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Rethinking Sustainable Development Drivers in D-8 Countries: Markets, Global Integration, and Political Constraints

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ABSTRACT

Sustainable development in D-8 countries remains limited by structural economic disparities and shifting political conditions. Using dynamic panel data from 2010–2019 with a GMM approach, this study evaluates how foreign direct investment, industrialization, de jure globalization, digitalization, economic growth, corruption control, and domestic credit shape SDG performance, with political constraints as a moderator. The results show that foreign investment, industrialization, globalization, and digitalization enhance SDGs, while domestic credit hinders them. Political constraints reduce the impact of foreign investment yet strengthen the role of economic growth. The findings underscore the need for political stability and disciplined credit management to support progress.

Keywords: Sustainable Development; Global Integration; FDI; Industrialization; Political Constraints

JEL Classification: Q01, F21, O14, F62, O43, C33

INTRODUCTION

Building on the findings of prominent scholars, the widening of social inequality (Cernev & Fenner, 2020), the persistence of exploitative economic expansion (Fukuda-parr, 2023), and the continued recurrence of environmental degradation (Leal Filho et al., 2020) prompted the United Nations to establish the 17 Sustainable Development Goals in 2015 as a global development framework (Kanie, 2020; SDGs, 2024; Shinwell & Cohen, 2020). Although designed to integrate economic, social, and environmental dimensions, cross-country SDG performance reveals significant disparities that underscore the complexity of aligning these three pillars (Sachs, 2015). Recent studies further show that many countries remain constrained by structural problems such as chronic poverty, demographic pressures, weak governance, and corruption (Acemoglu & Robinson, 2013; Gabrah et al., 2023; Leal Filho et al., 2021; Liu et al., 2022; Mubecua & David, 2019; Schleicher et al., 2018; Setioningtyas et al., 2022). Beyond these implementation challenges, several normative critiques argue that the SDGs contain internal contradictions, reflect neoliberal biases, and often operate as a top-down agenda that serves elite global interests rather than broader societal needs (Briant Carant, 2017; Choudhary, 2022; Gusmão Caiado et al., 2018; Kopnina, 2016; Kumi et al., 2014; Madeley, 2015; Pogge & Sengupta, 2015; Sengupta, 2018).

Within the field of development economics, several instruments are considered important for accelerating SDG achievement, including foreign investment (Borensztein et al., 1998; Dunning, 1988; Salvatore, 2019), industrialization (Chandra, 1992; Rostow, 1960), integration into the architecture of globalisation (Gasimli et al., 2022), digitalisation (Reis et al., 2020), economic growth (Mankiw, 2003; Todaro & Smith, 2012), corruption control (Acemoglu & Robinson, 2013; North, 1990), and the deepening of domestic credit (Ihsan, 2024; McKinnon & Shaw, 1973; Schumpeter, 1911). However, empirical findings show that the relationships between these variables and the SDGs are not linear. FDI, for instance, may act as a development catalyst (Appiah et al., 2023; Izadi & Madirimov, 2023; Rao et al., 2020) but can also increase emissions and environmental pressure (Dhahri & Omri, 2020a; Suehrer, 2019; Swart et al., 2023). Industrialization promotes productivity and employment (Firdous et al., 2024; N. Kumar & Chatterjee, 2023) yet is frequently accompanied by rising carbon emissions and obstacles to environmental targets (Göçoğlu & Göksu, 2024; Udemba & Keleş, 2022; J. Wang et al., 2024). Globalisation shows similar ambivalence, contributing positively in some contexts (J. Behera & Sahoo, 2023; Pal, 2024) but negatively affecting several sustainability indicators, particularly SDGs 13 and 15 (Destek et al., 2024; Dhingra, 2023; Hashmi et al., 2023; Leal & Marques, 2021).

Digitalisation creates opportunities for social inclusion and sustainable urban development (Abbas & Zaman, 2024; Jütting et al., 2021; Leal Filho et al., 2023; Mladenović, 2023). However, it may also deepen inequality, introduce new ecological risks, and drive industrial practices that do not align with sustainability (Beier et al., 2021; Kottmeyer, 2021; Niehoff, 2022; Pérez-Martínez et al., 2023; van der Velden,

2018). Economic growth shows inconsistent patterns, as it strengthens SDG-related social dimensions such as poverty reduction and employment (Frey, 2018; Sachs, 2005; Siddikee et al., 2022; Sulaeman & Sukmana, 2023) but can simultaneously weaken the achievement of environmental goals (Adebayo et al., 2023; Dhingra, 2023). A similar pattern is evident in corruption control and domestic credit, which on one hand support socio-economic development and governance, but on the other may increase emissions and environmental degradation (Anwar et al., 2022; Arora & Sarker, 2023; Hope, 2020; Levine, 1997; Li et al., 2021; Mugellini & Villeneuve, 2019; Sol Murta & Gama, 2024; Usman et al., 2022).

Within this context, political constraints are a dimension widely recognised in theory but rarely positioned as a moderating variable in empirical studies. Political constraints include fragmented power, policy congestion, and uncertainty in the preferences of political actors (Acemoglu & Robinson, 2013; J. Buchanan & Tullock, 1962; Lijphart, 2012; Shugart & Carey, 1992). At the same time, empirical patterns of SDG performance among D-8 countries, based on the overall SDGs score for the period 2000–2023, reveal marked heterogeneity, where Turkey, Malaysia, and Indonesia consistently attain higher overall SDG scores, while Pakistan and Nigeria remain at the lower end, indicating uneven institutional capacity and policy effectiveness across the group. Several studies show that political constraints influence ecological footprints, emissions, investment, green growth, and a state's capacity to respond to environmental damage (Cao et al., 2024; Fang et al., 2024; Gabriel & Pinho, 2024; Olanrewaju & Kirikkaleli, 2024; Z. Wang et al., 2023). At the same time, only a small number of studies place political constraints as a moderator in the relationship between economic variables and sustainable development (P. Behera et al., 2024; Datta et al., 2015; Hassan et al., 2022; Mokaya et al., 2018; Saha, 2024), revealing a relevant gap that merits further investigation. Based on these considerations, this study examines the roles of FDI, industrialization, *de jure* globalisation, digitalisation, economic growth, corruption control, and domestic credit in shaping SDG performance in D-8 countries, namely Indonesia, Malaysia, Bangladesh, Pakistan, Nigeria, Iran, Egypt, and Turkey. The study positions political constraints as a moderating variable, considering their potential to strengthen or weaken the relationships among these variables. By employing dynamic panel data covering the period 2010 to 2019 and applying the Generalized Method of Moments developed by Blundell and Bond (1998), this research seeks to provide a comparative understanding of how economic and institutional factors interact in determining sustainable development outcomes within D-8 countries.

METHOD

This study analysis eight member countries of the D-8 Organization for Economic Cooperation, namely Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey, over the period 2010 to 2019. The selection of countries is based on the

official composition of the D-8, while the time span is determined by the availability of complete and comparable data for all variables. The exclusion of years 2020 onward is intended to avoid structural disturbances caused by the COVID-19 pandemic, which significantly altered patterns of FDI, growth, domestic credit, and SDG performance, as also noted by Ihsan et al. (2025) in their justification. The 2010s decade further represents a period in which the measurement methodologies of the SDG Index (Lafortune et al., 2018), the *de jure* globalisation indicators from KOF (Gygli et al., 2019), and the Political Constraints Index (Henisz, 2002) reached a stable form, allowing for consistent cross-country comparisons. All data are obtained from internationally recognised repositories, including the World Bank's World Development Indicators (World Bank, 2024), the KOF Globalisation Index (Gygli et al., 2019), the Worldwide Governance Indicators (Kaufmann et al., 2011), the Political Constraints Index (Henisz, 2002), and the Sustainable Development Report database. The dependent variable is sustainable development performance, measured using the overall SDG Index score, which aggregates achievement across all 17 goals and serves as a comprehensive indicator of multidimensional development performance.

Several economic and institutional variables are used as independent variables. Foreign Direct Investment is measured through net inflows as a percentage of GDP, following standard cross-country FDI measurement practices (Salvatore, 2019). Industrialization is measured through manufacturing value added as a percentage of GDP, an indicator of structural transformation commonly used in development literature (Chandra, 1992; Rostow, 1960). *De jure* globalisation is measured using the overall KOF index score, which captures regulatory, legal, and institutional aspects of integration into the global economy. Digitalisation is proxied by fixed broadband subscriptions per one hundred people, reflecting the quality of national digital infrastructure. Economic growth is measured using annual GDP growth rates, following international macroeconomic standard. Control of corruption is taken from the Worldwide Governance Indicators, with a scale ranging from -2.5 to +2.5, widely used in institutional studies. Domestic credit to the private sector is measured as a percentage of GDP to indicate the depth of financial intermediation within the banking system.

Political constraints are included as a moderating variable using the Political Constraints Index III, which measures the presence of veto players, institutional oversight mechanisms, and preference heterogeneity that may influence policy implementation. Higher scores indicate tighter institutional constraints on policy change (Henisz, 2002). Operational definitions, measurement units, and data sources for all variables are presented in Table 1.

Table 1. Operationalisation of Variables

Variable Type	Variable	Measurement	Scale	Source
Dependent	Sustainable Development Goals	SDG Index overall score	0–100	SDGs Index
Independent	Foreign Direct Investment	FDI net inflows (% of GDP)	Percent	World Bank
	Industrialization	Manufacturing value added (% of GDP)	Percent	World Bank
	De jure globalisation	KOF *de jure* globalisation score	Index	KOF Globalisation Index
	Digitalisation	Fixed broadband subscriptions	Per 100 people	World Bank
	Economic Growth	GDP growth (annual %)	Percent	World Bank
	Control of Corruption	Control of Corruption: Estimate	−2.5 to +2.5	Worldwide Governance Indicators (WGI)
	Domestic Credit	Domestic credit to private sector by banks (% of GDP)	Percent	World Bank
Moderator	Political Constraints	Political Constraints Index III	0–1	POLCON Dataset

Source: Authors compilation

In summary, the dataset constructed for this study provides a balanced and methodologically consistent foundation for examining the economic and institutional determinants of sustainable development in D-8 countries. The use of harmonised international indicators, stable measurement frameworks, and comparable time-series observations ensures that the relationships tested in the subsequent empirical analysis are based on reliable and conceptually aligned data. This comprehensive structure allows the statistical model to capture both the direct effects of economic variables and the moderating influence of political constraints on SDG performance.

Before proceeding to estimation, several diagnostic procedures are applied to ensure that the empirical findings satisfy key statistical assumptions and meet the standards of validity and reliability. Descriptive statistics are first used to summarise the distributional characteristics of all variables, followed by the Im–Pesaran–Shin panel unit root test to confirm stationarity (Im et al., 2003). Since some variables exhibit non-stationary patterns at level, the Kao panel cointegration test is employed to verify the existence of a stable long-run equilibrium among the variables (Baltagi & Kao, 2001; Kao, 1999). Once long-run co-movement is established, the analysis proceeds with a dynamic panel specification to accommodate temporal dependence and address potential endogeneity. The empirical strategy adopts the dynamic panel framework of Arellano and Bond (1991), which incorporates a lagged dependent variable to capture persistence in SDG performance. The baseline model is expressed as:

$$SDGs_{it} = \lambda SDGs_{it-1} + X'_{it}\beta + u_{it} \quad \text{..... (1)}$$

where $SDGs_{it}$ denotes the sustainable development performance of country i at time t, $X'_{it}\beta$ represents the set of explanatory variables, and u_{it} is the composite error term. The disturbance term follows a one-way error component form:

$$\boldsymbol{u_{it} = u_i + v_{it}} \quad (2)$$

with u_i capturing unobserved, time-invariant heterogeneity across countries and v_{it} representing the idiosyncratic error component. The full specification of the baseline model is:

$$\boldsymbol{SDGs_{it} = \beta_o + \lambda SDGs_{it-1} + \beta_1 FDI_{it} + \beta_2 Ind_{it} + \beta_3 GLDJ_{it} + \beta_4 Dgt_{it} + \beta_5 EG_{it} + \beta_6 CC_{it} + \beta_7 CD_{it} + \in_{it}} \quad (3)$$

To address potential endogeneity arising from the inclusion of lagged dependent variables and possible correlation between regressors and the error term, estimation is performed using the Generalized Method of Moments (GMM). Both the First-Difference GMM estimator of Arellano and Bond (1991) and the System GMM estimator developed by Blundell and Bond (1998) are applied. System GMM improves efficiency by combining moment conditions in first differences and in levels, thereby reducing bias associated with weak instruments. Instrument validity is assessed through the Sargan test (Sargan, 1958), while the Arellano–Bond AR (1) and AR (2) tests are used to examine serial correlation in the residuals, with the absence of second-order autocorrelation serving as a key requirement for model consistency. To avoid the problem of instrument proliferation, which may weaken the Hansen and Sargan tests, the number of instruments is carefully controlled to remain lower than the number of cross-sectional units. This is achieved by limiting the lag depth of the endogenous variables and collapsing the instrument matrix, following the recommendations of Roodman (2009), thereby ensuring the robustness and credibility of the GMM estimations.

System GMM is preferred over Difference GMM given the highly persistent nature of the dependent variable, namely the SDG Index, which exhibits strong path dependency over time. In such conditions, Difference GMM may suffer from weak instruments, whereas System GMM improves efficiency by augmenting the differenced equations with level equations, thereby providing more reliable estimates for dynamic relationships (Blundell & Bond, 1998; Roodman, 2009). To examine whether political constraints alter the relationship between economic variables and SDG outcomes, interaction terms between political constraints and selected regressors are incorporated into the model:

$$\boldsymbol{SDGs_{it} = \alpha + \beta_1 SDGs - 1_{it} + \beta_1 FDI_{it} + \beta_2 Ind_{it} + \beta_3 GLDJ_{it} + \beta_4 Dgt_{it} + \beta_5 EG_{it} + \beta_6 CC_{it} + \beta_7 CD_{it} + \beta_8 PCON_{it} + \beta_9 FDI * PCON_{it} + \beta_{10} GLDJ * PCON_{it} + \beta_{11} EG * PCON_{it} + \beta_{12} CC * PCON_{it} + \varepsilon_{it}} \quad (4)$$

Post-estimation diagnostics include the examination of the relative position of GMM estimates compared with those of Fixed Effects and Ordinary Least Squares. System GMM estimates that lie between the two benchmarks are generally interpreted as less

biased (Blundell & Bond, 1998; Roodman, 2009). Long-run dynamics are further assessed to verify the stability of the long-run relationships implied by cointegration, consistent with the approach suggested by Phillips and Moon (1999) and MacKinnon et al. (1999). Taken together, the use of dynamic panel GMM provides a rigorous methodological foundation for addressing endogeneity, heterogeneity, and temporal dynamics in evaluating the determinants of sustainable development across D-8 countries.

RESULT

This subsection presents the descriptive statistics for all variables across the eight D-8 countries, as shown in Table 2. The statistics provide an initial overview of the data characteristics through maximum, minimum, mean, and standard deviation values. These indicators offer a preliminary understanding of the relative levels and variation in SDG performance as well as economic and institutional factors before the empirical estimation conducted in the following section.

Table 2. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Sustainable Development Goals	80	62.82452	6.024859	50.07	70.26
Foreign Direct Investment	80	1.90236	1.199881	-0.2045428	5.07446
Industrialization	80	16.35033	4.304876	6.552817	23.43378
De Jure Globalisation	80	64.62938	7.989527	53.45	77.55
Digitalisation	80	4,185,031	3,480,062	14,300	14,200,000
Economic Growth (billion USD)	80	475	267	115	1,120
Control of Corruption	80	-0.6111439	0.43915	-1.283504	0.3966891
Domestic Credit	80	42.97737	32.17309	10.17951	123.0652
Political Constraints	80	0.1971723	0.2447829	0	0.5860878

Source: Results of Data Processing, 2025

Based on the descriptive values in Table 2, Sustainable Development Goals performance shows moderate variation across D-8 countries, with scores ranging from 50.07 to 70.26. Foreign Direct Investment displays substantial dispersion, including negative values that indicate periods of net investment outflows. Industrialization and *de jure* globalisation vary noticeably, reflecting differences in structural transformation and regulatory integration into the global economy. Digitalisation demonstrates very large disparities, capturing significant gaps in digital infrastructure. Economic Growth also shows considerable variation consistent with differences in economic scale among countries. Control of Corruption is negative on average, indicating persistent governance challenges in several member states. Domestic Credit exhibits wide variation, pointing to unequal levels of financial development. Political Constraints also differ across countries, reflecting variations in institutional checks, veto structures, and policy rigidity.

This subsection presents the stationarity properties of all variables using the Im–Pesaran–Shin panel unit root test. The test evaluates whether each variable is stationary at level or becomes stationary after first differencing. Ensuring stationarity is essential for the validity of dynamic panel estimations such as GMM, as non-stationary series may generate spurious results. Table 3. summarises the test statistics for all variables in level and first difference form.

Table 3. Stationarity Test Results

Variable	Level (IPS)	First Difference (IPS)
Sustainable Development Goals	2.03202	-4.18038***
Foreign Direct Investment	-1.30736	-6.92854***
Industrialization	0.67105	-1.85999**
De Jure Globalisation	-0.71493	-2.69743***
Digitalisation	2.49794	-2.49794***
Economic Growth	0.23273	-2.21410**
Control of Corruption	-0.37517	-1.72890**
Domestic Credit	0.38270	-1.71665**
Political Constraints	0.41113	-1.88736**
PCON*FDI	-0.85071	-2.69206**
PCON*GLDJ	-0.44218	-2.83149***
PCON*EG	-0.23168	-2.88891***
PCON*CC	-0.25819	-2.72696***

Notes: *Significance levels: *10%, **5%, ***1%

Source: Results of Data Processing, 2025

Overall, the results show that none of the variables are stationary at level. All variables, including the interaction terms, become stationary at first difference, indicating I(1) behaviour. This confirms that the dataset satisfies the stationarity requirement for dynamic panel estimation and is therefore suitable for GMM-based modelling.

After confirming that variables are integrated of order one, the next step is to test whether they share a stable long-run equilibrium relationship. The Kao residual-based cointegration test is used for this purpose. To maintain model parsimony and avoid distortions arising from abnormal residual patterns, the interaction term PCON*CC is excluded from the cointegration specification.

Table 4. Cointegration Test Results

Test	Statistic	p-value
Dickey–Fuller	-7.6856	0.0000***
Augmented Dickey–Fuller	-3.1269	0.0009***

Source: Results of Data Processing, 2025

Both Dickey–Fuller and ADF statistics are significant at the 1 per cent level, indicating rejection of the null hypothesis of no cointegration. These results confirm that the variables exhibit a stable long-run relationship, which justifies the use of dynamic modelling to examine both short-run and long-run effects.

This subsection presents the dynamic panel regression results estimated using First-Difference GMM (FD-GMM) and System GMM (SYS-GMM). The models address potential endogeneity, unobserved heterogeneity, and autocorrelation that typically arise in panel data with a lagged dependent variable. Two model specifications are reported for each estimator: the baseline model without political constraints interactions (Model 1) and the full model incorporating interaction terms (Model 2). The estimation outputs are summarised in Table 5.

Table 5. Dynamic Panel Regression Results

Variable	FD-GMM M1	FD-GMM M2	SYS-GMM M1	SYS-GMM M2
SDGs (–1)	0.78049***	0.72955***	0.84265***	0.75119***
	(0.000)	(0.000)	(0.000)	(0.000)
Foreign Direct Investment	0.17912*	0.28040**	0.19806**	0.22196*
	(0.074)	(0.025)	(0.062)	(0.053)
Industrialization	0.01948	0.04043	0.06930	0.08452*
	(0.587)	(0.473)	(0.319)	(0.098)
De Jure Globalisation	0.14888**	0.20460***	0.05365	0.09573**
	(0.036)	(0.001)	(0.386)	(0.035)
Digitalisation	1.92E–07***	1.76E–07***	1.38E–07***	1.30E–07***
	(0.000)	(0.000)	(0.000)	(0.000)
Economic Growth	1.84E–12**	1.02E–12	1.18E–12	3.40E–13
	(0.037)	(0.371)	(0.127)	(0.726)
Control of Corruption	1.20157*	0.88444	1.28638**	0.79002
	(0.080)	(0.155)	(0.035)	(0.135)
Domestic Credit	–0.02321**	–0.02617***	–0.01574**	–0.01884***
	(0.020)	(0.009)	(0.049)	(0.003)
Political Constraints		–2.70142		–3.25158
		(0.773)		(0.617)
PCON*FDI		–1.13240***		–0.91052***
		(0.000)		(0.000)
PCON*GLDJ		0.00476		–0.01665
		(0.970)		(0.856)
PCON*EG		4.53E–12***		7.20E–12**
		(0.001)		(0.010)
PCON*CC		1.02697		0.45053
		(0.521)		(0.717)
Sargan p-value	0.5984	0.8163	0.8388	0.9023
AR(2) p-value	0.2867	0.2450	0.2814	0.2745
Observations	64	64	72	72

Notes: (*Significance levels: *10%, **5%, **1%)

Source: Results of Data Processing, 2025

The dynamic estimates reveal a strong persistence effect across all models, as indicated by the highly significant lagged SDGs coefficient (0.73–0.84), confirming that past SDG performance strongly influences current outcomes. Foreign direct investment consistently exerts a positive and significant impact across estimators, although the magnitude varies between models. Industrialization displays a modest effect and becomes significant only in the SYS-GMM full specification, suggesting that its influence strengthens when longer-run dynamics are captured. *De jure* globalisation

shows a robust positive effect in FD-GMM but a weaker effect under SYS-GMM, which may reflect sensitivity to the choice of moment conditions. Digitalisation emerges as a uniformly strong and significant driver of SDGs, with all coefficients highly significant at the 1% level. Economic growth shows limited significance—positive only in FD-GMM Model 1—indicating that growth alone may not translate directly into sustainable development gains.

Control of corruption is significant only in SYS-GMM Model 1, while domestic credit consistently exhibits negative and significant effects across all models, implying that financial deepening through domestic credit may hinder SDG performance in the D-8 context. Regarding moderating effects, political constraints significantly weaken the contribution of FDI to SDGs and significantly strengthen the link between economic growth and SDG outcomes. Other interaction terms are statistically insignificant. Diagnostic tests show that the Sargan p-values exceed 0.05 in all models, confirming instrument validity, while AR (2) statistics indicate no second-order autocorrelation. Together, these results suggest that the GMM estimators are appropriate and the findings are empirically reliable.

To verify the reliability of the dynamic panel estimations, a series of specification and robustness diagnostics were conducted, including the Arellano–Bond test for serial correlation, the Sargan test for instrument validity, and a cross-estimator bias comparison. The Arellano–Bond test confirms that first-order serial correlation appears as expected in dynamic models (Arellano & Bond, 1991), while second-order serial correlation is consistently insignificant across all specifications, indicating the absence of residual autocorrelation and validating the internal consistency of the GMM framework. The Sargan test further demonstrates that the instruments satisfy the over-identifying restrictions (Sargan, 1958), with all p-values well above the 5 percent threshold, affirming their orthogonality to the error term and ensuring that endogeneity is adequately addressed. To assess estimator bias, SYS-GMM results were compared with Fixed Effects, Pooled Least Squares, and FD-GMM, following the recommendations of Blundell and Bond (1998) and Roodman (2009). The SYS-GMM coefficients consistently fall between the FEM and PLS estimates, reflecting the expected pattern of lower finite-sample bias and supporting the efficiency of the system estimator for panels with relatively small N and moderate T. Overall, the diagnostic evidence confirms that the model is correctly specified, the instruments valid, and the SYS-GMM estimator robust for analysing the dynamic determinants of SDG performance in the D-8 economies.

Table 6. Arellano–Bond Test for Serial Correlation

Estimation	AR (1) χ^2	Prob	AR (2) χ^2	Prob
First Difference GMM 1	-1.9167	0.0553	1.0654	0.2867
First Difference GMM 2	-1.8453	0.0650	1.1627	0.2450
System-GMM 1	-1.9809	0.0476	1.0771	0.2814
System-GMM 2	-1.8385	0.0660	1.0929	0.2745

Source: Results of Data Processing, 2025

Table 7. Sargan Test for Instrument Validity

Estimation	Chi-Square	Prob
First Difference GMM 1	32.314	0.5984
First Difference GMM 2	27.40943	0.8163
System-GMM 1	33.88117	0.8388
System-GMM 2	31.52696	0.9023

Source: Results of Data Processing, 2025

Table 8. Comparison of GMM, FEM, and PLS Estimators

Model	FEM	FD-GMM	SYS-GMM	PLS
Model 1	0.788	0.780	0.842	0.924
Model 2	0.677	0.729	0.751	0.883

Source: Results of Data Processing, 2025

The combined evidence from the serial correlation tests, instrument validity tests, and estimator comparison confirms that the SYS-GMM specification is the most reliable and statistically defensible framework for this study. The absence of second-order autocorrelation and the strong performance of the Sargan statistics indicate that the estimated equations satisfy the required moment conditions, while the position of SYS-GMM estimates between FEM and PLS underscores its efficiency and reduced small-sample bias, consistent with the theoretical expectations outlined by Blundell and Bond (1998). These findings provide assurance that the empirical results derived from the GMM approach are robust, internally consistent, and suitable for explaining the dynamic interaction between globalisation, capital flows, institutional quality, political constraints, and sustainable development outcomes in D-8 countries. This strengthens the credibility of the subsequent interpretation of the coefficients and supports the broader analytical claims concerning the economic and institutional drivers of SDG performance in emerging Muslim-majority economies.

This subsection presents the long-run estimation results derived from the dynamic specification, focusing on the structural relationship between FDI, industrialization, *de jure* globalisation, economic growth, control of corruption, domestic credit, political constraints, and their interaction terms in explaining SDG performance. The long-run model excludes digitalisation due to statistical instability and partial multicollinearity detected during preliminary diagnostics, consistent with arguments in Nieminen (2016) and Trittin-Ulbrich et al. (2021) regarding the short-run and transitional nature of digital effects. The long-run coefficients are summarised in Table 9.

Table 9. Long-Run Estimation Results

Variable	Coefficient	Prob.
Foreign Direct Investment	8,920,899	0.036**
Industrialization	339,712	0.068*
De Jure Globalisation	3,847,899	0.021**
Economic Growth	1.37e–12	0.726
Control of Corruption	3.175194	0.127
Domestic Credit	–0.757369	0.002***

Variable	Coefficient	Prob.
Political Constraints	–13.06852	0.608
PCON*FDI	–3.659537	0.000***
PCON*GLDJ	–0.669132	0.858
PCON*EG	2.89e–11	0.010***
PCON*CC	1.810725	0.711

*Notes: Significance levels — *10%, **5%, **1%.

Source: Results of Data Processing, 2025

The long-run estimates show that structural factors shape SDG performance in the D-8 countries. Foreign direct investment exerts a strong positive effect, while industrialization also contributes favourably, though at a lower significance level. *De jure* globalisation remains a key long-term driver, indicating that institutional integration into global regulatory frameworks supports sustained development gains. Economic growth and control of corruption, however, do not display significant long-run effects, suggesting that neither growth nor governance improvements alone are sufficient to advance SDG outcomes. Domestic credit shows a negative and highly significant influence, implying that financial deepening may hinder sustainability when credit allocation is inefficient or debt-driven. Political constraints play a differentiated moderating role: they weaken the developmental impact of FDI but strengthen the contribution of economic growth, while other interactions remain insignificant. Overall, the long-run results highlight FDI, industrialization, and *de jure* globalisation as the main structural drivers of sustainable development, whereas poorly managed domestic credit and political constraints emerge as barriers that require targeted institutional and financial reforms.

DISCUSSION

The findings of this study show that SDG achievement in the D-8 countries is shaped not by economic growth alone but by layers of structural forces that move in tension with one another. The emerging empirical patterns resemble an ongoing conversation between international capital, industrial capacity, institutional design, digital infrastructures, and varying levels of political constraints. These forces interact in ways that reveal the deeper logic of sustainable development in politically diverse settings. Foreign direct investment emerges as the most consistent driver supporting SDG progress. It brings technology, efficient managerial practices, and expanded employment opportunities as described by Dunning (1988), and (Salvatore, 2019). Contemporary research shows that FDI reduces poverty (Dhahri & Omri, 2020b; Xu & Loang, 2024), strengthens food security (Adenle et al., 2019; Pretty, 1999), improves health systems (Dummer & Cook, 2007; Hooda, 2017), and supports education and women's empowerment (Afolabi & Raifu, 2024; Felipe et al., 2024; Gök & Ünlüoğlu, 2024). It also advances clean energy transitions by introducing low carbon technologies (Doytch & Narayan, 2016; Sarkodie et al., 2020), increasing industrial

efficiency, and supporting sustainability commitments (Zhang & Zhou, 2016). FDI contributes to governance transparency (Bissoon, 2012; B. G. Buchanan et al., 2012; Globerman & Shapiro, 2002) and cross border collaborations (Florini & Pauli, 2018; Zhan & Santos-Paulino, 2021).

Yet its influence is sensitive to political constraints. When political constraints intensify, the positive relationship between FDI and SDG outcomes weakens significantly. This pattern aligns with Acemoglu and Robinson's (2013) argument that extractive institutions undermine policy predictability and secure property rights. Buchanan and Tullock's (1962) concept of decision-making costs illustrates how inefficient political systems create delays and uncertainty. Henisz (2002) adds that weak political constraints make policy directions inconsistent. Empirical cases in Nigeria (Gobinda Goswami & Haider, 2014), Egypt during the Arab Spring (Gonchar & Greve, 2022), and Pakistan's renewable energy sector (King et al., 2021) show that heightened political constraints often lead foreign firms to withdraw. Thus, political constraints reduce the developmental potential of FDI by disrupting the conditions necessary for long term investment. On the other hand, industrialization exerts a steady and resilient influence. Rostow's (1960) stages of development can be observed in the D-8 as countries strengthen their manufacturing base. Industrialization supports food security (Haraguchi & Kitaoka, 2015; Joung et al., 2013), expands health system capabilities (Zhou et al., 2024), deepens educational and vocational skills (Hanushek & Woessmann, 2021), and broadens employment opportunities for women (Eastin & Prakash, 2013; Titumir, 2021). It can also reduce environmental pressures in line with the Kuznets hypothesis (Aquilas et al., 2024; Kuznets, 1995). Unlike FDI, industrialization remains largely unaffected by shifts in political constraints.

Furthermore, *de jure* globalisation underscores the importance of institutional architecture. North (1990) emphasises how stable rules shape economic cooperation, incentives, and technology transfer. Studies by Bataka (2020), Gozgor et al. (2020), and Fotio and Nguea (2022) show that rule-based integration supports clean energy investment, enhances labour standards (Thomas, 2018), and strengthens sustainable urban planning (Birch, 2016; Revi, 2016). Political constraints do not alter this relationship because *de jure* globalisation is driven by long term international commitments that are relatively insulated from domestic political tension. In contrast, digitalisation appears as a transformative force. Romer's (1990) understanding of knowledge as a non-rival input becomes visible in the digital expansion that supports education (Al-Arimi, 2014; Toader et al., 2021), health services (J. Wang & Xu, 2023), women's empowerment (Ahmad et al., 2024; S. Kumar et al., 2024), and green innovation (Hong et al., 2024; Zhao & Qian, 2023). It expands economic opportunities for low-income groups (Abbas & Zaman, 2024; Guo et al., 2024), enhances smart governance systems (Wichmann et al., 2021), and encourages transparency (Shenkoya, 2023).

Meanwhile, economic growth shows no significant relationship with SDGs. The critiques of Piketty (2014) and Stiglitz (2012) about growth without redistribution resonate strongly here. environment harming growth patterns (Dasgupta, 2024; Meadows et al., 1972) also appear in the D-8. Growth fails to capture capabilities (Sen, 2001) or social well-being (Osberg & Sharpe, 2005). Empirical studies including Grossman and Krueger (1995), Wau (2022), reinforce that growth alone does not improve environmental or gender outcomes. Concurrently, yet under strong political constraints, growth sometimes becomes politically strategic. Henisz (2000, 2002) explains how governments under pressure may accelerate public investment and redistribution to maintain legitimacy. In such situations, economic growth becomes a channel for advancing SDG linked sectors such as education, infrastructure, and social protection. Political constraints therefore increase the sensitivity of SDG outcomes to growth because governments redirect economic resources to stabilise political tensions.

In contrast again, control of corruption shows no meaningful influence, and political constraints do not moderate this relationship. Acemoglu and Robinson's (2013) explanation of extractive institutions helps clarify why surface level reforms fail. Political tension often leads to the politicisation of anti-corruption agencies as noted by Heeks and Mathisen (2012) and Hope (2024). Mugellini et al. (2021) highlight the long-term nature of anti-corruption outcomes, making short term SDG improvements unlikely.

On the other hand, domestic credit exhibits a negative relationship with SDGs. This finding indicates that credit expansion in D-8 countries does not automatically translate into sustainable development outcomes. Speculative credit allocation and lending to emission-intensive sectors undermine sustainable development, as demonstrated by Byaro et al. (2024) and Dong et al. (2020). Rather than supporting green investment and productive capacity, financial resources are often channelled toward short-term returns and environmentally harmful activities. This pattern is consistent with the concept of financial development maturity, whereby financial deepening in less mature systems remains weakly disciplined and insufficiently aligned with sustainability objectives. Unequal access to credit further aggravates this condition, as financial resources tend to concentrate among large firms and higher-income households (Distinguin et al., 2016; Jiang et al., 2024; Yadav & Rao, 2023). Such credit concentration exacerbates income inequality, which in turn undermines inclusive and sustainable development outcomes (Papadopoulos, 2019). In addition, excessive household debt reduces overall well-being and economic resilience (Leicht, 2012; Mutsonziwa & Fanta, 2019). Rent-seeking behaviour also becomes more prevalent in credit markets (Choi & Storr, 2019). This tendency is particularly pronounced in contexts characterised by weak regulatory and institutional frameworks (Ogbeide-Osaretin & Aliu, 2022; Úbeda et al., 2022).

Finally, political constraints do not meaningfully alter this pattern because the problem is structural rather than political. Taken together, these findings show that sustainable development requires more than economic growth and capital flows. It requires institutional stability, equitable opportunity structures, resilient knowledge infrastructures, and a political environment that does not obstruct investment, reform, or social progress. The SDGs are therefore not simply economic targets but institutional and societal commitments. The future of the D-8 countries depends on their ability to strengthen institutions, distribute opportunities more evenly, and align public policy with long term visions of sustainability.

CONCLUSION

The findings of this study demonstrate that SDG performance in the D-8 countries is shaped not merely by economic growth, but by the interaction of deeper structural and institutional forces linking international capital flows, industrial capacity, governance arrangements, and expanding digital infrastructures. Foreign direct investment, industrialisation, de jure globalisation, and digitalisation emerge as the most consistent drivers of sustainable development, while economic growth, control of corruption, and domestic credit exhibit more complex and context-dependent effects. Political constraints further condition these relationships by introducing regulatory uncertainty, fragmented policy coordination, and limited institutional capacity. In politically unstable environments, the developmental contribution of FDI weakens substantially, whereas digitalisation continues to foster social and economic transformation regardless of political frictions. Economic growth contributes to SDG progress only when public resources are effectively channelled into welfare-enhancing and productivity-oriented sectors. These findings underscore that sustainable development is fundamentally an institutional process, contingent upon governance quality, distributive equity, and the state's capacity to integrate productively into the global economy.

From a policy perspective, the results suggest several implications for D-8 countries. Greater policy stability and institutional coordination are essential to preserve the developmental impact of foreign investment. Financial system reforms are needed to discipline credit allocation and redirect financial resources toward productive, low-carbon, and socially inclusive activities. At the regional level, D-8 countries may benefit from harmonising investment and trade frameworks, including the incorporation of SDG-oriented clauses that align foreign capital inflows with domestic social and environmental objectives. Sustained investment in digital infrastructure and innovation-oriented industrial upgrading further appears critical for strengthening long-term development trajectories.

Despite providing a comprehensive empirical assessment, this study is subject to several limitations. The use of aggregate SDG Index scores may obscure variation

across individual goal dimensions, while reliance on perception-based institutional indicators may introduce measurement bias. In addition, the panel structure may not fully capture non-linear dynamics or threshold effects inherent in the development process. Future research could disaggregate SDG outcomes into thematic pillars, apply non-linear or machine learning techniques to identify structural breakpoints, and extend the analysis to the post-COVID period. Mixed-methods approaches and deeper intra–D-8 comparative studies may also enrich understanding of the political and historical contexts shaping sustainable development outcomes.

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