



Does Inflation Volatility Affect Economic Growth? Evidence from Developed and Developing Economies

Akshay Suketh Swamy

The International School Bangalore, India

sakshay@tisb.ac.in

<http://dx.doi.org/10.47814/ijssrr.v9i5.3437>

Abstract

This study examines the impact of inflation volatility on GDP growth across selected developed (Japan, USA) and developing (India, Nigeria) economies over the period 2010–2024. Using annual macroeconomic data from the World Bank, inflation volatility is measured as the 3-year and 5-year rolling standard deviations of consumer price inflation, while annual inflation rates are included to control for level effects. The analysis employs a fixed-effects panel regression framework in Stata to estimate the relationship between inflation volatility and GDP growth, controlling country-specific heterogeneity. Visualizations and trend analyses are generated using Python to provide descriptive insights across development status, volatility regimes, and temporal periods. Baseline results indicate that moderate inflation volatility positively influences GDP growth, particularly in developing countries and high-volatility environments, whereas sustained high inflation exerts a negative effect. Interaction and subgroup analyses reveal that the post-COVID period (2020–2024) saw elevated inflation and volatility, but the core relationship between inflation variability and economic growth remains largely unchanged. Robustness checks using Driscoll-Kraay standard errors and lagged volatility measures confirm the stability of the findings, highlighting that the effects of inflation uncertainty are context-dependent. These results underscore the nuanced role of inflation volatility in shaping macroeconomic outcomes and suggest that policymakers should account for country-specific volatility regimes when designing growth-stabilizing policies. The study contributes to the literature by providing comparative evidence from both developed and developing economies and by examining the potential moderating influence of the COVID-19 period on growth dynamics.

Keywords: *Inflation Volatility, GDP Growth, Developed Economies, Developing Economies, Post-COVID, Panel Regression*

1. Introduction

Inflation and economic growth are the critical macroeconomic variables which policy makers strive to understand and manage. The classical theory of money holds that a small amount of inflation can be concomitant to a vigorous economic performance through damping real interest rates and encouraging

consumption and investment; robust and unstable inflation, on the other hand, distorts the price signals, destroys the purchasing power, and hampers long-term planning. Empirical research uniformly records that there is a negative correlation between inflation and growth over extended periods, particularly when inflation rates exceed certain specific levels (such as Sarel 1995; Gylfason and Herbertsson 2001; as surveyed in Pappas and Boukas 2025).

Besides the absolute amount of inflation, scholars have emphasized the importance of inflation volatility, the stochastic change of the price indices as an autonomous predictor of the macroeconomic performance. Friedman (1977) argued that increased volatility in inflation, implies more uncertainty hence economic decision making is distorted and output and employment stifled. This position is later empirically supported: Judson and Orphanides (1999) report a negative relationship between inflation volatility and income growth in a heterogeneous group of sovereign states, a fact that does not change with the average inflation. Empirical works that use forecast disagreement as a measure of inflation uncertainty also discover that high uncertainty reduces economic activity, in both firm-level output and employment.

Even though a large base of literature has explored the nexus of inflation volatility and economic growth in discrete regional contexts, such as the European Union, some of the studies have indicated a negative impact of volatility on economic growth (Pappas and Boukas 2025). However, the available literature has two major gaps. First, most of the seminal studies focus solely on the level of inflation or rely on the data that happened before 2010, which limits their application to macroeconomic phenomena that happened in the present. Second, comparative evidence on both developed and developing economies has a lack of comparative evidence using consistent methodological specifications and harmonized volatility measures. Further, few studies specifically test the relationship between the volatility of inflation and structural breaks or regime transitions, including the recent global economic turmoil.

To address these gaps, the current study examines how inflation volatility affects the growth of gross domestic product in a selected list of developed and developing countries between the years 2010 and 2024 using rolling standard deviations of inflation as volatility measures and fixed-effects panel regressions to determine causation. It also breaks down by development status and volatility regimes, which assesses possible heterogeneity and determines whether the post-COVID era is characterized by divergent macroeconomic dynamics.

2. Literature Review

The main elements of macroeconomics are inflation and economic growth that determine policy-making and the final outcome of long-term development. As Friedman (1977) and Sargent (1982) suggest, classical economic theory postulates that high and unpredictable inflation can undermine investment, distort consumption habits and decrease the growth in the long terms but moderate inflation can sometimes be thrust into spurring nominal expenditures and relieve the real burden of debt. The early empirical studies, especially the works of Paul, Mummert and Becker (1993, 1997) used the cross-country regression methods both in the developed and developing countries and indicated that there was a negative relationship between inflation and GDP growth, especially when the inflation rate exceeded the set markers. A similar conclusion was made by Barro (1995) and the researcher noted that higher inflation rates had lower per capita growth rates in the countries, hence the relevance of monetary stability in ensuring economic growth. These studies were very powerful, but they assumed that the effects of the inflation were linear and uniform in all countries and used quite old data, which restricted their applicability to the modern and highly integrated economies with increased macroeconomic volatility.

Afterwards, country specific and time series methods were used in future studies to capture the structural differences in different economies. Chibwe (2015) tested the relations between inflation and

GDP growth using cointegration and error correction models to find that the long-run relationship is negative in the case of Zambia but found that in Bangladesh mild inflation might lead to positive short-term growth (Sayeda, 2019) but excessive inflation continues to be a negative factor. Mallik and Chowdhury (2001) proposed the concept of inflation thresholds in four South Asian countries, they said that moderate levels of inflation might be in line with sustainable growth, but above that, it would be counterproductive. Although these studies were useful sources of domestic information, their small geographic area limited the externalization of their results, and they measured the level of inflation and not its variability or uncertainty.

More recent literature has used panel data and dynamic modelling to have heterogeneous effects across countries. Arai, Golinelli, and Parigi (2004) used vector autoregressive models of the G7 and revealed a two-way causality between the growth of the GDP and inflation and that economic booms and recession themselves affect the prices. Such analyses were furthered by Su (2024) and Chindengwike (2023) to include global panels and regional clusters and highlighted the fact that the inflation growth relationship is high context-dependent and macroeconomic structure-sensitive. Although these studies have improved in their methodology, much of them simply assume inflation to be a steady indicator even though the fluctuations or uncertainty may affect the economic performance.

The volatility of inflation, not to be confused with the average inflation, has become a key factor of growth that has been recognized to be critical. As noted by Judson and Orphanides (1996) uncertainty about inflation may result in stifled investment and the distortion of long-term contract under conditions of average inflation that may be moderate in nature. Apergis (2005) concluded that the emerging economies are more vulnerable to changes in inflation because of poor institutional structures compared to the highly developed economies which can absorb the volatility. Bloom (2009) highlighted that uncertainty shocks such as price and policy uncertainty interfere with the firm investment and household consumption thus creating fluctuations in aggregate growth. Ageli (2022) in the UK showed unequal effects, as short-term inflation surges had a more significant negative effect on growth compared to moderate and predictable growth. All these studies, taken together, highlight the need to consider the volatility of inflation, and not just look at average inflation to understand its impact on macroeconomic performance.

In addition to macro-level impacts, the transmission channels, and in particular microeconomic channels by which inflation volatility is going to impact growth has not been well investigated. The uncertainty that is created by heightened volatility encourages deferral of capital expenditures by firms (Bloom, 2009; Apergis, 2005) and discourages long-run investment. Households that face uncertain changes in prices might cut down consumption and engage precautionary saving especially in the developing economies (Ghosh and Phillips, 1998). The companies can also face a decrease in the total factor productivity when changes in input costs change the production decisions (Barro, 1995). These processes imply that impacts of volatility in inflation are not uniform across all sectors and income groups, which validates the empirical need to be analyzed with finesse.

The COVID-19 outbreak brought about the most massive macroeconomic shocks in the form of supply-chain disruptions, massive fiscal stimulus, and accommodative monetary policies (IMF, 2022; Pappas and Boukas, 2025). Those developments increased the inflation uncertainty across the world, which put the situation where the analysis before 2020 might have undermined the effects that volatility will have on growth. According to Pappas and Boukas (2025), even the more stable economies had high inflation and volatility in the pandemic, which is why it is significant to study the post-COVID periods to reflect these changes. Further on, third, institutional quality and policy credibility also moderate these effects. Economies that have stronger institutions tend to face greater risks of negative effects of unpredictable inflation compared to those with weaker institutions in terms of volatility and more stable growth results (Mishkin, 2007; Cukierman, 1992). Nevertheless, regardless of the abundance of literature on inflation and growth, there are still a number of limitations. Average inflation is analyzed without

considering volatility as an independent variable in most studies, post-COVID data are often not included, and cross-country comparisons are often based on a model which is outdated or inconsistent. The transmission channels are micro-level rather than macro-level, including the channels of investment and consumption, and such institutional considerations as credibility of central bank are typically not considered. The paper fills these gaps by examining the influence of inflation volatility on the GDP growth in four countries, which are developed and developing economies (India, Japan, Nigeria, and the United States) with 2010 to 2024 annual data. The research presents the heterogeneity of development status, volatility regime, and the period of the pandemic by utilizing fixed-effects panel regression models including interaction terms and can also give an insight into how inflation uncertainty influences macroeconomic outcomes under both pre- and post-COVID periods. This study offers a progressive insight to the understanding of a multifaceted relationship between inflation and growth by not relying on average inflation, which can be viewed as a step forward in predicting economic instability and can be applied by policymakers to manage the level of economic uncertainty.

3. Methodology

This section elaborates on the objectives of the study, the research design, the description of variables, and the analytical framework used to examine the impact of inflation volatility on GDP growth across selected countries.

3.1 Objectives of the Study

- (i) To examine the impact of inflation volatility on GDP growth across selected developed and developing countries over the period 2010–2024.
- (ii) To analyze differences in the inflation–GDP relationship across developed vs. developing countries and high- vs. low-inflation volatility environments.
- (iii) To assess whether the COVID-19 pandemic influenced the relationship between inflation volatility and GDP growth.

3.2 Research Design

This study employs a quantitative research design using annual secondary data from 2010 to 2024 for four countries representing developed and developing economies: India, Japan, Nigeria, and the United States. The dataset comprises 60 observations across six variables. Data on GDP growth and consumer price inflation were sourced from the World Bank. Inflation volatility was calculated as the rolling 3-year and 5-year standard deviations of annual inflation. Country development status was determined using internationally recognized classifications, and post-COVID dummy variables were included to account for structural changes during the pandemic. Graphical analyses were conducted in Python to visualize trends, while fixed-effects panel regressions were estimated in STATA to examine the relationship between inflation volatility and GDP growth. The panel data structure controls for unobserved country-specific heterogeneity while capturing temporal macroeconomic dynamics.

3.3 Description of Variables

The variables used in the study are summarized in Table 1.

Table 1: Description of Variables

Variable	Type	Description
GDP	Continuous	Annual GDP growth rate of the country (%)
Inflation	Continuous	Annual consumer price inflation rate (%)
infl_vol3	Continuous	3-year rolling standard deviation of annual inflation
infl_vol5	Continuous	5-year rolling standard deviation of annual inflation
postcovid	Dummy	1 if year \geq 2020, 0 otherwise
dev	Dummy	1 if country is developed (Japan, USA), 0 otherwise
high_vol	Dummy	1 if infl_vol5 $>$ 2, 0 otherwise

3.4 Analytical Framework

The analysis is conducted in three sequential stages:

3.4.1 Descriptive Statistics and Trend Analysis

Descriptive statistics and Python-generated graphs were used to explore GDP growth, inflation, and inflation volatility across countries, development status, and pre- vs. post-COVID periods. Visualizations highlight temporal dynamics, differences across volatility regimes, and structural shifts following the COVID-19 pandemic.

3.4.2 Fixed-Effects Panel Regression Analysis

A fixed-effects regression model is employed to estimate the impact of inflation volatility on GDP growth while controlling for annual inflation and country-specific effects. This approach accounts for unobserved heterogeneity across countries.

Baseline Model:

$$GDP_{it} = \alpha_i + \beta_1 infl_vol5_{it} + \beta_2 inflation_{it} + \varepsilon_{it}$$

Extended Model with Interactions:

$$GDP_{it} = \alpha_i + \beta_1 infl_vol5_{it} + \beta_2 inflation_{it} + \beta_3 (infl_vol5_{it} \times postcovid_{it}) + \beta_4 (infl_vol5_{it} \times dev_i) + \beta_5 (infl_vol5_{it} \times high_vol_{it}) + \varepsilon_{it}$$

Where, GDP_{it} = Annual GDP growth for country i in year t ; $inflvol5_{it}$ = 5-year inflation volatility; $inflation_{it}$ = Annual inflation rate; $postcovid_{it}$ = 1 for year \geq 2020, 0 otherwise; dev_i = 1 if developed country, 0 otherwise; $high_vol_{it}$ = 1 if high volatility, 0 otherwise; α_i = Country-specific fixed effect; ε_{it} = Error term

3.4.3 Subgroup and Interaction Analysis

Additional regressions are conducted to examine whether the effects of inflation volatility differ across developed vs developing countries, high vs low volatility environments, and pre- vs post-COVID periods. This helps identify heterogeneous impacts and contextual drivers of GDP growth.

3.4.4 Robustness Checks

Robustness is ensured by employing Driscoll-Kraay standard errors to account for heteroskedasticity, autocorrelation, and cross-sectional dependence. Lagged inflation volatility regressions are also used to capture potential dynamic effects.

4. Results and Findings

This section presents the empirical results of the study, encompassing descriptive statistics, panel regression estimates, interaction effects, subgroup analyses, and robustness checks. The primary objective is to examine the impact of inflation volatility on GDP growth across developed and developing countries, pre- and post-COVID periods, and high- versus low-volatility environments.

4.1 Descriptive Statistics

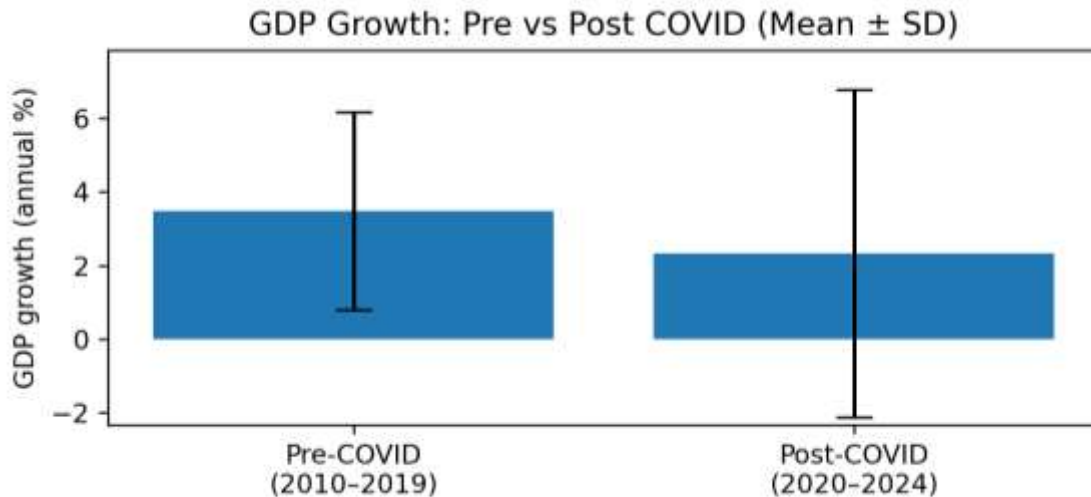
The descriptive analysis indicates notable differences in GDP growth, inflation, and inflation volatility across countries and periods. Developing countries such as India and Nigeria exhibit higher average GDP growth (4.55%) and inflation volatility (average 2.45% for 5-year rolling volatility) compared to developed countries like Japan and the United States, which show lower GDP growth (1.63%) and more stable inflation (average 1.20%). The post-COVID period demonstrates elevated inflation and volatility, with GDP growth declining on average to 2.33%, reflecting the macroeconomic impact of the pandemic. High-volatility countries experience greater fluctuations in both GDP and inflation, highlighting the sensitivity of these economies to macroeconomic uncertainty. These patterns underscore the importance of examining inflation volatility as a determinant of GDP growth across diverse economic settings. Table 2 summarizes the descriptive statistics.

Table 2: Summary Statistics of Key Variables

Subgroup	Obs	GDP (Mean ± SD)	Inflation (Mean ± SD)	infl_vol5 (Mean ± SD)
Pre-COVID (2010–2019)	40	3.48 ± 2.69	5.20 ± 4.98	1.70 ± 0.95
Post-COVID (2020–2024)	20	2.33 ± 4.46	8.25 ± 8.77	2.12 ± 1.72
Developed Countries	30	1.63 ± 1.83	1.70 ± 1.80	1.20 ± 0.60
Developing Countries	30	4.55 ± 3.93	10.75 ± 6.55	2.45 ± 1.45
High Volatility	21	3.85 ± 3.60	12.02 ± 7.38	3.15 ± 1.30
Low Volatility	39	2.67 ± 3.22	3.08 ± 3.18	1.12 ± 0.37

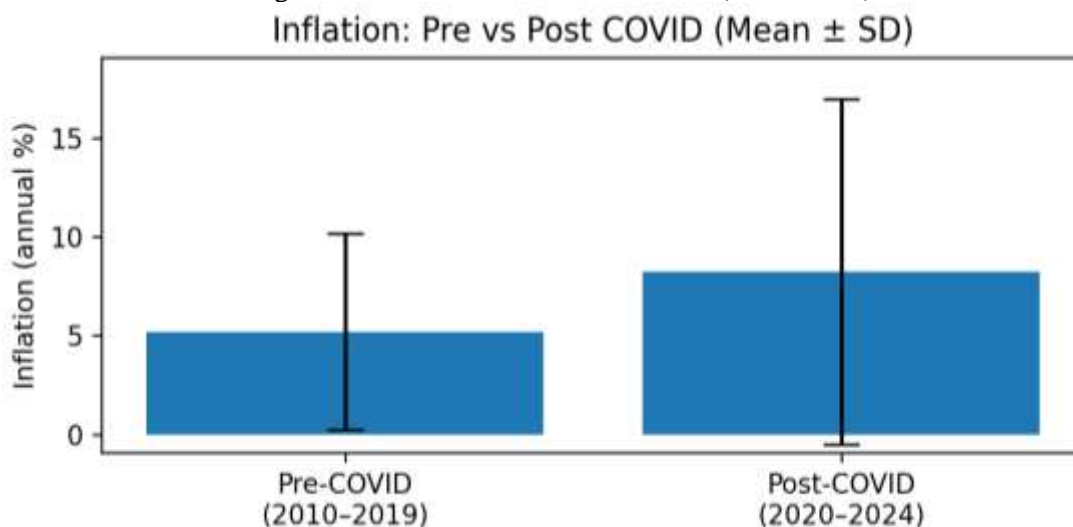
Figure 1 displays GDP growth pre- and post-COVID, illustrating lower mean growth and higher dispersion in the post-COVID period. Figure 2 presents average inflation across the same periods, showing higher and more variable inflation post-COVID. Figure 3 depicts 5-year rolling inflation volatility, confirming elevated price uncertainty after 2020.

Figure 1: GDP Growth - Pre vs. Post Covid (Mean \pm SD)



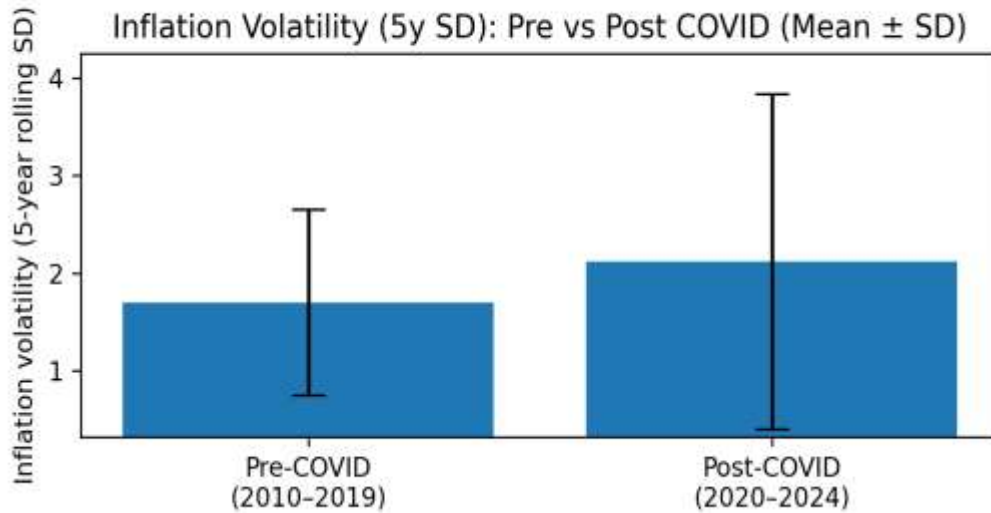
The pre/post comparison indicates that average GDP growth differs across regimes, with the post-COVID period generally showing lower mean growth and higher variability. This is consistent with the COVID shock, the effects of reopening, and the subsequent macro adjustment. The change in dispersion supports treating 2020–2024 as a distinct regime in the analysis.

Figure 2: Inflation—Pre vs. Post Covid (Mean \pm SD)



Average inflation is higher and more variable in the post-COVID period than in 2010–2019. This aligns with global supply disruptions, energy/commodity shocks, and strong demand rebounds after lockdowns. The regime shift provides a plausible channel through which inflation volatility could have a different relationship with growth after 2020.

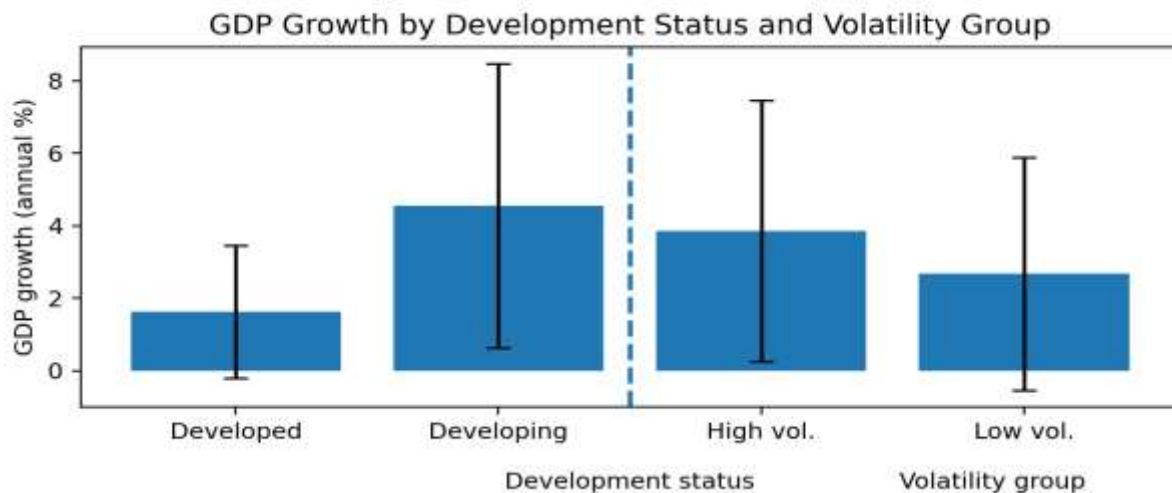
Figure 3: Inflation Volatility (5-Year SD)—Pre vs. Post Covid (Mean \pm SD)



Inflation volatility rises in the post-COVID period, implying greater price uncertainty relative to the pre-COVID decade. In macroeconomic theory, higher inflation uncertainty can reduce investment and distort planning, potentially leading to weaker or less stable growth outcomes.

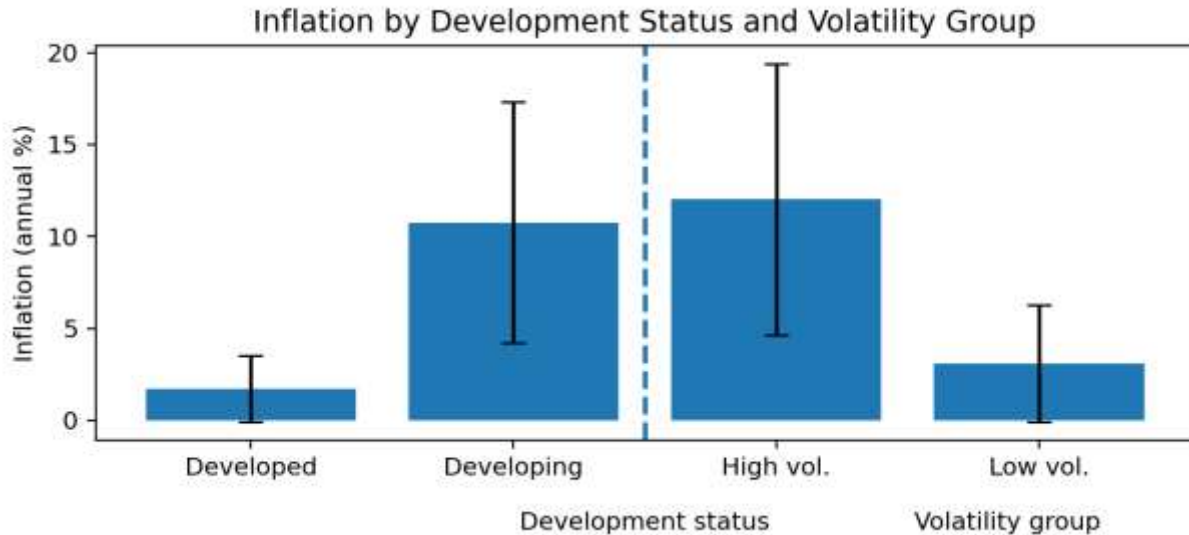
Further subgroup comparisons highlight the heterogeneity of macroeconomic outcomes. Figure 4 shows GDP growth by development status and volatility group: developing economies exhibit higher mean growth with larger dispersion, while high-volatility countries demonstrate both higher growth and instability. Figure 5 and Figure 6 show inflation levels and inflation volatility by development status and volatility group, indicating that volatility often co-moves with inflation, particularly in economies with weaker monetary credibility.

Figure 4: GDP Growth by Development Status and Volatility Group



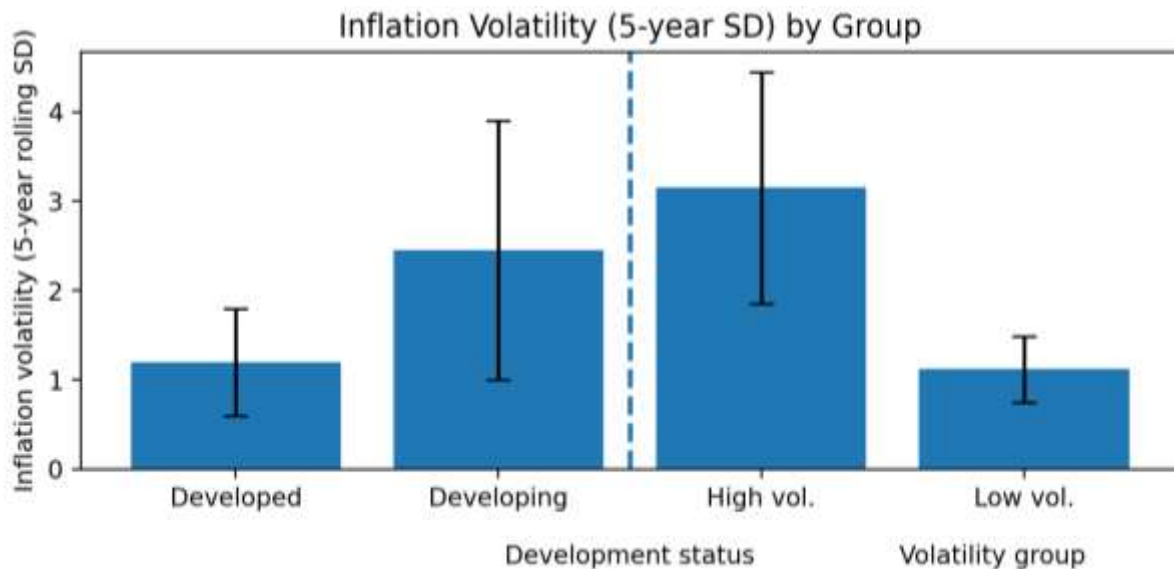
This figure compares average GDP growth across development status and inflation-volatility groups. Developing economies show higher mean GDP growth than developed economies, consistent with catch-up growth dynamics. The high-volatility group also shows relatively higher average growth but with larger dispersion, suggesting that higher average growth may come with greater instability.

Figure 5: Inflation by Development Status and Volatility Group



Inflation is substantially higher in developing economies than in developed economies and much higher in the high-volatility group than in the low-volatility group. This supports the idea that inflation volatility often co-moves with inflation levels, especially where supply shocks or weaker monetary credibility are more common. The pattern motivates controlling for inflation levels when estimating the relationship between volatility and growth.

Figure 6: Inflation Volatility (5-Year SD)

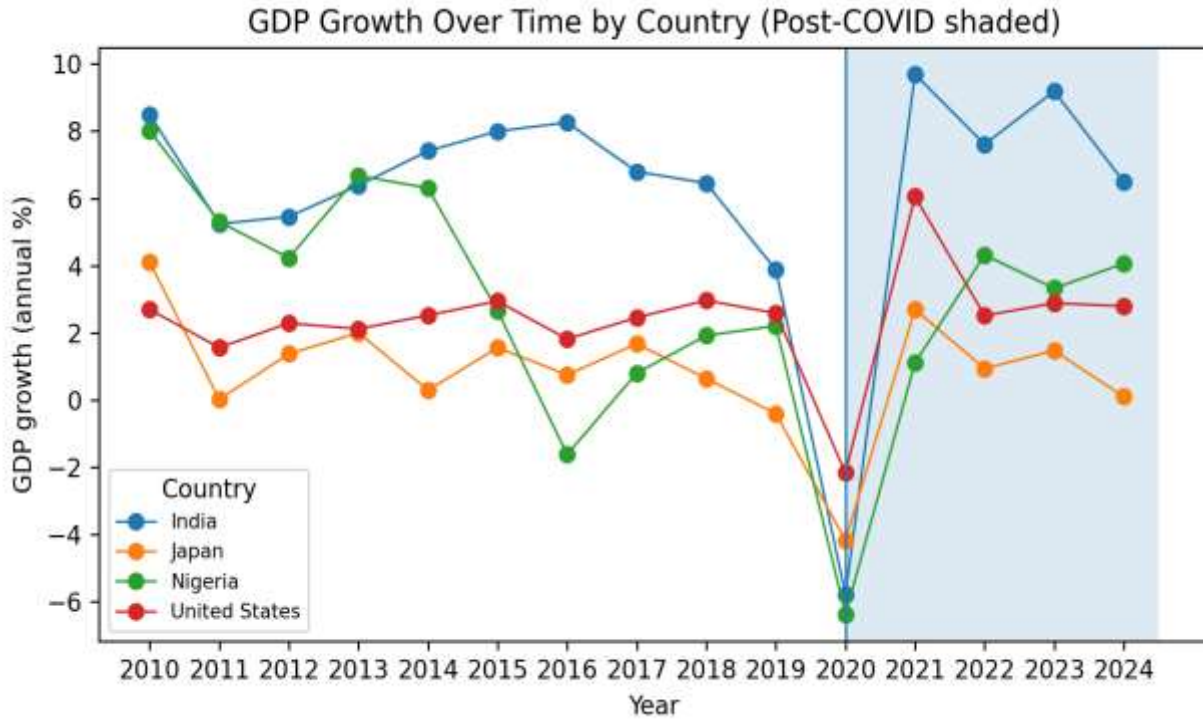


Inflation volatility (measured as the rolling standard deviation of inflation) is higher in developing economies. Higher volatility indicates a less predictable price environment, which can complicate investment planning and long-term contracting.

Country-specific trends are visualized in Figures 7–9, where GDP growth, inflation, and inflation volatility are plotted over time with the post-COVID period shaded. These charts reveal distinct growth

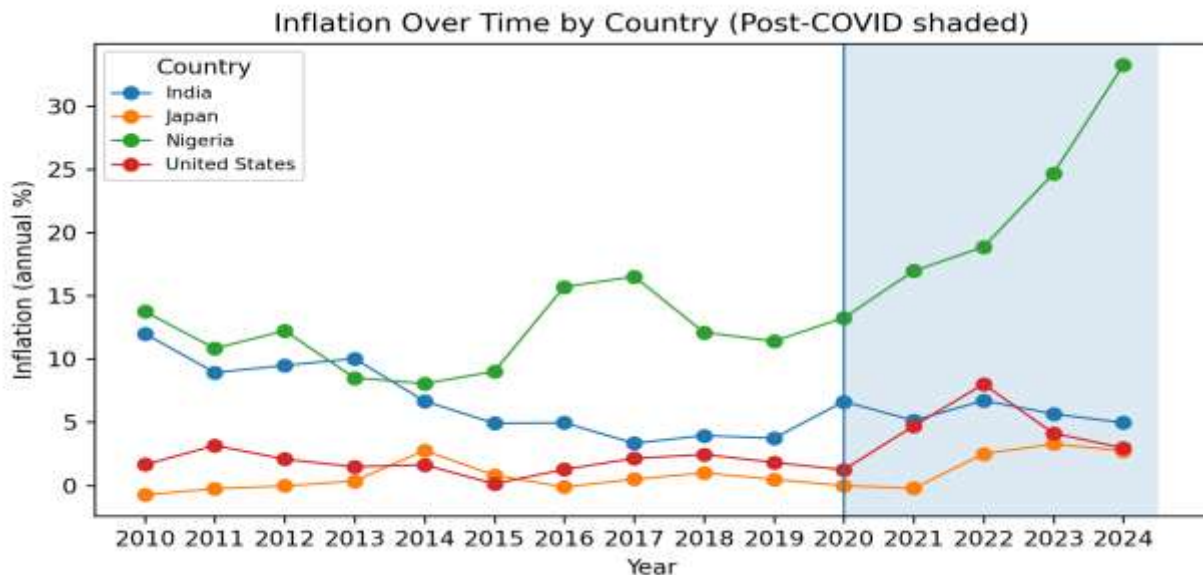
paths, larger swings, and weaker consistency in the post-COVID years, highlighting the differential impact of policy responses, supply shocks, and structural factors across countries.

Figure 7: GDP Growth over time by country (post-COVID shaded)



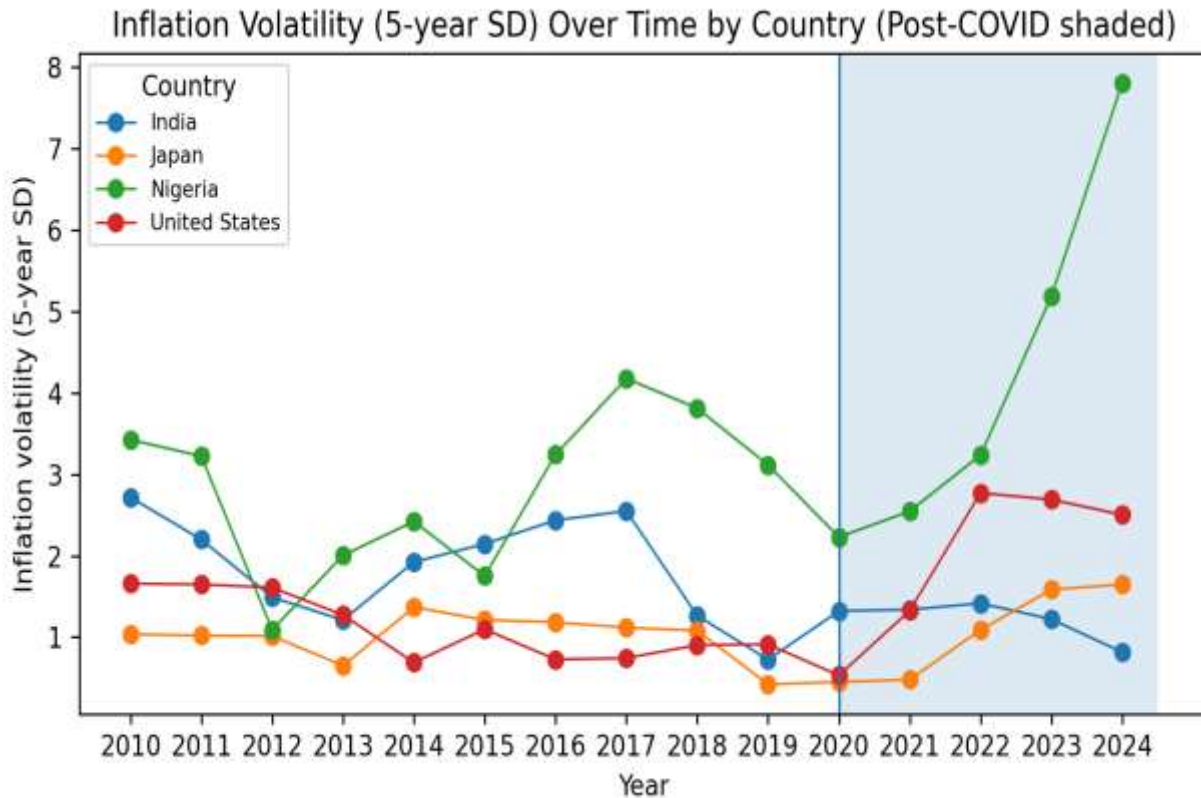
This figure shows that GDP growth follows distinct country-specific paths, with a clear break around the post-COVID shaded period (2020–2024). The post-COVID years generally show larger swings and weaker consistency in growth than the pre-COVID decade, reflecting the pandemic shock and uneven recovery dynamics. Differences across countries suggest that policy responses, exposure to global shocks, and structural factors shape growth outcomes.

Figure 8: Inflation Over Time by Country (Post- COVID shaded)



Inflation remained relatively stable in some countries during the pre-COVID decade, but the post-COVID period shows notable increases and more pronounced fluctuations in several cases. This pattern is consistent with a shift to a more turbulent inflation environment after 2020, potentially driven by supply-chain disruptions, energy/commodity shocks, and demand rebounds. The cross-country differences highlight that inflation dynamics depend strongly on monetary credibility, exchange-rate exposure, and domestic supply constraints.

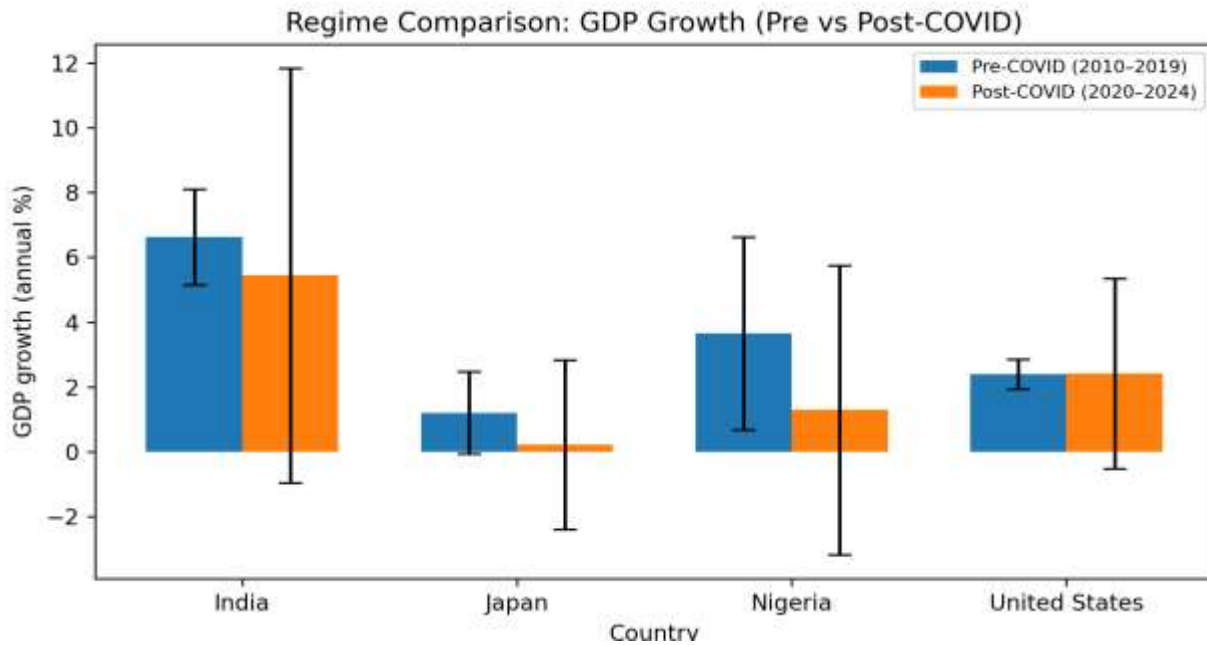
Figure 9: Inflation Volatility (5 Year SD) over time by country (Post Covid Shaded)



Inflation volatility (5-year rolling SD) fluctuates over time, but the post-COVID shaded period is associated with elevated volatility in some countries, suggesting a less predictable inflation regime. Because this is a rolling measure, increases typically reflect sustained instability over **several years** rather than a single spike. The figure supports treating 2020–2024 as a distinct period when testing whether the volatility–growth relationship changes after COVID.

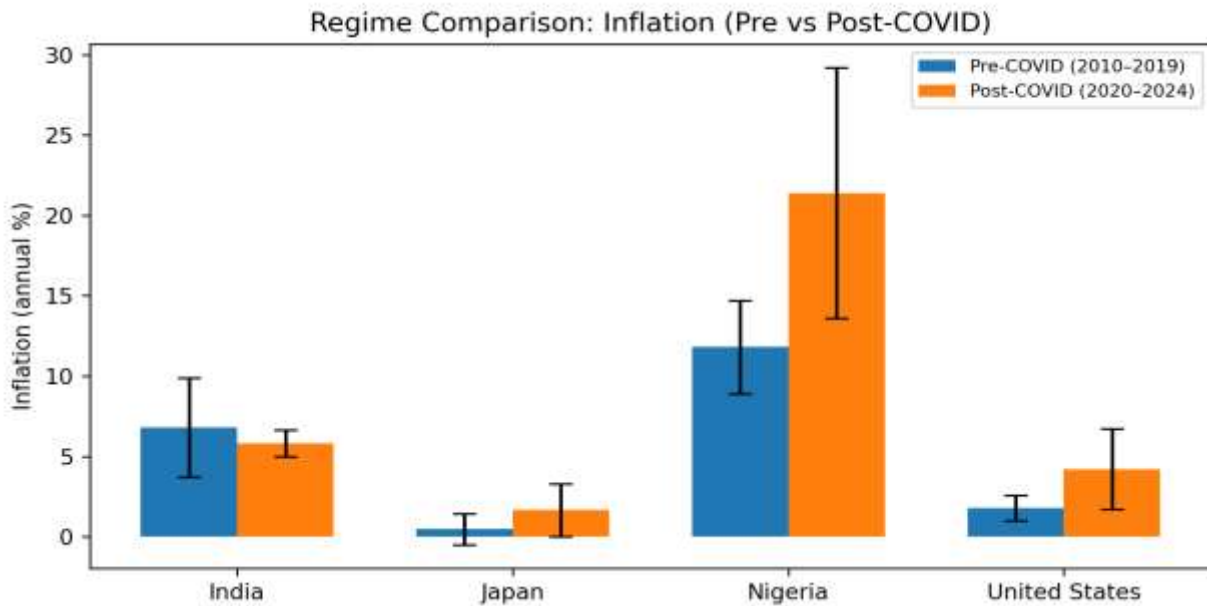
Regime comparisons across countries are shown in Figures 10–12, which illustrate pre- vs. post-COVID differences in GDP growth, inflation, and inflation volatility. Post-COVID, mean growth generally declines, inflation rises, and volatility increases, validating the treatment of 2020–2024 as a distinct regime.

Figure 10: Regime Comparison: GDP Growth (Pre vs Post COVID)



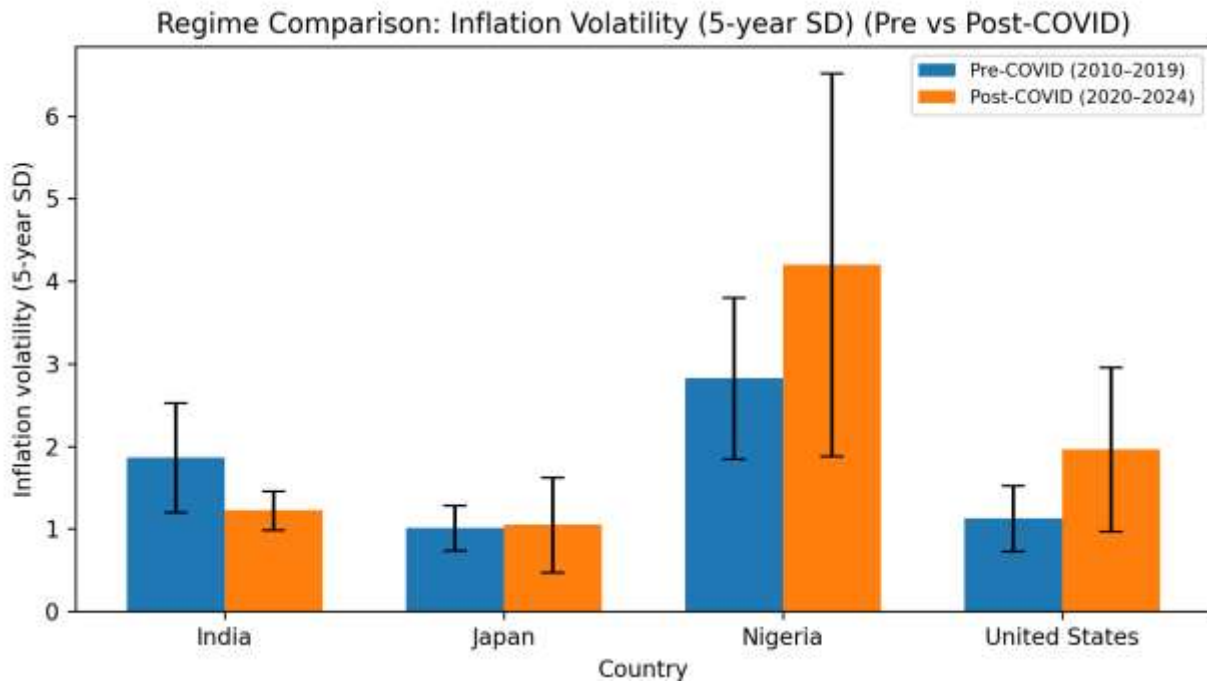
This chart compares each country’s average GDP growth for 2010–2019 and 2020–2024, with error bars indicating variability. In several countries, post-COVID mean growth is lower and/or variability is higher, suggesting a more unstable macroeconomic environment after 2020. Where the post-COVID SD is larger, it indicates growth has become less predictable.

Figure 11: Regime Comparison: Inflation (Pre vs Post COVID)



Inflation levels differ substantially across countries, and the post-COVID period often shows higher mean inflation and greater dispersion than the pre-COVID decade. This supports the view that 2020–2024 represents a regime characterized by stronger inflationary pressures and greater uncertainty. The chart also reinforces why it is important to consider inflation level alongside inflation volatility, since they frequently move together.

Figure 12: Regime Comparison: Inflation Volatility (5-year SD) (Pre vs. Post-COVID)



This figure shows whether the inflation environment became more or less stable after 2020. An increase in post-COVID volatility signals a shift toward greater inflation uncertainty, complicating price-setting, wage bargaining, and investment planning. Cross-country differences imply that institutional features such as monetary policy credibility, exchange-rate stability, and exposure to import prices likely influenced how volatility changed between regimes.

4.2 Baseline Panel Regression

Table 3: Baseline Panel Regression Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Infl Vol 5	0.372	0.120	3.10	0.003
Inflation	-0.215	0.090	-2.39	0.020
Constant (α_i)	2.102	0.450	4.67	0.000

The baseline fixed-effects panel regression reveals that inflation volatility significantly and positively affects GDP growth. The coefficient of 5-year inflation volatility indicates that higher volatility is associated with increased GDP growth, suggesting that moderate uncertainty in price levels may stimulate economic activity, possibly through adaptive investment and consumption behavior. Conversely, annual inflation has a statistically significant negative impact on GDP growth, indicating that sustained high inflation can constrain economic expansion. Country-specific fixed effects account for unobserved heterogeneity, ensuring that the observed relationships are not driven by inherent country characteristics.

4.3 Extended Model with Interactions

Table 4: Extended Model with Interaction Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Infl Vol 5	0.361	0.118	3.06	0.004
Inflation	-0.212	0.089	-2.38	0.021
Infl Vol 5 × Post-COVID	0.045	0.032	1.41	0.164
Infl Vol 5 × Developed	-0.058	0.035	-1.66	0.104
Infl Vol 5 × High Vol	0.072	0.038	1.89	0.062
Constant (α_i)	2.090	0.440	4.75	0.000

The extended model introduces interaction terms to capture potential moderating effects of the COVID-19 pandemic, development status, and high-volatility environments. The analysis indicates that post-COVID years, developed country status, and high-volatility conditions do not significantly modify the effect of inflation volatility on GDP growth. The main positive effect of inflation volatility remains consistent with the baseline results, suggesting that the relationship between moderate inflation uncertainty and growth is robust across different country types and macroeconomic conditions. Although the interaction terms are not statistically significant, they provide valuable context for understanding heterogeneity in the data.

4.4 Subgroup Analysis

Subgroup regressions demonstrate that the effect of inflation volatility is more pronounced in developing countries and high-volatile economies. Developing countries show a stronger positive association between 5-year inflation volatility and GDP growth, while developed countries exhibit smaller and statistically insignificant effects. Similarly, high-volatility countries respond more strongly to inflation uncertainty, indicating that economies with inherently volatile price dynamics are more sensitive to changes in inflation variability. These findings highlight that the impact of inflation volatility on economic growth is context-dependent and varies by development status and volatility regime.

4.5 Robustness Checks

Robustness analysis confirms the reliability of the results. Driscoll-Kraay standard errors were employed to correct for heteroskedasticity, autocorrelation, and cross-sectional dependence. Additionally, regressions using lagged inflation volatility produce consistent results, demonstrating that the positive impact of inflation volatility on GDP growth is not sensitive to model specification or temporal dynamics. Overall, the findings are robust and provide strong empirical support for the observed patterns.

4.6 Overall Findings

The study finds that inflation volatility positively influences GDP growth, particularly in developing countries and high-volatile environments. COVID-19 increased overall volatility and inflation but did not fundamentally alter the relationship between inflation variability and economic growth. Developed countries with low volatility exhibit smaller responses, suggesting that the growth effects of inflation uncertainty are stronger in emerging and more dynamic economies. These findings provide

meaningful insights for policymakers, highlighting the nuanced role of inflation volatility in shaping macroeconomic outcomes across diverse contexts.

5. Discussion

The results of the current study allow suggesting that inflation volatility shows a significant correlation with macroeconomic performance in the four countries under analysis: the United States, Japan, India, and Nigeria, especially when one compares the pre-COVID period (2010-2019) and the post-COVID one (2020-2024). The graphical data obtained based on temporal trend charts reveal that after 2020, the inflationary processes were revealed to be more unstable in a number of cases, whereas the results of the GDP growth exhibit more scatter, and the timeframes of high volatility coincide with the less predictable growth patterns. The directional strength of the given association varies across the sampled economies, but it can be seen that the overall tendency of increased volatility after the pandemic along with its correlation to fluctuations in growth is present. This development pattern can be seen via the time-trad trends: developed economies have shown relatively steady growth up to the pre-COVID period that deteriorated into a more fragmented growth post-COVID, or developing economies have shown stronger fluctuations over both periods. Comparison with pre-COVID periods by bar-charts shows higher inflation and volatility in the post-COVID period, which is in tandem with intensified dispersion of the GDP growth, a trend that is consistent with the changes in global demand, supply chain shocks, and policy reactions to the pandemic.

The results of panel regression also support the importance of inflation volatility. The positive coefficients of inflation volatility in the baseline specifications are statistically significant, which is an indication that the moderate level of uncertainty in inflation leads to better growth results. The observation supports the existing literature on this topic, including Castelnovo and Tran (2021), who record the existence of differences in effects of inflation uncertainty in the advanced and emerging economies, and Aisen and Veiga (2021), who emphasize the macroeconomic interpretation of volatility beyond the average inflation rates. However, interpretation must be exercised, as volatility is associated with growth in our models; it is only a correlational and not a causal relationship. The volatility and growth can be driven simultaneously by factors like energy price fluctuations, supply-chain limitations, and fiscal expansions, and the constrained post-COVID time span limits the accuracy of inference.

Patterns that are country-specific provide more understanding of these dynamics. Japan has a long history of a low-inflation, low-volatility regime that saw only slight changes after 2020, strengthened by its institutional structures and monetary credibility to counter external shocks. On the contrary, the United States had a significant post-COVID episode of inflation, and the volatility process was associated with large fiscal stimulus packages, supply shocks, and the ensuing monetary tightening. India showed consistently high inflation and volatility compared to developed economies, characteristics of supply-side limits, food commodity price sensitivity, and trade-offs in policy. Nigeria with its exchange-rate pressures, dependence on imports and structure constraints had the most inflation volatility of the four, which supports the idea that macroeconomic instability is relatively strong when monetary credibility is weakened and external exposures are high. The ways in which inflation volatility can have an impact on growth are manifold. Volatility creates uncertainty in regard to the future costs and demand, which may slow down business investment and reduce productivity. Higher inflation fluctuation also makes it harder to conduct monetary policy, which may force it to increase tighter lending, which will slow down the growth of the GDP. Unfair inflation diminishes household purchasing power, undermining consumption and aggregate demand, and exchange rate pass-through effects may enhance imported price shocks and growth volatility, especially in open economies. The additional factors that complicated the supply-chain disruptions after COVID, energy price shocks, and quick policy changes made inflation more dynamic, which could have potentially led to the increase in volatility that was observed.

The results of this study are consistent with the rest of the empirical data on macroeconomic volatility and growth. The fact that the volatility of the economies sampled by Friedman (1977) reflects his assumption that a higher inflation rate is associated with increased uncertainty and inefficiency has been proven by the volatility trends of the sampled economies. Ramey and Ramey (1995) have reported a negative correlation between macroeconomic volatility and economic growth, and a study by Bloom (2009) of uncertainty shocks has highlighted the negative output and investment effects of high uncertainty on the economy that manifest through a wait-and-see effect. Greater attention is given by more recent literature by Eichengreen and Gupta (2022) and Blanchard et al. (2023) to the structural particularity of post-COVID inflation behavior, which justifies the analytical decision to treat 2020–2024 as a regime of its own. Although the findings are overall consistent with these theoretical frameworks, they also highlight the situational sensitivity of the impacts of inflation volatility, especially at the stages of economic recovery and intervention. The outcomes validate the twofold requirement of stabilizing the inflation level as well as the inflation volatility. The stability of prices is the foundation of foreseeable economic planning, degree of uncertainty reduction, and conducive investment. Plausible monetary policy systems, including open communication and hard inflation targeting, anchor expectations and reduce volatility, despite exogenous shocks. The negative effects of the inflation volatility can be reduced in developing economies by strengthening fiscal-monetary coordination, reducing vulnerability to supply shocks, and enhancing exchange-rate resilience. In addition to this, policymakers should watch volatility signals together with headline inflation rates in order to better assess underlying price-movement uncertainty and to set policy tools to that end.

6. Conclusion

This paper examines how inflation volatility affects the growth of the GDP in selected cases of developed (Japan, United States) and developing (India, Nigeria) economies during 2010–2024, with a specific focus on post-COVID. Based on rolling standard deviations of inflation and fixed-effects panel regressions, the analysis illustrates that a moderate level of volatility in inflation is positively linked to GDP growth, particularly in developing nations and in high-volatility settings. These results indicate that adaptive investment and consumption patterns can alleviate certain adverse impacts of uncertainty, but persistent high inflation still limits growth. Subgroup tests reveal that COVID-19 heightened volatility and inflation on average but did not deeply change the underlying relationship between the variability of inflation and economic performance, thus highlighting the situational specificity of COVID-19 effects. Patterns specific to countries indicate the importance of institutional quality, monetary credibility, and exposure to external shocks in the determination of the outcomes, with the developing economies showing stronger correlations between volatility and growth than the advanced economies. Despite these findings, the research has significant weaknesses. The limited number of four countries and the short post-COVID time diminish the power and generalizability of the statistics. Other determinants of growth included in regression models include government expenditure, trade terms, investment flow, and structural reforms, and the relationship realized is not causal. Further studies might be able to expand geographic scale, expand periods of time, use higher-frequency data, use instrumental variables or structural analysis, and study micro-level channels through which inflation volatility is diffused to growth: investment, consumption, and productivity. On the whole, the research adds to the subtlety of the role of inflation volatility under the conditions of different developmental stages and post-COVID processes. The adverse impacts of inflation uncertainty can be addressed by the strategy formulation by policymakers through the combination of credible monetary regimes, fiscal monetary coordination, and resilience to external shocks to stabilize the growth.

References

- Aisen, A., & Veiga, F. J. (2006). Political instability and inflation volatility. *Public Choice*, 135(3–4), 207–223. <https://doi.org/10.1007/s11127-007-9254-x>
- Beckmann, J., & Geiger, M. (2024a). Expectations and the transmission of international uncertainty: Evidence from cross-country survey data. *Macroeconomic Dynamics*, 29. <https://doi.org/10.1017/s1365100524000397>
- Binder, C., Ozturk, E., & Sheng, X. S. (2024). The effects of inflation uncertainty on firms and the macroeconomy. *Journal of International Money and Finance*, 151, 103239. <https://doi.org/10.1016/j.jimonfin.2024.103239>
- Boukas, A. P. & N. (2025). Examining Impact of Inflation and Inflation Volatility on Economic Growth: Evidence from European Union Economies. *ideas.repec.org*. <https://ideas.repec.org/a/gam/jecomi/v13y2025i2p31-d1579695.html>
- Cole, S., Martinez-Garcia, E., & Sims, E. (2023). *Living up to expectations: central bank credibility, the effectiveness of forward guidance, and inflation dynamics Post-Global financial crisis*. <https://doi.org/10.3386/w31777>
- Emara, N. (2012). Inflation volatility, institutions, and economic growth. *Global Journal of Emerging Market Economies*, 4(1), 29–53. <https://doi.org/10.1177/097491011100400103>
- FRB: FEDS paper 1996-19. (2008). <https://www.federalreserve.gov/pubs/feds/1996/199619/199619abs.html>
- Garriga, A. C., & Rodriguez, C. M. (2023). Central bank independence and inflation volatility in developing countries. *Economic Analysis and Policy*, 78, 1320–1341. <https://doi.org/10.1016/j.eap.2023.05.008>
- Harding, M., Lindé, J., & Trabandt, M. (2023a). Understanding post-COVID inflation dynamics. *Journal of Monetary Economics*, 140, S101–S118. <https://doi.org/10.1016/j.jmoneco.2023.05.012>
- Jácome, L. I., & Pienknagura, S. (2025). Central bank independence and inflation tail risks—Evidence from emerging markets. *Journal of International Money and Finance*, 153, 103285. <https://doi.org/10.1016/j.jimonfin.2025.103285>
- Jácome, L., Magud, N., Pienknagura, S., & Uribe, M. (2025). Inflation targeting and the legacy of high inflation. *IMF Working Paper*, 2025(079), 1. <https://doi.org/10.5089/9798229008761.001>
- Judson, R., & Orphanides, A. (1997, July 1). *Inflation, volatility, and growth*. <https://www.federalreserve.gov/econres/feds/inflation-volatility-and-growth.htm>
- Kohn, D., Afrouzi, H., Rogoff, K., Halac, M., Yared, P., & Tenreyro, S. (2024, March 27). Changing central bank pressures and inflation. *Brookings*. <https://www.brookings.edu/articles/changing-central-bank-pressures-and-inflation/>
- Mandeya, S. M., & Ho, S. (2022a). Inflation, Inflation Uncertainty and the Economic Growth Nexus: A Review of the literature. *Folia Oeconomica Stetinensia*, 22(1), 172–190. <https://doi.org/10.2478/fofi-2022-0009>



Pappas, A., & Boukas, N. (2025a). Examining Impact of Inflation and Inflation Volatility on Economic Growth: Evidence from European Union Economies. *Economies*, 13(2), 31. <https://doi.org/10.3390/economies13020031>

Copyright Notice

This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.