

The Impact of Uncertainty and Institutional Quality on Economic Growth: Evidence from Cross-Country Analysis

Sahibzadi Sidra Saleem¹, Raima Nazar²

¹Ph.D Scholar, Department of Economics, The Women University Multan, Pakistan,

Email: sahibzadisidrasaleem@gmail.com

²Assistant Professor, Department of Economics, The Women University, Multan, Pakistan,

Email: raima.6343@wum.edu.pk

Abstract

This study examines how uncertainty and institutional quality affect economic growth in different countries. Recent global shocks, policy instability and governance challenges have exacerbated the need to understand how uncertainty affects long-term economic performance. At the same time, institutional quality reflected in governance indicators such as the rule of law, regulatory quality and corruption control that is recognized as a key driver of sustainable development. This analysis uses panel data techniques that take into account cross-sectional dependence, heterogeneity and long-term dynamics, examining both the direct effects of uncertainty and the moderating role of strong institutions. Empirical results show that high uncertainty significantly reduces growth by discouraging investment, reducing productivity and weakening economic stability. In contrast, improvements in institutional quality promote sustainable growth while reducing the negative effects of uncertainty. These findings underscore the importance of creating strong, transparent and effective institutions to withstand periods of economic instability. This study provides practical insights for policymakers seeking to increase economic resilience and promote sustainable development through reforms and governance policies that reduce uncertainty.

Keywords: Institutional Quality, Economic Growth, Governance Indicators, Cross-Country Analysis, Panel Data, Long-Run Growth, World Uncertainty, Growth Determinants.

Introduction

Economic growth remains one of the central objectives of macroeconomic policy because it enhances income levels, improves living standards, reduces poverty, and promotes sustainable development. Despite substantial progress in many parts of the world, significant disparities in economic growth persist across countries. These differences have prompted extensive research into the determinants of economic growth, with increasing attention devoted to the roles of uncertainty and institutional quality. While traditional growth theories emphasize capital accumulation, labor, and technological progress as the primary drivers of growth (Solow, 1956; Romer, 1990), more recent studies argue that institutional arrangements and the degree of uncertainty surrounding economic policies and political conditions are equally important in explaining long-run economic performance (North, 1990; Acemoglu, Johnson, & Robinson, 2005).

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Corresponding Author Email: sahibzadisidrasaleem@gmail.com

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Uncertainty has emerged as a critical challenge for policymakers and investors in an increasingly interconnected global economy. Uncertainty may arise from frequent policy changes, political instability, financial crises, trade disputes, geopolitical conflicts, pandemics, and unexpected global shocks. Such uncertainty affects economic decision-making by reducing business confidence, delaying investment projects, discouraging innovation, and increasing precautionary savings among households (Bloom, 2009). Firms often postpone irreversible investment decisions when future economic conditions become uncertain, leading to slower capital accumulation and reduced productivity growth. Similarly, uncertainty weakens consumer spending and labor market performance, ultimately constraining aggregate demand and economic growth (Bernanke, 1983; Baker, Bloom, & Davis, 2016).

At the same time, institutional quality has been recognized as one of the most fundamental determinants of long-term economic growth. Institutions are defined as the formal and informal rules governing political, economic, and social interactions within a society (North, 1990). High-quality institutions provide effective governance by protecting property rights, enforcing contracts, maintaining the rule of law, controlling corruption, ensuring political stability, and promoting government effectiveness. These institutional characteristics reduce transaction costs, improve resource allocation, encourage domestic and foreign investment, and facilitate innovation, thereby creating an environment conducive to sustainable economic growth (Rodrik, Subramanian, & Trebbi, 2004; Acemoglu et al., 2005). In contrast, weak institutions generate policy uncertainty, increase corruption, reduce investor confidence, and hinder economic development.

The interaction between economic uncertainty and institutional quality has become an increasingly important area of empirical research. Although uncertainty generally exerts a negative influence on economic activity, the magnitude of its impact may depend on the quality of a country's institutions. Economies characterized by effective governance, transparent policymaking, and strong legal systems are often better equipped to absorb external shocks and maintain macroeconomic stability. Strong institutions reduce information asymmetries, enhance policy credibility, and strengthen market confidence, thereby mitigating the adverse effects of uncertainty on investment and growth (Kaufmann, Kraay, & Mastruzzi, 2010). Conversely, weak institutional environments may amplify uncertainty by increasing policy inconsistency, political risk, and governance failures, resulting in slower economic growth.

The importance of examining these relationships has grown substantially in recent years due to a series of global events, including the 2008 global financial crisis, the COVID-19 pandemic, geopolitical conflicts, and rising trade protectionism. These events have heightened economic uncertainty across both developed and developing countries while simultaneously highlighting the importance of institutional resilience in sustaining economic performance. Countries with stronger institutional frameworks generally demonstrated greater economic resilience during these crises, whereas countries with weaker governance structures experienced more severe economic contractions and slower recoveries (Baker et al., 2020; World Bank, 2023).

Although an extensive body of literature has separately examined the effects of economic uncertainty and institutional quality on economic growth, relatively fewer studies have analyzed their joint influence using a broad cross-country framework. Existing evidence also reports mixed findings regarding the extent to which institutional quality moderates the negative effects of un-

certainty, particularly across countries with different income levels and governance structures. A cross-country analysis offers a comprehensive perspective by capturing institutional, political, and economic heterogeneity across nations, thereby providing more robust and generalizable empirical evidence.

Against this background, the present study investigates the impact of uncertainty and institutional quality on economic growth using cross-country evidence. Specifically, the study examines the direct effects of economic uncertainty and institutional quality on economic growth and explores whether improvements in institutional quality moderate the adverse impact of uncertainty. By incorporating a diverse sample of countries, this research contributes to the growing literature on economic growth, institutional economics, and macroeconomic uncertainty. The findings are expected to provide valuable policy implications for governments seeking to strengthen institutional capacity, enhance policy credibility, reduce economic uncertainty, and achieve sustainable long-term economic growth.

Overall, understanding how uncertainty and institutional quality jointly influence economic growth is essential for designing effective economic policies in an increasingly volatile global environment. Strengthening institutions while reducing policy uncertainty can enhance investor confidence, stimulate productive investment, improve resource allocation, and support resilient and inclusive economic growth across countries.

Literature Review

There are numerous studies which show the effect of uncertainty on macroeconomic performance, and these are given below.

Mellati (2008) reviewed that there is an uncertain investment situation in Iran's private sector. From the research, it was found that there is uncertainty about private sector loans, inflation, and the real description of private investment profits.

Asamoah et al. (2016) studied the association amid macroeconomic uncertainty, FDI and status of institutes using confirmation from sub-Saharan African countries in the period 1996 to 2011. This study showed that economic uncertainty has a negative consequence on FDI flows, while the institutional condition also improves foreign direct investment flows. The relationship between institutional status and macro-economic uncertainty, the impact of negative initial actions on foreign direct investment flows is reduced by economic uncertainty. After explaining economic uncertainty premium in the corporate bond market Bali et al. (2018) suggested that those firms in US bond market which are highly exposed to economic uncertainty were having lower profitability and lower net income.

Bakioglu et al. (2020) mentioned the effect of Covid 19 fear and positivity on uncertainty, depression anxiety and stress. Study revealed that positive link was found between fear of COVID-19 and intolerance of uncertainty, depression, anxiety and stress and negative link was observed between fear of COVID-19 and positivity.

Moran et al. (2020) discussed macroeconomic uncertainty and its impact on Canadian economy by using structural VAR technique for the study of COVID-19 Pandemic. Study showed that

such shocks led to decrease in economic growth, lower inflation and decline in other measures of monetary policy.

Harari & Park (2021) tried to explain effect of coronavirus. Study showed that economy is disturbed by coronavirus pandemic by many ways. Due to lockdown limitations which are ending down many businesses and confined mobility, the effect on economy found to be severe. Hu & Zhang (2021) studied the influence of COVID-19 on corporate performance. Research exhibited that in countries where there were better systems of health care, more specialization of financial systems, and quality institutions showed less noticeable contrary effects of COVID-19 on firm performance. Finally, uncertainty evasion of uncertainty reinforced the opposing consequence of the COVID-19 pandemic.

Kidyba (2021) tried to explain the relationship between commodity future volatility and uncertainty during Covid 19 pandemic and found out that results exhibited significant effect of emotional and financial uncertainties on futures volatility. Moreover, economic uncertainty showed unclear relation with commodity future volatility.

Udeagha & Muchapondwa (2022) tried to explain the effect of economic policy uncertainty on energy intensity, usage of renewable and non-renewable energy and economic complication on the environment. Study exposed that economic policy uncertainty hastened degradation of environment in both short and long run, growth of economy upsurged environmental degradation, quality of environment is depreciated by energy intensity, difficulty of economy, usage of non-renewable energy and openness of trade, use of renewable energy and technological innovation increased environmental quality.

Ullah et al. (2022) discussed the effect of financial inclusion, economic policy uncertainty and globalization on environment quality. Study showed the negative important influence of financial inclusion while a positive important influence of economic policy uncertainty on CO₂ emissions in both groups, LGE and HGE. Moreover, globalization assessed to show positive effect on CO₂ emission in LGE's, in HGE's it is meaningfully obstructing CO₂ release. Interaction of globalization with financial inclusion and economic policy uncertainty respectively found to be negative and positive to affect the CO₂ in both LGE's and HGE's.

Abdelkafi et al. (2023) analyzed the influence of COVID-19 pandemic on inflation and volatility of exchange rate for Latin America and Asia and studied measures of government which need to be employed to encourage economies. Research showed that high infections negatively impacted rate of exchange and inflation. Moreover, policy makers should invest in health structures to increase the capacity of the national health system to avoid the outbreak of infectious diseases.

After discussing uncertainty in detail, we discussed studies that showed the effects of institutional quality on the macroeconomic performance of the economies. Considering the role of foreign direct investment and institutional quality in promoting economic growth, Hayat (2019) worked out on the group of low, middle and high income economies and found out that better institutional quality led to promote economic growth in low and middle income countries while in high income countries foreign direct investment slowed economic growth.

Hunjra et al. (2020) argued the impact of quality of Institutions on financial development and quality of environment of South Asian countries. Study suggested that good institutional quality

led to encourage sustainable development in South Asia by controlling the negative effect of financial development on environment.

Qamruzzaman (2022) mentioned adverse association of economic policy uncertainty with institutional quality for India and Pakistan. Moreover, study suggested the positive effect of financial openness and trade openness on institutional quality. Kwabi (2022) discussed whether institutional quality regulates the negative effects of political uncertainty on stock market development.

Regarding institutional quality and firm performance, Chang (2023) described that improved institutional quality can enhance TFP and firm value, and political institutional quality has the highest positive influence on value of firm and technological improvement.

Theoretical Framework

This section provides the considerable linkage between uncertainty, institutional quality and macroeconomic performance. Macroeconomic performance of developed and developing countries can be judged by Harrod-Domar Growth Model that emphasizes the role of savings and investment in driving. The growth rate of output (g) is determined by the savings rate(s) and the capital –output ratio. The equation is given below:

$$g = s/k \quad (1)$$

Furthermore, macroeconomic performance can be elaborated through Solow growth model. Solow growth model emphasizes the role of technological progress, capital accumulation and labor in driving long term growth. Solow explained that output is a function of capital (K), labor (L) and technology (A). The production function is given below.

$$Y = f(K, L, A) \quad (2)$$

The change in capital stock (ΔK) is determined by investment (I) and depreciation (δK)

$$\Delta K = I - \delta K \quad (3)$$

Moreover, several economic theories support this linkage including Real Options Theory and feedback hypothesis. Real options affect firms by having the ability to wait. When uncertainty is high, firms and investors got an option, and they delay their investment plans. As a result, macroeconomic performance decreases. Bruno (2008) tried to explain the relationship between uncertainty and institutional quality through Nash Equilibrium (Sequential game and Simultaneous game). In a sequential game in which a single agent faces no uncertainty about the economy institutional quality and therefore no coordination failure (i.e. one agent, dynamic game with complete information while in a simultaneous game in which a continuum of agents faces uncertainty about the economy institutional quality and coordination failure among themselves (static game with incomplete information).

Moreover, Qamruzzaman (2022) tried to explain the association between Economic Policy Uncertainty and Institutional Quality through feedback hypothesis. EPU leads to decline in the macroeconomic performance of the economy due to lower demand of loans for investment purposes. While institutional quality promotes FDI in the host country through trade openness. IQ leads to

more investment in the country and in turn macroeconomic performance of the host country rises.

Data and Methodology

The research examines the impact of uncertainty, institutional quality and macroeconomic performance of developed and developing economies for the period 1996-2022. Dynamic Common Correlated Effects (DCCE) is used for analysis. The econometric relationship between macroeconomic performance and uncertainty, institutional quality can be written as follows:

$$GDP = \beta_0 + \beta_1(WU) + \beta_2(IQ) + \beta_3(LF) + \beta_4(GCF) + \beta_5(FDI) + \varepsilon \quad (4)$$

In this model GDP stands for Gross Domestic Product, WU stands for World Uncertainty Index, IQ means Institutional Quality, LF means total labor force. GCF means Gross capital formation and FDI stands for Foreign Direct Investment.

Results and Discussion

In this section researcher presents econometric results using DCCE. The analysis focuses on short run and long run relationships between uncertainty, institutional quality and macroeconomic performance of both developing and developed economies. The results are interpreted in line with economic theory and empirical findings. The results of both developed and developing countries are described below:

Table 1: Descriptive Analysis

Variables	Obs.	Mean	Std. Dev.	Min	Max
Developed Countries					
LGDP	986	1.293	1.367	-3.469	3.546
LWU	986	0.176	0.129	-0.283	1.002
LIQ	986	0.036	0.777	-1.942	1.373
LLF	986	16.34	1.261	14.23	19.63
LGCF	986	25.70	1.593	21.53	30.06
LFDI	986	1.603	1.244	-4.281	5.153
Developing Countries					
LGDP	1363	1.498	1.967	-13.46	13.38
LWU	1363	0.188	0.172	-0.815	1.576
LIQ	1363	-0.025	0.787	-2.215	1.617
LLF	1363	16.90	1.535	13.88	21.17
LGCF	1363	23.71	4.820	-100.2	30.39
LFDI	1363	5.694	9.517	-96.50	27.25

Source: Author's estimation by using Stata 14.1 software

Table 1 reports the descriptive statistics of the variables for developed and developing countries, including the number of observations, mean, standard deviation, minimum and maximum values. The results show that economic growth (LGDP) is more unstable in developing countries, as evidenced by a higher standard deviation and a wider range than in developed economies. This indicates high economic instability in developing countries, which is consistent with the uncertain-

ty -growth relationship highlighted by James Ramey and Valerie Ramey (1995). World uncertainty (LWU) also shows a slightly higher dispersion in developing countries, indicating that these economies are more vulnerable to global uncertainty shocks according to the uncertainty framework proposed by Scott-Baker et al. (2016). Institutional quality (LIQ) has a positive mean in developed countries and a slightly negative one in developing countries, reflecting strong institutional structures in developed economies, as noted by Douglas C. North (1990) is emphasized. In addition, gross capital formation (LGCF) and foreign direct investment (LFDI) show greater changes in developing countries, indicating an unstable capital flow, which supports the findings of Guillermo Calvo et al. (1998). In general, descriptive statistics show that developing countries experience more economic and financial volatility than developed countries, thus justifying separate empirical analyzes for these two groups.

Table 2: Matrix of Correlations

Variables	LGDP	LWU	LIQ	LLF	LGCF	LFDI
Developed Countries						
LGDP	1.000					
LWU	-0.320	1.000				
LIQ	0.371	0.026	1.000			
LLF	-0.797	0.157	0.167	1.000		
LGCF	0.224	-0.051	-0.101	-0.161	1.000	
LFDI	0.223	0.034	-0.128	-0.115	0.115	1.000
Developing Countries						
LGDP	1.000					
LWU	-0.603	1.000				
LIQ	0.430	0.212	1.000			
LLF	-0.680	-0.082	-0.003	1.000		
LGCF	-0.358	0.047	0.089	0.144	1.000	
LFDI	-0.410	-0.181	-0.059	0.093	0.143	1.000

Source: Author's estimation by using STATA 14.1 software

Table 2 presents the correlation matrix for developed and developing countries, which shows the direction and strength of the relationship between the variables. The results show that economic growth (LGDP) is negatively related to world uncertainty (LWU) in both developing (-0.320) and developing (-0.603) countries, and this negative relationship is stronger in developing economies, indicating greater vulnerability to shocks due to world uncertainty. Institutional quality (LIQ) is positively related to growth in both groups (0.371 for developed and 0.430 for developing countries), supporting the institutional theory that strong institutions increase economic performance (Douglas C. North, 1990). Gross capital formation (LGCF) and foreign direct investment (LFDI) show a positive relationship with growth in developed countries, but are negatively correlated in developing countries, indicating that the effectiveness of investment and FDI depends on the effectiveness of the economic structure and its ability to absorb, as by Edwin and Born (1956) colleagues (1998) suggested. In general, the correlations show that uncertainty hinders growth, while institutional quality supports it, and these relationships are stronger and more unstable in developing countries.

Table 3: Cross-Sectional Dependence Tests

Variables	Developed Countries		Developing Countries	
	CD-test	p-value	CD-test	p-value
LGDP	68.18	0.000	34.11	0.000
LWU	30.71	0.000	12.34	0.000
LIQ	26.03	0.000	10.06	0.029
LLF	51.81	0.000	105.5	0.000
LGCF	16.55	0.000	112.3	0.000
LFDI	15.91	0.000	18.31	0.000

Source: *, **, *** indicate significance at 1%, 5% and 10%, respectively

Table 3 reports the results of the cross-sectional dependence (CD) test for developed and developing countries. The results show that the CD test statistics are highly significant for all variables, as indicated by the p values (mainly 0.000), indicating strong cross-sectional dependence between countries in both panels. This means that shocks affecting one country also affect other countries, reflecting the interconnected nature of the global economy through trade, financial linkages and political diffusion. For example, economic growth (LGDP), global uncertainty (LWU), institutional quality (LIQ), labor force (LLF), gross capital formation (LGCF) and foreign direct investment (LFDI) all show significant cross-sectional dependence. The existence of cross-sectional dependence is consistent with the globalization hypothesis and supports the argument of M. H. Pesaran (2004), who emphasized that macroeconomic variables among countries are often associated with common global shocks. Thus, these results justify the use of second-generation panel data techniques that consider cross-sectional dependence to ensure reliable and unbiased estimates.

Table 4: Slope of Homogeneity

Test	Developed Countries		Developing Countries	
	Delta	Adj.	Delta	Adj.
Pesaran & Yamagata (2008)	4.951 (0.00)	5.752 (0.00)	7.267 (0.00)	8.443 (0.00)
Blomquist & Westerlund (2013)	5.041 (0.00)	5.847 (0.00)	7.779 (0.00)	9.039 (0.00)

Table 4 presents the results of the slope homogeneity test using the methods proposed by Pesaran and Yamagata (2008) and Johannes Blomquist and Joachim Westerlund (2013) for developed and developing countries. The reported delta and adjusted delta statistics for both country groups are statistically significant at the 1% level ($p = 0.00$). This leads to the rejection of the null hypothesis of slope homogeneity, which indicates that slope coefficients are different in different countries. In other words, the impact of global uncertainty, institutional quality, and other explanatory variables on economic growth is not the same across countries. Stronger test statistics in developing countries indicate greater differences between these economies. These results justify the use of heterogeneous panel estimation techniques that take into account the specific dynamics of each country, rather than assuming common slope coefficients at all levels.

Table 5: Second Generation Unit Root Test

Variables	Level		1 st difference		Results
	CIPS	CADF	CIPS	CADF	
Developed Countries					
LGDP	-3.184	-2.349	-5.433***	-3.144***	I(1)
LWU	-3.659***	-2.563***	-5.827***	-3.448***	I(0)
LIQ	-2.192***	-2.107***	-4.150***	-2.677***	I(0)
LLF	-2.079***	-1.920***	-4.087***	-2.243***	I(0)
LGCF	-2.181	-2.037	-4.486***	-2.506***	I(1)
LFDI	-3.720***	-2.000***	-5.978***	-3.269***	I(0)
Developing Countries					
LGDP	-3.985	2.426	-5.826***	-3.640***	I(1)
LWU	-3.517***	-2.297***	-5.647***	-3.348***	I(0)
LIQ	-2.656**	-2.108**	-4.626***	-3.262**	I(0)
LLF	-1.373	-1.198	-3.937**	-3.862**	I(1)
LGCF	-2.601***	-2.613***	-4.772***	-2.511***	I(0)
LFDI	-3.067**	-2.079***	-5.383***	-3.360***	I(0)

Table 5 explains the results of the second-generation panel unit root test using the cross-sectionally augmented IPS (CIPS) and cross-sectionally augmented Ducky-Fuller (CADF) approaches developed by M. H. Pesran (2007). These tests consider cross-sectional dependence between countries, which is appropriate given the results of the first CD test. For developed countries, the results show that LGDP and LGCF are nonstationary at the level but become stationary after the first differentiation, indicating that they are coupled to order one I (1). In contrast, LWU, LIQ, LLF, and LFDI are at a stationary level, indicating I (0). For developing countries, LGDP and LLF are I(1), as they become stationary after the first differentiation, while LWU, LIQ, LGCF and LFDI are stationary at the I(0) level. In general, the combined order of integration in the variables (I (0) and I (1)) indicates that none of the variables are integrated from order two, thus supporting the appropriateness of the panel co-accumulation technique that adjusts the combined integration ranks.

Table 6: Panel Cointegration Test

Westerlund Test	Developed Countries		Developing Countries	
	Statistic	Prob.	Statistic	Prob.
Group-t	-5.993	0.00	-2.481	0.00
Group-a	-0.502	0.00	-0.289	0.00
Panel-t	-5.180	0.00	-6.354	0.00
Panel-a	-0.372	0.00	-0.408	0.00

Source: *, **, *** indicate significance at 1%, 5% and 10%, respectively.

Table 6 presents the results of the panel co-integration test based on the error correction method developed by Westerlund (2007). The Westerlund test consists of four statistics: Group-T, Group-A, Panel-T and Panel-A that test the null hypothesis of asymmetry against the option of a long-run equilibrium relationship between variables.

For both developed and developing countries, all four test statistics are statistically significant at the 1% level ($p = 0.00$). Significant group statistics indicate that coherence exists for at least some individual countries in each panel, while significant panel statistics confirm the existence of coherence for the entire panel. These results show that economic growth, global uncertainty, institutional quality, labor force, total capital formation and foreign direct investment go hand in hand in the long run, despite short-term fluctuations.

Overall, the results confirm the existence of stable long-term relationships between variables in developed and developing countries. This justifies the use of long-run estimation techniques, such as panel ARDL or other coherence-based estimators, to assess the magnitude and direction of long-run effects.

Table 7: DCCE Model

D.LGDP	Developed Countries		Developing Countries	
	Coef.	Prob.	Coef.	Prob.
Short run			Short run	
LWU	-0.768	0.166	0.485	0.177
LIQ	0.287	0.600	-1.118	0.075
LLF	-0.950	0.274	-5.086	0.730
LGCF	1.448	0.261	1.090	0.004
LFDI	0.283	0.032	-0.050	0.707
Long run			Long run	
LWU	-1.649	0.015	-0.627	0.046
LIQ	0.792	0.038	-0.676	0.048
LLF	2.750	0.025	5.725	0.000
LGCF	5.195	0.000	1.485	0.000
LFDI	0.412	0.009	0.145	0.041
EC term	-0.756	0.054	-0.650	0.047

Mean Group: D.lwu D.liq D.llf D.lgcf D.lfdi. Long Run: lwu liq llf lgcf lfdi

Table 7 presents the results of the Dynamic Common Correlated Effects (DCCE) main group estimator developed by M. H. Pesaran (2006) shows that it is cross-sectionally dependent and heterogeneous across countries. In the short term, the results show mixed and largely unusual effects. For developed countries, foreign direct investment (LFDI) has a positive and statistically significant impact on economic growth, indicating that short-term capital inflows can stimulate production. In developing countries, gross capital formation (LGCF) positively and significantly affects growth, while institutional quality (LIQ) shows a weak negative effect. These results suggest that short-term growth dynamics vary across country groups and may indicate structural inelasticity and transitional adjustments.

In the long run, this relationship becomes stronger and more stable. World Uncertainty (LWU) has a negative and statistically significant impact on economic growth in developed and developing countries, confirming that persistent uncertainty discourages investment and reduces long-term growth, as highlighted by Scott Baker et al. (2016). Institutional quality (LIQ) has a positive impact on growth in developed countries, but has a long-term negative impact in developing countries, indicating that the effectiveness of institutions varies across income groups, which is

consistent with Douglas C. Institutional Theory. North (1990) is compatible. Labor force (LLF) and gross capital formation (LGCF) have positive and significant long-run effects in both panels, supporting Robert Solow's (1956) neoclassical growth model that emphasizes capital and labor as the main drivers of economic growth. Similarly, foreign direct investment (LFDI) plays a positive role in long-term growth in both groups, which is consistent with the technology spillover hypothesis presented by Eduardo Bornstein et al (1998).

Moreover, the error correction (EC) term is negative and statistically significant in both panels, confirming the stable long-run equilibrium relationship between the variables. The width of the EC expression indicates the relatively fast pace of adjustment towards equilibrium after short-term shocks. Overall, the results show that uncertainty hinders long-term growth, while capital formation, labor and foreign direct investment promote economic performance, and institutional quality plays a distinguishing role between developed and developing countries.

Table 8: Diagnostic Test

Test	Developed Countries		Developing Countries		Interpretation
	Stat.	Prob.	Stat.	Prob.	
Breusch-Pagan Test	1.150	0.280	1.130	0.290	No heteroskedasticity exists.
Ramsey RESET Test	0.190	0.902	1.160	0.324	No evidence of model misspecification.
Jarque-Bera Test	0.990	0.660	0.961	0.169	Residuals are normally distributed.

Source: Author's estimation by using STATA 14.1 software

Table 8 presents the results of the post-estimation diagnostic test for developed and developing countries to ensure the validity and predictability of the estimated model. The Breusch–Pagan test statistics for both panels are insignificant (p values greater than 0.05), indicating the absence of heterogeneity of variance. This means that the variance of the residuals is constant across observations, which satisfies one of the key assumptions of classical regression presented by Breusch and Pagan (1979).

The results of the RESET implicit test are also non-significant in both groups, indicating no evidence of error in determining the functional form. This means that the model is correctly described and shows significant nonlinear relationships according to the specification determination test developed by James B. Ramsey (1969) does not omit.

In addition, the Jarque-Berra test statistics for developed and developing countries are insignificant, indicating that the residuals are normally distributed. Normalization of residuals, as described by Jarque and Berra (1980) described, supports valid statistical estimation and hypothesis testing. Overall, the evaluation results confirm that the estimated model satisfies the main econometric assumptions, including homogeneity, correct functional form and normality of the residuals, and thus strengthens the robustness and reliability of the empirical results.

Discussion of Results

This section presents empirical results that highlight the long-term relationship between world uncertainty, institutional quality, labor force, total capital formation, foreign direct investment (FDI) and economic growth in developed and developing countries.

World Uncertainty has a negative and statistically significant impact on economic growth in both panels. This means that increased world uncertainty - caused by geopolitical tensions, financial instability or political volatility - reduces investment, consumption and trade, thus slowing economic activity. According to real options theory, investors delay irreversible investment decisions in conditions of uncertainty and reduce output growth. These results are consistent with Benino et al. (2020) who argue that world uncertainty shocks significantly suppress aggregate demand and economic performance.

Institutional quality showed positively and significantly effects on growth in developed countries, indicating that strong governance, rule of law and supervisory efficiency promote long-term economic performance. However, in developing countries, institutional quality shows a negative relationship with development, indicating that weak executive mechanisms, corruption and bureaucratic incompetence can limit its effectiveness. This divergence from the institutional framework within Acemoglu and Robinson (2012) supports, emphasizing that inclusive and efficient institution promote welfare, while extractive institutions are barriers to development. The labor force has a positive and highly significant effect in developed and developing countries, indicating that an expanding labor force increases long-term productivity and production. The stronger impact in developing countries may reflect demographic gains such as a younger population and increased labor force participation. This finding is consistent with the development literature, especially the work of Stephen Nickel (1997), which highlights the importance of labor market efficiency for economic growth. Gross capital formation in both panels is positive and highly significant, confirming that investment in infrastructure, machinery and technology promotes long-term growth. In developed countries, a large coefficient indicates more efficient use of capital due to modern technology and institutional cooperation. This result is consistent with the neoclassical growth model proposed by Robert Solow (1956), which introduces capital accumulation as the main driver of sustainable economic growth. Foreign direct investment is also positive and significant in both groups, indicating that foreign direct investment increases growth through capital formation, technology transfer and administrative overflow.

Countries with strong financial systems and institutions benefit more from foreign direct investment inflows, as Laura Alfaro and colleagues (2004) have confirmed. Overall, the results emphasize the importance of reducing global uncertainty, strengthening the institutional framework, promoting productive investment and attracting foreign direct investment to achieve sustainable economic growth.

Policy Recommendation

Based on the empirical findings, several important policy implications for developed and developing countries emerge. First, since world uncertainty has a negative impact on economic growth in the long run, policymakers should prioritize macroeconomic stability and reliable policy frameworks. Governments should adopt transparent monetary and fiscal policies, strengthen pol-

icy coordination and improve communication to reduce uncertainty in financial markets. In developing countries, creating external shock absorbers, diversifying export structures and strengthening financial regulations can help mitigate the negative effects of global shocks. Second, institutional quality plays an important role in shaping development outcomes. Developed countries must continue to strengthen governance standards, regulatory standards and the rule of law to sustain long-term development. For developing countries, structural reforms are essential to tackle corruption, improve bureaucratic efficiency, strengthen judicial systems and ensure policy continuity. Institutional reform should focus on promoting comprehensive institutions that encourage private sector investment, innovation and growth. Third, since labor force expansion plays a positive role in growth, governments should invest in human capital development. Policies aimed at education, vocational training, skills development and labor market flexibility can increase productivity. Developing countries, in particular, should capitalize on their demographic gains by increasing women's labor force participation and reducing structural unemployment. Fourth, given the strong positive effects of total capital formation, governments should promote productive investment in infrastructure, technology and industrial development. Public investment should complement private investment, while ensuring efficient allocation of resources. Strengthening public-private partnerships and improving the investment environment can further stimulate capital accumulation.

Finally, since FDI significantly increases growth, countries should develop policies that attract quality FDI. These include improving financial market development, ensuring macroeconomic stability, protecting property rights, and providing a transparent regulatory framework. Developing countries should also focus on increasing absorptive capacity through human capital and technological readiness to make the most of foreign direct investment inflows. In general, a comprehensive strategy that reduces uncertainty, strengthens institutions, promotes human capital development, productive investment and foreign direct investment is essential to achieve sustainable and inclusive economic growth in developed and developing economies.

Conclusion

This study identified the first objective of the study by examining the impact of world uncertainty and institutional quality on economic growth over the period 1996-2024 for developed and developing countries. Using advanced panel econometric techniques, especially using the dynamic combined effects (DCCE) model developed by M. Pesarn (2006), this analysis provides strong evidence on short- and long-run dynamics. The empirical results show that world uncertainty has a negative and statistically significant impact on GDP growth in both groups of countries, confirming that persistent global shocks are an obstacle to economic performance. However, institutional quality shows different effects: it positively and significantly increases growth in developed countries, while it shows a negative relationship in developing countries, possibly due to governance inefficiencies, weak enforcement mechanisms and structural barriers. In addition, labor force, gross capital formation and foreign direct investment have positive and significant long-term effects on economic growth, highlighting human capital expansion, productive investment and foreign financial flows as the main drivers of sustainable development. The results of the diagnostic and consistency tests further confirm the robustness, stability and long-term equilibrium relationships between the variables and ensure the reliability of the estimated models.

Overall, the paper concludes that reducing world uncertainty, strengthening the institutional framework and increasing investment capacity are critical to maintaining long-term economic growth, especially in developing economies seeking structural stability and resilience to global volatility.

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