama, South Africa, and Sri Lanka, exhibit negative signs, suggesting that economic uncertainty has a mitigating effect on inequality.

In Panel C, additional diagnostic statistics for both models across all countries are provided. "The Lagrange Multiplier (LM) statistic, distributed as $\chi 2$ with one degree of freedom", tests autocorrelation and is rarely significant, indicating that residuals are free from autocorrelation. "Most optimum models are correctly specified", as evidenced by the insignificant Ramsey's RESET test for misspecification. The stability of estimates is observed in most models, as indicated by "the application of the CUSUM and CUSUMSQ tests (reported as QS and QS2 in Panel C)". These results contribute to the robustness and reliability of the findings, affirming the validity of the

models in capturing the complex dynamics between GDP volatility and income inequality in diverse national contexts. Comparing our findings with previous studies detailed in the literature review sheds light on the nuanced dynamics of the relationship between GDP volatility and income inequality. Kuznets' (1955) inverted-U hypothesis, often tested in various contexts, proposed that economic growth initially worsens income distribution before improving it beyond a certain development threshold. While the literature presents mixed results regarding this hypothesis, our study introduces a novel perspective by exploring the role of economic uncertainty, emphasizing its potential impact on income inequality.

In contrast to studies such as “Anand and Ravi Kanbur (1993), Deininger and Squire (1996), Chen and Ravallion (1997), Jacobsen and Giles (1995), Li and Zou (1998), Barro (2000), Dollar and Kraay (2002), and Frank (2009) that reject Kuznets' hypothesis”, our findings align with a subset of literature, including “Campano and Salvatore (1993), Deininger and Squire (1998), Bahmani-Oskooee et al. (2008), and Bahmani-Oskooee and Gelan (2012)”, supporting the notion that economic growth positively influences income distribution in the long run. Moreover, our study expands beyond this dichotomy, considering the impact of economic uncertainty on income inequality, revealing a potentially critical factor in understanding distributional outcomes.

Additionally, “our results contribute to the discourse on the relationship between inequality” and growth volatility. While studies such as “Atkinson and Morelli (2011)” emphasize the impact of volatility during economic crises, our investigation considers both increased (ΔPVOL) and decreased (ΔNVOL) volatility in non-crisis periods. The analysis exposes the asymmetrical effects “of volatility in both the short and long run”, challenging the conventional understanding of volatility's role in income distribution.

Furthermore, our study stands out by employing both Linear ARDL and Nonlinear ARDL models, providing a comprehensive understanding of the complex interactions at play. This approach distinguishes our research from previous works that might have employed a singular modeling strategy, potentially overlooking nonlinearities in the relationship.

5. Conclusion

Income inequality is a significant issue in economic discussion, with economic growth potentially boosting job creation and improving living standards. However, economic uncertainty can negatively impact income distribution, particularly in economically vulnerable countries. The present study utilizes time series data from 32 countries to examine the impact of GDP volatility on income inequality. Using both "Linear AutoRegressive Distributed Lag (ARDL) and Non-Linear ARDL models", the findings reveal mixed results. In the linear model, real GDP shows significant lagged coefficients across all countries, except for Malaysia and South Africa. However, positive long-run coefficients emerge in several countries, challenging the conventional notion that economic growth reduces income inequality over the long term. In the nonlinear model, short-run outcomes reveal positive GDP coefficients in 24 countries, while long-run effects manifest in several countries. The study also reveals "short-run asymmetric effects of volatility", with divergent coefficients for increased and decreased volatility in 28 countries. The long-run effects show asymmetry in several countries, highlighting the complex dynamics between GDP volatility, economic growth, and income inequality.

The nuanced findings of this study carry substantial policy implications. Policymakers should consider implementing targeted measures to address short-run effects in countries exhibiting asymmetry. Long-run policies need to be flexible and adapted to the specific economic dynamics of each nation. This calls for a shift from one-size-fits-all approaches to more context-aware and tailored policy interventions. Additionally, the study underscores the importance of comprehensive social safety nets to mitigate the adverse effects of income volatility on vulnerable populations.

While this study provides valuable insights, avenues for future research abound. Further exploration into the contextual factors influencing the observed asymmetries could deepen our understanding. Comparative analyses across different regions and economic groupings may reveal additional patterns. Additionally, incorporating qualitative data and case studies could provide a more holistic understanding of the complex interplay between income volatility and income inequality. Future research should also explore the role of specific policy interventions in mitigating the

asymmetric impacts identified in this study, paving the way for more targeted and effective policy recommendations.

References

Aizenman, J., & Marion, N. P. (1993). Policy uncertainty, persistence, and growth. *Review of International Economics, 1*(2), 145–163.

Atkinson, A. B., & Morelli, S. (2011). Economic crises and inequality. *UNDP-HDRO occasional papers, (2011/6)*.

Atkinson, A. B. (2005). Comparing the distribution of top incomes across countries. *Journal of the European Economic Association, 3*(2–3), 393–401.

Anand, Sudhir, Ravi Kanbur, S. M. (1993). The Kuznets process and the inequality-development relationship. *Journal of Development Economics, 40*(1), 25–52.

Barro, R. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth, 5*, 5–32.

Bahmani-Oskooee, M., Gelan, A. (2012). On the relation between income distribution and economic growth. *Global Business and Economic Review, 14*, 249–273.

Bahmani-Oskooee, M., Hegerty, S. W., Wilmeth, H. (2008). Short-run and long-run determinants of income inequality: evidence from 16 countries. *Journal of Post Keynesian Economics, 30*, 463–484.

Barro, Robert J. (2000). Inequality and Growth in a panel of countries. *Journal of Economic Growth, 5*, 5–32.

Breen, R., García Peñalosa, C. (2005). Income inequality and macroeconomic volatility: an empirical investigation. *Review of Development Economics, 9*(3), 380–398.

Bernanke, B. S. (1983). Irreversibility, uncertainty, and cyclical investment. *The Quarterly Journal of Economics, 98*(1), 85-106.

Black, F. (1987). General equilibrium and business cycles. *Business Cycles and Equilibrium*, 153.

Campano, Fred, Salvatore, Dominick (1993). Economic development, income inequality and Kuznets U-shaped hypothesis. *Journal of Policy Modeling, 10*(2), 265–288.

Calderón, C., Levy-Yeyati, E. L. (2009). Zooming in: from aggregate volatility to income distribution. *Policy Research Working Paper. World Bank*.

Caroli, E., Garcıa-Penalosa, C. (2002). Risk aversion and rising wage inequality. *Economics Letters, 77*(1), 21–26.

Cevik, S., & Correa-Caro, C. (2015). Growing (Un)equal: Fiscal Policy and Income Inequality in China. *IMF Working Paper Fiscal Affairs Department*.

Chen, Shaohua, Ravallion, Martin (1997). What can new survey data tell us about recent changes in distribution and poverty? *World Bank Economic Review, 11*(2), 357–382.

Checchi, D., Garcıa-Peñalosa, C. (2004). Risk and the distribution of human Capital. *Economics Letters, 82*(1), 53–61.

Dabla-Norris, M. E., Kochhar, M. K., Suphaphiphat, M. N., Ricka, M. F., & Tsounta, M. E. (2015). Causes and consequences of income inequality: A global perspective. *International Monetary Fund*.

Davtyan, K. (2014). Interrelation among economic growth, income inequality, and fiscal performance: Evidence from Anglo-Saxon Countries. *AQR–Working Papers, 2014, AQR14/03*.

Deininger, K., Squire, L. (1996). Measuring income inequality: a new database. *World Bank Economic Review, 10*(3), 565–591.

Deininger, K., Squire, L. (1998). New ways of looking at old issues: inequality and growth. *Journal of Development Economics, 57*, 257–287.

Dollar, David, Kraay, Aart (2002). Growth is good for the poor. *Journal of Economic Growth, 7*(3), 195–26.

Forbes, K. J. (2000). A reassessment of the relationship between inequality and growth. *American Economic Review, 90*(4), 869-887.

Frank, Mark W. (2009). Inequality and growth in the United States: evidence from a new state-level panel of income inequality measures. *Economic Inquiry, 47*, 55–68.

Francis, N., & Ramey, V. A. (2005). Is the technology-driven real business cycle hypothesis dead? Shocks and aggregate fluctuations revisited. *Journal of Monetary Economics, 52*(8), 1379-1399.

Galor, O., & Tsiddon, D. (1997). The distribution of human capital and economic growth. *Journal of Economic Growth, 2*(1), 93-124.

Hausmann, R., Gavin, M. (1996). Securing stability and growth in a shock-prone region: the policy challenge for Latin America. *In: Hnatkovska, V.*.

Hnatkovska, V. (2005). Volatility and Growth. *Managing Economic Volatility and Crises: A Practitioner's Guide*, 65.

Huang, H.-C., Fang, W.-S., Miller, S. M., Yeh, C.-C. (2015). The effect of growth volatility on income inequality. *Economic Modelling, 45*, 212–222.

Iqbal, J., Aziz, S., & Nosheen, M. (2022). The asymmetric effects of exchange rate volatility on US–Pakistan trade flows: new evidence from nonlinear ARDL approach. *Economic Change and Restructuring*, 1-31.

Iqbal, J., Mahmood, F., Nosheen, M., & Wohar, M. (2023). The asymmetric impact of exchange rate misalignment on economic growth of India: An application of Hodrick–Prescott filter technique. *Economic Analysis and Policy*, 77, 809-823.

Iqbal, J., Jabeen, S., Nosheen, M., & Wohar, M. (2023). The Asymmetric Effects of Exchange Rate Volatility on Pakistan–Japan Commodity Trade: Evidence from Non-linear ARDL Approach. *Asia-Pacific Financial Markets*, 1-76.

Jacobsen, P. W., Giles, D. E. A. (1995). Income distribution in the United States: Kuznets' Inverted U hypothesis and data non-stationarity. *Journal of International Trade and Economic Development, 7*, 405–423.

Kaldor, N. (1957). A model of economic growth. *The Economic Journal*, 67 (268), 591-624.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2006). How do trade and financial integration affect the relationship between growth and volatility? *Journal of International Economics, 69*(1), 176-202.

Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review, 45*, 1–28.

Laursen, T., Mahajan, S. (2005). Volatility, income distribution, and poverty. *Managing Economic Volatility and Crises: A Practitioner's Guide*. Cambridge University Press, New York, pp. 101–136.

Li, H., Squire, L., Zou, H. (1998). Explaining international and intertemporal variation in income inequality. *Economic Journal, 108*, 26–43.

Lucas, R. E. (2002). *Lectures on Economic Growth*. Harvard University Press.

Mirman, L. J. (1971). Uncertainty and optimal consumption decisions. *Econometrica: Journal of the Econometric Society*, 179-185.

Nosheen, M., Chohan, B., Iqbal, J., & Wohar, M. (2023). Asymmetric response of domestic production to exchange rate changes: Evidence from Southeast Asian countries. *Asian-Pacific Economic Literature*.

Partridge, M. D. (2005). Does income distribution affect US state economic growth? *Journal of Regional Science*, *45*(2), 363-394.

Pesaran, M. Hashem, Shin, Yongcheol, Smith, Richard J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*, 289–326.

Pindyck, R. S. (1990). Irreversibility, uncertainty, and investment.

Saint-Paul, G., & Verdier, T. (1993). Education, democracy and growth. *Journal of Development Economics, 42*(2), 399-407.

Appendix

Table 1: Variables and source

Variable	Source	Time period
GINI	Measure of income inequality. Annual data come from the University of Texas-Austin Inequality Project (http://utip.lbj.utexas.edu/data.html).	1980 to 2018
GDP	Real GDP measure by GDP (constant 2010 US$) (WDI)	1980 to 2018
VOL	Volatility measure of real income.	1980 to 2018

Table 2: ADF test

Country	GINI		GDP		VOL	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Albania	-0.28	-3.37		-4.63	-2.26	-4.10
Azerbaijan	-1.23	-5.58*	-5.47*		-2.05	-4.68*
Bangladesh	-4.001**		6.18	-4.48*	-1.47	-6.20*
Cameroon	-4.786**		0.106	-3.51**	-1.62	-6.32*
Chile	-1.60	-5.84*	-0.20	-4.07*	-1.78	-7.70*
Colombia	-2.04**		3.13	-3.66*	0.03	-7.31*
Costa-Rica	-2.94**		0.77	-7.48*	-1.24	-5.14*
Ecuador	-2.71***	-5.62*	0.20	-5.24*	-2.08	-7.05*
Egypt	-4.09**		-1.08	-3.004**	-1.95	-3.06**
Eritrea	-1.98***	-4.92*	-1.65	-3.39**	-1.70	-4.73*
Estonia	-3.65*		2.84	-4.29*	-0.96	-4.98*
Ethiopia	-3.25**		0.61	-8.33*	-0.82	-5.04*
Fiji	-2.46**		2.14	-5.55*	-1.13	-5.73*
India	-4.55*		-0.30	-4.67*	-1.80	-6.72*
Indonesia	-1.28	-6.13*	-0.77	-5.75*	-1.15	-4.75*
Iran	-3.12**		-2.11	-3.70*	-2.17	-3.23**
Jamaica		-4.52*		0.45	-5.14*	-3.51*
Jordan	-3.87*		2.39	-3.32**	-0.85	-5.07*
Kenya	-2.20***	-9.06*	-1.09	-2.51**	-1.24	-4.72*
Kyrgyzstan	-5.06*		0.92	-8.12*	-1.018	-4.67*

Malawi	-0.93	-5.16*	-1.16	-5.004*	-1.61	-5.13*
Malaysia	-3.01*		-0.17	-6.75*	-1.93	-6.22*
Mexico	-3.20**		-1.14	-13.09*	-1.60	-5.88*
Morocco	-3.65**		-1.11	-9.59*	-2.04	-4.49*
Pakistan	-.3.23*		-4.39*		-1.67	-4.49*
Panama	-2.65**		-0.86	-6.91*	-1.74	-3.85*
Turkey	-1.20	-6.48*	-1,44	-5.33*	-1.18	-5.98*
Philippines	-2.96**		-1.23	-5.65*	-0.99	-3.88*
Russian	2.30	-3.22**	-1.27	-5.62*	-1.97	-3.59*
Senegal	0.55	-4.48*	-1.38	-6.51*	-1.86	-3.87*
South-Africa	0.98	-4.58*	-3.18**		-1.29	-5.89
Sri-Lanka	-2.75**		-1.87	-6.76*	-2.91**	

Table 3: Full Information Estimates of both Linear and Nonlinear ARDL Models

	Albania		Azerbaijan		Bangladesh		Cameroon	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	0.08**	0.35	0.38**	-0.06*	-0.11*	-0.41*	0.03*	0.02*
$D(GDP)_{t-1}$		0.89**						0.005***
D(VOL)	0.004		0.08*		0.003***		-0.003	
D(NVOL)		0.05		-0.28*				-0.04**
$D(NVOL)_{t-1}$		-0.20		-0.15*		0.0002		-0.09*
$D(NVOL)_{t-2}$		-0.43**						
D(PVOL)		-0.04		0.65*		0.001		0.10*
$D(PVOL)_{t-1}$		0.74**		0.03				0.05**
CointEq(-1) -	-0.51*	-0.91*	-0.22**	-0.95*	-0.67*	-0.22*	-0.18**	-0.16*
Panel B :								

Long Run								
LNGDP	0.15*	0.16*	-0.21	-0.06*	-0.17*	0.16*	0.18*	0.17*
LNVOL	0.009		0.38**		0.005**		-0.017	
NVOL		-0.33*		-0.40*		0.0008		0.033
PVOL		0.29*		0.68*		0.004		-0.07
Constant Panel C: Diagno	2.31*	1.21*	6.24*	5.44*	7.87*			
F TEST	8.61	4.74	10.55	5.02	26.32	5.47	10.18	8.85
10%	3.17—4.14	2.01—3.1	2.17—3.19	2.72—3.77	3.17—4.14	2.72—3.77	3.17—4.14	2.72—3.77
5%	3.79—4.85	2.45—3.63	2.72—3.83	3.23—4.35	3.79—4.85	3.23—4.35	3.79—4.85	3.23—4.35
1%	5.15—6.36	3.42—4.84	3.88—5.3	4.29—5.61	5.15—6.36	4.29—5.61	5.15—6.36	4.29—5.61
LM	2.08	2.79	0.77	1.78	0.68	2.87	3.24	3.53
Reset	4.88	3.34	2.56	5.51	27.76	2.46	2.33	0.19
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S

	Chile		Colombia		Costa-Rica		Ecuador	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	0.45**	0.302*	-0.006	0.85*	-0.22*	0.013	-0.0009	0.35**
$D(GDP)_{t-1}$	-0.38*	0.09*		0.32**				
$D(GDP)_{t-2}$	0.97**			1.22				
D(VOL)	0.0004		-0.012**		0.007**		0.020*	
D(NVOL)	-0.019*	-0.11*		-0.02*		-0.087**		-0.016**
$D(NVOL)_{t-1}$	-0.02*	0.11**		-0.03**				-0.021
$D(NVOL)_{t-2}$	-0.01	-0.02*		0.08**				
D(PVOL)		0.128*		0.10**		0.062**		0.079*
$D(PVOL)_{t-1}$		0.002		0.006				0.21*
$D(PVOL)_{t-2}$		0.07**		0.042				
CointEq(-1)	0.033	-0.19***	-0.83*	-0.147**	-1.18*	-	-0.27*	-0.45*

						0.084***		
Panel B : Long Run								
LNGDP	0.14**	0.04*	-0.007	0.15*	-0.13*	0.15*	-0.0034	0.081 *
LNVOL	0.013		-0.014*		0.0006		-0.0046	
NVOL		-0.09		-0.65**		-0.62		-0.40*
PVOL		-0.12		0.46*		-0.60		0.37*
Constant		2.72*	4.37*		6.98		4.06*	1.84**
Panel C: Diagnostic Statistics								
F TEST	10.18	8.85	5.67	11.92	5.10	5.61	13.32	6.01
10%	3.17—4.14	2.72—3.77	3.17—4.14	2.72—3.77	3.17—4.14	2.01—3.1	3.17—4.14	2.72—3.77
5%	3.79—4.85	3.23—4.35	3.79—4.85	3.23—4.35	3.79—4.85	2.45—3.63	3.79—4.85	3.23—4.35
1%	5.15—6.36	4.29—5.61	5.15—6.36	4.29—5.61	5.15—6.36	3.42—4.84	5.15—6.36	4.29—5.61
LM	2.58	1.67	2,.12	0.52	2.10	3.13	1.59	2.11
Reset	8.96	33.29	2.42	11.72	7.12	1.78	12.58	6.78
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S

	Egypt		Eritrea		Estonia		Ethiopia	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	0.081*	0.28*	-0.13**	0.22**	-0.059	0.019	0.051*	0.075*
$D(GDP)_{t-1}$		-0.016						
D(VOL)	-0.020*		0.004		-0.016*		-0.027**	
D(NVOL)		-0.15**		0.033		-0.103*		-0.092
$D(NVOL)_{t-1}$		-0.13*						
D(PVOL)		0.148*		-0.17*		0.057**		0.07
$D(PVOL)_{t-1}$		0.005		-0.14**		0.06		
CointEq(-1)	- 0.60**	-0.47*	-0.51**	-0.68**	-1.097*	-0.14*	-0.43*	-0.41*

Panel B : Long Run								
LNGDP	0.12*	0.15*	-0.25*	0.32*	0.04*4	0.165**	0.11*	0.18*
LNVOL	-0.006		0.008		-0.015*		-0.03*	
NVOL		-0.0441		-0.15**		-0.88**		-0.53**
PVOL		-0.202*		0.17**		0.850*		0.58*
CointEq(-1)	-0.60**	-0.47*	-0.51**	-0.68**	-1.097*	-0.14*	-0.43*	-0.41*
Panel C Diagnostic Statistics								
F TEST	6.23	8.56	7.21	6.31	12.93	5.89	4.76	4.45
10%	3.17 --4.14	2.01—3.1	3.17 -- 4.14	2.72—3.77	3.17 -- 4.14	2.01—3.1	2.17— 3.19	2.01— 3.1
5%	3.79—4.85	2.45—3.63	3.79— 4.85	3.23—4.35	3.79— 4.85	2.45— 3.63	2.72— 3.83	2.45— 3.63
1%	5.15—6.36	3.42—4.84	5.15— 6.36	4.29—5.61	5.15— 6.36	3.42— 4.84	3.88— 5.3	3.42— 4.84
LM	3.05	0.79	2.18	3.75	1.69	2.13	1.48	1.08
Reset	1.09	0.69	0.44	0.85	1.89	2.31	3.21	4.32
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S

	Fiji		India		Indonesia		Iran	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	0.0064**	0.010*	-0.33**	-0.47*	0.087*	0.026**	0.047*	0.067**
D(VOL)	-0.0044**		0.0014		-0.025*		0.009	
D(PVOL) 0.017**	0.00008		0.062***		-0.002	D(PVOL) 0.017**	0.00008	
CointEq(-1)	-0.47*	-0.62*	-0.98*	-1.10*	-0.41*	-0.18***	-0.33**	-0.89*
Panel B : Long Run								
LNGDP	0.013**	-0.17*	-0.03*	-0.20*	0.209*	0.14*	0.14*	0.07*
LNVOL	-0.0093**	0.0015	-0.061*		0.027		LNVOL	-0.0093** 0.0015

NVOL	-	0.038***		-0.0006		0.097		- 0.033 -
Panel B : Long Run								
F TEST	7.34	9.80	11.60	10.03	5.64	4.56	6,24	4.43
LNVOL	-0.006		0.008		-0.015*		-0.03*	
NVOL		-0.0441		-0.15**		-0.88**		-0.53**
PVOL		-0.202*		0.17**		0.850*		0.58*
CointEq(-1)	-0.60**	-0.47*	-0.51**	-0.68**	-1.097*	-0.14*	-0.43*	-0.41*
Panel C Diagnostic Statistics								
F TEST	6.23	8.56	7.21	6.31	12.93	5.89	4.76	4.45
10%	3.17—4.14	2.72—3.77	3.17—4.14	3.17—4.14	3.17—4.14	2.01—3.1	2.17—3.19	2.72—3.77
5%	3.79—4.85	3.23-4.35	3.79—4.85	3.79—4.85	3.79—4.85	2.45—3.63	2.72—3.83	3.23-4.35
1%	5.15-6.36	4.29-5.61	5.15--6.36	5.15--6.36	5.15--6.36	3.42—4.84	3.88—5.3	4.29-5.61
LM	3.05	0.79	2.18	3.75	1.69	2.13	1.48	1.08
Reset	1.09	0.69	0.44	0.85	1.89	2.31	3.21	4.32
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S

	Jamaica		Jordan		Kenya		Kyrgyzstan	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	0.038*	0.0009	-0.42**	0.0008	0.024***	-0.044	0.06**	0.068**
D(VOL)	-0.002		-0.017*		0.012		0.0010	
D(PVOL)		0.0006		-0.06**			-0.010**	
D(PVOL)		0.061**			0.0051		0.21*	
CointEq(-1)	-0.55**	-0.15**	-0.055	-0.52*	-0.372**	-0.37**	-0.55**	-0.15**
Panel B : Long Run								
LNGDP	0.013**	-0.17*	-0.03*	-0.20*	0.209*	0.14*	0.14*	0.07*
LNVOL	- 0.0093**	0.0015	-0.061*		0.027		LNVOL	- 0.0093** 0.00

								15
NVOL	-	0.038***		-0.0006		0.097		- 0.033 -
Panel B : Long Run								
F TEST	-0.47	0.13	0.43	-0.085	0.177*	0.18*	-0.47	0.13
LNVOL	0.03**		-0.24		0.0029		0.03**	
NVOL		2.72		0.10***		-0.028		2.72
PVOL		-2.92		0.0087		0.0038		-2.92
CointEq(-1)	-0.60**	-0.47*	-0.51**	-0.68**	-1.097*	-0.14*	-0.43*	-0.41*
Panel C Diagnostic Statistics								
F TEST	5.45.	4.34	4.60	5.01	4.12	5.21	5.45.	4.34
10%	3.17—4.14	2.01—3.1	2.17—3.19	3.47—4.45	2.17—3.19	2.01—3.1	3.17—4.14	2.01—3.1
5%	3.79—4.85	2.45—3.63	2.72—3.83	4.01—5.07	2.72—3.83	2.45—3.63	3.79—4.85	2.45—3.63
1%	5.15-6.36	3.42—4.84	3.88—5.3	5.17—6.36	3.88—5.3	3.42—4.84	5.15-6.36	3.42—4.84
LM	2.19	3.41	1.75	1.11	2.82	2.97	2.19	3.41
Reset	4.12	5.21	3.21	1.54	3.39	3.31	4.12	5.21
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S

	Malawi		Malaysia		Mexico		Morocco	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	-0.29*	-0.24*	0.02	0.02	0.025**	-0.47**	0.13***	-0.12
$D(GDP)_{t-1}$								
$D(GDP)_{t-2}$								
$D(GDP)_{t-3}$								
$D(GDP)_{t-1}$								
D(PVOL)	-0.0014		0.0007		-0.0018		0.006	
$D(PVOL)_{t-1}$	0.0148		0.0019					
CointEq(-1)	- 0.60**	-0.47*	-0.51**	-0.68**	-1.097*	-0.14*	-0.43*	-0.41*

Panel B : Long Run								
LNGDP	-0.076*	-0.082*	0.13*	0.15	0.066*	0.13**	6.35*	0.37*
LNVOL	-0.0065		0.0048		-0.0048		0.07	-0.0065
NVOL		0.026		-0.002		-0.17		
PVOL		-0.0155				-0.24		
Constant	5.69*	5.85*		0.001	2.37*	0.60		5.69*
Panel C Diagnostic Statistics								
F TEST	4.45	5.01	3.13	1.08	4.56	4.56	6.86	5.67
10%	3.17—4.14	2.72—3.77	2.17—3.19	2.72—3.77	3.17—4.14	2.72—3.77	2.17—3.19	2.01—3.1
5%	3.79—4.85	3.23--4.35	2.72—3.83	3.23--4.35	3.79—4.85	3.23--4.35	2.72—3.83	2.45—3.63
1%	5.15—6.36	4.29—5.61	3.88--53	4.29—5.61	5.15—6.36	4.29—5.61	3.88--53	3.42—4.84
LM	0.44	1.66	1.09	4.58	2.24	1.40	1.03	0.97
Reset	3.21	2.45	0.45	0.98	0.74	4.31	2.31	5.32
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S

	Pakistan		Panama		Turkey		Philippines	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	-0.05	0.06	-0.58**	-0.47**	0.59***	0.64*	0.27*	0.24***
$D(GDP)_{t-1}$			-0.58					0.28
D(VOL)	0.027**		-0.45**		0.019		-0.31*	
$D(VOL)_{t-1}$					-0.0003			
D(NVOL)		0.044***		-0.081*		-0.08**		-0.06**
D(PVOL)		-0.039		0.073***		0.061***		0.10*
CointEq(-1)	-0.027	-0.012***	-0.038**	-0.24*	-1.39*	-0.43*	-0.038*	-0.21*
$D(GDP)_{t-1}$			-0.58					0.28
Panel B : Long Run								
LNVOL	-0.64*	-0.052**	-0.042*		0.05			

NVOL	-3.69**	1.83		-3.21*		2.28		
PVOL	3.42**	1.23		8.12*		5.12		
PVOL		-0.0155				-0.24		
Constant	5.69*	5.85*		0.001	2.37*	0.60		5.69*
Panel C Diagnostic Statistics								
F TEST	13.43	4.51	3.93	4.21	6.91	11.74	4.21	5.49
10%	2.17—3.19	2.01—3.1	2.17—3.19	2.01—3.1	4.19--5.06	2.01—3.1	2.17—3.19	2.01—3.1
5%	2.72—3.83	2.45—3.63	2.72—3.83	2.45—3.63	4.87—5.86	2.45—3.63	2.72—3.83	2.45—3.63
1%	3.88—5.3	3.42—4.84	3.88—5.3	3.42—4.84	6.36—7.52	3.42—4.84	3.88—5.3	3.42—4.84
LM	0.96	0.53	1.41	0.54	2.81	0.11	1.34	0.86
Reset	3.41S,S	7.38	9.89	10.27	5.52	3.87	7.25	5.22
QS (QS^2)	S,S	S,s	S,S	S,S	S,S	S,S	S,S	S,S

	Russian		Senegal		South-Africa		Sri-Lanka	
	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL	LARDL	NLARDL
Panel A: Short Run								
D(GDP)	0.16**	0.13**	-0.03	0.14**	-0.04	0.10*	-4.03*	2.39*
$D(GDP)_{t-1}$	0.17**	0.16*						
$D(GDP)_{t-2}$	-0.19**							
$D(GDP)_{t-3}$ D(VOL)	-0.038**		-0.008**		0.005		0.04**	
$D(VOL)_{t-1}$	-0.01							
D(NVOL)		-0.19*		-0.082**		-0.05**		-0.039*
$D(NVOL)_{t-1}$		0.02				-0.28*		
$D(NVOL)_{t-2}$		0.04						
D(PVOL)		0.06*		0.10*		0.06*		0.0066***
$D(PVOL)_{t-1}$		0.09**		0.04***		0.11**		
CointEq(-1)	-0.050***	-0.32*	0.015	0.31*	-0.21***	-0.014**	-0.32*	-0.13**
Panel B : Long Run								
LNGDP 1.26		4.46	2.23	14.70	0.20**	11.48***	12.2	-1.29
LNVOL 0.05			0.62		-0.03**		-0.03	
NVOL		5.51		8.38		-4.55**		0.30
PVOL		5.28		0.90		5.57**		0.05
Constant	16.35	6.67		2.87	23.58	5.34**		3.88
Panel C: Diagnostic								
F TEST	5.21	4.53	14.98	4.65	7.92	6.41	6.21	6.81
10%	3.17—4.14	2.72—3.77	2.17—3.19	2.72—3.77	3.17—4.14	2.72—3.77	4.19—5.06	2.72—3.77
5%	3.79—4.85	3.23—4.35	2.72—3.83	3.23—4.35	3.79—4.85	3.23—4.35	4.87—5.85	3.23—4.35
1%	5.15--6.36	4.29—5.61	3.88—5.3	4.29—5.61	5.15--6.36	4.29—5.61	6.34—7.52	4.29—5.61
LM	2.81	2.99	2.82	0.27	1.75	0.12	2.80	0.60
Reset	10.09	9.86	0.98	1.47	2.61	3.49	3.39	2.85
QS (QS^2)	S,S	S,S	S,S	S,S	S,S	S,S	S,S	S,S