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Extending Okun's Law to encompass the governance-unemployment nexus: New Insights from PMG/ARDL Approach

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Abstract

This study has empirically aimed at estimating the short-and long-term dynamics of financial and institutional factors with respect to the unemployment rate in the case of the selected developing economies over the period of 1996-2023. The second-generation empirical analyses, such as cross-sectional dependence and unit-root analysis, support the use of pooled mean group regression analysis. The empirical outcomes of the pooled mean group regression have confirmed the existence of Okun's law in the influence of a rise in control of corruption, government effectiveness, and political stability to reduce the unemployment rate in this region. Among the financial factors, the economic growth-unemployment rate nexus significantly validates the existence of Okun's law. Further, the exchange rate is also highly significant in decreasing the unemployment rate in this region. However, the negative impact of the interest rate and the positive effect of broad money growth are surprisingly significant in affecting the unemployment rate and contradict the literature. Surprisingly, the institutional factors are more responsive to the unemployment rate compared with financial indicators. These outcomes suggest important policy implications regarding institutional and financial factors to control the unemployment rate in these economies.

Keywords: Okun's Law; Cross-Sectional Dependence; Pooled Mean Group Regression

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1. Introduction

South Asia comprises economies with diverse production structures and has experienced considerable growth in information technology services, manufacturing, textiles, and agriculture. However, employment challenges persist despite this expansion. The original country-level comparison identifies Nepal and Bhutan as having relatively high and low unemployment rates, respectively (National Statistics Bureau of Bhutan, 2024). According to estimates reported by the International Labor Organization (2024), South Asia's unemployment rate was 4.9% in 2023. Labour-force participation has also fluctuated: the rates reported in this study were 55.7% in 2000, 51.3% in 2019, and 54.2% in 2023, with projections of 53.6% in 2024 and 53.5% in 2025. These figures indicate that economic growth has not necessarily translated into uniformly stronger participation or employment outcomes. In addition, regional differences in financial conditions, institutional performance, and labour-market structures may shape the relationship between economic expansion and unemployment. Therefore, examining economic and governance indicators together is relevant to understanding persistent unemployment in South Asian economies.

1.1 Financial Indicators and Unemployment

Economic growth and unemployment are central concerns of macroeconomic policy because sustained growth is expected to support productive activity and employment. In expanding economies such as India and Bangladesh, growth in output has been associated with employment creation; however, the strength of this association can differ across countries and periods. India has experienced substantial GDP expansion and poverty reduction, whereas Pakistan and Sri Lanka have faced episodes of slower growth and labour-market pressure. These contrasting experiences make South Asia a relevant setting in which to examine Okun's Law. The law describes an inverse empirical relationship between movements in output and unemployment, although the size of the coefficient is not universal (Okun, 1963; Ayyubi et al., 2024). In particular, the large informal sectors in India and Bangladesh may weaken the measured relationship because underemployment and informal work are not fully represented by headline unemployment indicators. Similarly, differences in the structure and measurement of employment in smaller economies, including Bhutan, may influence estimated coefficients (Hussain et al., 2024; Ray & Chatterjee, 2015; Tenzin, 2019). The original illustration of a one-percentage-point increase in unemployment corresponding to an approximately two-percentage-point output gap should therefore be understood as a historical rule of thumb, not a fixed coefficient for every country. Consequently, policymakers need to consider the employment intensity of growth as well as its rate. Policies supporting productive sectors, education, skills development, and employment-generating investment may strengthen the connection between economic expansion and labour-market improvement. These considerations establish the financial dimension of the present study while recognising that the empirical growth–unemployment relationship can be affected by structural differences.

The different development levels, labour-market arrangements, and productive structures of South Asian economies provide a basis for assessing whether the inverse growth–unemployment association described by Okun's Law is evident in the selected sample. Therefore, the study examines how GDP growth and other financial indicators are associated with unemployment, alongside the possible contribution of institutional conditions (Aslam et al., 2023; Hussain et al., 2024).

1.2 Governance Indicators and Unemployment

Examining governance alongside Okun's Law enables this study to consider institutional conditions associated with unemployment while retaining GDP growth as the core variable in the conventional growth–unemployment relationship. Governance quality can influence investment expectations, the implementation of economic policy, and the environment in which firms make hiring decisions (Ibourk & Elaynaoui, 2024; Shabbir et al., 2019). The Worldwide Governance Indicators distinguish six dimensions: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. This study focuses on selected dimensions that may be relevant to labour-market outcomes. Across South Asian economies, governance performance varies considerably, and regional averages may conceal important differences between countries (Tran et al., 2023). Effective governance can support the design, implementation, and evaluation of policies. In addition, predictable rules, protection of property rights, contract enforcement, and reduced corruption can contribute to an investment environment in which firms are more willing to expand and employ workers. Government effectiveness may also improve the

allocation of resources and the delivery of infrastructure, health, and education services. However, these channels describe plausible mechanisms rather than causal effects established by the present regressions. Consequently, the governance indicators are examined as institutional correlates of unemployment, complementing the traditional economic-growth relationship.

Political stability can reduce uncertainty and improve confidence among domestic and foreign investors. Conversely, instability may disrupt production, delay investment, and restrict opportunities for employment. Similarly, the rule of law provides a framework for protecting property rights, enforcing contracts, and resolving commercial disputes. A predictable legal environment may reduce transaction costs and encourage firms to establish or expand their operations. Regulatory arrangements can also affect business entry, compliance costs, entrepreneurship, and innovation. In addition, government effectiveness shapes the quality of public services, policy implementation, and infrastructure supporting productive activity. Corruption, by contrast, may distort resource allocation, increase business costs, and weaken confidence in public institutions. Greater control of corruption could therefore help create conditions favourable to investment and employment (Fagbemi et al., 2023; Ibourk & Elaynaoui, 2024; Transparency International, 2023). Nevertheless, relationships between governance and labour-market outcomes can differ across institutional and economic contexts. The present study investigates these associations for selected South Asian countries. Table 1 reports descriptive values for three governance indicators and unemployment; the figures should not be interpreted as correlations or evidence of causality without additional statistical testing (International Labor Organization, 2024; Tran et al., 2023).

Table 1: World Bank Governance Indicators (2023)

Country	Political Stability	Government Effectiveness	Control of Corruption	Unemployment Rate
India	-0.9	-0.2	-0.5	7.8
Pakistan	-1.5	-0.7	-1.1	6.3
Bangladesh	-0.4	-0.3	-0.8	4.2
Sri Lanka	-1.2	-0.4	-0.9	5.5
Nepal	-0.8	-0.6	-0.9	11.4
Bhutan	0.3	0.1	0.2	3.3
Maldives	-0.1	-0.2	-0.4	6.1

Source: by the author

Table 1 illustrates considerable variation in governance indicators and unemployment across the countries included in the descriptive comparison. India combines relatively weak political-stability scores with an unemployment rate of 7.8%, whereas Pakistan records lower governance scores and a reported rate of 6.3%. Bangladesh, despite governance challenges, records 4.2% unemployment; Sri Lanka reports 5.5%, and Nepal has the highest rate in the table at 11.4%. By contrast, Bhutan combines more favourable governance scores with 3.3% unemployment, while the Maldives records 6.1%. These differences may suggest a role for institutional conditions, but they do not establish that governance explains the observed national unemployment rates. Labour-force composition, informal employment, data definitions, and economic structure may also contribute to the differences. Comparisons with advanced economies require similar caution: the unemployment figures discussed for Scandinavian countries, Germany, Canada, Singapore, and New Zealand reflect different institutions and labour-market arrangements and cannot be attributed solely to governance scores (OECD, 2023). Therefore, the descriptive evidence motivates a multivariate examination rather than a direct causal conclusion. Stronger institutions may support policy credibility, investment, and resource allocation, but the extent of their association with unemployment must be established through the reported empirical models.

2. Literature Review

Existing research provides the basis for examining economic growth, governance, and unemployment in developing economies. Hussain et al. (2024) report evidence supporting an inverse growth–unemployment association in South Asia. Similarly, Aslam et al. (2023) examine Okun's Law in the SAARC region, while Nair (2020) considers unemployment in India. These contributions suggest that economic expansion can be associated with job creation. However, Ray and Chatterjee (2015) show that the size and stability of Okun's coefficient may differ across South Asian countries and periods, drawing attention to structural variation and country-specific conditions. Waiba and Bomjan (2023)

also investigate the relationship between growth and unemployment in Bhutan. Outside South Asia, Karadzic et al. (2021) use an error-correction approach with annual data for 2007–2019 to examine Okun's Law in Montenegro. They report unemployment responses of approximately −0.27 in the short run and −1.46 in the long run for a one-percentage-point change in growth, illustrating that estimates can vary by time horizon. In addition to this growth-centred literature, studies of institutional quality examine governance and unemployment through corruption, democratic institutions, policy effectiveness, and related conditions (Fagbemi et al., 2023; Oueghlissi & Derbali, 2024; Ronaghi & Scorsone, 2024; Shabbir et al., 2019). Ibourk and Elaynaoui (2024) further discuss policy lessons associated with Okun's Law. Although these studies offer relevant evidence, examining financial and institutional indicators in the same South Asian panel remains useful for assessing their respective associations with unemployment. The conceptual distinction is important: governance indicators are additional explanatory factors, whereas the GDP-growth coefficient addresses the conventional Okun relationship.

The study makes three related contributions to this literature. First, it investigates the governance–unemployment relationship alongside the growth–unemployment association described by Okun's Law, controlling for interest rates, exchange rates, and broad money in selected South Asian economies. Second, it examines financial and institutional variables separately and jointly, enabling a comparison of their estimated relationships with unemployment. Third, it applies panel diagnostics for cross-sectional dependence and unit roots before estimating short- and long-run relationships using the pooled mean group approach. However, including governance indicators in an unemployment equation does not, by itself, demonstrate that governance changes the coefficient of Okun's Law. Such a claim would require an explicit interaction or alternative conditional specification. The present analysis is therefore interpreted as an extension of the set of unemployment correlates rather than a new causal test of the law (Okun, 1963; Pesaran et al., 1999).

The contribution is particularly relevant because the economic effect of growth on measured unemployment may depend on differences in sectoral composition, labour-force participation, and informality. Moreover, corruption control, government effectiveness, political stability, and rule of law represent distinct but related institutional dimensions. Discussing these dimensions together can inform later comparative research, although the present estimates cannot identify which underlying policy mechanism is responsible for each coefficient (Ray & Chatterjee, 2015; Shabbir et al., 2019; Tran et al., 2023).

The remainder of the manuscript is organised as follows. Section 3 describes the data, model specifications, and estimation strategy. Section 4 presents the diagnostic tests and regression results. Section 5 discusses the economic and institutional interpretations of the findings, while Section 6 provides conclusions and policy implications.

3. Data and Methods

To examine the research objectives, the study first estimates separate specifications for the financial and institutional determinants of unemployment in selected South Asian economies. These specifications follow the empirical emphasis of Farooq et al. (2024) and Tran et al. (2023), respectively. The first model considers GDP growth, interest rates, exchange rates, and broad money; the second focuses on selected governance indicators. The corresponding expressions are presented in Equations (1) and (2).

$$Un_{it} = \beta_0 + \beta_2 er_{it} + \beta_3 gdpg_{it} + \beta_5 irate_{it} + \beta_8 lnbrm_{it} + \varepsilon_{it} \quad (1)$$

$$Un_{it} = \beta_0 + \beta_1 curr_{it} + \beta_4 ge_{it} + \beta_6 ps_{it} + \beta_7 rl_{it} + \varepsilon_{it} \quad (2)$$

The third specification combines the financial and governance indicators in a single unemployment equation, as presented in Equation (3). Therefore, the combined model permits the reported associations to be examined after accounting for both groups of explanatory variables. However, without an interaction term, it does not identify a moderating effect of governance on Okun's coefficient.

$$Un_{it} = \beta_0 + \beta_1 curr_{it} + \beta_2 er_{it} + \beta_3 gdpg_{it} + \beta_4 ge_{it} + \beta_5 irate_{it} + \beta_6 ps_{it} + \beta\ rl_{it} + \beta_8 lnbrm_{it} + \varepsilon_{it} \quad (3)$$

Table 2 defines the unemployment measure, the financial indicators, and the selected governance variables. The financial and unemployment series come from the World Development Indicators, while the governance measures come from the Worldwide Governance Indicators. The analysis covers the

period 1996–2023; however, interpreting the estimates depends on the availability and comparability of the underlying country-year observations.

Table 2: Description of Variables and Data Source

Variables	Description	Data Source	Status
UN	Unemployment rate	WDI	Dependent Variable
Curr	Control of corruption	WGI	Independent Variables
er	Exchange rate	WDI	
GDPg	GDP growth	WDI	
ge	Government effectiveness	WGI	
Irate	Interest rate	WDI	
PS	Political stability	WGI	
RL	Rule of law	WGI	
Ln brm	Log of broad money	WDI	
Control of Corruption	Control of Corruption reflects perceptions of the degree to which public power is used for private benefit, including both petty and grand corruption, and "capture" of the state by elites and private interests. Estimate is the country's value on the aggregate indicator, in units of a standard normal distribution, i.e. between roughly -2.5 and 2.5.		
• **Government Effectiveness**	Government Effectiveness reflects people's perceptions of the quality of public services, of the quality and independence of the civil service, of the quality of policy-making and implementation, and of the credibility of the government's policy commitment. Estimate is the country's score on the composite indicator, in units of a standard normal distribution, i.e. around -2.5 to 2.5.		
• **Political Stability and lack of violence**	Absence of Terrorism/Violence and Political Stability measures the probability of political-oriented violence and/or political instability, including terrorism.		
• **Rule of law**	Rule of Law measures the chances about whether agents trust and respect the rules of society, and specifically the enforceability of contracts, protection of property rights, the police, and the judiciary, as well as the odds of crime and violence. Estimate provides the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. from roughly -2.5 up to 2.5.		

Source: by the author

3.1 Estimation Methodology

3.1.1 Tests for Cross-Sectional Dependence

The empirical strategy begins with tests of cross-sectional dependence. In a multi-country panel, common economic shocks, regional spillovers, and shared policy developments may generate correlation between countries' disturbances. Such dependence matters because conventional panel procedures that assume independent cross-sectional units can produce misleading standard errors and inference. Accordingly, the study reports the Pesaran cross-sectional dependence statistic together with Friedman and Frees tests (Pesaran, 2021). These diagnostics assess whether the independence assumption is plausible; however, evidence of dependence should also inform the selection and interpretation of subsequent estimators. The tests do not, by themselves, determine the appropriate long-run model.

The study also reports panel unit-root tests to examine the integration properties of the variables. The Maddala and Wu (1999) procedure and the cross-sectionally augmented approach developed by Pesaran (2007) are presented in the manuscript. However, the Maddala–Wu test should not be described as a second-generation test that explicitly accommodates cross-sectional dependence. The Pesaran CIPS approach is more directly designed for this concern. In addition, the reported level-test results should not be treated as evidence that every variable becomes stationary after first differencing,

because a complete first-difference assessment is not displayed. The original analysis was undertaken using Stata 14, and the reported integration diagnostics should be interpreted with these qualifications (Maddala & Wu, 1999; Pesaran, 2007).

3.1.2 Pooled Mean Group (PMG) Estimator

The pooled mean group (PMG) estimator developed by Pesaran et al. (1999) is designed for dynamic panels containing time-series and cross-sectional dimensions. Within an autoregressive distributed lag framework, it permits short-run coefficients, adjustment speeds, and error variances to differ across countries while imposing common long-run coefficients. This distinction can be valuable for studying macroeconomic relationships when short-run national circumstances vary but a shared long-run structure is considered plausible. An error-correction representation links short-run changes to deviations from the estimated long-run equilibrium. However, the assumption of long-run homogeneity is substantive, particularly for South Asian economies with different labour-market structures and institutional conditions. Consequently, PMG estimates should ideally be compared with mean-group or other appropriate alternatives, and the reported evidence of cross-sectional dependence should be taken into account when evaluating robustness (Pesaran et al., 1999; Pesaran, 2021). The present discussion describes the interpretation of the estimates actually reported and does not imply that additional robustness tests were performed.

4. Results

This section presents the reported evidence on the short- and long-run associations of financial and institutional factors with unemployment in the selected South Asian economies. The diagnostic results are considered before the PMG/ARDL estimates, followed by the cointegration and multicollinearity assessments. Throughout the interpretation, a statistically significant coefficient is treated as an association rather than proof of a causal effect.

4.1. Average Correlations and Pesaran Cross-Sectional Dependence Test

Table 3: Findings of Average Correlation Coefficients

Variable	CD-test	p-value	Correlation	Abs(corr)
ps	5.00	0.000	0.223	0.332
curr	1.66	0.097	0.074	0.264
rl	1.71	0.088	0.076	0.443
ge	2.51	0.012	0.112	0.323
gdpg	6.93	0.000	0.381	0.393
irate	1.74	0.082	0.100	0.426
er	15.97	0.000	0.895	0.895
lnbrm	2.27	0.023	0.131	0.219
e	1.74	0.081	0.108	0.372

Source: by the author

Table 3 reports the average pairwise correlations and the Pesaran cross-sectional dependence statistics. The evidence is not uniform across variables. Political stability ($p < .001$), government effectiveness ($p = .012$), GDP growth ($p < .001$), the exchange rate ($p < .001$), and broad money ($p = .023$) show statistically significant cross-sectional dependence at the 5% level. However, the corresponding tests for control of corruption, rule of law, interest rates, and the final listed series are not significant at that level. Therefore, it is inaccurate to conclude that every variable exhibits cross-sectional dependence. The significant results nevertheless indicate that common shocks or inter-country linkages may affect some of the series, supporting the use of diagnostics that recognise such dependence (Pesaran, 2021).

4.2 Friedman's Test of Cross-Sectional Independence: 15.033 (p = .0102)

Table 4: Friedman's Test

4.3 Frees' test of cross sectional independence = 0.107
Critical values from Frees' Q distribution
alpha = 0.10 : 0.1612
alpha = 0.05 : 0.2116
alpha = 0.01 : 0.3125

Source: by the author

4.4 Panel Unit-Root Tests

(A) **4.4.1 Maddala and Wu (1999) Panel Unit-Root Test**

Table 5: Panel Unit Root Test (A)

		Specification without trend		Specification with trend	
Variables	**lags**	**Chi-square**	**P-Value**	**Chi-square**	**P-Value**
gdpg	0	95.715	0.000	79.798	0.000
gdpg	1	55.217	0.000	42.166	0.000
ir	0	12.673	0.393	9.683	0.644
ir	1	24.213	0.019	24.166	0.019
er	0	1.048	1.000	3.729	0.988
er	1	1.319	1.000	10.415	0.580
bmg	0	131.895	0.000	126.772	0.000
bmg	1	52.397	0.000	55.200	0.000
ps	0	13.873	0.309	14.056	0.297
ps	1	15.405	0.220	19.203	0.084
curr	0	20.872	0.052	18.980	0.089
curr	1	20.324	0.061	18.973	0.089
rl	0	8.442	0.750	19.361	0.080
rl	1	7.702	0.808	27.447	0.007
ge	0	23.619	0.023	18.917	0.091
ge	1	26.785	0.008	21.946	0.038
un	0	8.626	0.734	7.330	0.835
un	1	8.294	0.762	6.245	0.903

Source: by the author

(B) **4.4.2 Pesaran (2007) CIPS Panel Unit-Root Test**

Table 6: Panel Unit Root Test (B)

		Specification without trend		Specification without trend	
Variable	**lags**	**Zt-bar**	**p-value**	**Zt-bar**	**p-value**
gdpg	0	-4.258	0.000	-3.334	0.000
gdpg	1	-0.887	0.187	-0.801	0.211
ir	0	-0.787	0.216	0.214	0.585
ir	1	-2.558	0.005	-1.509	0.066
er	0	0.398	0.655	1.449	0.926
er	1	-0.347	0.364	0.082	0.533
bmg	0	-4.184	0.000	-2.677	0.004
bmg	1	-1.785	0.037	-0.203	0.420
ps	0	-0.176	0.430	0.583	0.720
ps	1	-1.758	0.039	0.001	0.500
curr	0	-2.094	0.018	-0.915	0.180
curr	1	-2.463	0.007	-2.413	0.008
rl	0	0.566	0.714	-0.544	0.293
rl	1	0.813	0.792	-0.574	0.283
ge	0	-0.601	0.274	1.373	0.915
ge	1	-1.110	0.134	1.542	0.938
un	0	0.627	0.735	1.024	0.847
un	1	1.085	0.861	0.247	0.597

Source: by the author

Tables 5 and 6 present the reported panel unit-root results under alternative lag and trend specifications. Several variables reject the unit-root null under some specifications, whereas others do not. In particular, the findings vary with the lag choice and the inclusion of a trend; therefore, the results do not establish a single integration order for every series. These diagnostics provide information relevant to the PMG/ARDL framework, but they do not independently verify the absence of I(2) variables. Moreover, the Maddala–Wu and Pesaran CIPS procedures differ in their treatment of cross-sectional dependence, which should be recognised when comparing their findings (Maddala & Wu, 1999; Pesaran, 2007).

4.5 ARDL/PMG Regression Results

Table 7: ARDL/PMG Regression Results

Variable	PMG (1)	PMG (2)	PMG (3)	FE	RE
CURR	-1.22*** (-8.03)	-9.243** (-2.45)		-0.21 (-0.20)	-1.04** (-1.85)
ER	-0.07*** (-38.64)		-0.03 (-1.20)	0.02 *(1.15)	0.00 (0.51)
GDPG	-0.30*** (-24.60)		-0.19*** (-2.60)	-0.02 (-0.63)	-0.02 (-0.62)
GE	-0.96*** (-7.94)	8.173** (2.023)		-1.83** (-2.09)	-2.54*** (-3.33)
IRATE	-0.25*** (-21.58)		-0.46*** (-3.92)	-0.49 ***(-4.56)	-0.43*** (-4.41)
PS	-1.22*** (-21.47)	-0.428 (-0.327)		-1.63*** (-2.98)	0.01 (0.03)
RL	3.32*** (13.94)	0.547* (0.124)		1.47 (1.35)	3.68*** (4.82)
LNBRM	0.59*** (75.47)		0.51*** (4.66)	-0.14 (-0.48)	-0.27***(-2.66)
COINT. EQ.	-0.404*** (-3.17)	-0.033 (-0.713)	-0.22*** (-3.07)		
Wald Test F-statistic	20347.38***	7.133***	42.64***		
Chi-square	162779.0***	28.533***	170.52***	24.55***	

Source: by the author

4.6 Kao Residual Cointegration Test

Table 8: Kao Residual Cointegration Test

Series: UNR CURR ER GDPG GE IRATE PS RL LNBRM Null Hypothesis: No co-integration Newey-West automatic bandwidth selection and Bartlett kernel				
			t-Statistic	Prob.
ADF			-2.072736	0.0191
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(RESID)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.336645	0.069555	-4.839991	0.0000
D(RESID(-1))	0.153690	0.093675	1.640679	0.1039

Source: by the author

4.7 Variance Inflation Factor (VIF) Results

Table 9: VIF Test Results Link Excel.Sheet.12 Book1 Sheet1!R5c4:R14c6 \A \F 5 \H * Mergeformat

Variable	VIF	1/VIF
curr	7.71	0.129632
ge	5.87	0.17042
rl	5.49	0.182044
ps	4.05	0.247158
ir	1.54	0.647507
er	1.39	0.71696
bmg	1.05	0.953754
gdpg	1.03	0.966779

Variable	VIF	1/VIF
Mean VIF	3.52	

Source: by the author

Table 7 presents the three PMG specifications together with fixed-effects (FE) and random-effects (RE) comparisons. In the combined PMG model, control of corruption (−1.22), government effectiveness (−0.96), and political stability (−1.22) have negative, statistically significant coefficients, whereas rule of law has an unexpected positive coefficient (3.32). Thus, the institutional indicators do not all move in the same direction. In the governance-only specification, control of corruption remains negative (−9.243), while government effectiveness becomes positive (8.173), political stability is not statistically significant, and the rule-of-law coefficient is positive. These differences are important because they suggest sensitivity to model specification and potential overlap among institutional measures. Turning to financial variables, GDP growth has a negative coefficient in the combined model (−0.30), consistent with the inverse growth–unemployment association described by Okun's Law. The exchange-rate coefficient is negative (−0.07), and the interest-rate coefficient is also negative (−0.25), whereas the broad-money coefficient is positive (0.59). These last two signs differ from conventional expectations and require careful interpretation. In the financial-only model, GDP growth remains negative (−0.19), the interest-rate coefficient is negative (−0.46), and broad money is positive (0.51); however, the exchange-rate coefficient is not statistically significant. The FE and RE estimates provide additional comparisons but differ in magnitude and significance from the PMG results. Therefore, their inclusion alone does not establish the robustness of the long-run PMG coefficients. Although the manuscript refers to a Hausman comparison, the displayed table does not provide a complete PMG-versus-MG homogeneity assessment.

For interpretation, it is also important to distinguish the statistical information in the displayed tables from tests that have not been reported. The regression table does not establish that all long-run coefficients are homogeneous across countries, and the presence of significant cross-sectional dependence in several series raises questions about unmodelled common factors. In addition, differences in the results for governance indicators may arise from overlapping institutional measures or model specification choices. These points limit the strength of the conclusions but do not alter the original estimates (Pesaran et al., 1999; Pesaran, 2021).

The reported error-correction coefficient is negative and statistically significant in the combined PMG model (−0.404), suggesting an estimated annual adjustment of approximately 40.4% of the deviation from the model's long-run relationship. The corresponding coefficient in the financial-only model is also negative and statistically significant (−0.22). However, the error-correction estimate for the governance-only model (−0.033) is not statistically significant; therefore, it should not be interpreted as confirming adjustment toward a long-run equilibrium. The reported Wald statistics indicate joint significance within the estimated specifications, but they do not establish causality. Similarly, the Kao residual cointegration test rejects the null of no cointegration in the reported specification ($p = .0191$), although its assumptions should be considered alongside the cross-sectional dependence findings. Finally, the VIF results show a maximum reported value of 7.71 for control of corruption, followed by 5.87 for government effectiveness and 5.49 for rule of law. These values do not demonstrate the complete absence of multicollinearity; rather, they suggest that relationships among the governance measures deserve attention when interpreting coefficient signs and stability.

5. Discussion

The negative coefficient of political stability in the combined PMG specification suggests that stronger political stability is associated with lower unemployment in the selected economies. One possible explanation is that stable political conditions reduce uncertainty, encourage domestic and foreign investment, and allow firms to plan production and recruitment more confidently. Similarly, predictable policies may support business expansion and the creation of employment opportunities (Shabbir et al., 2019; Singha & Singh, 2022). Nevertheless, labour-market regulations can involve trade-offs. Protection for existing workers may improve employment security, while stringent adjustment costs can make some employers more cautious about hiring (Shabbir et al., 2021). The fixed-effects estimate also has a negative sign; however, political stability is not statistically significant in the governance-only PMG model, and the RE coefficient is close to zero. Consequently, the interpretation

should emphasise the conditional nature of the reported association rather than assume a uniformly negative effect across all models.

The negative control-of-corruption coefficient in the PMG specifications suggests an association between improved corruption control and lower unemployment. This relationship can be understood through several possible mechanisms. First, reduced corruption may increase investor confidence by lowering uncertainty and informal business costs. Second, more transparent allocation of public resources may improve the delivery of infrastructure and services that support productive firms. Third, fairer competition may expand opportunities for small and medium-sized enterprises to invest, innovate, and hire workers. In addition, improvements in education, training, and other public programmes may enhance the supply of skills needed by employers (Fagbemi et al., 2023; Oueghlissi & Derbali, 2024). These mechanisms provide a plausible interpretation of the negative coefficient, although they are not independently tested in the reported model. Furthermore, the substantial change in coefficient magnitude between the combined and governance-only PMG specifications suggests that the result may be sensitive to the variables included. Therefore, its policy interpretation should remain cautious, particularly where governance indicators are correlated.

Government effectiveness is negatively associated with unemployment in the combined PMG model. Effective policy implementation, public-service provision, infrastructure investment, and reliable administration may support productive activity and labour demand. Similarly, well-designed social protection and employment programmes may help workers adjust to structural changes (Mendonca & Tyson, 2019; Thai, 2024). However, the positive government-effectiveness coefficient in the governance-only model indicates that the estimated relationship is not stable across specifications. The rule-of-law coefficient is also positive in the combined model, contrary to the usual expectation that secure contracts and property rights foster investment and employment. In principle, stronger legal institutions may reduce uncertainty, facilitate business entry, support lending, and improve labour-market formalisation. Yet formalisation can also change the measurement of unemployment, and stronger enforcement may impose transition costs on some firms. These are possible explanations rather than mechanisms directly demonstrated by the data. In addition, correlation between rule of law, corruption control, and government effectiveness may affect their individual estimates. The unexpected sign should therefore be examined in the light of specification sensitivity and the reported VIF values, rather than interpreted as evidence that stronger legal institutions necessarily increase unemployment (Oueghlissi & Derbali, 2024; Shabbir et al., 2019). Taken together, the governance coefficients complement the study of unemployment but do not themselves constitute a test of Okun's Law.

The negative GDP-growth coefficient provides the clearest connection between the empirical findings and the conventional formulation of Okun's Law. Higher output growth may increase labour demand as firms respond to greater household spending and demand for goods and services. Similarly, expansion can encourage investment in equipment, technology, and additional production capacity, which may create opportunities for employment. Innovation and the development of new industries may generate further labour demand, although some technologies can also substitute for particular types of work (Blanchard & Sheen, 2013; Okun, 1963). The reported coefficient is consistent in direction with evidence discussed by Hegazy et al. (2024) and with the broader growth–unemployment literature, while findings across regions and specifications can differ (Gómez & Irewole, 2023; Sekwati & Dagume, 2023). However, the coefficient should be interpreted within the units and specification used in Table 7; it does not establish a universal Okun coefficient for all South Asian economies. In addition, informal employment and underemployment can weaken the link between recorded unemployment and changes in output (Ray & Chatterjee, 2015).

The combined PMG model reports a negative association between the exchange-rate indicator and unemployment. If the exchange rate is measured as units of domestic currency per US dollar, an increase represents depreciation, which can make domestically produced exports less expensive for foreign buyers. Higher external demand may then encourage production and employment in export-oriented industries. In addition, currency movements can affect import costs, competitiveness, and the current account. However, the employment response depends on export demand, imported-input requirements, and the speed with which firms adjust production (House et al., 2020). Short-run effects may therefore differ from longer-run adjustments. This interpretation is broadly related to the discussion of exchange-rate and labour-market relationships in Gómez and Irewole (2023). Nevertheless, the exchange-rate coefficient is statistically insignificant in the financial-only PMG

specification. Consequently, the finding should not be presented as stable across models, and an exchange-rate association is not itself a direct test of Okun's Law.

The reported negative coefficient for the interest rate is statistically significant but differs from the conventional expectation that higher borrowing costs restrain investment, consumption, and labour demand. Under standard monetary-transmission arguments, lower policy and lending rates can stimulate credit, spending, and recruitment, whereas higher rates may reduce employment opportunities (Ali, 2020). However, interest rates can also respond to inflation, macroeconomic instability, and shifts in economic activity, complicating the interpretation of their coefficient. Saptenno et al. (2024) provide an additional context for discussing macroeconomic determinants of unemployment, while Alemu (2025) examines relationships among unemployment and other macroeconomic indicators. The positive association between broad money and unemployment is similarly unexpected under a simple expansionary-money interpretation. In principle, greater monetary liquidity may support spending and investment; nevertheless, money growth can also reflect responses to adverse conditions or financial imbalances. Therefore, these results should be treated as conditional associations rather than evidence that higher interest rates or faster money growth directly cause particular employment outcomes. Among the financial indicators, the negative GDP-growth coefficient is the result most directly consistent with Okun's Law. Although the governance coefficients are often larger in absolute terms, their scales are different, so coefficient magnitudes cannot be compared as measures of relative importance without standardisation. Further research could examine differences in country-specific coefficients, structural changes, and whether governance conditions modify the growth–unemployment relationship.

6. Conclusion

Unemployment in South Asian economies reflects a combination of macroeconomic conditions, institutional environments, and labour-market characteristics. This study examined the associations of selected financial and governance indicators with unemployment using panel data for 1996–2023 and PMG/ARDL specifications. The results indicate a negative relationship between GDP growth and unemployment, consistent with the conventional direction of Okun's Law. In addition, the combined model reports negative coefficients for corruption control, government effectiveness, and political stability, although the results are not fully stable across alternative specifications. The positive rule-of-law coefficient, negative interest-rate coefficient, and positive broad-money coefficient depart from conventional expectations and warrant further investigation. The exchange-rate coefficient is negative in the combined model but not statistically significant in the financial-only specification. Moreover, the governance-only model does not provide a statistically significant error-correction coefficient. Consequently, the evidence supports a cautious interpretation of short- and long-run associations rather than a uniform causal account. The study highlights the importance of considering country-specific economic structures, informal labour markets, institutional characteristics, and potential structural changes when interpreting the growth–unemployment relationship.

The findings have implications for policies aimed at supporting employment and sustainable economic development in South Asia. Maintaining a stable macroeconomic environment and improving the quality of public administration may strengthen the conditions needed for private investment and job creation. Similarly, transparent governance, effective anti-corruption measures, and credible policies can help reduce uncertainty for domestic and foreign investors. The negative GDP-growth coefficient suggests that measures supporting productive expansion remain relevant to employment policy, particularly investment in infrastructure, skills, innovation, and sectors capable of generating jobs. Bangladesh's garment industry provides one example of the potential employment relevance of export-oriented production; however, experiences in individual countries cannot automatically be generalised to the whole region. In addition, policies promoting accountability and stronger public services should be accompanied by measures addressing underemployment, informal work, and the quality of employment. The analysis does not establish that a specific governance reform will produce a predetermined reduction in unemployment. Future studies could estimate country-specific growth–unemployment relationships and test whether governance quality moderates Okun's coefficient through explicit interaction terms. Further robustness work could also examine cross-sectional dependence, changes around the COVID-19 period, and possible nonlinear relationships. These extensions would build on the present aims without treating unestimated results as existing findings.

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Abbreviations

GDP	Growth Domestic Product
PMG	Pool Mean Group
ILO	International Labor Organization
IT	Information Technology
WGI	Worldwide Governance Indicators
CD	Cross-Sectional Dependency
VIF	Variance Inflating Factor
FEM	Fixed Effect Model
REM	Random Effect Model
FDI	Foreign Direct Investment
SMEs	Small and Medium-Sized Enterprises