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Financial Inclusion, Trade Openness, and Growth Volatility: Empirical Insights

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Abstract
Persistent and unpredictable growth volatility remains a key issue in Pakistan, constraining sustainable economic performance and weakening policy effectiveness. Hence, financial inclusion and trade openness emerge as pivotal determinants of macroeconomic performance. Although growing literature examines the effects of financial inclusion and trade openness on the level of economic growth, their combined impact on growth volatility within a unified framework remains inadequately explored empirically. The aim of the study is to examine the joint effect of financial inclusion and trade openness on growth volatility in Pakistan. To achieve the objective, the study uses data from 2004-2023 and employs the Autoregressive Distributed Lag (ARDL) bounds testing approach. The empirical results indicate that financial inclusion and trade openness reduce growth volatility. The findings offer important policy implications. Strengthening financial inclusion should be a central component of Pakistan's macroeconomic stabilization strategies. Moreover, trade policies should focus on export diversification and shock-absorbing mechanisms to minimize short-term volatility while leveraging long-term gains. Enhancing institutional quality and financial infrastructure can further reinforce economic resilience and reduce growth fluctuations.

Keywords: Financial Inclusion, Trade Openness, Growth Volatility, Government Spending, Interest rate Volatility, Exchange rate Volatility

JEL Classification: E44, E32, C22

1. Introduction

Economic stability remains a core objective for policymakers, especially during globalization, financial integration, and frequent external shocks. Growth Volatility (GV), the fluctuations in economic output, poses a major challenge. High GV undermines investment, erodes consumer confidence, and limits long-term development (Mushtaq et al., 2025; Andlib et al., 2024). Understanding what mitigates or worsens volatility is now a key focus of empirical study (Kanval & Ihsan, 2025). Recently, Financial Inclusion (FI) emerged as a prominent policy tool to foster stable, inclusive growth. FI means individuals and businesses can access and use formal financial services. By enabling savings, investment, risk management, and smooth consumption, a broad financial system can boost economic resilience and lessen vulnerability to shocks (Sun, 2018; Ahmad et al., 2020; Zafar et al., 2026).

Current literature indicates that, better access to financial services will allow households and firms to more effectively absorb income changes, and hence may stabilize economic growth (Zhuang et al., 2009; Beck et al., 2009). Ample evidence in the literature has explained the relationship between FI and growth, such as Gretta (2017), Daud (2023), Van et al. (2019), and Ozili et al. (2023). Meanwhile, Trade Openness (TO), which is the extent to which a particular economy has been incorporated into the international trade, has always been considered to be a two-sided sword. On the one hand, an increased

openness may contribute to Economic Growth (EG) by promoting specialization, efficiency, and getting access to bigger markets. Conversely, it opens up economies to external shocks, including fluctuations in demand across the globe, price volatility of commodities, and financial crises, which can enhance growth instability. Empirical evidence is inconclusive, with some studies indicating that more open countries are less vulnerable to volatility, in part due to greater sectoral specialization that boosts the volume of trade and lowers output volatility (Calderón et al., 2006; Haddad et al., 2013; Abbas & Andlib, 2026). In contrast, Razin, Sadka, and Coury (2003) demonstrate that TO can have a negative impact on the EG through the increase in uncertainty in the macroeconomic fundamentals.

In addition, the other factors like the Interest rate Volatility (IRV), Exchange rate Volatility (ERV) and Government Expenditure (GE) also proved to be important determinants of GV. As an example, increased interest rates would make borrowing costs more expensive, thus decreasing disposable income and reducing the growth in consumer spending. According to Azam and Khan (2022), high prices may raise doubts about the returns of long-term investment and eventually reduce the aggregate production. On the other hand, the decrease in interest rates raises disposable income to investors and consumers. This is because the low rates reduce saving which increases consumption which is positively related to EG. Also, households will be more likely to borrow with a low payback requirement, which will result in high levels of investment spending and, thus, corporate growth.

On the flipside, a low, stable exchange rate can promote exports and speed up economic growth (Ramoni-Perazzi and Romero, 2022; Oyadeyi et al., 2024). A competitive exchange rate promotes optimal utilization of investment resources, thus leading to growth (Oyadeyi, 2024a). Fluctuations generate external uncertainty, trade and capital flows, and cause macroeconomic instability, enhancing volatility in growth. Thus, interest and exchange rates can positively or negatively affect an economy based on their characteristics. The macroeconomic goals and stability are important in setting interest rates, exchange rates, and growth (Oyadeyi, 2024b). Likewise, GE is able to smooth out fluctuations by using counter-cyclical fiscal policy, yet inefficient or excessive spending can cause distortions in the allocation of resources and volatility.

However, the suitability of government size as a fiscal policy instrument for reducing economic volatility remains under debate. According to the traditional Keynes hypothesis, when resources are underutilized, governments should boost spending to stabilize production volatility. A larger government size generates demand and boosts the economy. On the other hand, proponents of the New Keynesian and traditional Real Business Cycle (RBC) models contend that increasing government spending could be detrimental. They argue that by discouraging private sector activity, such policies could worsen output volatility (Bernheim, 1989; Elmendorf & Mankiw, 1999; Mankiw, 2000). Empirical studies have mixed and inconclusive results; for example, Monacelli and Perotti (2008) found a negative correlation between government size and output volatility in a two-period model with sticky prices and optimizing agents.

In a study of 20 OECD nations, Mohanty and Zampolli (2009) also found that government size stabilizes. In their analysis of 20 OECD nations, Andrés et al. (2008) came to a similar conclusion. On the other hand, some research indicates that government size and output volatility are positively correlated, suggesting a destabilizing influence. This opinion is supported by studies by Carmignani et al. (2007, 2011) and Thornton (2010). Cogan et al. (2010) found that fiscal stimulus packages had smaller multipliers, defying the predictions of the old Keynesian model, when estimating the multipliers of government spending within the New Keynesian model using reduced-form VAR regressions on US data. However, Makin (2013) and Stoilova & Todorov (2021) discovered no connection between output volatility and government size.

Hence, by reviewing the literature we have found ample evidence on the relationship between FI, TO GE, IRV, ERV and GV. However, their joint impact on growth volatility remains insufficiently examined. Most of the studies conducted on growth level effect there is scant literature rewarding the effects of these variables on GV particularly in a single country context like Pakistan. This is a gap that is especially applicable in the case of the emerging economies such as Pakistan where the financial systems are still under development and trade exposure is increasing rapidly. The role of financial inclusion can be significant as it allows the economic actors to be more resilient to external and internal shocks. On the same note, it will assist in comprehending the risk and opportunities of TO. As an example, the availability of credit and savings tools can assist companies in dealing with the risks associated with exports and enable households to smooth their consumption in the case of external shocks. Thus, joint effect of FI and TO gives a more comprehensive insight into their concomitant effects on economic stability.

Moreover, IRV, ERV and GE also affect GV their combined effect is more integrated framework to overcome GV. In addition, stability aspect of growth which is also crucial to sustainable development has received little attention in the existing literature, as most studies have concentrated on average growth outcomes. From a policy perspective, a stable growth is essential in poverty alleviation, creation of employment, and long-term economic planning. This highlights the importance of empirical research that directly looks at the role of structural variables like FI, TO, IRV, ERV as well as GE in determining growth volatility. It is against this background that the current research will attempt to empirically examine the effects of FI, TO, IRV, ERV and GE on GV. To analyze a country specific situation to understand better the dynamic channels and to present policy implications to achieve sustainable EG, through ARDL approach.

This study makes three main contributions. First, it puts the emphasis on the GV rather than average economic growth and gives a more extensive insight into economic stability. Second, it includes a multidimensional indicator of FI, which provides a better evaluation than single-indicator methods. Third, it works out a holistic policy framework in sustainable growth promotion through the analysis of the joint impact of FI, TO, IRV, ERV and GE, an approach that is most applicable in the current globalized economic landscape. The research has good policy implications especially in nations such as Pakistan and other developing economies. The results can guide the policymakers to come up with coordinated policies that not only lead to EG, but also stability. As an example, increasing FI can act as a shock absorber to both external and internal shocks. This is more so with economies that are more susceptible to the global market volatilities.

2. Literature Review

What are the potential ways that FI may influence the GV? As mentioned, there hasn't been much research done on this connection. In the absence of a formal model, examining the different elements of aggregate demand would be a good place to start when trying to understand how FI affects GV. Starting with household consumption, increased FI may improve consumption smoothing by enabling agents to modify their consumption habits over time in a way that may reduce macroeconomic volatility (Mehrotra and Yetman 2015). Regarding firms' investments, there are two avenues. The first is predicated on the theory of "creative destruction".

According to Ayyagari et al. (2011), increased FI tends to spur innovation since it gives businesses and entrepreneur’s better access to bank loans. It can increase the volatility of output. Conversely, increased FI may cause the economy to become less concentrated among a small number of businesses, which could lower production volatility (Chauvet and Jacolin 2017). Hence, most of the research conducted on the relationship between FI and EG. Abor et al. (2018) used a survey with a large sample of households to explore FI and inclusive growth in Ghana. FI considerably lowers the likelihood that a household will become impoverished and raises per capita household spending, according to their

study, which was tested using unrelated probit and instrumental variables. Similarly, Otiwu et al. (2018) looked into how FI influence growth.

Hence, the gradual withdrawal of protectionism on domestic industry against foreign competition is known as TO (Kadid, 2015). The compensation theory has theoretically advanced the relationship between TO and GV. The compensation hypothesis has theoretically advanced the relationship between TO and GV (Down, 2007; Ehrlich & Hearn, 2013). This hypothesis views GV as a result of exposure to international markets. Nevertheless, the theory's proponents contend that greater trade exposure raises domestic economic instability. According to the hypothesis, because there is a greater chance of external risk to government spending, economies with larger public sectors are typically more open and vulnerable to economic shocks. However, Down (2007) contended that by fostering rather than undermining economic stability, the growth of international trade into more stable and expansive markets could enable risk diversification. According to a different perspective grounded in economic theory, smaller economies tend to be more volatile than larger ones. As a result, they feel more insecure in the international market (Ehrlich & Hearn, 2013).

Down (2007) and Ehrlich & Hearn (2013) have explored the relationship between TO and EG industrialized economies. Sakyi et al. (2015) discovered a positive bidirectional relationship between TO and growth. The authors attributed this relationship to the trade openness's consequential impacts. Using cross-national data from 141 nations between 1970 and 2002. Cavallo and Frankel (2008) demonstrated that, TO lessen economies' susceptibility to severe abrupt pauses and currency crashes. This association is much more pronounced when accounting for trade endogeneity. Similarly, Saha (2025), explored significant effect of FI and Openness on growth. Furthermore, In Japan, Fujii (2015) finds a substantial positive link between TO and output volatility.

Furthermore, along with FI and TO literature has also documented the well-known effects of IRV, ERV and GE on GV. Azam and Khan (2022) claim that high prices can cause uncertainty about the long-term advantages of investment initiatives, which lowers overall output. Higher interest rates typically result in an increase in exchange rates and a decrease in inflationary pressures. Conversely, lower interest rates mean that investors and consumers have more money in their pockets. Lower interest rates will deter individuals from saving, giving them more money in their pockets to boost consumption, which is positively correlated with economic growth.

Additionally, when interest rates are lower, households might borrow more money because their payback obligations will be reduced. Similarly, by increasing investment spending, lower interest rates can promote corporate expansion. Conversely, Ramoni-Perazzi and Romero (2022) and Oyadeyi et al. (2024a), claimed that a low and stable exchange rate can promote exports to accelerate economic growth. According to Oyadeyi (2024b) growth, exchange rates, and interest rates all have a significant impact on setting macroeconomic goals and ensuring economic stability. Similarly, GE can stabilize economic fluctuations through counter-cyclical fiscal policy; however, inefficient or excessive spending may distort resource allocation and increase volatility.

Hence, the current empirical literature yields mixed and inconclusive findings for example Monacelli and Perotti (2008) found a negative correlation between government size and output volatility in a two-period model with sticky prices and optimizing agents. In a study of 20 OECD nations, Mohanty and Zampolli (2009) also verified the stabilizing function of government size. In their analysis of 20 OECD nations, Andrés et al. (2008) came to a similar conclusion. On the other hand, some research indicates that government size and output volatility are positively correlated, suggesting a destabilizing influence. This opinion is supported by studies by Carmignani et al. (2007, 2011) and Thornton (2010). Cogan et al. (2010) found that fiscal stimulus packages had smaller multipliers, defying the predictions of the old Keynesian model, when estimating the multiplier effects of government spending within the context of the New Keynesian model using reduced-form VAR regressions on US data. However, Makin (2013) and Stoilova & Todorov (2021) discovered no connection between output volatility and

government size. Hence, by reviewing literature we have found that it is more relevant to explore the nexus between FI, To, ERV, IRV, GE and GV.

3. Methods and Materials

3.1 Model Specification

This paper extends the model of Farooq et al. (2023) which highlights the effect of FI on agricultural growth. We have added used more diversified FI index and used six broad indicators to cover deeper side of FI additional we have added TO, GE, IRV, and ERV to see their joint impact on GV. The pictorial representation of the nexus among FI, TO, and GV is presented in Figure 1. Our model takes the following functional form:

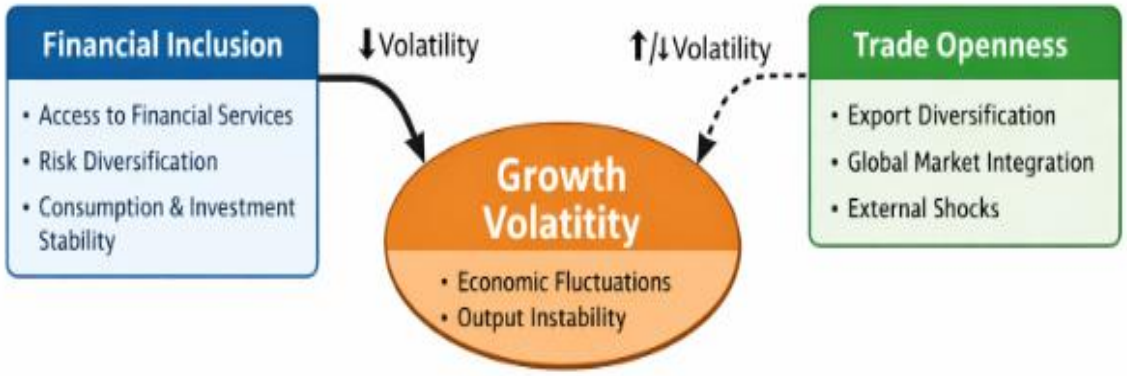
$$GV = F\ (FI,\ TO,\ GE,\ IRV,\ ERV)\ \ldots(1)$$

Hence the linear functional form of the model is as follows:

$$GV_t = \alpha_0 + \alpha_1 FI_t + \alpha_2 TO_t + \alpha_3 GE_t + \alpha_4 IRV_t + \alpha_5 ERV_t + \varepsilon_t \ldots(2)$$

where $\alpha_0,\ \alpha_1, \alpha_2, \alpha_3, \alpha_4 and\ \alpha_5$ are coefficients and GV is the growth volatility, FI is the Financial Inclusion index, GE is the Government Expenditure, IRV is the Interest Rate Volatility and ERV is the Exchange Rate volatility. Hence, ε_t is the error term.

Figure 1: Conceptual Framework



3.2 Estimation Method

The study has used Pesaran et al. (2001) ARDL to look at the connection between FI, TO and GV. Following the Pesaran & Smith (1998) the ARDL equation is given below:

$$\Delta GV_t = \alpha_i + \sum_{i=1}^{m} b_i \Delta GV_{t-i} + \sum_{i=1}^{n} c_i \Delta FI_{t-i} + \sum_{i=1}^{o} d_i \Delta TO_{t-i} + \sum_{i=1}^{p} e_i \Delta GE_{t-i} + \sum_{i=1}^{q} f_i \Delta IRV_{t-i} + \sum_{i=1}^{r} g_i \Delta ERV_{t-i} + \lambda_1 GV_{t-1} + \lambda_2 FI_{t-1} + \lambda_3 TO_{t-1} + \lambda_4 GE_{t-1} + \lambda_5 IRV_{t-1} + \lambda_6 ERV_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots(3)$$

The parameters α_i, b_i, c_i, d_i, e_i, f_i and g_i e represent the short-run dynamic whereas the parametrs λ_1, λ_2, λ_3, λ_4, λ_5 *and* λ_6 depict the level relationship (long-term). We investigate the level relationship by testing the null hypothesis below:

H_o: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$ (Long-term relationships don't exist)

H_1: at least one λ is not equal to zero (Long-term relationships exist.)

In particular, the ARDL method works well with small-sample estimation and is efficient when the variables under consideration are integrated of mixed order. Furthermore, both short-term dynamics and long-term equilibrium relationships can be calculated using the ARDL model. in a single reduced form model, which helps to avoid the possible endogeneity problem and omitted variable bias that can be caused by the traditional cointegration method. The study also accounts for the possibility of structural breaks occurring due to significant macroeconomic and financial events such as the 2008 global financial crisis, episodes of domestic economic instability, exchange rate adjustments, and the COVID-19 pandemic. The shocks can cause a parameter instability and a change in the long-run relationship between these variables. The ARDL approach is relatively strong when dealing with structural change in small sample. Post-estimation diagnosis and stability tests such as the CUSUM and CUSUMSQ procedures are used to assess the stability and reliability of the estimated coefficients. These tests provide the stability of the estimated parameters for the sample period and help to substantiate the robustness of the empirical results.

3.3 Data

The analysis employed secondary data for Pakistan from 2004 to 2023; the availability of the data dictated the sample size. Data is taken out of the World Development Indicator (WDI) and global financial development databases. The Principal Component Analysis (PCA) technique is used to build the financial inclusion index in order to decrease dimensionality and to merge several indicators of financial access into a single composite indicator with minimal loss of information. We have used six FI indicators including Automated Teller Machines (ATMs) per 100,000 adults, borrowers from commercial banks per 1000 adults, depositors with commercial banks per 1000 adults, commercial bank branches per 100,000 adults, domestic credit to the private sector by banks (% of GDP) and bank deposits (% of GDP) as used Wasim et al. (2022) and Chinoda (2020). 'Trade (% of GDP)' used for TO, 'GDP (constant 2015 US$)' for growth, 'lending interest rate (%)' has been included for interest rate, 'Nominal Effective Exchange Rate (NEER)' has been used for exchange rate and 'general government final consumption expenditure (% of GDP)' taken for GE, we have measures volatility of interests rate, exchange rate and growth rate through ARCH and GARCH.

Table 1: Expected Signs and Economic Interpretation of the variables

Variable	Expected Sign	Economic Interpretation
Financial Inclusion (FI) *(PCA Index)*	Negative (−)	FI, constructed from 'six indicators (ATMs, borrowers, depositors, bank branches, credit to private sector, and bank deposits)', enhances access, usage, and depth of financial services. It improves risk-sharing, stabilizes consumption and investment, and thereby reduces growth volatility.
Trade Openness (TO)	Ambiguous (+/−)	TO increases exposure to external shocks, which may raise growth volatility in the short run; however, it can reduce volatility in the long run through diversification, technological spillovers, and improved resource allocation.
Interest Rate Volatility (IRV)	Positive (+)	Higher volatility in lending interest rates increases uncertainty in borrowing and investment decisions, leading

		to unstable economic activity and higher GV.
Exchange Rate Volatility (ERV)	Positive (+)	Exchange rate fluctuations create external uncertainty, disrupt trade and capital flows, and increase macroeconomic instability, thereby amplifying growth volatility.
Government Expenditure (GE)	Ambiguous (+/−)	GE can stabilize economic fluctuations through counter-cyclical fiscal policy; however, inefficient or excessive spending may distort resource allocation and increase volatility.

Note: 'Growth volatility, interest rate volatility, and exchange rate volatility are estimated using ARCH and GARCH models following Engle (1982) and Bollerslev (1986), which capture time-varying conditional heteroscedasticity in macroeconomic series.

4. Results and Discussion

The first step of the empirical analysis is to study the descriptive statistics (Table 2) to gain a basic understanding of the properties of the variables. This is then followed by the diagnostic and econometric analyses to investigate the relationships between the variables of GV, FI, TO, ERV, IRV and GE. The outcomes are analyzed in such a manner as to provide an extensive understanding of the dynamics underpinning them.

Table 2: Descriptive Statistics

Variable	GV	FI	TO	GE	IRV	ERV
Mean	110.962	-0.195	119.315	92.197	2.719	1.642
Maximum	124.635	2.368	138.457	94.378	5.398	3.116
Minimum	79.599	-2.884	99.569	76.749	0.000	0.000
SD	9.9114	2.042	12.4368	6.9751	1.240	0.7928
Skewness	-2.148	-0.220	-0.170	-1.037	-0.420	-0.324
Kurtosis	8.531	1.460	1.733	3.307	4.246	3.341
Jarque–Bera	38.850	2.031	1.360	3.481	1.789	0.426

The unit root results in Table 3 is based on the ADF and PP tests indicate a mixed order of integration among the variables, justifying the use of the ARDL bounds testing approach. Specifically, TO, GE, IRV, and ERV are found to be stationary at level, I (0), as their *p*-values are below conventional significance levels in at least one of the tests. In contrast, FI becomes stationary after first differencing indicating integration of order I (1), while GV shows stationarity at difference in ADF but in case of PP it is stationary at level. Importantly, none of the variables are integrated of order I (2), satisfying a key precondition for the applicability of the ARDL model.

Table 3: Unit Root Test

Variable	GV	FI	TO	GE	IRV	ERV
ADF Test						
Level I(0)	-2.063	0.591	-2.129	-3.791	-3.720	-6.605
P-value	(0.260)	(0.985)	(0.002) ***	(0.013) **	(0.013) **	(0.000) ***
First Diff. I(1)	-0.874	-2.412	-3.275	-6.314	-6.164	-11.936
P-value	(0.077)*	(0.010) **	(0.032) **	(0.000) ***	(0.000) ***	(0.000) ***
PP Test						
Level I(0)	-3.840	0.430	-2.244	-3.552	-3.720	-6.290
P-value	(0.000) ***	(0.978)	(0.198)	(0.017) **	(0.013) **	(0.000) ***
First Diff. I(1)	-3.672	-3.230	-3.174	-6.406	-7.658	-7.323
P-value	(0.014) **	(0.000) ***	(0.039) **	(0.000) ***	(0.000)***	(0.000)***

Note: ADF = 'Augmented Dickey–Fuller'; PP = 'Phillips–Perron'.

There is a long-term link between the variables, according to the ARDL bounds test results shown in Table 4. For the finite sample (n = 30), the calculated F-statistic (6.935) is more than the upper bound critical values at the 10% and 5% significance levels, which are 3.517 and 4.193, respectively. As a result, the null hypothesis that there is no cointegration is rejected. At standard significance levels, the findings support cointegration. Consequently, the findings support the estimation of both long-run and short-run dynamics within the ARDL framework by confirming the existence of a stable long-run equilibrium connection.

Table 4: ARDL Bound Test

Test Statistic	**Value**	
F-statistic	6.935	
Significance	I(0) Lower Bound	I(1) Upper Bound
10%	2.407	3.517
5%	2.910	4.193
1%	4.134	5.761

Note: Note: Critical values are based on Pesaran et al. (2001). The null hypothesis is no long-run relationship.

The ARDL results in Table 5 provide robust evidence, that FI exhibits a detrimental and notable impact on GV, which indicates that FI reduce GV. FI, constructed from six indicators as explained in the data section, enhances access, usage, and depth of financial services. It improves risk-sharing, stabilizes consumption and investment, and thereby reduces GV. This is in line with (Isayev, 2025; Cavoli & Gopalan, 2023; Wang & Wang, 2022). TO coefficient is negative and significant showing that TO reduce GV, which indicates that external integration promotes technology diffusion, competitive efficiency, and scale economies this is consistent with Mireku et al. (2017). In the same vein, GE coefficient is negative and substantial which can be taken as Keynesian and fiscal-led growth views especially in developing economies where government investment is used to provide solutions to infrastructure and market failures which will contribute to decreasing volatility of growth. Also, government spending can even out economic fluctuations by counter-cyclical fiscal policy, but inefficient or excessive spending can distort resource allocation and make the fluctuations even more volatile.

The long-term connection between ERV and GV coefficient exhibits positive sign which is also significant indicating that, ERV bring about external uncertainty, trade and capital flows, and macroeconomic instability hence amplifying GV as Salah (2025) and Khusni and Nurviliza (2025) found. IRV has a positive, and significant influence on MV indicating, the greater the volatility in lending interest rates the greater the uncertainty in borrowing and investment decisions, which results in volatile economic activity and greater volatility of growth. In the short-run, TO, GE and ERVs have significant effects on GV because coefficients of these variables are positive, which means that higher external integration and macroeconomic policy changes impart immediate shocks in domestic output dynamics. This implies that even though openness and fiscal activity could be more efficient in the long run, they increase short run adjustment costs by exposing the economy to external shocks, fiscal pro-cyclicality and exchange rate uncertainty. The Error Correction Term (ECT) is statistically significant and negative. A steady long-term relationship is supported by the ECT, with a relatively fast adjustment rate, meaning that the system is efficient in converting shocks (in the short-run) to equilibrium.

Table 5: Estimated Coefficients from the ARDL model

Variables	**Coefficient**	***t*-statistic**	***p*-value**	**Sig**
Long Run Estimation (1,0,1,1,0,1)				
Long Run Estimates				
FI	-1.367	-3.393	0.000	***

TO	-0.505	-12.805	0.000	***
GE	-2.834	-3.140	0.013	**
IRV	0.276	1.871	0.098	*
ERV	0.674	2.558	0.028	**
Constant (C)	0.914	2.110	0.045	**
Short Run Estimates				
Δ TO	0.233	7.781	0.000	***
Δ GE	1.525	4.182	0.000	***
Δ ERV	3.419	10.654	0.000	***
Error Correction Term (ECT)	-0.577	-5.208	0.000	***
Diagnostic Tests				
Breusch–Pagan–Godfrey (F-stat)	2.048	—	0.171	
White Test (F-stat)	1.038	—	0.560	
Ramsey RESET Test (F-stat)	3.195	—	0.083	
Jarque–Bera Test	3.031	—	0.220	

Note: Δ denotes first difference capturing short-run dynamics. *, **, *** shows significance at 10%, 5% and 1% respectively.

We have used the CUSUM and CUSUMSQ tests to determine the stability of the estimated ARDL model. The graphical outcomes in Figure 2 and Figure 3 show that the plots of the two tests do not go out of the crucial limits at the significance level of 5%. This establishes that there is no structural instability and parameter instability during the period of the study. Thus, the approximate coefficients are consistent and sound, and the model can be applied to inferences and make predictions in terms of policy.

Figure 2. CUSUM for Parameter Stability

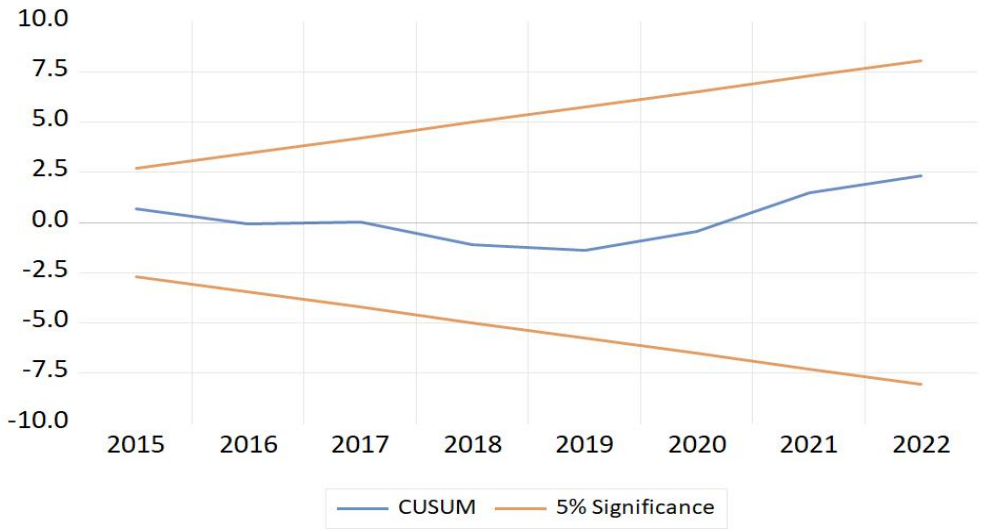
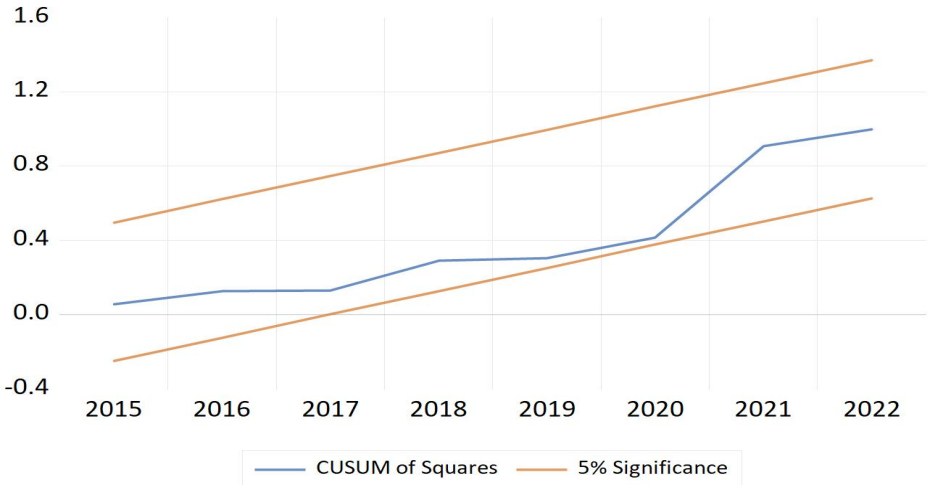


Figure 3. CUSUM of square for Parameter Stability



5. Conclusion and Policy Recommendations

This study examined the relationship between FI, TO, and GV in Pakistan using the ARDL bounds testing framework. The study also included GE, IRV and ERV to see their impact on GV. The findings provide robust evidence of a long-run equilibrium relationship among the variables. The ARDL results reveal that FI, TO, and GE reduce GV in the long run, while ERV and IRV increase it. In the short run, TO, GE, and ERV amplify GV. The model confirms a stable long-run equilibrium with rapid adjustment to shocks. From a policy perspective, several important implications arise. First, policymakers in Pakistan should prioritize expanding financial inclusion by promoting digital financial services, strengthening banking penetration in underserved regions, and improving financial literacy. A more inclusive financial system can enhance economic resilience and mitigate volatility. Second, trade policy should focus on export diversification, value-added production, and the development of shock-absorbing mechanisms to reduce vulnerability to global disturbances. Third, strengthening institutional quality, regulatory frameworks, and financial market infrastructure is essential to maximize the stabilizing benefits of both FI and TO. Coordinated macroeconomic policies that integrate financial and trade reforms can further support sustainable and stable growth.

Notwithstanding its merits, this research has limitations. The analysis relies on aggregate time-series data, which may mask regional disparities and sector-specific dynamics within the economy. Additionally, the measurement of financial inclusion is constrained by data availability and may not fully capture qualitative dimensions such as financial access, usage, and efficiency. The ARDL approach, while appropriate for small samples and mixed integration orders, may not fully account for structural breaks or nonlinear relationships in the data. Future research can extend this work in several directions. First, employing disaggregated or panel data at regional or sectoral levels could offer more profound understanding of the heterogeneous effects of FI and TO. Second, incorporating nonlinear models or threshold techniques would help capture asymmetric and regime-dependent effects. Third, future studies may explore the role of institutional quality, digital financial innovation, and external shocks (e.g., global financial crises or pandemics) as moderating factors. Expanding the analysis to a cross-country framework, particularly across emerging markets, would also make the results more broadly applicable.

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There have been no ethical violations in this study.

Author Contributions:
Nazish Kanval: Conceptualization, Methodology, Data Curation, Software, Writing – original draft preparation, Writing – reviewing and editing.
Hajra Ihsan: Conceptualization, Software, Writing – reviewing and editing.
Misbah Aslam: Conceptualization, formal analysis, writing - reviewing and editing.

References

Abbas, M. N., & Andlib, Z. (2026). Digitalization, Climate Change, and Labor Force Participation: Empirical Evidence and Policy Perspectives. Pakistan Journal of Economic Studies (PJES), 9(1), 40-50.

Abor, J.Y., M. Amidu and H. Issahaku, (2018). Mobile telephony, financial inclusion and inclusive growth. *Journal of African Business, 19(*3): 430-453. https://doi.org/10.1080/15228916.2017.1419332.

Ahmad, W., Majeed, T., & Andlib, Z. (2020). Tourism led growth hypothesis: Empirical evidence from five South Asian countries. *Bulletin of Business and Economics (BBE)*, *9*(1), 51-59.

Ali, B., Shahzad, K., & Sarwar, B. (2024). Determinants of foreign direct investment: A cross-country analysis of South Asia. *Journal of Economic Sciences, 3*(2), 213-226.

Andlib, Z., Scicchitano, S., & Padda, I. U. H. (2024). The role of natural resources, fintech, political stability, and social globalization in environmental sustainability: Evidence from the United Kingdom. *Resources Policy*, *91*, 104922.

Andrés, J., Doménech, R., & Fatás, A. (2008). The stabilizing role of government size. *Journal of Economic Dynamics and Control, 32*(2), 571-593. https://doi.org/10.1016/j.jedc.2007.02.006

Ayyagari, M., Demirgüç-Kunt, A., & Maksimovic, V. (2011). Firm innovation in emerging markets: The role of finance, governance, and competition. *Journal of Financial and Quantitative Analysis, 46*(6), 1545–1580. https://doi.org/10.1017/s0022109011000378

Azam, M., & Khan, S. (2022). Threshold effects in the relationship between inflation and economic growth: Further empirical evidence from the developed and developing world. *International Journal of Finance & Economics, 27*(4), 4224-4243. https://doi.org/10.1002/ijfe.2368

Beck, T., Demirguc-Kunt, A., & Honohan, P. (2009). Access to financial services: Measurement, impact, and policies. *The World Bank Research Observer,* 24(1), 119–145. https://doi.org/10.1093/wbro/lkn008

Bernheim, B. D. (1989). A neoclassical perspective on budget deficits. *Journal of Economic Perspectives, 3*(2), 55–72. https://doi.org/10.1257/jep.3.2.55

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of Econometrics, 31*(3), 307–327. https://doi.org/10.1016/0304-4076(86)90063-1

Calderón, C., Loayza, N., & Schmidt-Hebbel, K. (2006). *External conditions and growth performance*. Banco Central de Chile. https://tinyurl.com/bdenvjfr

Carmignani, F., Colombo, E., & Tirelli, P. (2007). Public expenditure and growth volatility: Do" globalisation" and institutions matter?. Working Paper Dipartimento di Economia Politica, Università di Milano Bicocca; 116.

Carmignani, F., Colombo, E., & Tirelli, P. (2011). Macroeconomic risk and the (de)stabilising role of government size. European *Journal of Political Economy, 27*(4), 781–790. https://doi.org/10.1016/j.ejpoleco.2011.04.002

Cavallo, E. A., & Frankel, J. A. (2008). Does openness to trade make countries more vulnerable to

Cogan, J. F., Cwik, T., Taylor, J. B., & Wieland, V. (2010). New Keynesian versus old Keynesian sudden stops, or less? Using gravity to establish causality. *Journal of International Money and Finance, 27*, 1430–1452. https://doi.org/10.1016/j.jimonfin.2007.10.004

Cavoli, T., & Gopalan, S. (2023). Does financial inclusion promote consumption smoothing? Evidence from emerging and developing economies. *International Review of Economics & Finance, 88*, 1529–1546. https://doi.org/10.1016/j.iref.2023.07.037

Chauvet, L., & Jacolin, L. (2017). Financial inclusion, bank concentration, and firm performance. *World Development, 97,* 1–13. https://doi.org/10.1016/j.worlddev.2017.03.018

Chinoda, T. (2020). The nexus between financial inclusion, trade and economic growth in Africa? *Transnational Corporations Review, 12(*3), 266–275. https://doi.org/10.1080/19186444.2020.1742065

government spending multipliers. *Journal of Economic Dynamics and Control, 34*(3), 281-295. https://doi.org/10.1016/j.jedc.2010.01.010

Daud, S. N. M., & Ahmad, A. H. (2023). Financial inclusion, economic growth and the role of digital technology. *Finance Research Letters, 53*, 103602. https://doi.org/10.1016/j.frl.2022.103602

Down, I. (2007). Trade openness, country size and economic volatility: The compensation hypothesis evisited. *Business and Politics, 9*(2), 1–20. https://doi.org/10.2202/1469-3569.1201

Ehrlich, S. D., & Hearn, E. (2013) Does compensating the losers increase support for trade? An experimental test of the embedded liberalism thesis. Foreign Policy Analysis. doi: https://doi.org/10.1111/fpa.12001

Elmendorf, D. W., & Mankiw, N. G. (1999). Government debt. *Handbook of Macroeconomics, 1*, 1615-1669.

Engle, R. F. (1982). Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. *Econometrica, 50*(4), 987-1007.

Everaert, G., & Vierke, H. (2016). Demographics and business cycle volatility: A spurious relationship? *Journal of Applied Econometrics, 31*(7), 1467-1477.

Farooq, U., Gang, F., Guan, Z., Rauf, A., Chandio, A. A., & Ahsan, F. (2023). Exploring the long-run relationship between financial inclusion and agricultural growth: Evidence from Pakistan. *International Journal of Emerging Markets*, *18*(7), 1677-1696.

Fujii, E. (2015). Government size, trade openness, and output volatility: A case of fully integrated economics (CESifo Working Paper No. 5563).

Gourieroux, C., & Jasiak, J. (2018). Financial econometrics: Problems, models, and methods. Princeton University Press.

Gretta, S. A. A. B. (2017). Financial inclusion and growth. *The Business & Management Review*, *8*(4), 434.

Haddad, M., Lim, J. J., Pancaro, C., & Saborowski, C. (2013). Trade openness reduces growth volatility when countries are well diversified. *Canadian Journal of Economics, 46*(2), 765–790. https://doi.org/10.1111/caje.2013.46.issue-2

Hassan, A. A., & Khan, E. (2025). What drives inflation in oic economies? A fixed-effects panel approach. *Journal of Economic Sciences, 4*(2), 81-97.

Isayev, M. (2025). Financial inclusion and economic growth: The role of non-bank financial intermediation. *International Review of Economics & Finance*, 104829.

Kadid, A. (2015). Nouvelle Approche de Mesure de l'Ouverture Commerciale dans les Modèles de Gravite new approach to measure the opening in business models of gravity. *Academic Journal of Social and Human Studies, 13*(1) 9–18. https://doi.org/10.12816/0034533

Kanval, N., & Ihsan, H. (2025). Terms of trade volatility, financial integration and macroeconomic fluctuations: A global panel analysis. *Journal of Management Practices, Humanities and Social Sciences, 9*(4), 218-231. https://doi.org/10.33152/jmphss-9.4.2

Khusni, K., & Nurviliza, O. (2025). Navigating economic turbulence: Exchange rate volatility and macroeconomic resilience in open economies. *Sosioedukasi: Jurnal Ilmiah Ilmu Pendidikan Dan Sosial*, *14*(2), 917-932.

Makin, A. J. (2013). The policy (in) effectiveness of government spending in a dependent economy. *Journal of Economic Policy Reform, 16*(3), 287–301. https://doi.org/10.1080/17487870.2013.812937

Mankiw, N. G. (2000). The Savers–Spenders Theory of Fiscal Policy. *American Economic Review, 90*(2), 120–125. https://doi.org/10.1257/aer.90.2.120

Mehrotra, A. N., & Yetman, J. (2015). Financial inclusion-issues for central banks. BIS Quarterly Review March. Available at. https://shorturl.at/x4CM5

Mireku, K., Animah Agyei, E., & Domeher, D. (2017). Trade openness and economic growth volatility: An empirical investigation. *Cogent Economics & Finance, 5*(1), 1385438. https://doi.org/10.1080/23322039.2017.1385438

Mohanty, M. S., & Zampolli, F. (2009). Government size and macroeconomic stability. BIS Quarterly Review. Available at. https://shorturl.at/FLd0P

Monacelli, T., & Perotti, R. (2008). Fiscal policy, wealth effects, and markups (No. w14584). National Bureau of Economic Research.

Mushtaq, M., Hameed, G., Mahmood, N., & Hanif, M. (2025). Financial development, financial globalization, and economic growth volatility: A comparative analysis for developing and developed economies. *Journal of the Knowledge Economy, 17(*1), 1847–1875. https://doi.org/10.1007/s13132-025-02722-9

Okere, P. A., Kingsley C, O., Lawrence N, U., & P.N, O. (2018). Financial inclusion and economic growth of Nigeria (the microfinance option). *International Journal for Innovation Education and Research, 6(*2), 61–74. https://doi.org/10.31686/ijier.vol6.iss2.949

Otiwu, K., Okere, P. A., & Uzowuru, L. N. (2018). Determinants of private domestic savings in Nigeria (1981-2015). *International Journal for Innovation Education and Research, 6*(2), 21-40. https://doi.org/10.31686/ijier.vol6.iss2.938

Oyadeyi, O. O. (2024a). The macroeconomic determinants of exchange rate volatility and the impact of currency volatility on the performance of the Nigerian economy. *Foreign Trade Review, 61*(1), 79–108. https://doi.org/10.1177/00157325241295884

Oyadeyi, O. O. (2024b). Macroeconomic Uncertainty and Sectoral Output in Nigeria. *Economies, 12(*11), 304. https://doi.org/10.3390/economies12110304

Ozili, P. K., Ademiju, A., & Rachid, S. (2023). Impact of financial inclusion on economic growth: Review of existing literature and directions for future research. *International Journal of Social Economics*, *50*(8), 1105-1122.

Pesaran, H. M., & Pesaran, B. (1997). Microfit 4.0. Oxford University Press.

Pesaran, M. H., & Smith, R. P. (1998). Structural analysis of cointegrating VARs. *Journal of Economic Surveys*, *12*(5), 471-505.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289-326. https://doi.org/10.1002/jae.616

Ramoni-Perazzi, J., & Romero, H. (2022). Exchange rate volatility, corruption, and economic growth. *Heliyon, 8*(12), e12328. https://doi.org/10.1016/j.heliyon.2022.e12328

Razin, A., Sadka, E., & Coury, T. (2003). Trade openness, investment instability and terms-of-trade volatility. *Journal of International Economics, 61*, 285–306. https://doi.org/10.1016/S0022-1996(03)00014-X

Saha, S. (2025). The effects of financial inclusion and openness on economic growth: Evidence from Asian countries. *Journal of Economic Studies (ahead-of-print)*. https://doi.org/10.1108/JES-05-2025-0304

Sakyi, D., Villaverde, J., & Maza, A. (2015). Trade openness, income levels, and economic growth: The case of developing countries, 1970–2009. *The Journal of International Trade & Economic Development, 24*(6), 860 882. https://doi.org/10.1080/09638199.2014.971422

Salah, A. R. M. (2025). Exchange rate fluctuations and their effect on national economies.

Stoilova, D., & Todorov, I. (2021). Fiscal policy and economic growth: Evidence from Central and Eastern Europe. *Journal of Tax Reform, 7*(2), 146-159. https://doi.org/10.15826/jtr.2021.7.2.095

Sun, T. (2018). Balancing innovation and risks in digital financial inclusion—experiences of ant financial services group. In *Handbook of Blockchain, Digital Finance, and Inclusion, Volume 2* (pp. 37-43). Academic Press.

Thornton, J. (2010). government size and the stability of output: evidence from emerging market economies. *Applied Economics Letters, 17(*8), 733–736. https://doi.org/10.1080/13504850802464117

Van, L. T.-H., Vo, A. T., Nguyen, N. T., & Vo, D. H. (2019). Financial inclusion and economic growth: An international evidence. *Emerging Markets Finance and Trade, 57*(1), 239–263. https://doi.org/10.1080/1540496x.2019.1697672

Wang, X., & Wang, X. (2022). Digital financial inclusion and household risk sharing: Evidence from China's digital finance revolution. *China Economic Quarterly International, 2*(4), 334–348. https://doi.org/10.1016/j.ceqi.2022.11.006

Wasim, S. Z., Iftikhar, K., & Rizvi, S. Z. A. (2022). Relationship between financial inclusion, trade, and economic growth. *Pakistan Journal of Social Research*, *4*(03), 675-684.

Zafar, S., Andlib, Z., Fareed, Z., & Rehman, M. A. (2026). Food Security and Environmental Pollution: Policy Directions in the Face of COVID19. *Food and Environmental Virology*, *18*(1), 2.

Zhuang, J., Gunatilake, H., Niimi, Y., Ehsan Khan, M., Jiang, Y., Hasan, R., & Huang, B. (2009). Financial sector development, economic growth, and poverty reduction: A literature review. ADB Economics Working Paper Series, No. 173.