



Geopolitical Risk and Central Bank Independence: Evidence from Inflation and Unemployment Dynamics in Developing Eight (D-8) Countries

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Abstract

Recurring external shocks and domestic institutional constraints increasingly test macroeconomic stabilization in developing economies. This study examines how central bank independence (CBI) and geopolitical risk (GPR) shape inflation–unemployment dynamics in the Developing Eight (D-8) countries, Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey over 2012–2023. Using a two-step dynamic panel GMM approach with Windmeijer-corrected standard errors and collapsed instruments, we estimate multiple specifications for inflation and unemployment that incorporate monetary (interest rate, money supply), fiscal (public debt, government expenditure, tax revenue), and macro-structural controls (e.g., growth, productivity, oil prices), alongside governance and external-sector controls. The results suggest that conventional policy levers remain relevant but operate conditionally in D-8 settings characterized by import dependence, exchange-rate pass-through, shallow financial markets, and heterogeneous institutional credibility. Higher interest rates are associated with lower inflation but higher unemployment, while public debt is consistently linked to higher macroeconomic stress. CBI does not emerge as a uniformly strong direct determinant; instead, its role is more visible through policy-transmission channels, where stronger CBI can alter the effectiveness of interest-rate and fiscal actions. A salient finding is that GPR is often associated with lower inflation, consistent with an uncertainty-driven demand-contraction channel. At the same time, its labor-market effects appear more interaction-dependent (e.g., amplifying the unemployment implications of specific fiscal responses). Overall, the evidence indicates that stabilizing inflation and unemployment in D-8 economies requires credible monetary policy complemented by budgetary discipline and shock-resilience strategies, particularly during periods of elevated geopolitical uncertainty.

Keywords: Central Bank Independence, Geopolitical Risk, Inflation, Unemployment, GMM.

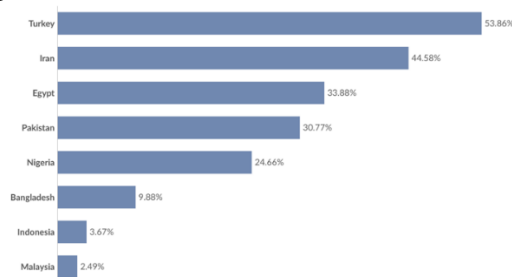
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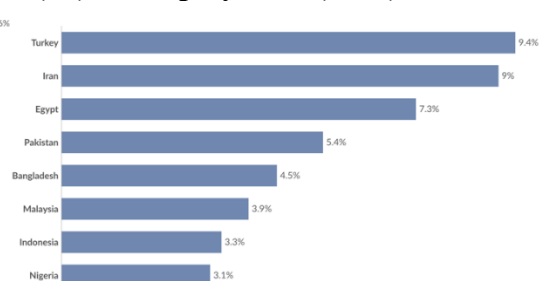
1. Introduction

Macroeconomic stabilization in developing economies is increasingly challenged by a combination of persistent domestic constraints and volatile external shocks (Ha et al., 2024). Inflation and unemployment remain two key indicators of economic stability, yet their dynamics are often difficult to manage when economies are exposed to commodity price swings, exchange rate pressures, and disruptions in trade and financial flows. The current global environment has intensified these vulnerabilities, as geopolitical tensions and supply-chain disruptions have become more frequent and economically consequential, contributing to what many describe as a “permacrisis” in the global economy (Asab, 2025). In this setting, inflation is increasingly understood to result from the interconnected effects of shifting demand, constrained supply, and exchange rate fluctuations, rather than from a single factor (Andreev et al., 2024).

Figure: (1a) Inflation,



(1b) Unemployment (2023)



Source: Our World in Data (2024). Inflation and Unemployment Data. Available at: <https://ourworldindata.org>.

Interestingly, inflation and unemployment trends across the D-8 countries in 2023, as shown in Figure 1(a), indicate that Turkey recorded the highest average inflation (53.86%), followed by Iran (44.58%), while Malaysia (2.49%) and Indonesia (3.67%) recorded lower rates. Figure 1(b) shows that labor market conditions are also uneven, with average unemployment rates relatively higher in Turkey (9.4%) and Iran (9.1%) than in Nigeria (3.1%), Indonesia (3.3%), and Malaysia (3.9%). This cross-country dispersion suggests that inflation and unemployment responses to external shocks, particularly geopolitical uncertainty, may differ across countries, depending on domestic structures and policy institutions. This motivates a focused investigation into how institutional quality and external risks interact within a coherent group of developing countries. Essentially, a key institutional factor in stabilization policy is Central Bank Independence (CBI). The literature emphasizes that independence can strengthen credibility and support inflation stabilization by reducing political interference in monetary policy.

Goodfriend (2007) argued that central bank independence has played a crucial role in achieving monetary policy consensus and stabilizing inflation. However, evidence on the effectiveness of CBI in developing countries remains mixed: while some studies document its role in reducing inflation, others find that its impact may be weak or dependent on structural factors such as exchange rate regimes and commodity shocks, suggesting that institutional channels may not operate uniformly across contexts (Garriga & Rodriguez, 2023).

Therefore, we argue that one important reason for these mixed results is the role of Geopolitical Risk (GPR), which can reshape the macroeconomic environment and affect policy effectiveness. Geopolitical tensions can affect inflation and unemployment through uncertainty, investment delays, disruptions to trade and supply chains, commodity market volatility, and shifts in global risk perceptions (Taheri Hosseinkhani, 2025). Recent studies have called for greater attention to these channels, noting that geopolitical risk can materially affect inflation spillovers and macroeconomic stability (Bouri et al., 2023; Asafo-Adjei et al., 2023). To capture this dimension empirically, this study uses the GPR measure developed by (Caldara & Iacoviell, 2022).

This study focuses on the Developing Eight Countries (D-8)—Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey—during 2012–2023. The sample is chosen not just for description but for analysis. These countries share structural vulnerabilities that heighten sensitivity to how institutions handle external shocks. Such vulnerabilities include commodity dependence, volatile capital flows, shallow financial markets, and political cycle pressures. These factors make the D-8 a strong case for testing whether geopolitical risks influence the effectiveness of monetary institutions in controlling inflation and unemployment.

To address this gap, this study combines CBI and GPR into a single empirical framework. The CBI is defined using (Cukierman & Lippi, 1999), who see independence as key to credibility and bias reduction. This study looks at how monetary policy, fiscal policy, and macroeconomic factors shape inflation and unemployment. It then examines whether the CBI and GPR affect these links.

Methodologically, this paper uses dynamic panel estimation with a System GMM framework. This approach helps study the persistence and possible endogeneity of macroeconomic relationships, following standard dynamic panel methods. This study asks three questions. (1) How does geopolitical risk relate to inflation and unemployment in D-8 countries? (2) Does higher central bank independence improve inflation or unemployment in this setting? (3) Does geopolitical risk affect how effective the CBI and other policy variables are on inflation and unemployment? Answering these questions adds to the debate on macroeconomic stabilization in developing countries facing external uncertainty. The study provides evidence for creating policy mixes that stay credible and useful in times of high geopolitical tension.

2. Literature Reviews

The relationship between inflation and unemployment has long been framed through the Phillips Curve, which initially suggested a short-run trade-off between wage/price inflation and unemployment (Phillips, 1958; Samuelson & Solow, 1960). In the Keynesian tradition, this trade-off was often interpreted as a policy menu in which lower unemployment could be achieved at the cost of higher inflation (Mankiw, 2013). However, the stagflation episode of the 1970s challenged the stability of this relationship and shifted macroeconomic thinking toward expectations-based frameworks. Monetarist and natural-rate arguments (Friedman, 1963; Phelps, 1967) emphasized that any trade-off is temporary once expectations adjust, implying that systematic demand management cannot permanently reduce unemployment without inducing accelerating inflation. This critique later evolved into the NAIRU concept (Gordon, 1997), which became influential in modern monetary policy and rule-based stabilization (Taylor, 1993).

Yet, the Phillips-curve/NAIRU logic is increasingly debated, especially for open and shock-prone economies, because the inflation–unemployment link can weaken or even change sign under globalization, structural shifts, and repeated external disturbances

(Stockhammer & Sturn, 2012; Piazza, 2018; Crump et al., 2024). Modern monetary frameworks, therefore, place greater weight on credibility and the expectations channel rather than discretionary fine-tuning of real activity (Mishkin, 2004; Lucas Jr., 1976). This is particularly relevant for developing economies where inflation is often shaped by imported inflation, exchange-rate pass-through, and supply bottlenecks—channels that are not well captured by a purely demand-side narrative.

In many emerging markets, expansionary monetary conditions may raise demand, but output and employment responses can be muted when monetary transmission is imperfect and productive capacity is constrained (Mishkin, 2008; Agénor & Montiel, 2015). Under these conditions, liquidity expansion may translate more into price pressures than into sustained job creation, increasing the risk of stagflation. Inflation can also be amplified through currency depreciation and import dependence, while uncertainty discourages long-term investment and hiring (Rodrik, 2009; Baker et al., 2016). At the same time, developing economies may experience jobless growth, in which GDP growth does not translate proportionately into employment due to sectoral composition, productivity shifts, or commodity dependence (Okun, 1963; Ademola & Badiru, 2016).

Collectively, these arguments imply that inflation-unemployment dynamics in developing countries can be structurally different from the textbook Phillips-curve setting. Within this broader stabilization debate, Central Bank Independence (CBI) matters because it supports credibility and anchors inflation expectations, helping reduce inflationary bias and improve policy effectiveness (Cukierman & Lippi, 1999; Eichengreen & Rose, 1999; Arnone & Romelli, 2013).

However, the effectiveness of CBI is not uniform across countries and may be particularly conditional in developing economies. Recent crises show that even credible central banks can be pushed to adopt unconventional measures and to coordinate more closely with fiscal authorities in the face of large supply-side shocks (e.g., pandemics and wars), which blur monetary–fiscal boundaries and expose the limits of de jure independence (Blinder et al., 2024). This concern is more pronounced in developing countries where the gap between formal legal independence and de facto autonomy can be substantial due to indirect political intervention, weak institutional enforcement, and governance constraints (Masciandaro & Romelli, 2018b; Dincer et al., 2022).

As a result, the CBI should not be treated as a universal “shield” but as an institutional feature whose stabilizing role may vary across macroeconomic regimes. This motivates modeling CBI not only as a direct determinant of inflation (and potentially unemployment) but also as a moderator of policy transmission, i.e., whether monetary and fiscal instruments translate into different inflation–unemployment outcomes under stronger versus weaker central bank independence. Recent literature increasingly treats geopolitical risk (GPR) as a state variable that can reshape macroeconomic dynamics through multiple channels. The GPR index developed by Caldara & Iacoviell (2022) captures heightened geopolitical tensions that transmit to developing economies through: (i) trade disruptions and supply-chain frictions (Glick & Taylor, 2010), (ii) commodity and energy price volatility, (iii) uncertainty that delays investment and hiring (Bloom 2009; Baker et al., 2016), and (iv) higher risk premia and capital-flow volatility that pressure exchange rates and amplify imported inflation. These mechanisms imply that geopolitical shocks can produce supply-side inflationary pressures while simultaneously weakening demand and employment, making the inflation–unemployment relationship more unstable and potentially consistent with stagflation-like co-movement.

Importantly, the predicted sign of GPR on inflation is not theoretically unambiguous. On the one hand, supply disruptions and commodity price spikes can increase inflation; on the other hand, uncertainty-driven demand contraction and

postponed investment can dampen inflationary pressures. This ambiguity strengthens the case for empirical testing in developing-country settings. Moreover, GPR provides a clear rationale for interaction effects: it can condition the effectiveness of both policy instruments and institutional credibility. Under elevated geopolitical risk, governments face stronger incentives to prioritize short-term stabilization, fiscal accommodation, or strategic spending reallocations, which can intensify political pressure on monetary policy and raise the likelihood of de facto fiscal dominance.

In such environments, GPR can weaken the credibility/expectations channel and disrupt monetary transmission, implying that CBI's stabilizing role becomes more conditional during periods of geopolitical stress. Therefore, GPR is expected to interact not only with CBI ($GPR \times CBI$) but also with key policy variables ($GPR \times$ interest rate, $GPR \times$ money supply, and related channels), as the strength and direction of policy effects may change under heightened uncertainty. Despite these advances, two gaps remain. First, empirical evidence on how geopolitical risk reshapes the inflation–unemployment nexus in developing economies is still limited, and theoretical predictions remain mixed because GPR may trigger both supply-side pressures (through energy and trade disruptions) and demand-side contraction (through uncertainty and delayed investment). Second, while central bank independence is widely associated with credibility and inflation control, the literature suggests that its effectiveness in developing countries is conditional on institutional and political constraints, especially in crisis environments.

This study addresses these gaps by explicitly modeling CBI as a moderator of policy transmission (through interaction terms between CBI and key policy variables) and by testing whether GPR conditions the effectiveness of CBI and policy instruments in stabilizing inflation and unemployment in the D-8 economies using a dynamic panel framework.

3. Methodology

This study analyzes an annual panel dataset for the developing countries (D-8) Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey—covering 2012–2023. The D-8 were selected for analytical reasons, as they are large developing economies commonly exposed to external shocks such as commodity and energy price volatility, global risk sentiment, and trade disruptions. They also face domestic institutional and political economy constraints that may affect policy credibility and transmission.

These shared circumstances create a coherent context for examining how geopolitical risk (GPR, measured using the established GPR index) and central bank independence (CBI, defined as the statutory and de facto ability of central banks to set policy without external influence) interact to impact macroeconomic stability. The study focuses on two dependent variables, inflation (measured as the annual percentage change in consumer prices) and unemployment (measured as the unemployment rate) — reflecting the dual objectives of price stability and labor market performance. The analysis includes monetary, fiscal, and macrostructural covariates, as well as institutional and governance controls. Table 1 details all variables and their measurements for clarity.

Table 1: Variable Description

Variable	Measurement	Data Source
Inflation	Consumer Prices (annual %)	WDI database-World Bank
Unemployment	Total (% of labor force)	Our World in Data
Interest Rate	Real Interest Rate (%)	WDI database-World Bank
Money Supply	Annual broad money growth	Our World in Data
Public Debt	Central Government Debt, total (% of GDP)	WDI database-World Bank
Tax Revenue	Tax Revenue (% of GDP)	WDI database-World Bank
Government Expenditure	Government Expenditure as a % of GDP	IMF
Gross Domestic Product	GDP Growth (annual %)	WDI database-World Bank
Labor Productivity	Labor Force Participation Rate, Total (% of total population)	WDI database-World Bank
Oil Price	Crude Oil Annual Price	Our World Data
Globalization	Ratio of exports and imports to a country's GDP	Our World in Data
Central Bank Independence	Indices Range from 0 to 15	The Quality of Government Institute
Geopolitical Risk	Frequency By Caldara & Iacovelli	Mateoiacovellio.com
Control Variable		
Exchange Rate	Official Exchange Rate (LCU per US\$, period average)	WDI database-World Bank
Population Growth	Population growth (annual %)	Total Population Annual
Corruption Perception Index	CPI the level of public sector corruption 0 to 100	Trasparency.org

Source: Computed by Authors

3.1 Research Model

Because inflation and unemployment exhibit persistence over time and policy variables may be jointly determined with macroeconomic outcomes, the study specifies a dynamic panel model. Two baseline equations are estimated, one for inflation and one for unemployment, each including a lagged dependent variable:

$$INF_{it} = \alpha + \rho INF_{it-1} + \beta' X_{it} + \gamma_1 CBI_{it} + \gamma_2 GPR_{it} + \delta' Z_{it} + \mu_i + \lambda t + \varepsilon_{it} \quad [1]$$

$$UNP_{it} = \alpha + \rho UNP_{it-1} + \beta' X_{it} + \gamma_1 CBI_{it} + \gamma_2 GPR_{it} + \delta' Z_{it} + \mu_i + \lambda t + \varepsilon_{it} \quad [2]$$

Where i indexes countries and t indexes years. X_{it} denotes the vector of core monetary, fiscal, and macro-structural regressors (e.g., real interest rate, money supply growth, debt, taxes, government expenditure, GDP growth, labor/productivity, oil price, and globalization). Z_{it} represents control variables (exchange rate, population growth, and corruption index). μ_i captures country fixed effects, and λt captures common time effects.

3.2 Moderation Framework

The core theoretical contribution of this study lies in examining how institutional design and external risk conditions affect policy effectiveness. To operationalize this examination, we estimate models that include multiplicative interaction terms. This specification allows us to test whether the impacts of monetary, fiscal, and macroeconomic variables on inflation and unemployment are significantly altered by varying levels of Central Bank Independence (CBI) and Geopolitical Risk (GPR).

$$\text{INFit}_i = \sum_j \eta_j \text{CBI}_{it} X_{jit} + \epsilon_{it} \quad [3]$$

$$\text{INFit}_i = \dots + \sum_j \omega_j (\text{GPR}_{it} \cdot X_{jit}) + \epsilon_{it} \quad [4]$$

These interaction terms evaluate whether the influence of policy instruments and macro-structural factors on inflation and unemployment depends on institutional credibility (CBI) and the prevailing geopolitical risk environment (GPR).

3.3 Econometric Procedures

To ensure robust and valid empirical results, this study uses a structured estimation strategy. Before estimation, several pre-diagnostic checks confirm data suitability and detect problems. Checks include descriptive statistics to summarize variables and identify outliers; panel unit-root tests (LLC, ADF-Fisher, PP-Fisher) to assess stationarity; a Pearson correlation matrix to assess multicollinearity; and scatter plots to detect unusual patterns. The main estimation method is the two-step System GMM estimator (Blundell & Bond, 1998), which is well-suited to dynamic panel models and addresses endogeneity, simultaneity, and unobserved country heterogeneity.

The estimator uses internal instruments from lagged endogenous variables and a parsimonious lag structure to limit instrument proliferation and maintain the reliability of specification tests. As a sensitivity check, System GMM results are compared with OLS estimates under two specifications (with and without control variables) to test whether the main conclusions hold under alternative assumptions. Model validity is evaluated using standard System GMM diagnostics. The Hansen J-test is reported to assess the overall validity of the instruments (with p-values above 0.05 indicating no evidence that instruments are correlated with the error term), and the Arellano–Bond AR (2) test is used to confirm the absence of second-order serial correlation in first-differenced residuals ($p > 0.05$), which supports the validity of the moment conditions. Consistent with good practice, the study also reports the number of instruments and ensures it remains reasonable relative to the number of countries/groups.

4. Results and Discussion

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Unemployment	18,611	14,575	0,144	45,93
Inflation	146,719	126,876	-113,87	445,792
Interest Rate	6,139	7,919	-18,845	42,5
Moneys Supply	65,157	28,528	24,3	140,092
Public Debt	46,868	24,507	2,00	103
Government Expenditure	20,368	7,437	9,761	35,515
Gross Domestic Product	4,08	2,889	-5,457	11,439
Labor Productive	57,84	12,283	40,543	82,64
Central Bank Independence	0,625	0,139	0,438	0,841
Globalization	273,129	148,04	22,58	495,829
Geopolitical Risk (GPR)	97,012	29,328	67,51	166,62
Brent Crude Oil Prices	50.321,022	28.277,985	43.609,18	95.964,557
Exchange Rate	5897,798	11859,03	1,796	42000
Population Growth	1,467	0,519	0,406	2,774
Corruption Perception Index (CPI)	33,611	8,266	24	53
Tax Revenue	11,172	5,13	3,818	24,547

Source: Data processed by the authors using Stata 17, 2025.

First, we present descriptive statistics for each variable used in this study, as shown in Table 2. During the 2012–2023 period, the average unemployment rate reached 18.61 percent. The lowest unemployment rate was 0.14 percent, recorded in Malaysia (2014), while the highest unemployment rate was 45.93 percent, recorded in Bangladesh (2022). Meanwhile, average inflation across the D-8 panel reached 146.72 percent. The lowest inflation value in this dataset was -113.87 percent in Malaysia (2020), while the highest inflation was 445.79 percent in Iran (2023). Regarding monetary policy, the average interest rate ranged from -18.85 percent in Iran (2013) to 42.50 percent in Turkey (2023), with an average of 6.14 percent. The average money supply variable was 65.16, with the lowest value recorded in Iran (2023) at 24.30, and the highest in Malaysia (2013) at 140.09.

Regarding fiscal conditions, public debt averaged 46.87 percent of GDP, with the lowest level recorded in Bangladesh (2018) at 2.00 percent and the highest in Egypt (2017) at 103.00 percent. In terms of government activities, government spending (% of GDP) averaged 20.37 percent. The lowest value was 9.76 percent in Nigeria (2016), while the highest was 35.51 percent in Turkey (2019). GDP growth averaged 4.08 percent, peaking at 11.44 percent (Turkey, 2021) and declining to -5.46 percent (Malaysia, 2020). Labor productivity averaged 57.84, ranging from 40.54 (Iran, 2023) to 82.64 (Nigeria, 2023). The central bank independence index averaged 0.62, ranging from 0.438 (Iran, 2012) to 0.841 (Indonesia, 2013). The globalization proxy averaged 273.13, with values ranging from 22.58 (Nigeria, 2021) to 495.83 (Indonesia, 2012). The geopolitical risk index (GPR) averaged 97.01, ranging from 67.51 in Bangladesh (2013) to 166.62 in Bangladesh (2015).

For commodity conditions, the Brent crude oil variable ranged from 4,360,918 (2015) to 95,964,557 (2012). The average exchange rate was 5,897.80, with the lowest value in Turkey (2012) at 1.796 and the highest in Iran (2019) at 42,000. Average population growth was 1.47 percent, ranging from 0.41 percent in Turkey (2023) to 2.77 percent in Nigeria (2012). The average corruption perception index was 33.61, with the

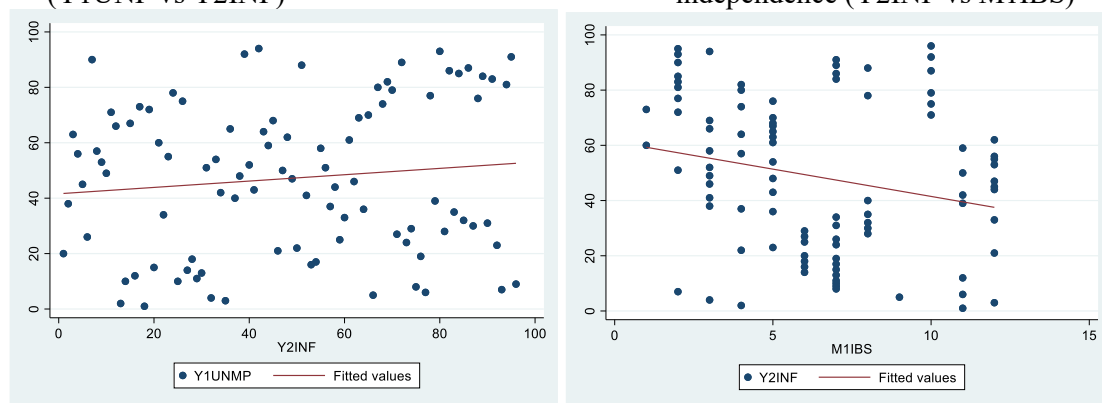
lowest score in Bangladesh (2023) at 24 and the highest in Malaysia (2019) at 53. Finally, tax revenue averaged 11.17 percent of GDP, with the lowest value observed in Iran (2021) at 3.818 percent and the highest in Bangladesh (2016) at 24.55 percent.

Next, potential multicollinearity among the explanatory variables was examined using a correlation matrix (Table 4). The results indicate that there are no significant pairwise correlations between the variables. Thus, serious multicollinearity is not indicated and is unlikely to affect the stability of the coefficients and the inferences in our estimates.

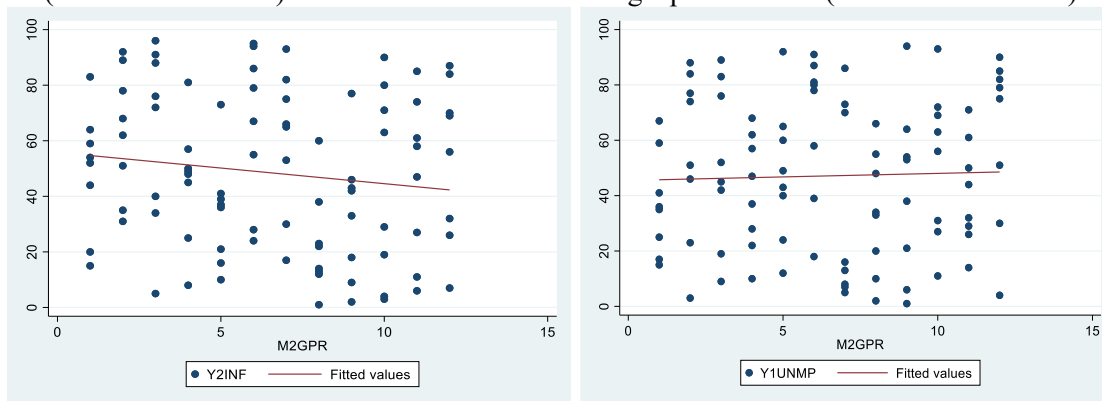
4.1 Visual Analysis of Scatter Char

Figure 2. Scatter Plot Analysis (D-8, 2012–2023)

(2a) Scatter plot of unemployment and inflation (Y1UNP vs Y2INF) (2b). Scatter plot of inflation and central bank independence (Y2INF vs M1IBS)



(2c). Scatter plot of inflation and geopolitical risk (Y2INF vs M2GPR) (2d). Scatter plot of unemployment and geopolitical risk (Y1UNP vs M2GPR)



Note: Y1UNP = Unemployment rate (% of labor force); Y2INF = Inflation rate (CPI, annual %); M1IBS = Central Bank Independence index (IBS/CBI); M2GPR = Geopolitical Risk index (GPR). Scatter plots provide bivariate (descriptive) relationships. The fitted line illustrates the average linear trend and does not imply causality.

Source: Data processed by the authors using EViews 12, 2025.

First, we attach Figure 2, which shows a slightly positive trend: higher inflation is often accompanied by higher unemployment in the raw data. Although the distribution is substantial, this pattern is generally consistent with episodes of stagflation that may occur when developing countries face supply constraints, imported inflationary pressures, and limited production capacity. This should be interpreted as a stylized association rather than a structural trade-off because the plot does not control for country-

specific factors or policy responses. Second, the INF–IBS (central bank independence) scatter plot shows a negative slope, suggesting that higher central bank independence is associated with lower inflation in the bivariate relationship. This is consistent with the credibility argument that stronger monetary independence can help anchor expectations and contain inflationary pressures.

However, the widespread points suggest that the strength of this relationship may vary across countries and periods, reinforcing the need for multivariate dynamic panel estimation. Third, the INF–GPR scatter plot shows a downward-sloping trend, indicating that higher geopolitical risk is associated with lower inflation. A plausible interpretation is that, in parts of the sample, the uncertainty/demand channel dominates: heightened geopolitical risk can suppress investment and consumption, reducing aggregate demand and dampening inflation even when supply disruptions are present. Finally, the UNP–GPR scatter suggests a positive association, meaning that higher geopolitical risk tends to coincide with higher unemployment, consistent with uncertainty shocks that delay hiring and weaken labor-market conditions.

Overall, these scatter plots illustrate bivariate patterns in the data. The main conclusions regarding magnitude, statistical significance, and policy interpretation are therefore drawn from the System GMM results, which control for persistence, endogeneity, and other covariates.

4.2 Inflation Dependent Variable

Table 5: GMM Inflation Estimation Results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
INF L1	0,120 (0,310)	0,030 (0,746)	0,036 (0,746)	0,072 (0,488)	0,131 (0,267)	0,141 (0,245)	0,121 (0,327)
IR	-0,102 (0,073)	-0,100** (0,034)	-0,099** (0,049)	-0,165** (0,043)	-0,053 (0,417)	-1,167** (0,010)	-0,083 (0,373)
MS	0,376** (0,046)	0,262** (0,031)	0,254 (0,333)	0,239 (0,112)	0,278 (0,075)	0,307 (0,704)	0,193 (0,403)
PD		0,038** (0,014)	0,306*** (0,002)	0,248** (0,051)	0,207*** (0,005)	0,131 (0,076)	0,172** (0,033)
GE		0,100 (0,453)	0,085 (0,379)	0,012 (0,914)	0,087 (0,306)	0,072 (0,292)	0,047 (0,650)
GDP			-0,158** (0,030)	-0,199** (0,012)	-0,189*** (0,008)	-0,251*** (0,000)	-0,277*** (0,002)
OIL			-0,616 (0,482)	-0,660 (0,307)	-0,621 (0,559)	-0,244 (0,768)	-0,192 (0,836)
CBI				2,381 (0,168)	3,332 (0,148)	3,163 (0,272)	3,610** (0,041)
CBI*IR					-0,263** (0,011)		-0,224** (0,015)
CBI*MS					0,090 (0,258)		0,076 (0,499)
CBI*PD					0,017 (0,822)		0,000 (0,999)
CBI*GE					0,225**		0,148**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
					(0,028)		(0,040)
GPR				-0,974**	-0,907**	-1,081**	-0,962
				(0,036)	(0,011)	(0,021)	(0,091)
GPR*GE						0,060	0,000
						(0,338)	(0,998)
GPR*PD						0,114**	0,065
						(0,049)	(0,317)
GPR*OIL						-0,564	-0,510
						(0,306)	(0,367)
GPR*GBL						-0,058	0,021
						(0,270)	(0,691)
ER	0,067	0,008	-0,049	-0,032	-0,035	-0,049	-0,103
	(0,602)	(0,916)	(0,699)	(0,766)	(0,628)	(0,588)	(0,425)
POP	-0,254	0,256	-0,198	-0,155	-0,078	-0,041	-0,058
	(0,289)	(0,083)	(0,403)	(0,324)	(0,674)	(0,850)	(0,713)
CPI	-1,822***	-1,504	-2,633***	-1,865**	-1,539**	-1,890***	-1,856
	(0,013)	(0,149)	(0,001)	(0,018)	(0,026)	(0,003)	(0,092)
Sfesification	All Models						
Estimation Method	Two-step Differenced GMM with Windmeijer correction						
Instrumen Type	Collapsed instruments						
Lag Depth	t-2 to t-4 for endogenous variables						
Number Ins.	70	62	63	74	68	68	82
Prob.	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Sargan T	61,36	70,371	57364	64,326	56,726	57,211	69,34
	(0,151)	(0,192)	(0,251)	(0,360)	(0,270)	(0,255)	(0,216)
AR 1	-2,290	-2,126	-2,433	-2,452	-2,322	-2,485	-2,370
	(0,020)	(0,033)	(0,015)	(0,014)	(0,020)	(0,013)	(0,017)
AR2	-1,090	-0,836	-0,957	-0,277	-1,314	-0,084	-0,453
	(0,275)	(0,407)	(0,338)	(0,781)	(0,188)	(0,932)	(0,650)

*Note: This table presents the significance levels, with ***, **, and * indicating significance at the 1%, 5%, and 10% levels, respectively.*

Source: Data processed by the authors using Stata 17, 2025

Table 5 reports the two-step differenced GMM estimates of inflation for D-8 countries, using Windmeijer-corrected standard errors and collapsed instruments. The diagnostic tests support the specification: AR(1) is significant as expected in first-differenced models, while AR(2) is consistently insignificant, indicating no second-order serial correlation in the differenced residuals. The Sargan test does not reject instrument validity across models (p-values > 0.10), and the number of instruments is transparently reported for each specification (62–82), directly addressing the reviewer’s request regarding instrument disclosure.

Turning to the main coefficients, the interest rate (IR) generally enters with a negative sign and is statistically significant in several specifications, suggesting that tighter monetary conditions are associated with lower inflation. This pattern is consistent

with modern expectations-based monetary frameworks, in which policy tightening can dampen aggregate demand and, importantly, strengthen credibility, thereby anchoring inflation expectations (Lucas Jr, 1976; Mishkin, 2004). In the D-8 context, the relevance of this channel is heightened because these economies are frequently exposed to imported inflation and exchange-rate pass-through. When external price shocks occur, a credible and consistent policy stance can help prevent temporary disturbances from becoming entrenched in domestic inflation dynamics. By contrast, money supply (MS) is positive and significant only in the more parsimonious specifications (Models 1–2) and becomes insignificant once fiscal and institutional variables are introduced. This suggests that liquidity conditions matter, but inflation dynamics in D-8 countries are not explained by a single “money-only” channel when broader macro-fiscal and institutional constraints are taken into account. Such instability is plausible in developing economies where monetary transmission can be imperfect, and the demand response to liquidity may not translate into sustained real expansion when productive capacity is constrained (Mishkin, 2008; Agénor & Montiel, 2015). Accordingly, the estimates suggest that monetary aggregates may still be informative, yet policy effectiveness likely depends on structural conditions and credibility rather than on money growth alone.

On the fiscal side, public debt (PD) shows a positive, frequently significant association with inflation across many models. In the D-8 setting—where domestic bond markets may be shallower and fiscal capacity can be limited—rising debt can heighten inflation pressure through credibility and expectations, particularly when markets anticipate future accommodation or perceive sustainability risks. This interpretation aligns with the broader argument in the literature review that inflation dynamics in developing economies are shaped not only by standard demand management but also by institutional credibility and vulnerabilities to external financing conditions (Rodrik, 2009). In contrast, government expenditure (GE) is generally not significant as a standalone regressor, suggesting that spending levels alone do not robustly explain inflation after accounting for other factors. This is consistent with the idea that the inflationary consequences of fiscal actions depend on financing conditions and whether spending is accompanied by supply-side capacity improvements—an important nuance for D-8 economies that often face supply bottlenecks and dependence on imported inputs.

Another robust pattern is the negative relationship between GDP growth and inflation once growth is included (Models 3–7). In the D-8 context (the Developing-8, an organization of eight developing countries), this association holds during periods when higher growth coincides with stronger supply capacity and productivity, or during stabilization episodes that reduce cost pressures (Asadollah et al., 2024). It also fits the “structural change/jobless growth” issue in developing economies: growth may result from sectoral shifts or productivity gains that do not proportionally increase employment but do expand supply conditions for inflation (Okun, 1963; Ademola & Badiru, 2016). In a dynamic panel setting, this coefficient should be taken as a conditional association, not a direct causal relationship.

The institutional results reinforce the paper’s framing, which holds that central bank independence (CBI, the legal and practical autonomy of a central bank) should be treated as a conditional credibility mechanism, not a universal “anti-inflation shield.” CBI’s direct effect is not consistently significant, matching the literature, which shows that many developing countries experience a gap between formal independence and practical autonomy due to political and institutional limits (Masciandaro & Romelli, 2018a; Dincer et al., 2022). The interaction terms clarify the key associations: the negative and significant $CBI \times IR$ (interest rate) coefficient (Models 6 and 7) shows that the effect of interest rates in reducing inflation is stronger with higher CBI, in line with a credibility/expectations channel rate signals are more effective with greater independence

(Cukierman & Lippi, 1999; Mishkin, 2004). Meanwhile, the positive and significant CBI×GE (government expenditure) coefficient indicates that the inflation-increasing association of government spending grows with higher CBI. This highlights that monetary credibility does not negate the importance of fiscal policy, especially in economies facing external shocks and supply issues. Together, these results demonstrate that CBI's impact is more visible through its influence on policy transmission than via a direct, uniform effect.

A particularly reviewer-sensitive result concerns geopolitical risk (GPR), which is associated with lower inflation in several models (Models 4-6) and is negative at the 10% level in Model 7. This can be reconciled with the literature review by clarifying that the sign of GPR on inflation is theoretically ambiguous because of two competing mechanisms. First, the supply-disruption mechanism: geopolitical shocks can raise inflation by disrupting supply chains and pushing up commodity prices. Second, the uncertainty-driven demand-contraction mechanism: when uncertainty increases, households may save more and firms may delay investments and hiring, thereby reducing aggregate demand and lowering inflation (Bloom, 2009; Baker et al., 2016). This demand-dominant mechanism is plausible for D-8 economies where geopolitical tensions can trigger volatility in capital flows and confidence, compressing domestic spending even when supply frictions exist.

To address concerns about potential misspecification or omitted variables, this result should be interpreted cautiously as an average conditional association across countries and time rather than a universal structural law; the sign may reflect heterogeneity across episodes in which supply or demand channels dominate. The inclusion of controls and the dynamic specification help reduce omitted-variable bias, yet additional robustness checks (e.g., subperiod analysis or country-specific sensitivity analyses) could further assess this heterogeneity. Finally, the interaction evidence is selective: GPR×PD is positive and significant in Model 6, suggesting that geopolitical stress can amplify the inflationary association of public debt through heightened risk premia and sustainability concerns, whereas other GPR interactions are not robust and should therefore not be overstated.

From a policy perspective, inflation stabilization in D-8 countries relies on a mix of effective monetary policy, fiscal credibility, and resilient institutions, especially under external risk. Strengthening monetary policy credibility may improve the transmission of interest-rate policy, but it cannot replace fiscal discipline when geopolitical uncertainty is high. Because the inflationary impact of geopolitical risk depends on whether supply disruptions or demand contractions dominate, policymakers should complement monetary measures with strategies that reduce external vulnerability, lowering import dependence, improving supply-chain resilience, and maintaining transparent policy communication to anchor expectations.

4.3 Unemployment Dependent Variable

Table 6: GMM Unemployment Estimation Results

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
UNP L1.	0,341* (0,052)	0,399** (0,020)	0,314* (0,052)	0,398*** (0,010)	0,346*** (0,003)	0,477*** (0,001)
IR	0,167* (0,059)	0,203** (0,028)	0,270** (0,011)	0,326*** (0,047)	0,321*** (0,001)	0,352** (0,010)
MS	0,176 (0,228)	0,140 (0,437)	0,167 (0,289)	-0,077 (0,719)	0,026 (0,901)	-0,089 (0,070)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
PD		0,352** (0,039)	0,461*** (0,000)	0,491*** (0,000)	0,468*** (0,003)	0,544*** (0,009)
GE		0,258*** (0,003)	0,362*** (0,000)	0,409*** (0,000)	0,276* (0,056)	0,467*** (0,002)
TR		-0,254** (0,016)	-0,179** (0,030)	-0,167*** (0,013)	-0,174 (0,084)	-0,263** (0,038)
GDP			0,020 (0,691)	0,011 (0,899)	0,001 (0,993)	0,037 (0,797)
LP			-1,083 (0,075)	-1,359*** (0,014)	-0,536** (0,046)	-1,271** (0,024)
OIL			-1,254 (0,198)	1,031 (0,344)	-0,388 (0,714)	0,798 (0,505)
GLB			-0,062 (0,647)	-0,117 (0,476)	0,125 (0,534)	-0,178 (0,498)
CBI*IR				-0,053 (0,632)		-0,007 (0,960)
CBI*MS				0,206*** (0,016)		0,218 (0,269)
CBI*PD				-0,036 (0,810)		0,026 (0,915)
CBI*GE				0,036 (0,787)		0,032 (0,866)
GPR				0,316 (0,413)	0,576 (0,319)	0,203 (0,763)
GPR*GE					0,215*** (0,017)	0,225** (0,037)
GPR*PD					0,023 (0,841)	0,044 (0,724)
GPR*OIL					1,187 (0,195)	0,249 (0,816)
GPR*GBL					-0,219** (0,045)	-0,145 (0,262)
ER	0,278** (0,037)	0,275 (0,077)	0,371*** (0,004)	0,367*** (0,010)	0,415*** (0,006)	0,488*** (0,005)
POP	-0,496* (0,058)	-0,477 (0,082)	0,368 (0,083)	-0,281 (0,323)	-0,215 (0,163)	-0,104 (0,648)
CPI	1,638 (0,391)	1,610 (0,358)	1,224 (0,479)	1,122 (0,548)	0,206 (0,772)	0,417 (0,736)

Sfesification All Models

Estimation Method Two-step Differenced GMM with Windmeijer correction

Instrumen Type Collapsed instruments

Lag Depth t-2 to t-4 for endogenous variables

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Number Ins.	61	65	66	70	80	74
Prob.	0,000	0,000	0,000	0,000	0,000	0,000
Sargan T	61.624 (0,146)	61.865 (0,141)	60,991 (0,159)	57,168 (0,256)	72952 (0,140)	52,477 (0,416)
AR 1	-2.051 (0,040)	-1,710 (0,087)	-1.936 (0,052)	-2,192 (0,028)	-2.233 (0,025)	-2,239 (0,025)
AR 2	1.355 (0,175)	0,015 (0,987)	-0,326 (0,744)	-0,276 (0,782)	0,515 (0,606)	-0,556 (0,578)

*Note: This table presents the significance levels, with ***, **, and * indicating significance at the 1%, 5%, and 10% levels, respectively*

Source: Data processed by the authors using Stata 17, 2025.

Table 6 presents the two-step differenced GMM estimates (Windmeijer-corrected) for unemployment in D-8 countries, using collapsed instruments and lag depth t-2 to t-4 for endogenous variables. The diagnostic results are acceptable: AR(1) is significant or near-significant, which is expected in first-differenced models, while AR(2) is consistently insignificant, supporting the validity of the moment conditions. The Sargan test does not reject the instrument set across specifications, and the number of instruments is transparently reported (61-80), addressing the reviewer's request and helping assess concerns about instrument proliferation.

A notable feature of the estimates is the persistence of unemployment. The lagged unemployment term is positive and statistically significant across all models, indicating that labor-market conditions in D-8 economies adjust slowly. This persistence aligns with structural frictions, such as skill mismatches, segmented labor markets, and institutional rigidities, which are common in developing countries. As a result, shocks to employment can have longer-lasting effects rather than merely producing short-lived fluctuations. In the (D-8) context, this is important because repeated external disturbances such as commodity cycles, exchange-rate volatility, and heightened uncertainty can lead to prolonged labor-market weakness.

The interest rate (IR) shows a positive and statistically significant association with unemployment in Models (1)-(6). This suggests that tighter monetary conditions tend to coincide with higher unemployment, consistent with an aggregate-demand and credit-cost channel: higher borrowing costs reduce investment and spending, weaken firms' working-capital conditions, and ultimately reduce labor demand. The effect can be amplified in D-8 economies, where firms, particularly in manufacturing and tradable sectors, depend more heavily on bank financing and where monetary transmission can be less smooth than in advanced economies. Importantly, the coefficient should be interpreted as a conditional association within a dynamic-panel framework rather than a direct causal claim; nevertheless, it is consistent with the literature review emphasizing that monetary stabilization in developing economies often involves trade-offs, especially when transmission is imperfect, and economies face repeated shocks (Mishkin, 2008; Agénor & Montiel, 2015).

In contrast, money supply (MS) does not show a strong relationship with unemployment in any specification. The sign even changes in Models (4) and (6). This lack of robustness supports the argument from the literature review. Expansionary liquidity does not necessarily lead to more jobs when policy transmission to the real sector is weak and supply-side constraints limit output. In the D-8 setting, liquidity expansion may raise demand in the short run. However, employment responses can

remain muted when firms face supply bottlenecks, import dependence for intermediate inputs, and heightened macro uncertainty.

Fiscal variables display a clearer pattern. Public debt (PD) and government expenditure (GE) are consistently positive and significant across most models, indicating that these variables are associated with higher unemployment in the sample. In D-8 economies, this association may occur when fiscal expansions are dominated by short-run consumption or subsidy components with weaker employment multipliers, or when debt accumulation is linked to increased risk premia and potential crowding out of private credit, which may coincide with lower private-sector job creation. At the same time, the negative and significant coefficient on tax revenue (TR) suggests that stronger fiscal capacity is associated with lower unemployment, consistent with the view that better revenue systems can underpin more stable fiscal management, decrease crisis-driven adjustments, and support more productive expenditure composition. These results should not be framed as evidence that fiscal policy directly causes unemployment; rather, they suggest that the composition and credibility of fiscal policy are relevant in D-8 economies where institutional quality and policy credibility can vary (Rodrik, 2009; Yilmazkuday, 2022).

Another important result is that GDP growth is not statistically significant in the unemployment equation. This aligns with the “jobless growth” argument emphasized in the literature review: in developing economies, output growth can be driven by capital-intensive sectors, productivity changes, or commodity cycles without proportional job creation (Okun, 1963; Siyan et al., 2016). In this sense, unemployment in D-8 appears to be more closely associated with macro-financial conditions (interest rates, debt pressures, and exchange-rate movements) and structural labor-market frictions than with short-run growth fluctuations. Consistent with this interpretation, labor productivity (LP) is negative and often significant, implying that higher productivity is associated with lower unemployment, which is compatible with a supply-side efficiency channel when productivity gains reflect capability upgrading rather than pure labor substitution. Meanwhile, the exchange rate (ER) is positive and significant in most models, indicating that currency depreciation is associated with higher unemployment. This is particularly relevant for D-8 economies that are exposed to imported inputs and exchange-rate pass-through: depreciation increases local production costs for firms dependent on imported energy and intermediate goods, compresses margins, and may be linked to reduced hiring. This mechanism is consistent with the literature review’s emphasis on external vulnerability in open developing economies (Rodrik, 2009).

Regarding institutions, the estimates do not support portraying central bank independence (CBI) as a universally strong determinant of unemployment outcomes. The interaction between CBI and interest rates ($CBI \times IR$) is not statistically significant, and most other CBI interactions are not robust across models; therefore, claims that CBI decisively improves unemployment performance should be softened. The only strong signal appears in Model 4, where $CBI \times MS$ is positive and significant, but the effect is not significant in Model 6, so it should be presented as indicative rather than conclusive. A cautious interpretation is that in certain institutional settings, liquidity expansion may coincide with higher unemployment possibly reflecting weak transmission to productive sectors, credit misallocation, or inflation/uncertainty feedback that discourages hiring, yet the lack of robustness suggests this mechanism should be discussed briefly and not overstated.

Finally, geopolitical risk (GPR) does not have a statistically significant direct effect on unemployment, consistent with the literature's emphasis on heterogeneous impacts across countries and periods, depending on whether supply-disruption or demand-contraction channels dominate (Caldara & Iacoviell, 2022; Yilmazkuday, 2025).

The interaction terms, however, provide clearer conditionality. The positive and significant $GPR \times GE$ coefficient in Models 5-6 suggests that during periods of higher geopolitical risk, the association between government spending and unemployment becomes stronger. A plausible D-8 mechanism is that geopolitical stress shifts fiscal priorities toward emergency responses, subsidies, or security-related outlays with weaker employment multipliers, while heightened uncertainty discourages private investment and hiring. The interaction term $GPR \times GBL$ is negative and significant in Model 5 but not in Model 6, so it should be treated as suggestive rather than robust; a conservative reading is that trade integration may sometimes buffer employment losses through market diversification, but geopolitical tensions can also disrupt trade and supply chains and alter how external integration translates into domestic outcomes (Glick & Taylor, 2010).

From a policy perspective—kept separate from causal claims, the results suggest that D-8 labor markets are sensitive to monetary tightening, fiscal stress, and exchange-rate vulnerability, while output growth alone does not reliably translate into job creation. This implies that reducing unemployment likely requires policy coordination: maintaining macro-financial stability to avoid abrupt rate hikes and depreciation spirals, strengthening fiscal capacity and improving spending quality to prevent debt-driven vulnerabilities, and addressing structural labor constraints to make growth more employment-intensive. Under heightened geopolitical risk, the estimates also suggest that the labor-market effects of fiscal actions become more conditional, highlighting the importance of designing shock responses with stronger employment multipliers and protecting productive investment even during periods of external stress.

4.4 Robustness Test with Ordinary Least Square (OLS)

Robustness checks assess whether the main relationships observed in the dynamic-panel GMM estimates remain broadly comparable under simpler panel estimators. Following common practice, we report Ordinary Least Squares–based panel models—Common Effects (CEM/pooled OLS), Fixed Effects (FEM), and Random Effects (REM). These are estimated under two specifications: without control variables and with the full set of controls (Tables 7–8). The baseline framework is a dynamic panel, so OLS-type estimators are known to be biased in the presence of a lagged dependent variable and potential endogeneity. Therefore, we present these results strictly as a benchmark and a useful bound. We avoid treating them as validation of the GMM findings.

For inflation (Table 7), the OLS-based results show similar qualitative patterns for key monetary and fiscal variables. The interest rate (IR) is generally negative and becomes statistically significant once controls are included across alternative panel estimators. The money supply (MS) remains positive and highly significant across most specifications. Public debt (PD) is also positive and tends to be statistically significant, particularly when controls are added. In contrast, government expenditure (GE) and GDP growth are not consistently significant, indicating sensitivity to specification choice. Several additional variables—such as oil prices and institutional measures—appear significant in some estimators but not others. This supports the view that OLS results serve as sensitivity checks rather than definitive inference. Overall, OLS benchmarks suggest that the direction of several core associations is not driven by a single estimator.

However, the dynamic-panel GMM framework remains the preferred basis for interpretation. For unemployment (Table 8), the OLS-based estimates indicate that interest rates are positively associated with unemployment after controlling for other factors. Fiscal variables, especially public debt and government expenditure, tend to have positive coefficients in several specifications. Other regressors—including money supply, GDP growth, globalization, and geopolitical risk—are generally not robustly

significant across estimators. The coefficient on tax revenue is sensitive to model specification. This highlights the limitations of OLS-type estimators in this setting and reinforces the need to rely on dynamic GMM results for substantive conclusions. These robustness checks offer a complementary perspective on the stability of signs for key variables. However, the main inferences continue to be drawn from the GMM estimates and their diagnostic tests.

5. Conclusion

This study examines how monetary and fiscal policy instruments interact with institutional credibility and external uncertainty in shaping inflation and unemployment across D-8 economies over the study period. Using a two-step dynamic panel GMM framework with Windmeijer-corrected standard errors and collapsed instruments, the evidence suggests that macroeconomic stabilization in developing-country settings is fundamentally state-dependent: identical policy tools can operate differently depending on institutional strength, fiscal pressures, and exposure to external shocks. This perspective helps explain why inflation-unemployment dynamics in D-8 countries often deviate from the textbook Phillips-curve narrative and appear more unstable in the face of recurrent disturbances and structural constraints.

Regarding inflation, the estimates indicate that conventional monetary tightening remains relevant, as higher interest rates are generally associated with lower inflation, consistent with an expectations-and-credibility channel through which policy signals help anchor inflation dynamics. At the same time, money supply effects are less stable across specifications, implying that liquidity conditions matter but do not fully characterize inflation outcomes once broader fiscal and institutional constraints are accounted for, especially in environments with imperfect monetary transmission and binding supply constraints. Budgetary pressures are more consistent: public debt is frequently linked to higher inflation, underscoring the role of fiscal credibility and sustainability concerns in D-8 economies, where shallow domestic bond markets and external financing vulnerabilities can amplify inflation risks. Economic growth is negatively associated with inflation in the preferred specifications, which is consistent with episodes in which improvements in adequate supply capacity and stabilization efforts ease price pressures, even when growth does not automatically translate into broad employment gains.

A central contribution of this study is clarifying the role of Central Bank Independence (CBI). The results do not support portraying CBI as a uniformly strong "anti-inflation shield" with significant direct effects across all specifications. Instead, CBI behaves more plausibly as a conditional credibility mechanism whose influence becomes more visible through policy transmission interactions rather than as a consistently strong, standalone determinant. In practical terms, a stronger CBI can alter how monetary and fiscal actions map into inflation outcomes. Still, it does not substitute for fiscal discipline, nor can it offset structural bottlenecks that make inflation in developing economies more sensitive to external shocks and financing conditions. Another key and policy-relevant finding concerns geopolitical risk (GPR). In the inflation equation, GPR is often associated with lower inflation, which is consistent with an uncertainty-driven demand-contraction mechanism in which precautionary behavior suppresses consumption and investment.

However, this relationship should be interpreted as an average conditional association rather than a universal law, because the theoretical sign of GPR is ambiguous and may vary across episodes depending on whether demand or supply channels dominate. Notably, the interaction evidence suggests that under heightened geopolitical

stress, debt-related inflation pressures can become more pronounced, highlighting macro-financial fragility when external uncertainty intersects with fiscal vulnerability. For unemployment, the dynamic estimates show strong persistence, indicating slow labor-market adjustment and the potential for hysteresis-like dynamics in D-8 settings. Interest rates are positively associated with unemployment, suggesting that anti-inflationary tightening can entail labor-market costs, particularly when the credit channel is dominant and monetary transmission is uneven. Fiscal variables also matter: public debt and government expenditure are frequently associated with higher unemployment, consistent with the view that budgetary stress and spending composition especially under constrained fiscal space and supply limitations, can weaken job creation.

Meanwhile, GDP growth is not robustly related to unemployment, which aligns with concerns about jobless growth in developing economies where expansion may be concentrated in capital-intensive sectors and where structural factors constrain labor absorption. External vulnerability is also evident, as exchange-rate movements are associated with unemployment in key specifications, consistent with import dependence and cost pressures that can compress firm margins and reduce labor demand. As a complementary benchmark, OLS-based panel estimations (CEM/FEM/REM, with and without controls) are reported to assess sign stability. Still, these should not be treated as validating the dynamic GMM results, given the known bias of OLS-type estimators in dynamic panel settings. The robustness exercise nevertheless indicates that several core relationships—most notably those involving interest rates and public debt—are not driven by a single estimator. At the same time, other coefficients remain sensitive to specification choices, reinforcing the rationale for relying on the dynamic GMM framework for the main inferences.

From a policy perspective, the findings suggest that D-8 stabilization requires a balanced mix of credible monetary policy, fiscal discipline, and institutional strengthening, with explicit recognition of external shock exposure. Monetary tightening can help contain inflation, but policymakers should account for unemployment persistence and the credit channel's sensitivity to avoid prolonged labor-market scarring. Strengthening fiscal capacity and improving the composition and efficiency of public spending are essential to reduce debt-related vulnerabilities that propagate into both inflation and employment outcomes. Institutional reform should also be framed realistically: enhancing the effectiveness of CBI is likely to matter most by improving credibility and moderating policy transmission rather than by guaranteeing significant direct effects on macro outcomes. Finally, elevated geopolitical risk should be treated as a state variable that can reshape policy effectiveness and amplify fiscal risks, implying the need for shock-response packages that protect productive investment, strengthen supply-chain resilience, and prioritize measures with higher employment multipliers during stress periods. Several limitations should be noted.

Although dynamic panel GMM helps address endogeneity and unobserved heterogeneity, results can remain sensitive to instrument choice and lag structure. While collapsed instruments and diagnostic tests mitigate this concern, residual specification risk cannot be eliminated. The D-8 sample is heterogeneous, so pooled estimates may mask country- and episode-specific mechanisms, especially for GPR, where dominant channels may differ across contexts. Measurement error in institutional and risk proxies—particularly the gap between de jure and de facto independence—may also attenuate estimated effects, and the macro-level design cannot directly observe micro transmission mechanisms such as firm credit constraints, sectoral labor reallocation, or expectation formation. Future research could address these issues through country- or subperiod-specific analyses that distinguish crisis and non-crisis regimes, event-study designs around major geopolitical and energy shocks, and nonlinear or threshold models

to test whether policy effectiveness changes when debt, inflation, or external risk crosses critical levels. Linking macro evidence with sectoral or firm-level datasets would further clarify how credit-market conditions, import dependence, and labor-market frictions jointly shape unemployment persistence and the inflation–employment trade-off in developing economies.

References

- Ademola, A. S., & Badiru, A. (2016). The impact of unemployment and inflation on economic growth in Nigeria (1981-2014). *International Journal of Business and Economic Sciences Applied Research (IJBESAR)*, 9(1), 47–55.
- Agénor, P.-R., & Montiel, P. J. (2015). *Development macroeconomics* (4th ed.). Princeton, New Jersey: Princeton University Press.
- Andreev, M., Peiris, M. U., Shirobokov, A., & Tsomocos, D. P. (2024). Commodity cycles and financial instability in emerging economies. *Annals of Finance*, 20, 167–197.
- Arnone, M., & Romelli, D. (2013). Dynamic central bank independence indices and inflation rate: A new empirical exploration. *Journal of Financial Stability*, 9(3), 385–398.
- Asab, N. A. (2025). Are supply shocks a key driver of global inflation? Evidence from CPI and GDP deflator analysis. *Research in Globalization*, 10.
- Asadollah, O., Carmy, L. S., Hoque, M. R., & Yilmazkuday, H. (2024). Geopolitical risk, supply chains, and global inflation. *The World Economy*, 47(8), 3450–3486.
- Asafo-Adjei, E., Qabobho, T., & Adam, A. M. (2023). Conditional effects of local and global risk factors on the co-movements between economic growth and inflation: Insights into G8 economies. *Heliyon*, 9(9).
- Aytaç, A., Korkmaz, M., & Yücel, A. S. (2024). The impact of unemployment and inflation on economic growth in Turkey. *International Refereed Journal of Humanities and Academic Sciences*, 33, 1–11.
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636.
- Blinder, A. S., Ehrmann, M., De Haan, J., & Jansen, D.-J. (2024). Central bank communication with the general public: Promise or false hope? *Journal of Economic Literature*, 62(2), 425–457.
- Bloom, N. (2009). The impact of uncertainty shocks. *Econometrica*, 77(3), 623–685.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143.
- Bouri, E., Gabauer, D., Gupta, R., & Kinatader, H. (2023). Global geopolitical risk and inflation spillovers across European and North American economies. *Research in International Business and Finance*, 66.
- Caldara, D., & Iacoviello, M. (2022). Measuring geopolitical risk. *American Economic Review*, 112 (4), 1194–1225.
- Crump, R. K., Eusepi, S., Giannoni, M., & Şahin, A. (2024). The unemployment–inflation trade-off revisited: The Phillips curve in COVID times. *Journal of Monetary Economics*, 145.
- Cukierman, A., & Lippi, F. (1999). Central bank independence, centralization of wage bargaining, inflation and unemployment: Theory and some evidence. *European Economic Review*, 43(7), 1395–1434.
- Dincer, N., Eichengreen, B., & Geraats, P. (2022). Trends in monetary policy transparency: Further updates. *International Journal of Central Banking*, 18(1), 331–348.
- Eichengreen, B., & Rose, A. K. (1999). Contagious currency crises: Channels of conveyance. In T. Ito & A. O. Krueger (Eds.), *Changes in exchange rates in rapidly developing countries: Theory, practice, and policy issues* (pp. 29–56). Chicago, IL: University of Chicago Press

- Friedman, M. (1963). *Inflation: Causes and consequences*. Bombay, India: Asia Publishing House
- Garriga, A. C., & Rodriguez, C. M. (2023). Central bank independence and inflation volatility in developing countries. *Economic Analysis and Policy*, 78, 1320–1341.
- Glick, R., & Taylor, A. M. (2010). Collateral damage: Trade disruption and the economic impact of war. *The Review of Economics and Statistics*, 92 (1), 102–127
- Goodfriend, M. (2007). How the world achieved consensus on monetary policy. *Journal of Economic Perspectives*, 21(4), 47–68.
- Gordon, R. J. (1997). The time-varying NAIRU and its implications for economic policy. *Journal of Economic Perspectives*, 11(1), 11–32.
- Ha, J., Kose, M. A., Ohnsorge, F., & Yilmazkuday, H. (2024). What explains global inflation. *IMF Economic Review*, 73 (2), 1–34.
- Lucas Jr, R. E. (1976). Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy*, 1, 19–46.
- Mankiw, N. G. (2013). *Macroeconomics* (8th ed.). New York, NY: Worth Publishers
- Masciandaro, D., & Romelli, D. (2018a). Beyond the central bank independence veil: new evidence. *BAFFI CAREFIN Centre Research Paper*, 2018–71.
- Masciandaro, D., & Romelli, D. (2018b). Central bankers as supervisors: Do crises matter? *European Journal of Political Economy*, 52, 120–140.
- Mishkin, F. S. (2004). Can inflation targeting work in emerging market countries?. *NBER Working Paper No. 10646*. Cambridge, MA: National Bureau of Economic Research.
- Mishkin, F. S. (2008). How should we respond to asset price bubbles. *Financial Stability Review*, 1265–74.
- Okun, A. M. (1962). Potential GNP: Its measurement and significance. In *Proceedings of the Business and Economic Statistics Section of the American Statistical Association* (pp. 98–103). Alexandria, VA: American Statistical Association.
- Phelps, E. S. (1967). Phillips curves, expectations of inflation and optimal unemployment over time. *Economica*, 34 (135), 254–281.
- Phillips, A. W. (1958). The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957. *Economica*, 25(100), 283–299.
- Piazza, M. R. (2018). Is there a Phillips curve? A full information partial equilibrium approach. *IMF Working Paper No. 18/83*. Washington, DC: International Monetary Fund.
- Rodrik, D. (2009). The Turkish economy after the crisis. *Discussion Paper No. 2009-1*. Cambridge, MA: Harvard University.
- Agénor, P.-R., & Montiel, P. J. (2015). Development Macroeconomics. In *Development Macroeconomics*. degruyter.com. <https://doi.org/10.1515/9781400866267>
- Andreev, M., Peiris, M. U., Shirobokov, A., & Tsomocos, D. P. (2024). Commodity cycles and financial instability in emerging economies. *Annals of Finance*, 20(2), 167–197.
- Asab, N. A. (2025). Are supply shocks a key driver of global inflation? Evidence from CPI and GDP deflator analysis. *Research in Globalization*, 10, 1–12.
- Asadollah, O., Carmy, L. S., Hoque, M. R., & Yilmazkuday, H. (2024). Geopolitical risk, supply chains, and global inflation. *The World Economy*, 47(8), 3450–3486.
- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636.
- Bloom, N. (2009). The impact of uncertainty shocks. *Econometrica*, 77(3), 623–685.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143.

- [https://doi.org/https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/https://doi.org/10.1016/S0304-4076(98)00009-8)
- Caldara, D., & Iacoviell, M. (2022). Measuring Geopolitical Risk. In *American Economic Review* (Vol. 112, Issue 4). <https://doi.org/10.1257/aer.20191823>
- Cukierman, A., & Lippi, F. (1999). Central bank independence, centralization of wage bargaining, inflation and unemployment:: Theory and some evidence. *European Economic Review*, 43(7), 1395–1434.
- Data, O. W. in. (2024). *Inflation and Unemployment Data*.
- Dincer, N., Eichengreen, B., & Geraats, P. (2022). Trends in monetary policy transparency: further updates. *International Journal of Central Banking*, 18(1), 331–348.
- Glick, R., & Taylor, A. M. (2010). Collateral Damage: Trade Disruption and The Economic Impact of War. *The Review of Economics and Statistics*, 92(1), 102–127. <http://www.jstor.org/stable/25651393>
- Lucas Jr, R. E. (1976). Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy*, 1, 19–46.
- Masciandaro, D., & Romelli, D. (2018a). Beyond the central bank independence veil: new evidence. *BAFFI CAREFIN Centre Research Paper*, 2018–71.
- Masciandaro, D., & Romelli, D. (2018b). Central bankers as supervisors: Do crises matter? *European Journal of Political Economy*, 52, 120–140.
- Mishkin, F. S. (2004). *Can inflation targeting work in emerging market countries?* National Bureau of Economic Research Cambridge, Mass., USA.
- Mishkin, F. S. (2008). How should we respond to asset price bubbles. *Financial Stability Review*, 12(1), 65–74.
- Okun, A. M. (1963). *Potential GNP: its measurement and significance*. Cowles Foundation for Research in Economics at Yale University.
- Rodrik, D. (2009). *The Turkish economy after the crisis*. Discussion Paper.
- Samuelson, P. A., & Solow, R. M. (1960). Analytical aspects of anti-inflation policy. *The American Economic Review*, 50(2), 177–194
- Siyan, P., Adegioriola, A. E., & Adolphus, J. A. (2016). Unemployment and Inflation: Implication on Poverty Level in Nigeria. In *Journal of Development and Society* (Vol. 3, Issue 4). [mpra.ub.uni-muenchen.de](https://mpra.ub.uni-muenchen.de/79765/). <https://mpra.ub.uni-muenchen.de/id/eprint/79765/>
- Yilmazkuday, H. (2022). Drivers of Turkish inflation. *The Quarterly Review of Economics and Finance*, 84, 315–323.
- Yilmazkuday, H. (2025). Navigating geopolitical risks: shipping costs and policy implications. *Maritime Policy & Management*, 1–17.
- Siyan, P., Adegioriola, A. E., & Adolphus, J. A. (2016). Unemployment and inflation: Implication on poverty level in Nigeria. *Journal of Development and Society*, 3 (4), 1–15. Retrieved from <https://mpra.ub.uni-muenchen.de/79765/>
- Stockhammer, E., & Sturn, S. (2012). The impact of monetary policy on unemployment hysteresis. *Applied Economics*, 44(21), 2743–2756.
- Taheri Hosseinkhani, N. (2025). *Geopolitical turmoil, supply-chain realignment, and inflation: Commodity shocks, trade fragmentation, and policy responses*. Retrieved from SSRN https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5448354
- Taylor, J. B. (1993). Discretion versus policy rules in practice. *Carnegie-Rochester Conference Series on Public Policy*, 39, 195–214.
- Yilmazkuday, H. (2022). Drivers of Turkish inflation. *The Quarterly Review of Economics and Finance*, 84, 315–323.
- Yilmazkuday, H. (2025). Navigating geopolitical risks: Shipping costs and policy implications. *Maritime Policy & Management*, 1–17.

Appendix

Table 3: Stationary Test

Variable	LLC	ADF-Fisher	PP-Fisher
INF	-8.622*** (0.000)	73.93*** (0.000)	159.6*** (0.000)
UNP	-6.107*** (0.000)	65.21*** (0.000)	125.4*** (0.000)
IR	-9.761*** (0.000)	81.40*** (0.000)	90.00*** (0.000)
MS	-5.570*** (0.000)	37.33*** (0.000)	37.43*** (0.000)
PD	-4.832*** (0.000)	31.19*** (0.000)	49.24*** (0.000)
GE	-3.477*** (0.000)	37.87*** (0.000)	46.24*** (0.000)
TR	-3.983*** (0.000)	40.62*** (0.000)	56.23*** (0.000)
GDP	-7.682*** (0.000)	53.74*** (0.000)	117.5*** (0.000)
LPR	-9.331*** (0.000)	91.96*** (0.000)	140.2*** (0.000)
GBL	-6.359*** (0.000)	57.60*** (0.150)	132.1*** (0.007)
COL	-12.40*** (0.000)	107.2*** (0.000)	167.0** (0.000)
GPR	-7.182*** (0.000)	58.48*** (0.000)	91.11*** (0.000)
CBI	-5.633*** (0.000)	28.83*** (0.000)	41.18*** (0.000)

Note: Table 3 presents the results of the unit root test (stationary) with the provisions ***, **, and * which mean significant at 1%, 5%, and 10%.

Source: Data processed by the authors using Stata 17, 2025.

Table 4: Pearson Correlation

Variable	1	2	3	4	5	6	7	8	9	10	11	12
INF	1.0											
UNP	0.15*	1.0										
IR	-0.22*	0.08*	1.0									
MS	0.51*	0.28*	-0.14*	1.0								
PD	0.21*	-0.01*	0.06*	0.55*	1.0							
GE	-0.08*	0.30*	0.18*	0.12*	-0.47	1.0						
TR	0.23*	0.18*	-0.02*	0.15*	-0.08*	-0.03	1.0					
GDP	-0.13*	0.04*	0.14*	-0.07*	-0.18*	0.16*	-0.18*	1.0				
LP	-0.56*	-0.10*	0.24*	-0.54*	-0.36*	0.32*	0.32*	0.01*	1.0			
GBL	0.29*	0.15*	0.13*	0.37*	-0.35*	0.21*	-0.08*	0.06*	-0.39*	1.0		
OIL	-0.21*	-0.02*	-0.11*	-0.15*	-0.04*	-0.17*	-0.13*	0.20*	-0.00*	0.23*	1.0	
GPR	-0.15*	-0.40*	0.00*	0.13*	0.37*	-0.35*	-0.08*	0.06*	-0.39*	0.23*	0.02*	1.0
IBS	-0.23*	-0.02*	0.41*	-0.29*	-0.27*	0.38*	-0.26*	0.11*	0.54*	0.21*	0.00*	-0.04*

*Note: This table presents the correlation coefficient or relationship of variables. INF is inflation, UNP is unemployment, IR is interest rate, MS is money supply, PD is public debt, GE is government expenditure, TR is tax revenue, GDP is gross domestic product, LP is labor productivity, GBL is globalization, OIL is crude oil or global oil prices, GPR is geopolitical risk, and CBI is central bank independence. * indicates correlation with a significance level of 10%.*

Source: Data processed by the authors using Stata 17, 2025.

Table 7: Robustness OLS Estimation Inflation

Variable	Without Control Variable			With Control Variable		
	CEM	FEM	REM	CEM	FEM	REM
IR	-0.109 (0.2840)	-0.232*** (0.003)	-0.227*** (0.002)	-0.177** (0.034)	-0.173** (0.021)	-0.177** (0.031)
MS	0.658*** (0.000)	0.476*** (0.005)	0.497*** (0.001)	0.645*** (0.000)	0.512*** (0.001)	0.645*** (0.000)
PD	0.212* (0.057)	0.245 (0.074)	0.267** (0.038)	0.290*** (0.003)	0.284** (0.044)	0.290*** (0.002)
GE	-0.029 (0.785)	0.123 (0.254)	0.118 (0.256)	-0.135 (0.133)	0.084 (0.418)	-0.135 (0.129)
GDP	0.053 (0.547)	0.003 (0.967)	0.002 (0.969)	-0.059 (0.422)	-0.012 (0.862)	-0.059 (0.420)
OIL	-1.187 (0.103)	-1.157** (0.038)	-1.126** (0.036)	-0.829 (0.161)	-1.183** (0.031)	-0.829 (0.157)
CBI	0.487 (0.586)	4.874*** (0.009)	3.758** (0.018)	0.389 (0.649)	4.546** (0.011)	0.389 (0.648)
GPR	-0.722 (0.293)	-0.716 (0.159)	-0.754 (0.127)	-0.535 (0.328)	-0.306 (0.539)	-0.535 (0.325)
ER				-0.182** (0.018)	-0.139 (0.128)	-0.182** (0.016)
POP				-0.535*** (0.000)	-0.124 (0.386)	-0.535*** (0.000)
CPI				-0.442 (0.169)	-2.284*** (0.005)	-0.442 (0.165)

Variable	Without Control Variable			With Control Variable		
	CEM	FEM	REM	CEM	FEM	REM
CONS.	25,41 (0.070)	3594 (0.829)	9084 (0.622)	83,36 (0.000)	89.73 (0.004)	83,36 (0.000)
Number OBS	96	96	96	95	95	95
Prob.	0,000	0,000	0,000	0,000	0,000	0,000
R-squared	0,3	0,3	0,3	0,6	0,6	0,3

Note: This table presents the regression results for inflation as the dependent variable. ***, **, and * indicate significance and stationary levels at 1%, 5%, and 10%, respectively.

Source: Data processed by the authors using Stata 17, 2025.

Table 8: Robustness OLS Estimation Unemployment

Variable	Without Control Variable			With Control Variable		
	CEM	FEM	REM	CEM	FEM	REM
IR	0,124 (0.261)	0,143 (0.148)	0,124 (0.258)	0.239** (0.026)	0.213** (0.034)	0.239** (0.024)
MS	0,163 (0.287)	-0.314 (0.142)	0,163 (0.284)	-0.096 (0.545)	-0.232 (0.260)	-0.096 (0.543)
PD	0,199 (0.175)	0.574*** (0.000)	0,199 (0.172)	0.391*** (0.006)	0,415 (0.029)	0.391*** (0.005)
GE	0.409*** (0.001)	0,238 (0.094)	0.409*** (0.001)	0.365*** (0.003)	0.329** (0.022)	0.365*** (0.002)
TR	0.217** (0.037)	-0.054 (0.636)	0.217** (0.034)	0.004 (0.964)	-0.056 (0.616)	0.004 (0.964)
GDP	0.040 (0.688)	0.061 (0.537)	0.040 (0.687)	0.090 (0.964)	0,106 (0.274)	0.090 (0.354)
LP	-0.141 (0.365)	-1.324*** (0.003)	-1141 (0.362)	-0.128 (0.357)	-1.606*** (0.001)	-0.128 (0.377)
OIL	0,952 (0.277)	-0.043 (0.961)	0,952 (0.952)	0,131 (0.878)	0,569 (0.506)	0,131 (0.877)
GBL	-0.036 (0.805)	-0.037 (0.877)	-0.036 (0.805)	0.042 (0.770)	-0.244 (0.334)	0.042 (0.769)
GPR	0,139 (0.854)	0,760 (0.250)	1139 (0.853)	0,709 (0.314)	0,555 (0.398)	0,709 (0.311)
ER				0,122 (0.222)	0.352*** (0.006)	0,122 (0.699)
POP				0.042 (0.700)	-0.248 (0.191)	0.042 (0.699)
CPI				-1.741*** (0.000)	-0.546 (0.620)	-1.741*** (0.000)
CONS.	-8835 (0.671)	74.81 (0.010)	-8835 (0.670)	46,54 (0.083)	4,25625 (0.037)	46,54 (0.079)
Number OBS	96	96	96	95	95	95
Prob.	0,011	0,008	0,005	0,000	0,000	0,000
R-squared	0,225	0,010	0,225	0,393	0,039	0,393

Note: This table presents the regression results for unemployment as the dependent variable. ***, **, and * indicate significance and stationary levels at 1%, 5%, and 10%, respectively.

Source: Data processed by the authors using Stata 17, 2025.