INSTITUTE OF INTERNATIONAL FINANCE

IIF Deep Dive

JOB CREATION, ECONOMIC GROWTH, AND POLICY REFORMS: AN EMPIRICAL REASSESSMENT

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Abstract

A key element of economic development is the ability of an economy to produce increasing numbers of better and more jobs. This ability likely varies according to country-specific institutions and characteristics. This paper takes a broad view of the determinants of changes in unemployment rate and job creation given changes in aggregate production for a panel of 185 countries from 1990 to 2022. We find that the sensitivity of unemployment to cyclical output variations rises with country income levels. The behavior of labor force participation and informality are shown to be important reasons for such a pattern. Long-run employment growth seems also to be less sensitive to output growth in lower-income countries. Finally, we show that long-run job creation elasticities rise significantly in the presence of more openness to external trade, less restrictive regulations for the (domestic and external) financial sector, greater product market competition, and (less robustly) labor market flexibility. The policy reform agenda for the future is clear.

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1. Introduction

The Global Financial Crisis and, more recently, the worldwide recession brought about the COVID-19 pandemic have led to an increasing concern about "jobless growth" – can rapid economic growth be relied on to boost job creation in the short and long run?[1] This paper attempts to tackle this question head on by examining the relationship between economic growth and job creation from a macroeconomic perspective.

There are multiple demand-side and supply-side channels from growth to job creation: Macroeconomic (Okun's Law—which relates output growth to unemployment rate changes—and employment-intensity of growth); sectoral (structural transformation and its impact on the sectoral composition of employment); and micro (job creation at the firm level) channels. Given the highly complex nature of the growth/jobs creation nexus, "we start from the beginning" by estimating basic macroeconomic relationships between the two variables for the largest panel of countries possible, aiming at unearthing key relationships relevant for developing countries—a group often disregarded in this type of estimation.

The empirical literature suggests that economic growth is a necessary but not always sufficient condition for sustained job creation.[2] We focus here on providing updated macro-level evidence on how policy reforms affect job creation through the economic growth channel. The employment-growth relationship will be examined both from a shorter-term – through Okun's Law – and a longer-term perspective – through estimates of employment elasticities.

This type of inquiry has been much more commonly applied to developed economies. For example, concerns about jobless recovery in the aftermath of the Great Recession of 2008-2009 rekindled interest in empirical assessments of Okun's Law. Drawing on data from 1948 for the United States and from 1980 for 20 advanced economies, Ball, Leigh and Loungani (2017) find no breakdown in the output-employment relationship: Okun's Law holds up well in explaining short-term, aggregate demand-driven unemployment movements in these countries. In contrast, initial efforts to expand such analysis to developing countries have found considerable heterogeneity in estimates of the Okun coefficients for low and lower middle-income countries. For instance, An et al. (2016) and An et al. (2017) find that Okun's Law holds in only about half of their sample. The responsiveness of employment to short-term output fluctuations was shown to vary inversely with a poverty headcount index and skills mismatches. Lee et al. (2020) similarly find that the Okun relationship is stronger in developed countries than in developing and emerging economies. As a result, they recommend caution in using Okun's Law as a guide to policy decisions.

Beyond short-term demand fluctuations, the employment-output relationship is relevant to understanding longer-run job creation patterns. The long-term impact of output growth on employment can be gauged by estimating employment-output elasticities, which are a useful gauge for the employment intensity of growth, that is, the relationship between output growth and employment growth over time. As far as we can tell, Kapsos (2005) has written the first paper looking at panel estimates for such elasticity using a large panel of countries at different stages of development. Crivelli, Furceri, and Toujas-Bernaté (2012) use IMF data to estimate the employment intensity of growth using an unbalanced panel of 167 countries, covering the 1997-2009 period. In a similar vein to the above-described results for Okun coefficients, they find that employment elasticities are on average three times larger for high-income countries compared to low-income countries.

Policymakers can also influence short- and long-run employment patterns through the impact of structural reforms and stabilization policies on output levels and growth rate. Crivelli, Furceri and Toujas-Bernaté (2012) regress their estimated employment elasticities against a number of structural policy variables, macroeconomic variables, demographic variables and invariant controls. They find that some policy reforms have a larger employment effect in less developed countries, while employment elasticities are higher for more developed countries, suggesting the potential for some "catching-up" effect if the right type of reforms are implemented.

Our paper adds to the literature on the estimation of Okun's Law and employment elasticities by using an even larger panel of countries across more years, evaluating the effect of broader measures of economic reforms on employment elasticities, and looking at some of the underlying causes for the different labor market responses to output shocks.

The paper is organized as follows. Section II describes the various datasets used in this research, including how they expand the number of countries, period of time, and quality of the structural variables used in previous research on the topic. Section III discusses the empirical strategies and findings with respect to the growth-jobs relationship, that is, the economic growth channel to job creation. Section IV does the same regarding the impact of policy reforms on the employment sensitivity to economic growth. Section V concludes.

2. Data Description

The data used in this paper are extracted from multiple sources, as follows:

- Basic data on real GDP growth, employment growth, and labor force participation are from the World Development Indicators (WDI) database.

[1] See, e.g., World Bank (2018).

[2] Merotto, Weber, and Aterido (2018) survey cross-country results from Jobs Diagnostics conducted in low-income and lower-middle-income countries. They conclude that economic growth creates jobs on average – but that the labor intensity of growth matters. Not all production growth episodes are associated with employment growth

- Data on unemployment rates are from ILOSTAT[3] with 185 countries from 1991 to 2022. We also use unemployment rate data from the IMF from 1980 to 2022 for 114 countries. Our main analysis uses ILOSTAT unemployment data, while the IMF data are used for robustness check (shown in the Appendix C).

- Data on sectoral output (value added) are from ETD – Economic Transformation Database (1990 – 2018) with 12 sectors.[4]

- Income and region classifications follow the World Bank Group definitions.

- Data on policy reforms draw primarily from the IMF Structural Reform Database, as developed by Alesina et al. (2020), covering 90 countries over the period 1973-2014. The reform areas covered in this database are summarized in Table 1.

- The informality indexes are collected from the Informal Economy Database of The World Bank's Prospects Group, covering 196 economies over the period 1990-2020.

- The names of countries in our sample and their regions and income classification are provided in Appendix A.

3. The Growth-Jobs Relationship

This section looks into the growth-jobs relationship from two angles: (i) from a shorter-term point of view, it examines the cross-country robustness of Okun's Law (Okun 1962), or the relationship between changes in output and changes in unemployment, mostly reflecting demand-driven, cyclical factors; and (ii) from a longer-term perspective, it assesses the cross-country employment-intensity of growth by updating estimates of employment elasticities, with a greater role for supply-side factors. In all cases, results will be presented at both aggregate and sectoral analysis with different country income categories.

3.1. Revisiting Okun's Law

Recent empirical research on Okun's Law shows an overall negative short-run relationship between real GDP growth and the unemployment rate, which holds well for the United States but with significant cross-country variations (see e.g. An et al, 2016; Ball, Leigh, and Loungani 2017). Their estimated Okun coefficients increase with per capita income: The average coefficient for advanced countries is double (four times larger) than for emerging markets (low-income countries).

The remainder of this subsection reports and discusses Okun coefficients both in aggregate (also presented in terms of geographic regions and country income categories) and by sector. Our estimates use more countries and time series data than previous papers. We also delve deeper into explanations for the differences in Okun's Law coefficients, with a focus on factors that matter most for lower-income countries.

Aggregate Analysis

The empirical literature adopts two main specifications of Okun's Law. A traditional "gap version" of Okun's Law would be written as:

$$(1)\quad u_{i,t} - u^*_{i,t} = \mu_i + \beta[\ln(y_{i,t}) - \ln(y^*_{i,t})] + \epsilon_{i,t}$$

where u and y are the unemployment rate and GDP, respectively; the subscripts i and t denote countries and years, respectively; μi are country fixed effects; * indicates the long-term equilibrium values of unemployment and GDP (calculated using a Hodrick-Prescott filter); and β represents the short-term responsiveness of the unemployment gap with respect to the output gap.[5]

Table 2 displays estimates of equation (1). The estimates shown in this subsection are based on ILO data for the period 1991-2022, covering 185 countries. Appendix B also shows results for geographic regions for the sake of completeness, although this type of aggregation assumes the same elasticities for countries with very different economic structures. For instance, the East Asia and Pacific region includes Japan and Lao PDR, while Europe and Central Asia includes Germany and Turkmenistan. Our estimates use the broadest dataset so far and the longest time series possible given the availability of basic information. The same exercise is repeated using IMF data for the period 1980-2022, of which results are reported in Appendix C.

The gap version estimates of the Okun coefficient have the expected signs, confirming that slower GDP growth is associated with higher cyclical unemployment. Furthermore, and in line with the recent empirical literature (but showing estimates using a broader panel data), a positive relationship between per capita income level and the absolute value of the Okun coefficient emerges from Panel B of Table 1: The impact of output changes on unemployment is strongest in high-income countries and weakest in low-income countries (see Figure 2). The magnitude of the Okun coefficients also generally aligns with Lee et al. (2020).

[3] The ILO defines unemployment as open unemployment, which refers to the unavailability of job opportunities despite an unemployed person's willingness and capability to work.

[4] This dataset can be accessed through this link: https://www.wider.unu.edu/database/etd-economic-transformation-database

[5] The traditional Okun's Law interpretation has a causality going from output growth to changes in the unemployment rate. That is consistent with macroeconomic models as contemporaneous, independent changes in the unemployment rate (say, because of a change in preferences for work affecting labor force participation) tend to be rarer and to affect output in the longer term. In general, Okun's Law estimates do not instrument for a possible endogeneity of changes in unemployment rate and output. Indeed, robustness checks for the estimations shown here using lagged log output as instruments in equation (1) or similar specifications produce results that are qualitatively very close to the ones reported here

An alternative specification of Okun's Law is the "difference version", namely:

$$(2)\ \Delta u_t = \alpha + \beta \Delta y_t + \epsilon_t,$$

where Δ denotes a variable's first difference

The difference version estimates of the Okun coefficient are shown in Table 3. They also have the expected signs, confirming an inverse relationship between GDP growth and cyclical unemployment. Again, the largest Okun coefficient is found in high-income countries and the lowest in low-income ones, as shown in Panel B of Table 2. However, there is basically no difference between the coefficients for lower and upper middle-income countries, suggesting that the positive relationship between per capita income and the size of the Okun coefficient is more nuanced here than under the gap version (see Figure 1), although the coefficients estimated in the gap version are also close to each other. Results for geographical regions reported in Appendix B show overall similar estimates to those found under the gap version, except that now the coefficient for Latin America is somewhat larger than that for Europe and Central Asia (caveats apply again). The overall magnitude of coefficients also aligns with Lee et al. (2020), despite differences in time, country samples, and data sources.

While the aggregate analysis conducted above sheds light on the impact of demand-driven output changes on

unemployment, it misses potential "composition effects" on the labor market brought about by structural transformation. For this reason, aggregate estimates of Okun coefficients should be complemented by sectoral estimates as a first step towards integrating structural transformation into the analysis.

The "difference version" can be expanded to account for sectoral output and unemployment:

$$(3)\ \Delta u_t = \alpha + \beta \sum \beta_s \lambda_{st} \Delta y_{st} + \epsilon_t$$

where β_s are sectoral Okun coefficients and λ_{st} is the share of GDP in sector s in total GDP at time t for a given country in the sample. The sector-disaggregated analysis uses sectoral value-added data from the Economic Transformation Database, covering 12 sectors over the period 1990-2018.

The general regression results reported in Table 4 show statistically significant sectoral Okun coefficients – and with the expected negative sign – for manufacturing, construction, trade services, and business services. Construction and trade services employment, in particular, tend to follow the business cycle. On the other hand, the Okun coefficients for mining and government services have positive signs, likely for different reasons. Government spending and hiring are known to be countercyclical, with government activity picking up when the unemployment rate rises to ameliorate the social impact of economic slowdowns. Thus, a positive relationship between government value added and aggregate unemployment rate would have been expected in the first place. In turn, a positive coefficient for mining might reflect more capital- or technology-intensive production methods. Finally, the results suggest that agricultural employment behaves acyclically.

To dig deeper into how sectoral elasticities vary according to countries' income levels, Table 5 shows the estimates for equation (3) for each major income group levels used in this paper.[6] First, except for agriculture in low-income countries, most sectoral Okun coefficients are not statistically significant in LICs and LMICs, despite the fact that they show statistically significant aggregate Okun coefficients with the correct predicted signs. Second, it also shows that the Okun coefficients tend to be considerably larger in high-income countries than in upper-middle-income countries. Third, strong positive Okun coefficient on mining for high-income countries confirms that they are the source for this apparent anomaly in the general regression reported in Table 4. Here the coefficient is not slightly countercyclical but strongly so in high-income countries. Finally, Table 5 clarifies that the positive and statistically significant coefficient on government services is an upper-middle-income phenomenon: Government employment in these countries seem to act in a countercyclical fashion, moving in opposite directions with respect to output changes to help stabilization of economic activity. A similar effect seems present in high-income countries, but the coefficient is not statistically significant for this grouping.

Is Labor Force Participation Responsive to Demand-Side Fluctuations?

The Okun's Law coefficients estimated in the previous session could behave the way they do across different country groupings because of the response of labor force participation (LFP) to output shocks.[7] In his seminal (1962) paper, Okun estimated that a 2% increase in output would be associated with a 0.5% increase in labor force participation. In contrast with the unemployment rate, we would expect to find a positive coefficient for the LFP rate when regressing it against the output gap, since one would expect that people's incentives to offer their labor supply are larger when economic activity is stronger.

[6] Lee et al (2020), using different data sources for sectoral employment, find that all sectoral Okun coefficients are statistically insignificant for developing and emerging countries for what they call "post-crisis period" (2010-2017). However, for the "pre-crisis period" (1992-2007), they find statistically significant coefficients in those countries for construction, wholesale trade, retail trade, restaurants and hotels.

[7] The US The Bureau of Labor Statistics (BLS) defines the labor force participation (LFP) rate as "the percentage of the civilian noninstitutional population 16 years and older that is working or actively looking for work." (Hipple 2016).

It is important to stress that labor force participation rates differ from cyclical unemployment rates in a fundamental way: The former are more heavily influenced by structural factors and, as a result, are probably less sensitive to fluctuations in aggregate demand. Focusing on the evidence for advanced economies over the past three decades, Grigoli et al (2018) find that the main drivers of variations in LFP rates are labor market institutions and policies (including the tax benefit system and active labor market policies), structural change, and educational attainment. Merotto et al (2019) report that LFP rates vary nonlinearly with countries' per capita income: They are relatively high for low-income countries, significantly lower for middle-income countries, and reach their highest values in high-income countries. The findings of those two papers on structural characteristics of the LFP rate suggest that we may see significant differences in the LFP Okun coefficient across per capita income levels.

The LFP version of Okun's Law will only capture the sensitivity of LFP to cyclical fluctuations in the output gap. Since potential structural determinants are not included in the Okun approach, our estimates will not fully account for cross-country LFP variations beyond the country fixed effects. For the most part, we do find positive and statistically significant values for the LFP Okun coefficients in both gap and difference regressions, as reported in Tables 6 and 7. Positive and statistically significant LFP Okun coefficients are found for high-income countries (in both gap and difference regressions) and upper middle-income countries (for the difference version), but not for lower middle-income countries or low-income countries. This latter result mirrors our previous finding that the unemployment Okun coefficient varies positively with per capita income levels, potentially reflecting factors of a more structural nature, such as informality and the lack of a social safety net or family savings in less developed countries (implying that every able body needs to work no matter the state of the business cycle). As unemployment rates and labor force participation rates are not very sensitive to output shocks in less developed countries, the same can be said about employment, given the tight relationship between unemployment, employment, and labor force participation.

The expected positive sign is found in both gap and difference regressions for most regions, except East Asia and Pacific and Europe and Central Asia. It is possible that the results for these two regions reflect idiosyncratic aspects of their labor market institutions affecting the sensitivity of LFP to demand fluctuations or composition effects from aggregating very different economies in the same grouping.

Controlling for Informality

The above results lend further support to previous findings that Okun's Law is on average less relevant in developing countries, albeit with a considerable degree of heterogeneity. These results likely reflect labor market distortions that dampen the impact of changes in output on the unemployment rate, at least in the short term, such as lower labor market flexibility and mobility; prevalence of underemployment; lower labor force participation; and informality.

The presence of large informal sectors could help explain why developing countries tend to have lower Okun coefficients than their advanced counterparts. In fact, informality is likely to reduce the sensitivity of employment to demand conditions as well as labor-related regulations. Estevão and de Carvalho Filho (2012) point out and show evidence that "informality may serve as an escape valve to circumvent these [labor market] institutions and regulations" (p. 17). Islas-Camargo and Cortez (2018) find that the Okun coefficient for Mexico is low and regime-dependent, being asymmetric depending on the stage of the business cycle – with considerably higher values for recessions than for expansions. They confirm that a large informal sector reduces the impact of cyclical output on cyclical unemployment, thus lowering the Okun coefficient for Mexico, and that the informal employment rate affects the transition probabilities associated with each regime (i.e., recessionary versus expansionary).

Here we search for a generalization of these two country-specific estimates by including interactive effects in our basic Okun's Law specifications accounting for the degree of informality in each country and year in our sample. The informality indexes we use here are from the Informal Economy Database of The World Bank's Prospects Group, covering 196 economies over the period 1990-2020 and includes the 11 most commonly used measures of informality. Three variables that have large number of observations are DGE (Dynamic general equilibrium model-based estimates of informal output as a % of official GDP); MIMIC (Multiple indicators multiple causes model-based estimates of informal output as a % of official GDP) and SEMP (Self-employment as a % of total employment). We normalize these indicators setting their average equal to zero for the groupings under study. Thus, the coefficient of the output gap or changes in output represent the average effect when the informality index being used is at its average value (equal to zero) and are shown in Tables 8 and 9.

All estimates show that, indeed, informality greatly attenuates the effect of output changes on unemployment and LFP rates. This is the first broad direct estimate of this effect, as far as we know. Because informality tends to be more prevalent in countries with lower levels of income, it is an important factor

underpinning the lower sensitivity of the unemployment and LFP rates to output shocks in lower-income countries.[8][9]

Implications

Do these results mean that short-term stabilization policies in developing countries have lower potency to affect unemployment? The answer is a qualified yes. Structural distortions – including those that sustain informality – probably impair Okun's Law's workings in developing countries. This suggests that structural factors are more important than short-run fluctuations to understand employment changes in these countries as well. However, the implication is not that stabilization policies are irrelevant from a labor market point of view in these countries. Rather, this means that the transmission channels from cyclical output to cyclical unemployment are jammed in the short term due to the presence of structural distortions. Removing these distortions through structural reforms can help improve the functioning of labor and product markets, thereby increasing the power of short-term stabilization policies to affect cyclical unemployment in developing countries. This suggests that structural reforms not only can affect longer-term employment levels – which is the object of the remainder of this paper – but also help short-term stabilization policies do their job in impacting cyclical unemployment.

3.2. Long-Term Employment Elasticities

A more comprehensive assessment of the relationship between employment and output requires moving beyond the Okun framework – which is suited for the study of demand-side, cyclical fluctuations, owing to its focus on unemployment rates – and incorporating structural factors into the analysis. As a first step towards assessing the effects of structural variables and policy reforms on employment in the long run, we estimate long-term employment-GDP elasticities, to gauge the employment-intensity of growth. We use empirical strategies similar to the ones adopted by Kapsos (2005) and Crivelli et al. (2012), with the estimation of employment elasticities using two different approaches. The first approach uses time-series regressions, whereby the following static and dynamic equations are estimated for each country i:

$$(4)\ \Delta u_t = \alpha + \beta \sum \beta_s \lambda_{st} \Delta y_{st} + \epsilon_t$$

$$(5)\ \ln(e_t) = \alpha + \rho_1 \ln(e_{t-1}) + \beta_1 \ln(y_t) + \omega_t$$

Where et is employment and y_t is GDP, both at time *t*.

To overcome the limitation that long-term employment data are not available for some countries, Kapsos (2005) implemented a static panel regression approach using country-specific dummies, Di, in which elasticities are estimated using country-specific estimates for GDP slopes as in equation (6). Following that approach, employment persistence within the dynamic model is introduced in equation (7). While the static approach is more parsimonious, the inclusion of lagged employment in the dynamic approach makes it better suited for long-run analysis, as there is a long literature showing that employment adjusts in a sluggish way to output shocks, possibly even when using yearly data.[10]

Static approach

$$(6)\ \ln(e_{it}) = \alpha + \beta_1 \ln(y_{it}) + \beta_2 D_i \ln(y_{it}) + D_i + \omega_{it}$$

Dynamic approach

$$(7)\ \ln(e_{it}) = \alpha + \rho_1 \ln(e_{it-1}) + \rho_2 D_i \ln(e_{it-1}) + \beta_1 \ln(y_{it}) + \beta_2 D_i \ln(y_{it}) + D_i + \omega_{it}$$

Where e_t is employment, e_{t-1} is lag one year of employment and y_t is GDP, both at time *t*.

Long-term elasticities ε are then calculated from country-specific GDP slopes and lagged employment coefficients, specifically, $\varepsilon = \beta_1 + \beta_2$ in equation 6 and $(\beta_1 + \beta_2) / (1 - \rho_1 - \rho_2)$ in equation 7. Given the possibility that shocks to employment could affect GDP growth, we use two lags of real GDP as instruments in a 2SLS method in both specifications to bypass this possible endogeneity problem. The country-specific elasticities are shown in Figures 2 and 3 and used in the next section to examine the effect of structural reforms.

Long-term Elasticities per income categories

Besides country-specific elasticities, we estimate elasticities per country-income categories following both the static and dynamic approaches and using OLS and 2SLS (with two lags of real GDP as instruments) methods.

Static approach

$$(8)\ \ln(e_{it}) = \alpha + \beta_1 \ln(y_{it}) + c_i + t_t + \omega_{it}$$

Dynamic approach

$$(9)\ \ln(e_{it}) = \alpha + \rho_1 \ln(e_{it-1}) + \beta_1 \ln(y_{it}) + c_i + t_t + \omega_{it}$$

[8] Informality itself can be the result of a country's economic structure. For example, resource-dependent countries often have enclave-type economies with limited job creation, even in high-growth periods. Workers excluded from the resource sectors are thus forced to find employment in informal activities. For example, Kpognon (2022) finds that natural resource abundance contributes to the expansion of the informal economy in Sub-Saharan Africa.

[9] An alternative but related explanation is offered by Feng et al (2018). They build a dataset that indicates that unemployment tends to rise with the level of development, suggesting that unemployment is "an advanced economy problem". In less developed countries, the "traditional" sector (which is largely informal) absorbs low-skilled workers in low-productivity activities. As economies develop, the traditional sector shrinks and a greater number of low-skilled workers look for jobs in the "modern" sector, raising the unemployment rate.

[10] See Hamermesh (1996)

Where et is employment, e_{t-1} is lag one year of employment and y_t is GDP, both at time *t*. c_i is a country fixed effect while t_t is a year fixed effect.

The elasticities are presented in the main text for the full sample. Relative to Kapsos (2005) and Crivelli et al. (2012), the sample is updated to include 185 countries over the period 1991-2022.

The results reported in Table 10 are broadly in line with prior empirical work: (1) for the most part, country-specific elasticities (see Figures 3 and 4) are positive and fall between 0 and 1, that is, employment tends to respond less than proportionally to changes in output; (2) at the same time, there is considerable variation in the employment intensity of growth across countries and income groups; and (3) while there is a broadly direct relationship between the magnitude of employment elasticities and per capita income levels, it is not linear as in Crivelli et al (2012): The estimates suggest a U-shaped relationship,[11] with employment elasticities being higher for LICs than for LMICs,☐ but then rising for UMICs and HICs. However, if LICs and LMICs are taken as a single category, a clearer positive relationship between employment elasticities and per capita income levels emerges. This pattern is stronger under the static approach.

It should be stressed that the relationship between employment and output is mediated by average labor productivity, or output-per-worker. This stems from the arithmetical identity between changes in output and the sum of changes in employment and average labor productivity. The fact that estimated elasticities are mostly in the (0,1) interval indicates that labor productivity growth is on average positive. This means that, although employment does not respond to changes in output in the same (or greater) proportion, such job gains are accompanied by higher labor productivity. From a development perspective, employment elasticities in the 0-1 range seem ideal. If the employment elasticity exceeds 1, then output growth is accompanied by lower labor productivity. Conversely, if employment elasticities are negative, any output growth that occurs is entirely accounted for by higher labor productivity, which in this case could be associated with labor-saving technological change in some sectors without an accompanying increase in job creation elsewhere in the economy.

4. How Do Structural Reforms Affect Employment Elasticities?

Since employment elasticities reflect the state of the demand for labor, it is reasonable to assume that they are endogenous to reforms that impact the labor market, either directly or indirectly. For instance, evidence from previous empirical analysis has indicated that labor market rigidity dampens the impact of changes in output on employment (see e.g. Blanchard and Wolfers 2000).

The determinants of long-term employment elasticities can be assessed by regressing the elasticities calculated in subsection III.B against plausible explanatory variables according to the following equation:

$$\varepsilon_i = \alpha + \delta' \bar{S}_i + \theta' \bar{M}_i + \mu' \bar{D}_i + \varphi' \bar{X}_i + \epsilon_i \quad (10)$$

Where S, M, D, and X are vectors containing, respectively, structural policy variables, macroeconomic variables, demographic variables, and other controls. As the dependent variables are estimates reflecting different degrees of precision, we use Weighted Least Squares (WLS) estimation.

The policy reform variables used in this section come from Alesina et al (2020). Past work has focused on less comprehensive structural reform datasets, focusing only on labor and product market policies and government size. Alesina et al (2020) built a comprehensive database of reforms where variables are defined as a continuum (and not as discrete 0-1 variables) by a systematic reading and coding of policy actions documented in various sources, including national laws and regulations, and the information in IMF Staff Reports. The trade indicator measures trade tariffs at the product level aggregated using the import share. The product market indicator covers liberalization in telecommunications and electricity sectors, which are key network sectors. The labor market indicator provides a measure of employment protection legislation related to the termination of full-time indefinite contracts for objective reasons. They consider six dimensions of financial sector regulation in their "domestic finance" indicator: credit controls, interest rate controls, bank entry barriers, banking supervision, privatization, and security market developments. Their "external finance" indicator is based on the laws and regulations described in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) with information about policy across six categories: payment for imports, receipts from exports, payment for invisibles, capital flows by residents, and capital flows by nonresidents.

Employment elasticities respond positively to all structural reform areas in both static and dynamic versions (see Table 11). That is, employment elasticities are positively affected by liberalization in each of these categories. These results are broadly consistent with the analysis in Crivelli et al (2012), which focused only on the correlation between liberalization in labor and product markets and employment elasticities. Therefore, reforms aimed at increasing efficiency and reducing misallocation are associated with improved labor market functioning. Trade and domestic finance have the strongest impact on employment elasticities in both versions.

[11] This somewhat puzzling result might reflect data quality issues in LICs or the presence of stronger labor market rigidities in LMICs, which would need to be assessed on a country-by-country basis. All this said, even though there are differences in point estimates, these differences are not statistically different from zero.

The impact of labor market reforms on employment elasticities seems to be less statistically significant (and, in the case of the dynamic approach estimates, not significant), in contrast with Crivelli et al. Two factors may help explain this apparently counterintuitive result: First, when a more comprehensive set of reforms is taken into account, the individual effect of labor market reforms might get diluted. Second, there is less variation in the labor market reform index overall, compared to the other structural reform indices in the Alesina et al (2020) database.

We next introduce different sets of controls in large blocks to test for the robustness of the effect of reforms on employment elasticities, while not compromising too much the degrees of freedom in the estimation process. The picture does not change considerably when such controls (macroeconomic, demographic, and geographic) are applied. In fact, introducing different types of controls tend to keep these results qualitatively unchanged, including the near irrelevance of the labor market reform index, which seems more sensitive to the introduction of different sets of controls (see Tables 12, 13, and 14).[12] In particular, when geographic controls (Table 14) are introduced, the overall results do not differ much from those obtained without controls. However, the impact of labor market reforms on employment elasticities is no longer statistically significant in the static approach estimations with macroeconomic and demographic controls (while remaining not significant in the case of the dynamic approach estimations).

The above findings should be encouraging for policymakers. While our estimates in previous sections imply that, by and large, changes in output are accompanied by changes in employment in the same direction, structural reforms are now shown to boost the degree to which employment responds to output. It is important to observe that the impact of reforms is larger on long-term elasticities estimated using specification (5.2), as it can be seen in all tables (from Table 11 to Table 14). As they account for dynamic adjustments in employment, those estimates are probably a better measure of the long-term effects of output changes on employment.

It should be borne in mind, however, that reforms take time to generate positive outcomes. For example, David, Komatsuzaki, and Pienknagura (2020) estimate the impact of variations in the average reform index – and its individual components – on GDP in Latin America, represented by a sample of 16 countries. They confirm that reforms take time in generating positive output effects: On average, reforms are associated with gains of 2 percentage points in GDP after 5 years. Furthermore, Caldera, de Serres, and Yashiro (2016) note that the output and employment impact of structural reforms can be adverse in the short (and possibly medium) term if they are implemented in the downward phase of the cycle. While policy reforms are usually geared towards long-term growth, the fact that they may have little or even adverse short-term impacts can be critical for policymakers due to political economic reasons.

5. Conclusions

This paper examined the empirical evidence on the relationship between changes in output and the unemployment rate, as well as output growth and employment in both advanced and developing countries, based on a panel of 185 countries from 1990 to 2022. The main focus of our analysis is the responsiveness of the labor market to changes in the level of economic activity, in both the short and long term, as well as the potential role of policy in affecting this relationship.

The short-term analysis focused primarily on the cyclical response of unemployment rates to output changes, in the tradition of Okun's Law estimation. The paper presented evidence that Okun's Law tends to hold in both its gap and differences versions. However, the magnitude of the Okun coefficients is found to vary directly with per capita income levels, implying a lower labor market responsiveness to cyclical changes in output in LICs and LMICs, compared to UMICs and HICs. Broadly similar results are found when labor force participation (LFP) replaces the unemployment rate as the dependent variable – while bearing in mind that LFP is affected by structural factors, so that its sensitivity to the business cycle is lower than that of short-term unemployment. Extending the Okun equation to account for informality confirms that the latter indeed attenuates the effect of output changes on the unemployment and LFP rates, thereby helping explain the direct relationship between per capita income levels and the size of Okun coefficients.

Moving beyond the effects of short-term business cycle fluctuations, the long-term analysis produced estimates of employment elasticities aimed at gauging the employment-intensity of economic growth, under different specifications. Our findings show that employment elasticities are largely positive and fall between 0 and 1, in line with previous literature. We also find considerable variation in the employment intensity of growth across countries and income groups. There is evidence that employment elasticities may vary directly with per capita income, similarly with our finding on Okun coefficients.

Next, we investigated the determinants of employment elasticities themselves. Drawing on the IMF Structural Reform Database, as developed by Alesina et al. (2020), we found that employment elasticities are positively affected by liberalization reforms in domestic and external finance; product markets; international trade; and labor markets. These results are robust to the inclusion of macroeconomic, geographic, and demographic controls. Thus, reforms aimed at increasing efficiency and reducing misallocation strengthen labor market functioning and job creation. International trade and domestic

[12] Note that the macroeconomic control with the greatest statistical significance – particularly in the dynamic model – is growth volatility, which is in line with Crivelli et al (2021)'s finding that reducing macroeconomic volatility boosts employment elasticities

finance reforms have the strongest impact on employment elasticities in our analysis.

The evidence that structural reforms are ultimately job creating can help make them more palatable to voters and policymakers, thus allaying political economy concerns. A seemingly paradoxical result is that the statistical significance of labor market reforms is overall lower than the other reform categories – which might partly reflect the relatively lower variability encountered in the labor market reform indices in the database. Notably, when macroeconomic and demographic controls are introduced, the labor market reforms coefficient is no longer statistically significant.

At least two broad policy implications emerge from our analysis: (1) in the medium to long term, structural reforms – especially trade and domestic finance reforms – can enhance the job-creating potential of output growth by allowing for larger employment elasticities; and (2) in addition, structural reforms can potentially strengthen the effectiveness of macroeconomic stabilization policies to increase employment in recessions, particularly in low and lower middle-income countries where deeper structural constraints – such as informality – are associated with smaller Okun coefficients. Both implications highlight the potential job creation gains that can result from a well-designed and steadfastly implemented structural reform agenda, particularly in LICs and LMICs.

A number of areas for future research can be identified. First, a more explicit consideration of the role of productivity in mediating output and employment changes is warranted. This is particularly important in a context where deep technological changes such as automation and artificial intelligence are rapidly being developed and deployed. Second, an in-depth discussion of the impact of different job quality measures on the above results is needed. Finally, while this paper briefly assessed sectoral variations in both Okun coefficients and employment elasticities, a deeper understanding of the structural reforms-growth-job creation nexus is needed in the context of structural transformation, which is a central aspect of the process of economic development.

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List of Tables

Table 1. Reform Areas Covered in the IMF Structural Reform Database

Reform Area	Coverage
Domestic Finance	Degree of government restrictions on domestic financial markets and development of a regulatory framework, including credit and interest rate controls for banks, restrictions on entry of new banks, share of private institutions in the credit market, adoption of international standard of banking supervision regulation, and development of a private securities market.
External Finance	Degree of government restrictions on exchange payments for capital inflows and outflows, including foreign direct investment, equities, securities, bank credit, and money market funds.
Product Markets	Degree of government intervention in the markets for electricity and telecommunications, regarding presence of state-owned firms as well as access to services, independence of regulatory body, and other market structures.
Labor Markets	Degree of employment protection in five dimensions: valid-grounds dismissals by employers, procedural inconvenience in layoffs, monetary and nonmonetary firing costs, redress measures to contest layoffs, and additional requirements for collective dismissals.
Trade	Presence of tariff and nontariff restrictions on imports and exports of products as well as restrictions on receipts and payments for trade.

Source: IMF Structural Reform Database; table adapted from Aligishiev et al. (2023).

Table 2: Unemployment - Gap Version Results

	Cyclical GDP	Std	Observations
Panel A: All Sample			
All countries in sample	-0.080***	(0.004)	3625
Panel B: By Income Groups			
Low income	-0.006**	(0.003)	414
Lower middle income	-0.042***	(0.006)	964
Upper middle income	-0.059***	(0.006)	1,094
High income	-0.231***	(0.009)	1,153

This table shows estimated results of gap version with all countries in samples (Panel A) and by each income group (Panel B). The main independent variable is Cyclical GDP, which represents the difference of logarithm of actual GDP and long-term equilibrium value of GDP following Hodrick-Prescott filter. The dependent variable is Cyclical unemployment rate calculated by difference of actual unemployment rate and long-term equilibrium value of unemployment rate following Hodrick-Prescott filter. Country fixed effect: YES. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Unemployment - Difference Version Results

	Difference GDP	Std	Observations
Panel A: All Sample			
All countries in sample	-0.048***	(0.002)	5,398
Panel B: By Income Groups			
Low income	-0.005**	(0.002)	689
Lower middle income	-0.045***	(0.004)	1,543
Upper middle income	-0.041***	(0.005)	1,423
High income	-0.130***	(0.006)	1,720

This table shows estimated results of difference version with all countries in samples (Panel A) and by each income group (Panel B). The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference unemployment rate calculated by difference of actual unemployment rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Unemployment - Sectoral Estimates of Okun Coefficients, All Countries

	Difference GDP	Std	Observations
Agriculture	0.007	(0.014)	1344
Mining	0.035*	(0.019)	1344
Manufacturing	-0.095***	(0.022)	1344
Utilities	0.005	(0.061)	1344
Construction	-0.143***	(0.040)	1344
Trade Services	-0.138***	(0.029)	1344
Transport	-0.087	(0.070)	1344
Business Services	-0.096**	(0.042)	1344
Financial Services	-0.032	(0.038)	1344
Real Estate	0.014	(0.030)	1344
Government Services	0.072**	(0.030)	1344
Other Service	-0.066	(0.079)	1344

This table shows estimated results of difference version with 12 sectors following Economic Transformation Database over the period 1990-2018. The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference unemployment rate calculated by difference of actual unemployment rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Unemployment - Sectoral Estimates of Okun Coefficients, By Income Group

	Difference GDP	Std	Observations
Panel A: Low Income			
Agriculture	-0.012*	(0.006)	162
Mining	0.003	(0.022)	162
Manufacturing	0.005	(0.025)	162
Utilities	0.042	(0.044)	162
Construction	-0.004	(0.033)	162
Trade Services	0.011	(0.021)	162
Transport	-0.015	(0.053)	162
Business Services	0.007	(0.033)	162
Financial Services	0.005	(0.017)	162
Real Estate	-0.007	(0.020)	162
Government Services	-0.001	(0.017)	162
Other Service	-0.006	(0.041)	162
Panel B: Lower Middle Income			
Agriculture	-0.008	(0.018)	594
Mining	0.000	(0.026)	594
Manufacturing	-0.012	(0.029)	594
Utilities	0.015	(0.062)	594
Construction	-0.061	(0.047)	594
Trade Services	-0.046	(0.037)	594
Transport	-0.093	(0.074)	594
Business Services	-0.020	(0.055)	594
Financial Services	0.037	(0.078)	594
Real Estate	-0.002	(0.055)	594
Government Services	0.033	(0.037)	594
Other Service	-0.061	(0.098)	594
Panel C: Upper Middle Income			
Agriculture	-0.086	(0.128)	426
Mining	0.042	(0.033)	426
Manufacturing	-0.116**	(0.056)	426
Utilities	-0.159	(0.251)	426
Construction	-0.196*	(0.108)	426
Trade Services	-0.244**	(0.099)	426
Transport	-0.085	(0.260)	426
Business Services	-0.229*	(0.131)	426
Financial Services	0.031	(0.115)	426
Real Estate	0.056	(0.195)	426
Government Services	0.198**	(0.090)	426
Other Service	0.041	(0.309)	426
Panel D: High Income			
Agriculture	-0.012	(0.511)	162
Mining	0.683***	(0.229)	162
Manufacturing	-0.103	(0.064)	162
Utilities	0.236	(0.344)	162
Construction	-0.345**	(0.157)	162
Trade Services	-0.246***	(0.072)	162
Transport	0.241	(0.308)	162
Business Services	-0.573***	(0.164)	162
Financial Services	-0.002	(0.128)	162
Real Estate	-0.073	(0.056)	162
Government Services	0.105	(0.179)	162
Other Service	-0.243	(0.273)	162

This table shows estimated results of difference version by income groups (Panel A: High income; Panel B: Higher middle income; Panel C: Lower middle income; Panel D: Low income) with 12 sectors following Economic Transformation Database over the period 1990-2018. The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference unemployment rate calculated by difference of actual unemployment rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Labor Force Participation - Gap Version Results

	Cyclical GDP	Std	Observations
Panel A: All Sample			
All countries in sample	0.009***	(0.002)	3,625
Panel B: By Income Groups			
Low income	-0.003	(0.004)	414
Lower middle income	0.004	(0.005)	964
Upper middle income	-0.001	(0.004)	1,094
High income	0.058***	(0.005)	1,153

This table shows estimated results of gap version with all countries in samples (Panel A) and by each income group (Panel B). The main independent variable is Cyclical GDP, which represents the difference of logarithm of actual GDP and long-term equilibrium value of GDP following Hodrick-Prescott filter. The dependent variable is Cyclical labor force participation rate calculated by difference of actual labor force participation rate and long-term equilibrium value of labor force participation rate following Hodrick-Prescott filter. Country fixed effect: YES. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Labor Force Participation - Difference Version Results

	Difference GDP	Std	Observations
Panel A: All Sample			
All countries in sample	0.012***	(0.002)	5,398
Panel B: By Income Groups			
Low income	-0.004	(0.003)	689
Lower middle income	-0.002	(0.004)	1,543
Upper middle income	0.013***	(0.004)	1,423
High income	0.053***	(0.004)	1,720

This table shows estimated results of difference version with all countries in samples (Panel A) and by each income group (Panel B). The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference labor force participation rate calculated by difference of actual labor force participation rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Unemployment, Labor Force Participation, and Informality

Gap Version Results

	Informality proxy: DGE	Informality proxy: MIMIC	Informality proxy: SEMP
Panel A: Unemployment Rate			
Cyclical GDP	-0.238***	-0.192***	-0.347***
	(0.011)	(0.012)	(0.014)
Cyclical GDP * Informality_proxy	0.294***	0.250***	0.414***
	(0.020)	(0.023)	(0.035)
Informality_proxy	-0.003	0.073***	-0.001
	(0.004)	(0.009)	(0.005)
Observations	3,133	2,985	1,899
Panel B: Labor Participation Rate			
Cyclical GDP	0.098***	0.106***	0.092***
	(0.007)	(0.007)	(0.010)
Cyclical GDP * Informality_proxy	-0.184***	-0.203***	-0.176***
	(0.013)	(0.015)	(0.025)
Informality_proxy	0.001	-0.008	0.005
	(0.002)	(0.006)	(0.003)
Observations	3,133	2,985	1,899

This table shows estimated results of gap version of unemployment (Panel A)/ labor force participation (Panel B) and output with interaction of three proxies of informality (DGE – Dynamic general equilibrium model-based estimates of informal output (% of official GDP); MIMIC – Multiple indicators multiple causes model-based estimates of informal output (% of official GDP) and SEMP – Self-employment (% of total employment). The main independent variable is Cyclical GDP, which represents the difference of logarithm of actual GDP and long-term equilibrium value of GDP following Hodrick-Prescott filter. The dependent variable is Cyclical unemployment rate (Panel A) or labor force participation rate (Panel B) calculated by difference of actual rate and long-term equilibrium value of rate following Hodrick-Prescott filter. Country fixed effect: YES. *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Unemployment, Labor Force Participation, and Informality

Difference Version Results

	Informality proxy: DGE	Informality proxy: MIMIC	Informality proxy: SEMP
Panel A: Unemployment Rate			
Difference GDP	-0.013***	-0.010***	-0.038***
	(0.002)	(0.002)	(0.003)
Difference GDP * Informality_proxy	0.009**	0.001	0.046***
	(0.004)	(0.005)	(0.006)
Informality_proxy	-0.002	0.004*	-0.001
	(0.003)	(0.002)	(0.003)
Observations	4,412	4,166	2,695
Panel B: Labor Participation Rate			
Difference GDP	0.010***	0.020***	0.040***
	(0.002)	(0.002)	(0.003)
Difference GDP * Informality_proxy	-0.048***	-0.073***	-0.090***
	(0.004)	(0.005)	(0.005)
Informality_proxy	0.001	-0.001	-0.003
	(0.003)	(0.003)	(0.003)
Observations	4,412	4,166	2,695

This table shows estimated results of difference version of unemployment (Panel A)/ labor force participation (Panel B) and output with interaction of three proxies of informality (DGE – Dynamic general equilibrium model-based estimates of informal output (% of official GDP); MIMIC – Multiple indicators multiple causes model-based estimates of informal output (% of official GDP) and SEMP – Self-employment (% of total employment). The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference unemployment rate (Panel A) or Difference labor force participation rate (Panel B) calculated by difference of actual rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Long-term Elasticities

	Static Model		Dynamic Model	
	OLS	**2SLS**	**OLS**	**2SLS**
Low income	0.093***	0.096***	0.154	0.084
	(0.015)	(0.016)	(0.094)	(0.134)
Lower middle income	0.038*	0.028	0.158	-0.016
	(0.023)	(0.022)	(0.127)	(0.112)
Upper middle income	0.113***	0.103***	0.223***	0.125***
	(0.017)	(0.020)	(0.040)	(0.046)
High income	0.480***	0.509***	0.544***	0.340***
	(0.033)	(0.032)	(0.085)	(0.109)

This table shows estimations of long-term elasticities per income category, following equations (6.1) and (6.2). We estimate both OLS and 2SLS (instruments of two lag values of logarithm of real GDP values for endogeneity variable logarithm of real GDP). The four income categories in the table are defined by the following World Bank classifications.

Table 11: Effect of Key Structural Variables on Employment Elasticities (No Controls)

Dependent variable:	Static model					Dynamic model				
Long-term Elasticities	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Trade	0.385***					0.708**				
	(0.127)					(0.298)				
External Finance		0.223**					0.426**			
		(0.085)					(0.200)			
Domestic Finance			0.398***					0.795***		
			(0.111)					(0.280)		
Product Market				0.307**					0.760***	
				(0.122)					(0.274)	
Labor					0.274*					0.561
					(0.159)					(0.432)
Constant	0.066	0.216***	0.085	0.240***	0.185	-0.353	-0.089	-0.358*	-0.120	-0.218
	(0.107)	(0.068)	(0.086)	(0.061)	(0.118)	(0.233)	(0.140)	(0.199)	(0.122)	(0.315)
Observation	90	90	90	90	90	90	90	90	90	90

Table 12: Effect of Key Structural Variables on Employment Elasticities (Macro Controls)

Dependent variable:	Static model					Dynamic model				
Long-term Elasticities	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Trade	0.636***					0.602*				
	(0.186)					(0.334)				
External Finance		0.307**					0.451**			
		(0.125)					(0.225)			
Domestic Finance			0.836***					1.086***		
			(0.193)					(0.369)		
Product Market				0.292*					0.535*	
				(0.149)					(0.287)	
Labor					0.190					-0.321
					(0.187)					(0.381)
GDP Per Capita	-0.020**	-0.016	-0.014	-0.013	-0.016	-0.017	-0.015	-0.016	-0.009	-0.012
	(0.010)	(0.010)	(0.010)	(0.011)	(0.011)	(0.020)	(0.019)	(0.019)	(0.019)	(0.020)
Openness	-0.038	-0.001	-0.023	0.035	0.025	0.211**	0.243**	0.176*	0.257**	0.234**
	(0.066)	(0.066)	(0.062)	(0.066)	(0.067)	(0.106)	(0.102)	(0.103)	(0.102)	(0.108)
Inflation	0.000	0.000	0.000	-0.001	-0.001	-0.002	-0.001	-0.001	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Growth Volatility	-0.050*	-0.040	-0.044	-0.033	-0.023	-0.208***	-0.208***	-0.203***	-0.199***	-0.218***
	(0.030)	(0.030)	(0.028)	(0.031)	(0.032)	(0.026)	(0.026)	(0.026)	(0.027)	(0.027)
FDI	-0.001	-0.004	0.003	-0.006	-0.005	-0.029*	-0.030*	-0.023	-0.028	-0.027
	(0.008)	(0.009)	(0.008)	(0.009)	(0.009)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)
Service	-0.004	-0.002	-0.009**	0.000	0.001	0.002	0.001	-0.007	0.002	0.010**
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.005)	(0.005)	(0.006)	(0.005)	(0.004)
Constant	0.510	0.515	0.567*	0.300	0.291	-0.667	-0.585	-0.380	-0.724	-0.504
	(0.324)	(0.337)	(0.313)	(0.340)	(0.354)	(0.521)	(0.525)	(0.520)	(0.517)	(0.633)
Observation	87	87	87	87	87	87	87	87	87	87

Table 13: Effect of Key Structural Variables on Employment Elasticities (Demographic Controls)

Dependent variable:	Static model					Dynamic model				
Long-term Elasticities	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Trade	0.552***					0.867**				
	(0.126)					(0.414)				
External Finance		0.288***					0.516*			
		(0.088)					(0.279)			
Domestic Finance			0.537***					1.025**		
			(0.111)					(0.433)		
Product Market				0.233**					0.836**	
				(0.103)					(0.369)	
Labor					-0.089					0.194
					(0.123)					(0.438)
Urban Population	0.003***	0.004***	0.003***	0.005***	0.006***	0.007**	0.008**	0.005	0.006*	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Population Density	-0.031***	-0.030***	-0.024***	-0.032***	-0.035***	0.010	0.006	0.025	0.010	0.012
	(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.046)	(0.046)	(0.046)	(0.046)	(0.047)
Labor Force	0.005	0.003	-0.008	-0.009	-0.017	0.032	0.029	0.023	0.004	0.008
	(0.011)	(0.012)	(0.010)	(0.011)	(0.012)	(0.044)	(0.044)	(0.042)	(0.042)	(0.043)
Working Population	0.171***	0.168***	0.166***	0.153***	0.151***	0.208***	0.209***	0.192***	0.192***	0.178**
	(0.019)	(0.020)	(0.018)	(0.020)	(0.021)	(0.065)	(0.066)	(0.064)	(0.064)	(0.069)
Constant	-0.479*	-0.249	-0.189	0.041	0.304	-1.805**	-1.436*	-1.611*	-0.942	-0.999
	(0.262)	(0.261)	(0.221)	(0.238)	(0.259)	(0.895)	(0.841)	(0.836)	(0.786)	(0.827)
Observation	90	90	90	90	90	90	90	90	90	90

Table 14: Effect of Key Structural Variables on Employment Elasticities (Geographical Controls)

Dependent variable:	Static model					Dynamic model				
Long-term Elasticities	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Trade	0.440***					0.812***				
	(0.129)					(0.297)				
External Finance		0.286***					0.500**			
		(0.087)					(0.198)			
Domestic Finance			0.493***					1.000***		
			(0.117)					(0.282)		
Product Market				0.353***					1.014***	
				(0.123)					(0.282)	
Labor					0.314*					0.410
					(0.160)					(0.435)
Distance Equator	-0.085*	-0.093*	-0.122**	-0.076	-0.039	-0.201**	-0.198**	-0.239***	-0.253***	-0.149*
	(0.049)	(0.050)	(0.049)	(0.049)	(0.049)	(0.080)	(0.080)	(0.079)	(0.080)	(0.083)
Oil Dummy	0.066	0.081*	0.047	0.069	0.081*	0.090	0.116	0.067	0.035	0.127
	(0.043)	(0.043)	(0.042)	(0.044)	(0.045)	(0.124)	(0.124)	(0.121)	(0.123)	(0.128)
Constant	0.114	0.267***	0.164*	0.298***	0.181	-0.220	0.065	-0.237	0.064	0.033
	(0.113)	(0.084)	(0.091)	(0.082)	(0.142)	(0.233)	(0.155)	(0.195)	(0.131)	(0.351)
Observation	90	90	90	90	90	90	90	90	90	90

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Figure 1: Okun Coefficients by Income Group

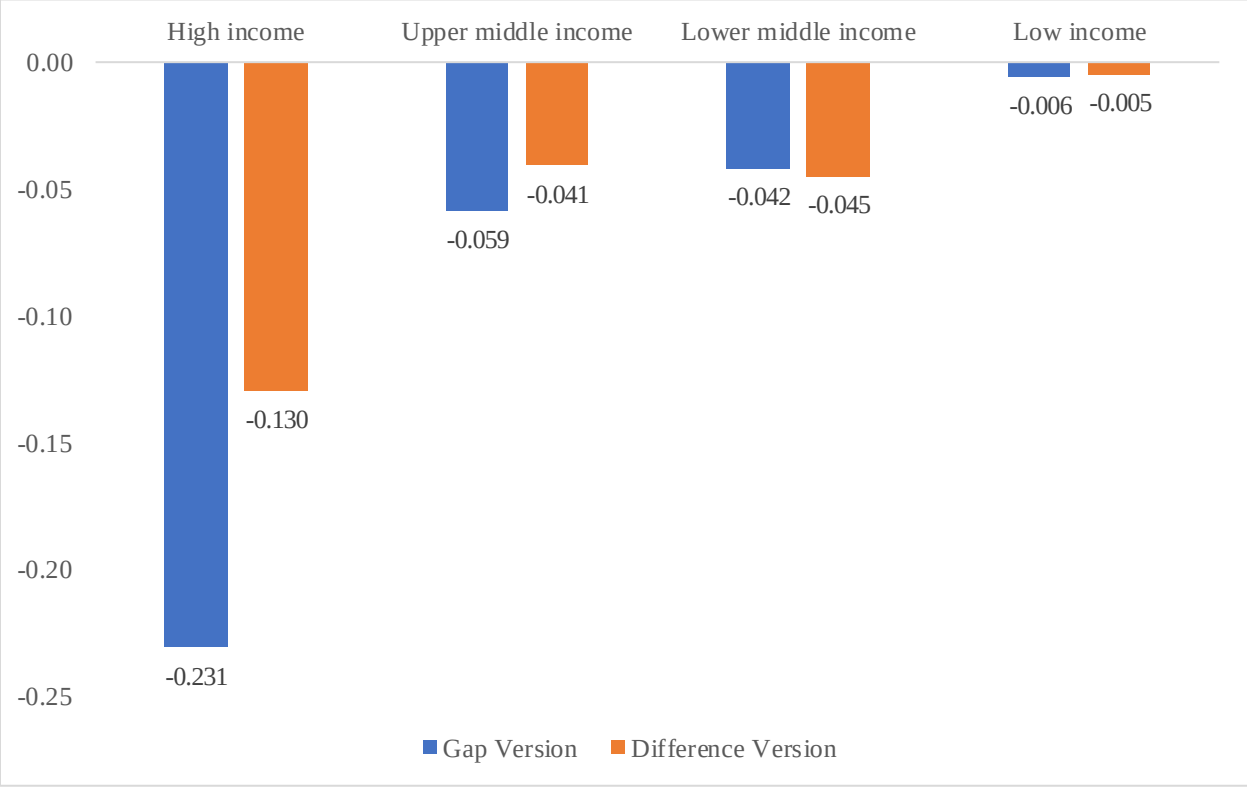


Figure 2: Country Long-Term Elasticities (Static Approach)

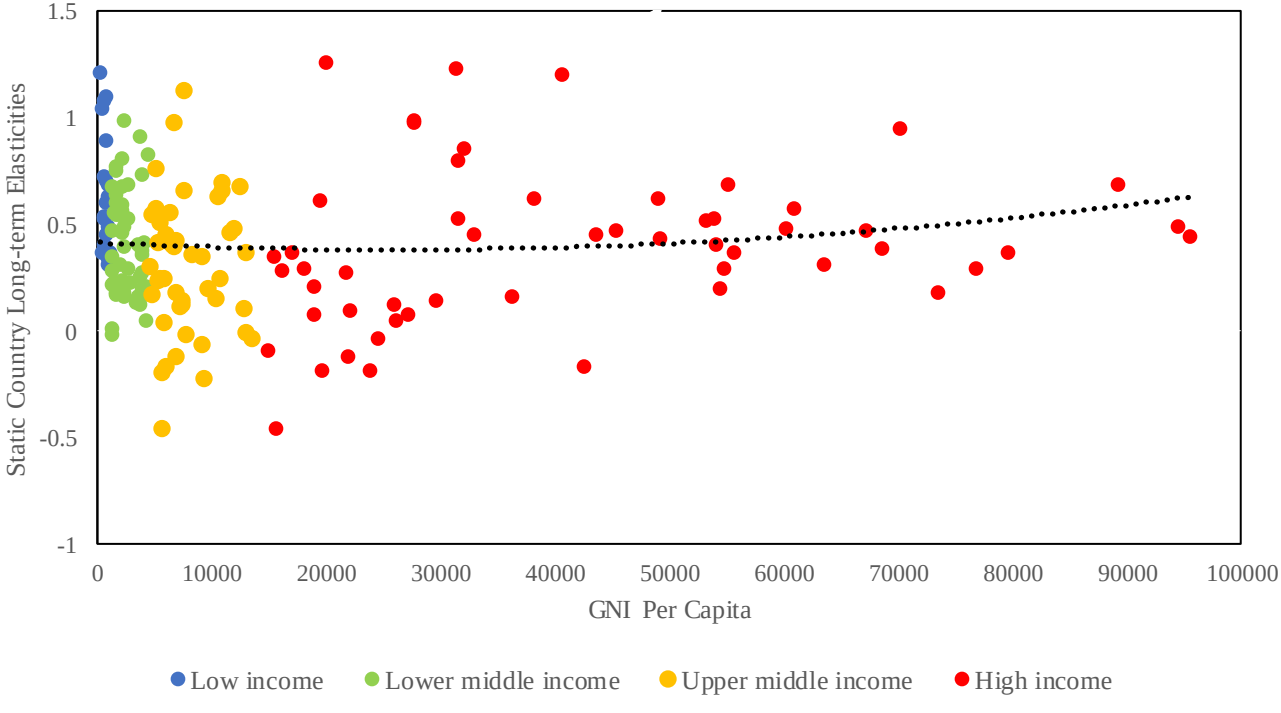
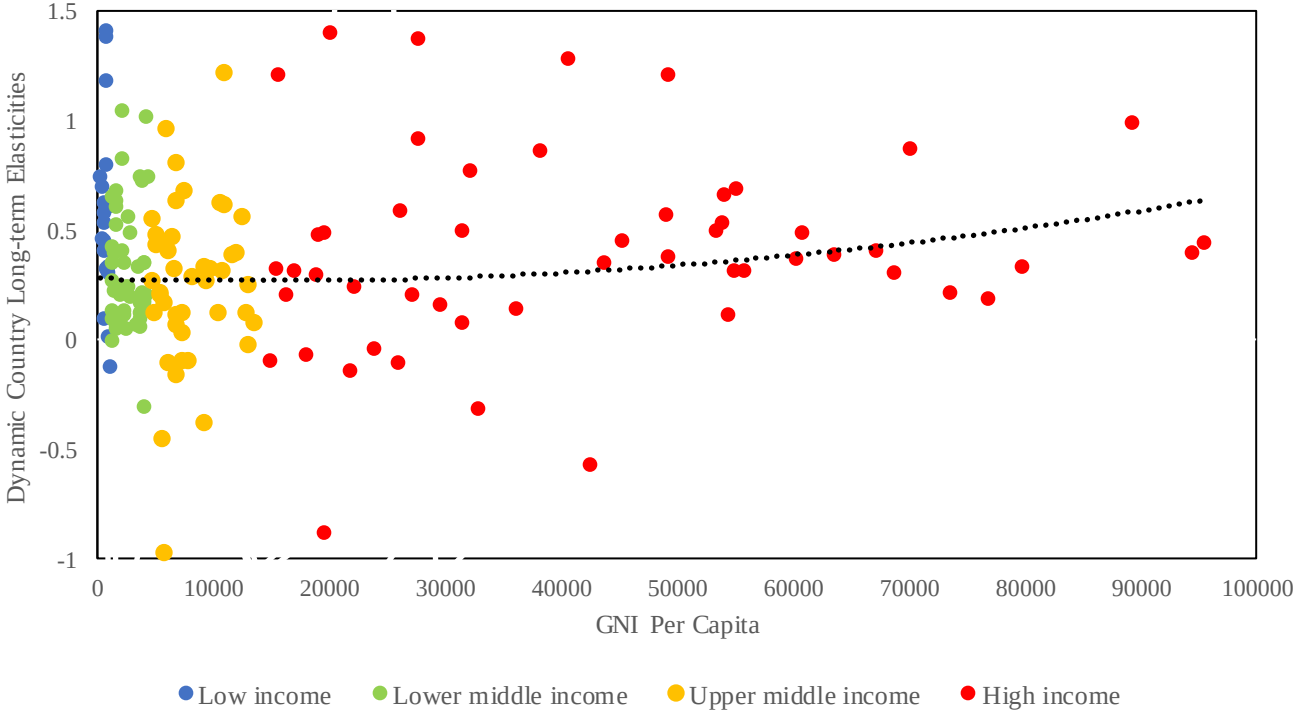


Figure 3: Country Long-term Elasticities (Dynamic Approach)



Appendix A

This Appendix shows countries by region and income classifications in the sample. We report 185 countries following unemployment data collected from ILOSTAT that we have used in the main analysis.

Table A1: Countries in The Sample

No	Country	ISO3	Region	Income	Lending
1	Afghanistan	AFG	South Asia	Low income	IDA
2	Angola	AGO	Sub-Saharan Africa	Lower middle income	IBRD
3	Albania	ALB	Europe & Central Asia	Upper middle income	IBRD
4	United Arab Emirates	ARE	Middle East & North Africa	High income	
5	Argentina	ARG	Latin America & Caribbean	Upper middle income	IBRD
6	Armenia	ARM	Europe & Central Asia	Upper middle income	IBRD
7	Australia	AUS	East Asia & Pacific	High income	
8	Austria	AUT	Europe & Central Asia	High income	
9	Azerbaijan	AZE	Europe & Central Asia	Upper middle income	IBRD
10	Burundi	BDI	Sub-Saharan Africa	Low income	IDA
11	Belgium	BEL	Europe & Central Asia	High income	
12	Benin	BEN	Sub-Saharan Africa	Lower middle income	IDA
13	Burkina Faso	BFA	Sub-Saharan Africa	Low income	IDA
14	Bangladesh	BGD	South Asia	Lower middle income	IDA
15	Bulgaria	BGR	Europe & Central Asia	Upper middle income	IBRD
16	Bahrain	BHR	Middle East & North Africa	High income	
17	Bahamas	BHS	Latin America & Caribbean	High income	
18	Bosnia and Herzegovina	BIH	Europe & Central Asia	Upper middle income	IBRD
19	Belarus	BLR	Europe & Central Asia	Upper middle income	IBRD
20	Belize	BLZ	Latin America & Caribbean	Upper middle income	IBRD
21	Bolivia	BOL	Latin America & Caribbean	Lower middle income	IBRD
22	Brazil	BRA	Latin America & Caribbean	Upper middle income	IBRD
23	Barbados	BRB	Latin America & Caribbean	High income	
24	Brunei Darussalam	BRN	East Asia & Pacific	High income	
25	Bhutan	BTN	South Asia	Lower middle income	IDA
26	Botswana	BWA	Sub-Saharan Africa	Upper middle income	IBRD
27	Central African Republic	CAF	Sub-Saharan Africa	Low income	IDA
28	Canada	CAN	North America	High income	
29	Channel Islands	CHI	Europe & Central Asia	High income	
30	Switzerland	CHE	Europe & Central Asia	High income	
31	Chile	CHL	Latin America & Caribbean	High income	IBRD
32	China	CHN	East Asia & Pacific	Upper middle income	IBRD
33	Côte "Ivoire	CIV	Sub-Saharan Africa	Lower middle income	IDA
34	Cameroon	CMR	Sub-Saharan Africa	Lower middle income	Blend
35	Congo, Democratic Republic of the	COD	Sub-Saharan Africa	Low income	IDA
36	Congo	COG	Sub-Saharan Africa	Lower middle income	Blend
37	Colombia	COL	Latin America & Caribbean	Upper middle income	IBRD
38	Comoros	COM	Sub-Saharan Africa	Lower middle income	IDA
39	Cabo Verde	CPV	Sub-Saharan Africa	Lower middle income	Blend
40	Costa Rica	CRI	Latin America & Caribbean	Upper middle income	IBRD
41	Cuba	CUB	Latin America & Caribbean	Upper middle income	
42	Cyprus	CYP	Europe & Central Asia	High income	
43	Czechia	CZE	Europe & Central Asia	High income	
44	Germany	DEU	Europe & Central Asia	High income	
45	Djibouti	DJI	Middle East & North Africa	Lower middle income	IDA
46	Denmark	DNK	Europe & Central Asia	High income	
47	Dominican Republic	DOM	Latin America & Caribbean	Upper middle income	IBRD
48	Algeria	DZA	Middle East & North Africa	Lower middle income	IBRD
49	Ecuador	ECU	Latin America & Caribbean	Upper middle income	IBRD
50	Egypt	EGY	Middle East & North Africa	Lower middle income	IBRD
51	Eritrea	ERI	Sub-Saharan Africa	Low income	IDA
52	Spain	ESP	Europe & Central Asia	High income	
53	Estonia	EST	Europe & Central Asia	High income	
54	Ethiopia	ETH	Sub-Saharan Africa	Low income	IDA
55	Finland	FIN	Europe & Central Asia	High income	
56	Fiji	FJI	East Asia & Pacific	Upper middle income	Blend
57	France	FRA	Europe & Central Asia	High income	
58	Gabon	GAB	Sub-Saharan Africa	Upper middle income	IBRD
59	United Kingdom	GBR	Europe & Central Asia	High income	
60	Georgia	GEO	Europe & Central Asia	Upper middle income	IBRD
61	Ghana	GHA	Sub-Saharan Africa	Lower middle income	IDA
62	Guinea	GIN	Sub-Saharan Africa	Lower middle income	IDA
63	Gambia	GMB	Sub-Saharan Africa	Low income	IDA
64	Guinea-Bissau	GNB	Sub-Saharan Africa	Low income	IDA
65	Equatorial Guinea	GNQ	Sub-Saharan Africa	Upper middle income	IBRD
66	Greece	GRC	Europe & Central Asia	High income	
67	Guatemala	GTM	Latin America & Caribbean	Upper middle income	IBRD
68	Guam	GUM	East Asia & Pacific	High income	

69	Guyana	GUY	Latin America & Caribbean	High income	IDA
70	Hong Kong, China	HKG	East Asia & Pacific	High income	
71	Honduras	HND	Latin America & Caribbean	Lower middle income	IDA
72	Croatia	HRV	Europe & Central Asia	High income	IBRD
73	Haiti	HTI	Latin America & Caribbean	Lower middle income	IDA
74	Hungary	HUN	Europe & Central Asia	High income	
75	Indonesia	IDN	East Asia & Pacific	Upper middle income	IBRD
76	India	IND	South Asia	Lower middle income	IBRD
77	Ireland	IRL	Europe & Central Asia	High income	
78	Iran, Islamic Republic of	IRN	Middle East & North Africa	Lower middle income	IBRD
79	Iraq	IRQ	Middle East & North Africa	Upper middle income	IBRD
80	Iceland	ISL	Europe & Central Asia	High income	
81	Israel	ISR	Middle East & North Africa	High income	
82	Italy	ITA	Europe & Central Asia	High income	
83	Jamaica	JAM	Latin America & Caribbean	Upper middle income	IBRD
84	Jordan	JOR	Middle East & North Africa	Lower middle income	IBRD
85	Japan	JPN	East Asia & Pacific	High income	
86	Kazakhstan	KAZ	Europe & Central Asia	Upper middle income	IBRD
87	Kenya	KEN	Sub-Saharan Africa	Lower middle income	Blend
88	Kyrgyzstan	KGZ	Europe & Central Asia	Lower middle income	IDA
89	Cambodia	KHM	East Asia & Pacific	Lower middle income	IDA
90	Korea, Republic of	KOR	East Asia & Pacific	High income	
91	Kuwait	KWT	Middle East & North Africa	High income	
92	Lao Peopl''s Democratic Republic	LAO	East Asia & Pacific	Lower middle income	IDA
93	Lebanon	LBN	Middle East & North Africa	Lower middle income	IBRD
94	Liberia	LBR	Sub-Saharan Africa	Low income	IDA
95	Libya	LBY	Middle East & North Africa	Upper middle income	IBRD
96	Saint Lucia	LCA	Latin America & Caribbean	Upper middle income	Blend
97	Sri Lanka	LKA	South Asia	Lower middle income	IDA
98	Lesotho	LSO	Sub-Saharan Africa	Lower middle income	IDA
99	Lithuania	LTU	Europe & Central Asia	High income	
100	Luxembourg	LUX	Europe & Central Asia	High income	
101	Latvia	LVA	Europe & Central Asia	High income	
102	Morocco	MAR	Middle East & North Africa	Lower middle income	IBRD
103	Moldova, Republic of	MDA	Europe & Central Asia	Upper middle income	IBRD
104	Madagascar	MDG	Sub-Saharan Africa	Low income	IDA
105	Maldives	MDV	South Asia	Upper middle income	IDA
106	Mexico	MEX	Latin America & Caribbean	Upper middle income	IBRD
107	North Macedonia	MKD	Europe & Central Asia	Upper middle income	IBRD
108	Mali	MLI	Sub-Saharan Africa	Low income	IDA
109	Malta	MLT	Middle East & North Africa	High income	
110	Myanmar	MMR	East Asia & Pacific	Lower middle income	IDA
111	Montenegro	MNE	Europe & Central Asia	Upper middle income	IBRD
112	Mongolia	MNG	East Asia & Pacific	Lower middle income	IBRD
113	Mozambique	MOZ	Sub-Saharan Africa	Low income	IDA
114	Mauritania	MRT	Sub-Saharan Africa	Lower middle income	IDA
115	Mauritius	MUS	Sub-Saharan Africa	Upper middle income	IBRD
116	Malawi	MWI	Sub-Saharan Africa	Low income	IDA
117	Malaysia	MYS	East Asia & Pacific	Upper middle income	IBRD
118	Namibia	NAM	Sub-Saharan Africa	Upper middle income	IBRD
119	New Caledonia	NCL	East Asia & Pacific	High income	
120	Niger	NER	Sub-Saharan Africa	Low income	IDA
121	Nigeria	NGA	Sub-Saharan Africa	Lower middle income	Blend
122	Nicaragua	NIC	Latin America & Caribbean	Lower middle income	IDA
123	Netherlands	NLD	Europe & Central Asia	High income	
124	Norway	NOR	Europe & Central Asia	High income	
125	Nepal	NPL	South Asia	Lower middle income	IDA
126	New Zealand	NZL	East Asia & Pacific	High income	
127	Oman	OMN	Middle East & North Africa	High income	
128	Pakistan	PAK	South Asia	Lower middle income	Blend
129	Panama	PAN	Latin America & Caribbean	High income	IBRD
130	Peru	PER	Latin America & Caribbean	Upper middle income	IBRD
131	Philippines	PHL	East Asia & Pacific	Lower middle income	IBRD
132	Papua New Guinea	PNG	East Asia & Pacific	Lower middle income	Blend
133	Poland	POL	Europe & Central Asia	High income	IBRD
134	Puerto Rico	PRI	Latin America & Caribbean	High income	
135	Korea, Democratic Peopl''s Republic of	PRK	East Asia & Pacific	Low income	
136	Portugal	PRT	Europe & Central Asia	High income	
137	Paraguay	PRY	Latin America & Caribbean	Upper middle income	IBRD
138	French Polynesia	PYF	East Asia & Pacific	High income	
139	Qatar	QAT	Middle East & North Africa	High income	
140	Romania	ROU	Europe & Central Asia	High income	IBRD
141	Russian Federation	RUS	Europe & Central Asia	Upper middle income	IBRD
142	Rwanda	RWA	Sub-Saharan Africa	Low income	IDA

143	Saudi Arabia	SAU	Middle East & North Africa	High income	
144	Sudan	SDN	Sub-Saharan Africa	Low income	IDA
145	Senegal	SEN	Sub-Saharan Africa	Lower middle income	IDA
146	Singapore	SGP	East Asia & Pacific	High income	
147	Solomon Islands	SLB	East Asia & Pacific	Lower middle income	IDA
148	Sierra Leone	SLE	Sub-Saharan Africa	Low income	IDA
149	El Salvador	SLV	Latin America & Caribbean	Upper middle income	IBRD
150	Somalia	SOM	Sub-Saharan Africa	Low income	IDA
151	Serbia	SRB	Europe & Central Asia	Upper middle income	IBRD
152	South Sudan	SSD	Sub-Saharan Africa	Low income	IDA
153	Suriname	SUR	Latin America & Caribbean	Upper middle income	IBRD
154	Slovakia	SVK	Europe & Central Asia	High income	
155	Slovenia	SVN	Europe & Central Asia	High income	
156	Sweden	SWE	Europe & Central Asia	High income	
157	Eswatini	SWZ	Sub-Saharan Africa	Lower middle income	IBRD
158	Syrian Arab Republic	SYR	Middle East & North Africa	Low income	IDA
159	Chad	TCD	Sub-Saharan Africa	Low income	IDA
160	Togo	TGO	Sub-Saharan Africa	Low income	IDA
161	Thailand	THA	East Asia & Pacific	Upper middle income	IBRD
162	Tajikistan	TJK	Europe & Central Asia	Lower middle income	IDA
163	Turkmenistan	TKM	Europe & Central Asia	Upper middle income	IBRD
164	Timor-Leste	TLS	East Asia & Pacific	Lower middle income	Blend
165	Tonga	TON	East Asia & Pacific	Upper middle income	IDA
166	Trinidad and Tobago	TTO	Latin America & Caribbean	High income	IBRD
167	Tunisia	TUN	Middle East & North Africa	Lower middle income	IBRD
168	Türkiye	TUR	Europe & Central Asia	Upper middle income	IBRD
169	Taiwan, China	TWN	East Asia & Pacific	High income	
170	Tanzania, United Republic of	TZA	Sub-Saharan Africa	Lower middle income	IDA
171	Uganda	UGA	Sub-Saharan Africa	Low income	IDA
172	Ukraine	UKR	Europe & Central Asia	Lower middle income	IBRD
173	Uruguay	URY	Latin America & Caribbean	High income	IBRD
174	United States	USA	North America	High income	
175	Uzbekistan	UZB	Europe & Central Asia	Lower middle income	Blend
176	Saint Vincent and the Grenadines	VCT	Latin America & Caribbean	Upper middle income	Blend
177	Venezuela, Bolivarian Republic of	VEN	Latin America & Caribbean		IBRD
178	United States Virgin Islands	VIR	Latin America & Caribbean	High income	
179	Viet Nam	VNM	East Asia & Pacific	Lower middle income	IBRD
180	Vanuatu	VUT	East Asia & Pacific	Lower middle income	IDA
181	Samoa	WSM	East Asia & Pacific	Lower middle income	IDA
182	Yemen	YEM	Middle East & North Africa	Low income	IDA
183	South Africa	ZAF	Sub-Saharan Africa	Upper middle income	IBRD
184	Zambia	ZMB	Sub-Saharan Africa	Lower middle income	IDA
185	Zimbabwe	ZWE	Sub-Saharan Africa	Lower middle income	Blend

Appendix B

This Appendix describes estimates of Okun coefficients with both unemployment rate and labor force participation under both the gap and difference versions, using ILO data as in the main text, in terms of different geographic regions.

Gap version – Unemployment Rate

The results for the gap version estimate with unemployment rate are shown in Tables B1 with the largest regional Okun coefficient been found for North America and the lowest for Sub-Saharan Africa. The relatively low coefficient for East Asia and the Pacific seems somewhat surprising, but as mentioned above, that region mixes countries in very different stages of development.

Table B1: Unemployment - Gap Version Results (ILO Data) by Regions

	Cyclical GDP	Std	Observations
East Asia & Pacific	-0.054***	(0.008)	432
Europe & Central Asia	-0.145***	(0.009)	1,029
Latin America & Caribbean	-0.129***	(0.011)	607
Middle East & North Africa	-0.019***	(0.007)	412
North America	-0.438***	(0.045)	32
South Asia	-0.040***	(0.010)	174
Sub-Saharan Africa	-0.013***	(0.004)	939

This table shows estimated results of gap version with countries in samples by each region. The main independent variable is Cyclical GDP, which represents the difference of logarithm of actual GDP and long-term equilibrium value of GDP following Hodrick-Prescott filter. The dependent variable is Cyclical unemployment rate calculated by difference of actual unemployment rate and long-term equilibrium value of unemployment rate following Hodrick-Prescott filter. Country fixed effect: YES. *** p<0.01, ** p<0.05, * p<0.1.

Difference Version – Unemployment Rate

The results for the difference version estimate with unemployment rate are shown in Table B2. A similar pattern can be seen across regions, as per the results reported in Table B1.

Table B2: Unemployment - Difference Version Results (ILO Data) by Regions

	Difference GDP	Std	Observations
East Asia & Pacific	-0.035***	(0.004)	792
Europe & Central Asia	-0.099***	(0.006)	1,447
Latin America & Caribbean	-0.115***	(0.008)	939
Middle East & North Africa	-0.016***	(0.005)	569
North America	-0.506***	(0.045)	62
South Asia	-0.033***	(0.008)	230
Sub-Saharan Africa	-0.008***	(0.002)	1,359

This table shows estimated results of difference version with countries in samples by each region. The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference unemployment rate calculated by difference of actual unemployment rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Gap version – Labor Participation Rate

The results for the gap version estimate with labor participation rate are shown in Tables B3. The expected positive sign is found in both gap and difference regressions for most regions, except East Asia and Pacific and Europe and Central Asia.

Table B3: Labor Participation - Gap Version Results (ILO Data) by Regions

	Cyclical GDP	Std	Observations
East Asia & Pacific	-0.005	(0.008)	432
Europe & Central Asia	-0.012***	(0.004)	1,029
Latin America & Caribbean	0.0652***	(0.009)	607
Middle East & North Africa	0.024***	(0.005)	412
North America	0.139***	(0.041)	32
South Asia	0.049***	(0.013)	174
Sub-Saharan Africa	0.002	(0.003)	939

This table shows estimated results of gap version by each region. The main independent variable is Cyclical GDP, which represents the difference of logarithm of actual GDP and long-term equilibrium value of GDP following Hodrick-Prescott filter. The dependent variable is Cyclical labor force participation rate calculated by difference of actual labor force participation rate and long-term equilibrium value of labor force participation rate following Hodrick-Prescott filter. Country fixed effect: YES. *** p<0.01, ** p<0.05, * p<0.1.

Difference Version – Labor Participation Rate

The results for the difference version estimate with labor participation rate are shown in Table B4. A similar pattern can be seen across regions, as per the results reported in Table B3.

Table B4: Labor Participation - Difference Version Results (ILO Data) by Regions

	Difference GDP	Std	Observations
East Asia & Pacific	-0.012**	(0.005)	792
Europe & Central Asia	-0.004	(0.004)	1,447
Latin America & Caribbean	0.092***	(0.007)	939
Middle East & North Africa	0.015***	(0.004)	569
North America	0.141***	(0.023)	62
South Asia	0.055***	(0.010)	230
Sub-Saharan Africa	0.002	(0.002)	1,359

This table shows estimated results of difference version by each region. The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference labor force participation rate calculated by difference of actual labor force participation rates between two years. *** p<0.01, ** p<0.05, * p<0.1.

Appendix C

This Appendix describes estimates of Okun coefficients under both the gap and difference versions, using IMF data covering 114 countries over the period 1980-2022. The results are also presented in terms of different income categories (as in the main text), and by geographic regions.

Gap version

The results for the gap version estimates are shown in Table C1. The results are broadly similar to those found using ILO data. The estimated Okun coefficients have negative signs as expected, and their magnitudes tend to increase with the level of per capita income. Two results depart from the gap version estimates in the main text: (i) the Okun coefficient for Sub-Saharan Africa is larger than for East Asia and Pacific as well as for South Asia; and (ii) the coefficient for low-income countries is not statistically significant and has the "wrong" sign.

Table C1: Unemployment - Gap Version Results (IMF Data)

	Cyclical GDP	Std	Observations
Panel A: All Sample			
All countries in sample	-0.192***	(0.005)	3,780
Panel B: By Regions			
East Asia & Pacific	-0.074***	(0.008)	521
Europe & Central Asia	-0.238***	(0.008)	1,613
Latin America & Caribbean	-0.233***	(0.011)	897
Middle East & North Africa	-0.081***	(0.018)	349
North America	-0.515***	(0.032)	85
South Asia	-0.078***	(0.020)	92
Sub-Saharan Africa	-0.095***	(0.023)	223
Panel C: By Income Groups			
High income	-0.241***	(0.007)	1,934
Upper middle income	-0.185***	(0.010)	1,120
Lower middle income	-0.114***	(0.012)	654
Low income	0.012	(0.032)	56

IMF Data: This table shows estimated results of gap version with all countries in samples (Panel A), by each region (Panel B) and by each income group (Panel C). The main independent variable is Cyclical GDP, which represents the difference of logarithm of actual GDP and long-term equilibrium value of GDP following Hodrick-Prescott filter. The dependent variable is Cyclical unemployment rate calculated by difference of actual unemployment rate and long-term equilibrium value of unemployment rate following Hodrick-Prescott filter. Country fixed effect: YES. *** p<0.01, ** p<0.05, * p<0.1.

Difference Version

The results for the difference version estimates are shown in Table C2. They are broadly similar to the above results under the gap version, but now the direct relationship between the size of the Okun coefficient and per capita income levels breaks down: The Okun coefficient is larger for upper-middle-income countries than for high-income countries, and it is statistically insignificant for low-income countries. Moreover, the Okun coefficient for high-income countries is only slightly larger than that for lower-middle-income countries.

Table C2: Unemployment - Difference Version Results (IMF Data)

	Difference GDP	Std	Observations
Panel A: All Sample			
All countries in sample	-0.162***	(0.005)	3,667
Panel B: By Regions			
East Asia & Pacific	-0.056***	(0.007)	505
Europe & Central Asia	-0.198***	(0.008)	1,564
Latin America & Caribbean	-0.237***	(0.012)	873
Middle East & North Africa	-0.116***	(0.020)	337
North America	-0.491***	(0.034)	83
South Asia	-0.074***	(0.021)	89
Sub-Saharan Africa	-0.092***	(0.023)	216
Panel C: By Income Groups			
High income	-0.158***	(0.007)	1,880
Upper middle income	-0.182***	(0.010)	1,086
Lower middle income	-0.145***	(0.013)	632
Low income	-0.079	(0.049)	54

IMF Data: This table shows estimated results of difference version with all countries in samples (Panel A), by each region (Panel B) and by each income group (Panel C). The main independent variable is Difference GDP, which represents the difference of logarithm of actual GDPs between two years. The dependent variable is Difference unemployment rate calculated by difference of actual unemployment rates between two years. *** p<0.01, ** p<0.05, * p<0.1.