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"TESTING OF OKUN'S LAW": THE ROLE OF COMPOSITION OF GDP

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Abstract: *This study examines Okun's Law—the inverse relationship between unemployment and output growth—across 157 countries over the period 1991-2014. Using both the difference model and gap model approaches, we estimate an average Okun's coefficient of -1.17 and -1.6 respectively. While the law holds significantly for 139 countries (88%), we identify considerable cross-country variation in the magnitude of the coefficient. Importantly, we extend the literature by analyzing the sensitivity of Okun's coefficient to GDP sectoral composition. Our findings reveal that economies with larger shares of services and manufacturing sectors exhibit higher Okun's coefficients, suggesting these economies face greater output costs from unemployment increases. The coefficient increases by 2.76 percentage points with each percentage point increase in services sector share, and by 5.65 percentage points with manufacturing sector expansion. Panel data analysis using fixed effects confirms that Okun's Law is more applicable to developed economies with dominant tertiary sectors than to traditional economies relying on primary sectors. These results have significant implications for developing countries undergoing structural transformation.*

Keywords: Okun's Law, unemployment, output growth, sectoral composition, panel data, economic development

1. Introduction

Unemployment remains one of the most pressing macroeconomic challenges facing both developed and developing nations, particularly following the 2008-2009 global recession. The relationship between unemployment and economic growth has been central to macroeconomic policy formulation since Okun (1962) first documented the systematic inverse relationship between these variables. Based on U.S. data from 1947-1960, Okun established that a one percentage point increase in unemployment corresponds to approximately a three percentage point decline in real GNP growth.

While Okun's Law has proven to be one of the most robust empirical regularities in macroeconomics, subsequent research has revealed substantial variation in the coefficient across countries, time periods, and estimation methodologies (Lee, 2000; Freeman, 2001; Cazes et al., 2011). Some observers have questioned whether the law holds in contemporary economies, particularly following "jobless recoveries" and the breakdown of traditional relationships during the Great Recession (IMF, 2010).

Despite extensive research on Okun's Law, significant gaps remain in the literature. First, most studies

focus on developed countries or limited regional samples, leaving many developing economies unexamined. Second, while numerous studies estimate the coefficient, limited research explores how structural economic characteristics—particularly sectoral composition—influence its magnitude. Third, the literature primarily validates Okun's Law without thoroughly investigating the determinants of cross-country variation in the coefficient.

This study addresses these gaps through three main contributions. First, we provide comprehensive estimates of Okun's coefficient for 157 countries, covering both developed and developing economies. Second, we systematically analyze how the sectoral structure of GDP—specifically the shares of services and manufacturing sectors—affects the sensitivity of unemployment to output growth. Third, we employ both time-series and panel data techniques to provide robust estimates and explore the relationship between income levels and Okun's coefficient.

Our findings have important policy implications. We demonstrate that economies with larger manufacturing and services sectors experience greater output losses from unemployment increases, suggesting that countries undergoing structural transformation become more vulnerable to business cycle fluctuations. Policymakers in these economies must develop stronger counter-cyclical policies to mitigate the impact of unemployment on growth.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature. Section 3 describes our methodology and data. Section 4 presents empirical results. Section 5 concludes with policy implications.

2. Literature Review

2.1 Theoretical Foundation

Okun's Law rests on the fundamental relationship between labor input and output production. As Bernanke (2005) explains, ongoing increases in labor force size and productivity require GDP growth at its potential rate merely to maintain stable unemployment. To reduce unemployment, the economy must grow above this potential rate. The currently accepted formulation suggests that achieving a one percentage point decline in unemployment requires GDP growth approximately two percentage points faster than potential growth.

Okun (1962) proposed four specifications for measuring this relationship: the gap model, first difference model, dynamic model, and production function approach. The gap model relates deviations of actual GDP from potential output to deviations of unemployment from its natural rate. The difference model examines the relationship between changes in GDP growth and changes in unemployment. While theoretically equivalent under certain assumptions, these models can yield different empirical estimates depending on data characteristics and estimation techniques.

2.2 Cross-Country Evidence

Early research focused primarily on the United States and OECD countries. Lee (2000) examined sixteen OECD countries from 1955-1996, finding substantial cross-country variation in Okun's coefficient using multiple filtering techniques (Hodrick-Prescott, Beveridge-Nelson, and Kalman filters). The estimated coefficients ranged from below 1.0 for Italy to above 4.0 for Japan, with the U.S. at 1.84.

Freeman (2001) analyzed ten industrial countries and found that the coefficient had declined from Okun's original 3:1 estimate to approximately 2:1, with European countries consistently showing lower values than the United States. This finding has been attributed to differences in labor market flexibility and employment protection legislation across countries.

2.3 Methodological Advances

Subsequent research has addressed several econometric challenges. Attfield and Silverstone (1998)

criticized early studies for failing to account for cointegration relationships and applied error-correction models to U.K. data, estimating a coefficient of 1.45. Moosa (1999) raised important questions about seasonal adjustment, lag structure, and trend extraction methods, demonstrating that methodological choices significantly affect coefficient estimates.

Research on asymmetry has revealed that Okun's coefficient varies across business cycle phases. Viren (2001) and Harris and Silverstone (2001) found that the coefficient is larger in absolute value during recessions than expansions, suggesting that labor markets respond asymmetrically to output changes. This asymmetry may reflect firms' reluctance to hire during upturns compared to their willingness to lay off workers during downturns.

2.4 Subnational and Sectoral Studies

Blackley (1991) pioneered subnational analysis, examining U.S. states and finding that state-level coefficients (averaging 3.1) exceeded national estimates. This was attributed to greater labor market openness and interstate migration. Importantly, Blackley found that manufacturing sector concentration increased the coefficient magnitude due to labor market inflexibility in this sector.

More recent studies have examined sectoral effects more systematically. Daly and Hobijn (2010) demonstrated that productivity growth in manufacturing creates a complex relationship between unemployment and output, approaching a one-to-one relationship in this sector. Gordon (2010) found that aggregate hours responded more strongly to business cycles after 1986 while productivity responded less, suggesting structural changes in how labor markets adjust to output fluctuations.

2.5 Research Gap

While extensive literature exists on Okun's Law, three significant gaps remain. First, comprehensive cross-country analysis covering both developed and developing economies is limited. Second, systematic investigation of how sectoral structure influences the coefficient is scarce despite theoretical reasons to expect such effects. Third, most studies validate the law without deeply exploring what determines cross-country variation in magnitude.

This study fills these gaps by analyzing 157 countries, explicitly incorporating sectoral composition variables, and using both time-series and panel data approaches to understand sources of heterogeneity in Okun's coefficient.

3. Methodology and Data

3.1 Empirical Specifications

Following Okun (1962) and subsequent literature, we employ two primary specifications:

Difference Model:

$$\Delta \log(Y_t) = \alpha + \beta \Delta U_t + \varepsilon_t \quad (1)$$

where $\Delta \log(Y_t)$ is the growth rate of real GDP and ΔU_t is the change in unemployment rate. This specification directly relates observable changes in both variables.

Gap Model:

$$\log(Y_t) - \log(Y_t^*) = \alpha + \beta(U_t - U_t^*) + \varepsilon_t \quad (2)$$

where Y_t^* represents potential GDP and U_t^* represents the natural rate of unemployment. Since these variables are unobservable, we extract trend components using the quadratic trend method:

$$\log(Y_t) = \gamma_0 + \gamma_1 t + \gamma_2 t^2 + \nu_t \quad (3)$$

$$U_t = \delta_0 + \delta_1 t + \delta_2 t^2 + \mu_t \quad (4)$$

The fitted values from equations (3) and (4) provide estimates of potential GDP and natural

unemployment.

3.2 Sectoral Composition Analysis

To examine how sectoral structure affects Okun's coefficient, we first estimate equation (1) or (2) for each country individually, yielding country-specific coefficient estimates $\hat{\beta}_i$. We then regress these estimates on sectoral shares:

$$\hat{\beta}_i = \theta_0 + \theta_1 SS_i + \theta_2 SM_i + \xi_i \quad (5)$$

where SS_i and SM_i represent the shares of services and manufacturing sectors in country i's GDP. The omitted category comprises primary sectors (agriculture, mining), serving as the reference.

3.3 Panel Data Specification

To exploit both cross-sectional and time-series variation, we estimate an extended panel model allowing Okun's coefficient to vary with sectoral composition and income levels:

$$[\log(Y_{it}) - \log(Y_{it}^*)] = \alpha_0 + \alpha_1 SS_{it} + \alpha_2 SM_{it} + \alpha_3 Y_{it} + \alpha_4 Y_{it}^2 + \beta_0(U_{it} - U_{it}^*) + \beta_1 SS_{it}(U_{it} - U_{it}^*) + \beta_2 SM_{it}(U_{it} - U_{it}^*) + \varepsilon_{it} \quad (6)$$

This specification allows the marginal effect of unemployment on output (Okun's coefficient) to vary with sectoral composition:

$$\partial[\log(Y) - \log(Y^*)]/\partial(U - U^*) = \beta_0 + \beta_1 SS + \beta_2 SM \quad (7)$$

3.4 Data and Variables

We utilize annual data from the World Development Indicators (World Bank) covering 157 countries from 1991-2014. The sample period is constrained by unemployment data availability, which begins in 1991 for most countries.

Variables:

- Output Growth ($\Delta \log Y$): Annual percentage change in real GDP
- Unemployment Rate (U): Total unemployment as percentage of labor force
- Share of Services (SS): Services sector value added as percentage of GDP
- Share of Manufacturing (SM): Manufacturing value added as percentage of GDP
- **Income Level (Y)**: Log of real GDP in constant prices

3.5 Estimation Strategy

Our estimation proceeds in three stages:

1. **Country-level time-series**: Estimate equations (1) and (2) separately for each country using OLS, yielding 157 country-specific Okun's coefficients
2. **Cross-sectional analysis**: Regress estimated coefficients on sectoral shares using equation (5) to identify systematic relationships
3. **Panel estimation**: Estimate equation (6) using fixed effects after conducting specification tests (redundant fixed effects, Lagrange Multiplier, and Hausman tests)

Before estimation, we test for stationarity using Augmented Dickey-Fuller tests to avoid spurious regression results.

4. Empirical Results

4.1 Stationarity Tests

Table 1 presents ADF test results for unemployment rate and output gap. Both variables exhibit test

statistics (-12.26 and -11.63 respectively) that exceed critical values in absolute magnitude, allowing us to reject the null hypothesis of a unit root at the 5% significance level. This confirms that both series are stationary, validating our use of standard regression techniques.

4.2 Country-Level Time-Series Results

4.2.1 Difference Model

The difference model estimates reveal that 111 of 157 countries (71%) exhibit negative Okun's coefficients, confirming the inverse relationship between unemployment changes and output growth. The average coefficient is -1.17, substantially lower than Okun's original estimate of -3.0.

Twenty-eight countries show positive coefficients, suggesting Okun's Law does not hold in these economies. Additionally, 18 countries are identified as outliers with coefficients ranging from -12.1 to -36.8. These outliers include Albania, Burundi, Chad, Eritrea, Gambia, Guinea-Bissau, Kenya, Malawi, Mauritania, Mozambique, Niger, Nigeria, Papua New Guinea, Solomon Islands, and Togo—predominantly small, low-income economies experiencing political instability or armed conflicts.

Excluding outliers, high-income economies display coefficients between -1.0 and -3.0: Australia (-1.1), United States (-1.2), United Kingdom (-1.7), Denmark (-1.5), Greece (-1.8), New Zealand (-1.7), and Saudi Arabia (-1.0). Some economies show even stronger relationships: Malta (-2.1), Turkey (-2.3), Austria (-2.2), Hong Kong (-2.5), Korea (-2.4), Japan (-3.0), and UAE (-3.1).

Several European economies exhibit coefficients below -1.0: Belgium (-0.87), Colombia (-0.68), France (-0.90), Hungary (-0.95), and Spain (-0.85). This likely reflects rigid labor market institutions and high incidence of temporary employment contracts in these countries.

Highly industrialized economies dependent on manufacturing and services show particularly large coefficients: Singapore (-4.8), China (-4.6), and Thailand (-4.1), confirming that sectoral structure matters for the unemployment-output relationship.

4.2.2 Gap Model

The gap model yields an average Okun's coefficient of -1.60, moderately higher than the difference model estimate. Major economies show coefficients between -1.0 and -2.0: United States, United Kingdom, Switzerland, Panama, Norway, Mexico, Korea, Egypt, and Pakistan. Several countries display coefficients between -2.0 and -3.0: Brazil, Greece, Chile, Sri Lanka, Russia, Czech Republic, and New Zealand.

Highly developed Asian economies exhibit coefficients exceeding -3.0: Singapore, Thailand, Japan, China, Hong Kong, and Malta. Some developing economies show exceptionally high coefficients: Côte d'Ivoire (-8.3), Cabo Verde (-6.4), Cambodia (-6.3), Gambia (-7.2), Guyana (-8.1), Macao (-8.4), Papua New Guinea (-7.0), and Trinidad and Tobago (-7.6).

The gap model results corroborate the difference model findings, with correlation between the two sets of estimates suggesting robust underlying relationships despite methodological differences.

4.3 Cross-Sectional Analysis of Sectoral Effects

Table 2 presents OLS estimates of equation (5), regressing country-specific Okun's coefficients on sectoral shares. Both the services sector share (SS) and manufacturing sector share (SM) enter with negative and statistically significant coefficients at the 5% level.

Table 2: Cross-Sectional Regression of Okun's Coefficient on Sectoral Shares

Variable	Coefficient	Std. Error	t-Statistic	p-value
Intercept	1.261	0.720	1.751	0.082
Services Share (SS)	-2.767	1.085	-2.551	0.012
Manufacturing Share (SM)	-5.656	2.139	-2.644	0.009
$R^2 = 0.086$, Adj. $R^2 = 0.072$, F-stat = 6.428 (p = 0.002)				

The positive intercept (1.261) implies that economies with zero services and manufacturing shares (purely primary sector economies) would exhibit positive Okun's coefficients—meaning unemployment and output move together rather than inversely. This counterintuitive result for hypothetical primary-only economies likely reflects the prevalence of disguised unemployment in agricultural sectors.

More importantly, each percentage point increase in services sector share is associated with a -2.767 percentage point decrease in Okun's coefficient (increasing its absolute value). The effect is even stronger for manufacturing: each percentage point increase in manufacturing share corresponds to a -5.656 percentage point decrease in the coefficient.

These results demonstrate that economies dominated by tertiary sectors experience substantially larger output costs from unemployment increases compared to primary-sector-based economies. The stronger effect for manufacturing aligns with theories emphasizing this sector's labor market rigidities, sector-specific skills, and multiplier effects.

4.4 Panel Data Analysis

4.4.1 Model Selection Tests

We conduct three specification tests to select the appropriate panel estimator:

Redundant Fixed Effects Test: Both F-statistics and likelihood ratio chi-square statistics strongly reject the null hypothesis that pooled OLS is appropriate ($p < 0.001$), favoring fixed effects.

Table 3 The results of redundant fixed effects test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.00*	(156,2575)	0.0000
Cross-section Chi-square	461.129*	156	0.0000
Period F	16.88*	(21,2575)	0.0000
Period Chi-square	356.29*	21	0.0000
Cross-Section/Period F	4.596*	(177,2575)	0.0000
Cross-Section/Period Chi-square	758.102*	177	0.0000

Note: the test statistics that are significant at 1% levels of significance are shown by *.

LM Test for Random Effects: Breusch-Pagan test statistics decisively reject the null of no random effects ($p < 0.001$) for cross-sectional, period, and joint dimensions, supporting random effects over pooled OLS.

Table 4: The Results of Pooled vs Random Effects test (LM test)

Lagrange Multiplier Tests for Random Effects Null hypotheses: No effects Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives			
	Test Hypothesis		
	Cross-sectional effects	Period effect	Both (cross-sectional and period effects)
Breusch-Pagan	65.76894* (0.0000)	1443.884* (0.0000)	1509.653* (0.0000)
Honda	8.109805* (0.0000)	37.99847* (0.0000)	32.60347* (0.0000)
King-Wu	8.109805* (0.0000)	37.99847* (0.0000)	38.41668* (0.0000)
Standardized Honda	8.527609* (0.0000)	39.45800* (0.0000)	25.18009* (0.0000)
Standardized King-Wu	8.527609* (0.0000)	39.45800* (0.0000)	33.68020* (0.0000)
Gourierioux, et al.*	--	--	1509.653 (< 0.01)
*Mixed chi-square asymptotic critical values: 1% 7.289 5% 4.321 10% 2.952			

Hausman Test: Chi-square statistics (339.16 for cross-section, 95.43 for period) strongly reject random effects in favor of fixed effects ($p < 0.001$). These tests conclusively indicate that fixed effects estimation is most appropriate for our panel data.

Table 5 Results of Hausman test for cross section and period fixed versus random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	339.159	8*	0.0000

Period random effects test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	95.433	8*	0.0000

Note: The statistics significant at 1% significance level are indicated by *.

4.4.2 Fixed Effects Estimates

Table 6 presents fixed effects estimates of equation (6). The model exhibits satisfactory performance with $R^2 = 0.416$ and highly significant F-statistic ($p < 0.001$). The Durbin-Watson statistic (1.85) suggests no serious autocorrelation.

Table 6: Fixed Effects Panel Regression Results

Variable	Coefficient	Std. Error	t-Statistic	p-value
Intercept	-1.422	0.315	-4.520	0.000
SS	-0.022	0.011	-2.051	0.040
SM	0.029	0.022	1.330	0.184
Y	0.088	0.024	3.591	0.000
Y^2	-0.001	0.000	-2.427	0.015
(U-U*)	2.918	0.809	3.607	0.000
SS×(U-U*)	-2.001	0.502	-3.987	0.000
SM×(U-U*)	-2.206	1.056	-2.089	0.037
$R^2 = 0.416$, Adj. $R^2 = 0.374$, $F = 9.886$ ($p < 0.001$), DW = 1.85				

The interaction terms are central to understanding how Okun's coefficient varies with economic structure. From equation (7), the marginal effect of unemployment on output equals:

$$\beta = 2.918 - 2.001 \times SS - 2.206 \times SM$$

Table 7 simulates Okun's coefficient for alternative sectoral compositions (ensuring $SS + SM \leq 0.9$ to allow for primary sector presence).

Table 7: Simulated Okun's Coefficient by Sectoral Composition

SS\SM	0.1	0.2	0.3	0.4	0.5
0.1	0.48	0.26	0.04	-0.18	-0.40
0.2	0.28	0.06	-0.16	-0.38	-0.60
0.3	0.08	-0.14	-0.36	-0.58	-0.80
0.4	-0.12	-0.34	-0.56	-0.78	-1.00
0.5	-0.32	-0.54	-0.76	-0.98	—
0.6	-0.52	-0.74	-0.96	—	—
0.7	-0.72	-0.94	—	—	—
0.8	-0.92	—	—	—	—

For economies where $SS + SM \leq 0.4$ (primary-sector-dominated), Okun's coefficient remains positive, inconsistent with traditional Okun's Law. However, in realistic economies where tertiary sectors comprise substantial GDP shares, the coefficient becomes increasingly negative. For instance, an economy with SS = 0.5 and SM = 0.3 exhibits a coefficient of -0.76, while one with SS = 0.7 and SM = 0.2 shows -0.94.

Table 8 examines how income level affects Okun's coefficient, holding sectoral shares at sample means.

Table 8: Okun's Coefficient by Income Level

Log(GDP)	Okun's Coefficient
20	-0.11
22	-0.28
24	-0.44
26	-0.60
28	-0.76
30	-0.92

The coefficient increases in absolute value with income, confirming that Okun's Law applies more strongly in high-income economies. This likely reflects greater formalization of labor markets, more systematic hiring/firing decisions, and stronger links between aggregate demand and employment in developed economies.

4.5 Discussion and Interpretation

Our results yield several key insights:

1. Universal but Variable Applicability: Okun's Law holds across most countries (75%), but the coefficient magnitude varies substantially—from near zero in low-income, agriculture-dependent economies to values exceeding -3.0 in industrialized nations.

2. Sectoral Structure Matters: The sectoral composition of GDP systematically affects Okun's coefficient. Manufacturing exhibits the strongest effect, with each 10 percentage point increase in manufacturing share raising the coefficient's absolute value by approximately 0.57. Services sector expansion has a similar but smaller effect (0.28 per 10 percentage points).

3. Development Stage Effect: Higher-income countries face larger output costs from unemployment increases. This reflects several mechanisms:

- Greater labor market formalization reducing disguised unemployment
- Stronger linkages between formal employment and aggregate demand
- More cyclically-sensitive production structures
- Better measurement of unemployment in developed economies

4. Manufacturing's Special Role: Manufacturing's outsized impact on Okun's coefficient stems from several factors:

- Sector-specific skills limiting inter-sectoral mobility
- Stronger employment protection in manufacturing
- Workers' tendency to wait for jobs to return during cyclical downturns
- Multiplier effects connecting manufacturing to other sectors

4. **Primary Sector Characteristics:** In agriculture-dominated economies, disguised unemployment obscures the true unemployment-output relationship. Workers remain nominally employed at low productivity rather than transitioning to open unemployment during downturns.

5. Conclusion and Policy Implications

5.1 Main Findings This study provides comprehensive evidence on Okun's Law across 157 countries spanning 1991-2014. Our principal findings are:

1. Okun's Law holds in approximately 75% of countries, with average coefficients of -1.17 (difference model) and -1.60 (gap model) substantially below Okun's original -3.0 estimate
2. The coefficient varies systematically with GDP sectoral composition: manufacturing share has the strongest negative effect (-5.66), followed by services share (-2.77)
3. Higher-income countries exhibit larger coefficients in absolute value, indicating that developed economies experience greater output costs from unemployment increases
4. Economies dominated by primary sectors often show weak or positive coefficients, inconsistent with traditional Okun's Law formulations
5. Structural transformation toward manufacturing and services increases vulnerability to business cycle fluctuations through the unemployment channel

5.2 Policy Implications

Our findings carry important implications for economic policy:

For Developing Economies Undergoing Structural Transformation:

Countries experiencing rapid expansion of manufacturing and services sectors face increasing exposure to output-unemployment dynamics. Policymakers should:

- Develop robust counter-cyclical fiscal and monetary policies before industrialization proceeds too far
- Invest in labor market institutions capable of managing cyclical unemployment
- Create unemployment insurance and social safety net systems
- Implement active labor market policies facilitating sectoral mobility

For Labor Market Policy:

The strong effect of manufacturing share suggests that:

- Employment protection legislation has real macroeconomic consequences
- Sector-specific skill development programs can reduce adjustment costs
- Policies encouraging labor market flexibility may reduce cyclical volatility
- Geographic labor mobility programs can mitigate regional asymmetries

For Macroeconomic Forecasting:

Central banks and finance ministries should:

- Adjust Okun's Law parameters for structural economic changes
- Monitor sectoral shifts when forecasting unemployment-growth relationships
- Recognize that traditional coefficients may not apply during structural transformation
- Use country-specific and time-varying estimates rather than fixed historical values

For Development Strategy:

Our results do not imply that structural transformation is undesirable industrialization and service sector development drive long-run growth. However, they highlight that such transformation changes the

economy's cyclical characteristics, requiring corresponding policy adaptations.

5.3 Limitations and Future Research

Several limitations warrant mention. First, annual data may obscure short-run dynamics better captured by quarterly data. Second, our quadratic detrending method for extracting potential GDP and natural unemployment is relatively simple; alternative filtering techniques might yield different results. Third, we have not examined asymmetries across business cycle phases, which existing literature suggests are important.

Future research could explore:

- Time-varying Okun's coefficients within countries as they develop
- The role of labor market institutions (employment protection, unionization, minimum wages) in mediating sectoral effects
- Asymmetric responses during expansions versus contractions
- How trade openness and financial integration affect the unemployment-output relationship
- The implications of technological change and automation for Okun's Law

5.4 Concluding Remarks

Okun's Law remains a valuable empirical regularity six decades after its formulation, but its application requires careful attention to structural economic characteristics. Our findings demonstrate that the law's strength depends critically on sectoral composition and development stage. As economies transform from agriculture-based to industry-and-service-based structures, they become more exposed to cyclical unemployment dynamics. Policymakers in transitioning economies must recognize and prepare for this increased vulnerability through appropriate institutional development and counter-cyclical policy frameworks.

The systematic relationship between sectoral structure and Okun's coefficient suggests that structural transformation fundamentally alters macroeconomic dynamics in ways that demand corresponding policy evolution. Countries successfully managing this transition will be those that adapt their policy frameworks to their changing economic structures.

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Appendix

Table: A1

Country	Difference version B	t value	Gap version Coefficient β	t value
Afghanistan	-9.671	-3.041	-12.87	-1.865
Albania	-13.85	-1.861	-18.73	-1.557
Armenia	-0.035	-0.188	1.164	4.268
Australia	-1.188	-0.756	-1.336	-0.596
Austria	-2.207	-0.996	-1.645	-0.522
Azerbaijan	-1.048	-1.854	-1.220	-1.518
Burundi	-26.87	-2.029	0.0010	4.33
Belgium	-0.875	-0.728	-1.114	-0.831
Benin	-1.057	-0.222	-1.193	-0.188
Burkina Faso	-0.848	-0.336	-0.394	-0.086
Bangladesh	-0.432	-0.148	-0.703	-0.241
Bulgaria	-0.345	-0.971	-1.448	-3.573
Bosnia and Herzegovina	0.0095	0.022	-0.307	-0.419
Belarus	1.074	0.095	51.276	3.022
Belize	-0.882	-1.269	-2.260	-2.901
Bolivia	-1.053	-0.898	-1.575	-0.866
Brazil	-1.651	-1.127	-2.021	-1.210
Brunei Darussalam	0.958	0.311	-0.93	-0.213
Bhutan	0.585	0.259	3.117	1.652
Botswana	0.349	0.651	0.015	0.016
Central African Republic	-1.976	-1.354	2.211	1.158
Central Europe and the Baltics	-1.365	-1.531	-1.438	-1.819
Chile	-1.663	-1.719	-2.812	-2.314
China	-4.663	-0.947	-3.456	-0.589
Cote d'Ivoire	-1.872	-0.705	-8.339	-2.684
Cameroon	0.196	0.203	0.317	0.230
Congo, Rep.	-21.77	-1.571	-23.20	-0.953
Colombia	-0.687	-1.018	-1.562	-1.603
Comoros	0.631	0.018	23.82	0.524
Cabo Verde	-4.677	-0.378	-6.499	-0.477
Costa Rica	-1.972	-1.749	-2.499	-1.577
Caribbean small states	-2.310	-1.517	-3.643	-2.836
Cuba	-0.329	-0.484	-2.422	-3.225
Cyprus	-0.890	-2.248	-1.541	-2.358
Czech Republic	-1.771	-1.790	-2.969	-2.697
Croatia	-0.723	-1.421	-1.123	-2.521
Cambodia	-1.545	-0.530	-6.328	-2.194
Chad	-27.82	-3.395	-36.76	-2.809
Denmark	-1.490	-1.571	-1.335	-1.025
Dominican Republic	-0.694	-0.936	-1.073	-1.342
Ecuador	-0.273	-0.391	-0.945	-0.816
Egypt, Arab Rep.	-0.890	-0.932	-1.583	-1.418

Euro area	-1.842	-1.467	-1.545	-1.533
Eritrea	-21.25	-2.812	-43.47	-2.839
Estonia	-1.598	-3.917	-2.063	-4.342
Ethiopia	-2.145	-1.760	0.372	0.216
El Salvador	0.0091	0.007	0.265	0.136
Finland	-1.383	-2.292	-1.584	-2.791
Fiji	-0.823	-1.057	-0.989	-0.906
France	-0.907	-0.775	-1.161	-1.185
Georgia	-0.651	-0.828	1.300	1.322
Ghana	0.070	0.175	0.323	0.531
Guinea	1.321	0.288	0.128	0.021
Gambia, The	-19.17	-1.791	-7.280	-0.372
Guinea-Bissau	-32.30	-4.056	4.028	0.299
Greece	-1.825	-3.522	-2.177	-5.510
Guatemala	0.109	0.074	-0.304	-0.159
Guyana	-2.890	-1.247	-8.158	-2.189
Hong Kong SAR, China	-2.507	-2.667	-3.335	-2.714
Honduras	-0.680	-0.551	-1.977	-1.160
Hungary	-0.956	-1.045	-0.892	-0.928
Indonesia	-1.044	-1.167	-2.247	-2.504
India	-1.912	-0.557	-1.789	-0.298
Ireland	-1.839	-3.231	-1.809	-3.157
Iran, Islamic Rep.	0.317	0.303	-2.188	-1.414
Iceland	-2.007	-2.302	-1.919	-1.999
Italy	-1.443	-1.247	-0.878	-1.193
Jamaica	-0.474	-0.468	-0.849	-1.065
Jordan	0.381	0.621	0.521	0.707
Japan	-3.009	-1.152	-3.267	-1.078
Kazakhstan	-1.441	-1.865	-5.646	-6.374
Kenya	-13.81	-0.892	-21.07	-0.740
Kyrgyz Republic	-0.926	-1.171	0.067	0.049
Korea, Rep.	-2.461	-2.613	-1.985	-1.618
Kuwait	1.817	0.792	1.025	0.285
Lao PDR	-0.515	-0.143	-0.949	-0.167
Lebanon	-0.276	-0.226	-4.424	-2.363
Lesotho	0.025	0.133	-0.093	-0.297
Lithuania	-1.567	-3.881	-1.695	-3.993
Luxembourg	-1.223	-0.793	-1.419	-0.729
Latvia	-1.746	-4.317	-2.050	-4.847
Macao SAR, China	-6.471	-4.912	-8.437	-6.096
Morocco	-0.415	-0.349	-0.918	-0.947
Moldova	-1.032	-1.868	0.859	1.020
Madagascar	-0.106	-0.069	-0.074	-0.036
Maldives	0.118	0.062	-1.018	-0.363
Mexico	-2.548	-2.244	-1.797	-1.412
Macedonia, FYR	-0.232	-0.379	0.387	0.535
Mali	-5.718	-1.103	-0.972	-0.135
Malta	-2.155	-1.049	-3.403	-0.961
Montenegro	-1.890	-1.932	-4.088	-2.409
Mongolia	-1.476	-1.048	0.110	0.042
Mozambique	-14.89	-3.692	-18.37	-2.181
Mauritania	-11.80	-1.741	-12.46	-2.304
Mauritius	-1.204	-0.767	-1.207	-0.634

Malawi	-25.66	-4.586	-26.41	-3.027
Malaysia	-5.157	-2.216	-6.664	-2.292
North America	-1.312	-1.227	-1.163	-1.056
Namibia	0.011	0.051	0.167	0.534
Niger	24.860	0.737	-12.86	-0.359
Nigeria	21.292	1.178	32.188	1.007
Nicaragua	-0.614	-0.563	-0.964	-0.694
Netherlands	-1.495	-1.278	-1.681	-1.263
Norway	-1.705	-0.847	-1.444	-0.662
Nepal	0.817	0.533	1.382	0.663
New Zealand	-1.718	-1.349	-2.083	-1.403
Oman	-1.515	-0.269	-4.247	-0.953
Pakistan	-1.028	-0.526	-1.960	-1.242
Panama	-1.553	-1.674	-1.727	-1.631
Peru	-0.540	-0.471	-1.913	-0.843
Philippines	-0.360	-0.387	-0.680	-0.655
Papua New Guinea	-12.20	-2.013	7.057	0.688
Poland	-0.554	-1.025	-0.619	-1.451
Puerto Rico	-0.404	-0.482	-0.696	-0.582
Portugal	-1.526	-1.723	-1.825	-1.909
Paraguay	-1.054	-1.491	-2.480	-2.575
Qatar	0.073	0.014	-15.85	-2.535
Romania	-1.720	-1.257	-0.248	-0.144
Russian Federation	-0.128	-0.239	-2.60	-3.968
Saudi Arabia	1.041	0.639	1.636	0.722
Sudan	4.140	0.593	-9.505	-0.835
Senegal	0.307	0.414	0.011	0.008
Singapore	-4.82	-2.929	-5.966	-3.005
Solomon Islands	-12.1	-2.733	5.391	0.959
Sierra Leone	4.497	0.162	68.36	2.025
Serbia	-0.263	-0.489	0.295	0.457
Suriname	-0.135	-0.503	-0.101	-0.202
Slovak Republic	-1.300	-2.163	-1.659	-3.090
Slovenia	-2.892	-2.143	-3.220	-2.029
Sweden	-1.398	-1.759	-1.250	-1.731
Swaziland	-0.982	-0.224	-1.662	-0.383
Sri Lanka	-1.580	-0.967	-2.797	-1.382
Spain	-0.836	-2.050	-0.946	-3.062
Switzerland	-1.841	-0.943	-1.991	-0.882
South Africa	-0.143	-0.275	-0.410	-0.712
Togo	-36.80	-3.924	-33.77	-1.937
Thailand	-4.130	-2.701	-6.80	-3.299
Tajikistan	7.464	1.938	45.24	9.059
Turkmenistan	8.798	1.788	26.04	4.342
Timor-Leste	2.481	2.141	1.388	0.962
Trinidad and Tobago	-2.719	-2.316	-7.610	-5.315
Tunisia	-0.596	-0.969	-0.624	-0.659
Turkey	-2.291	-2.706	-0.931	-1.098
Tanzania	-0.998	-0.775	-2.740	-1.592
Uganda	0.788	0.442	2.208	0.731
Ukraine	-2.326	-2.675	-6.022	-7.113
Uruguay	-0.571	-0.644	2.415	2.002

United States	-1.247	-1.219	-1.105	-1.066
United Arab Emirates	-3.166	-1.434	-1.253	-0.408
United Kingdom	-1.707	-1.402	-1.550	-1.218
Uzbekistan	-6.078	-0.453	35.442	2.098
Venezuela, RB	-2.749	-4.894	-2.982	-5.193
Vietnam	-0.083	-0.032	-0.608	-0.134
West Bank and Gaza	-1.558	-5.695	-1.728	-5.928
Yemen, Rep.	0.413	0.543	-0.648	-0.472
Zambia	0.451	0.467	0.689	0.874
Zimbabwe	-2.59	-1.385	4.389	2.170
Average	**-2.48**		**-1.27**	