Chapter 2. Labor Market Challenges during the Pandemic, the Role of Informality, and the Road Ahead

Online Annexes

Online Annex 2.1. Event Study to Identify Recessions or Slowdowns Using High-Frequency Data

Three criteria were used to define slowdowns or recessions before 2020 (Figure 2.3). These criteria have to be met jointly to define an episode: (1) The quarter-over-quarter real GDP growth rate is lower than one standard deviation from the mean growth rate, (2) the quarter-over-quarter real GDP growth rate is in the bottom 10 percent of the real GDP growth rate distribution obtained from the country's time series, and (3) two or more consecutive quarters display a negative output gap (using the output gap obtained with the Hodrick-Prescott filter). For oil exporters, the results in which slowdown or recession episodes were found were the same if non-oil real GDP was used instead of total real GDP.

Online Annex 2.2. Event Studies of Labor Markets over the Business Cycle

The methodology described here underlines the analysis presented in Figure 2.4. Event studies using annual data across countries and sectors are carried out to assess how labor markets in the Middle East, North Africa, Afghanistan, and Pakistan (MENAP) and the Caucasus and Central Asia (CCA) subregions have behaved in response to business cycle fluctuations over the past three decades. In a first step, the cyclical event is defined as a year in which GDP growth falls below or exceeds a country's average level of growth by a particular threshold (1.5 standard deviations in advanced economies, and 1 standard deviation in emerging market and developing economies, including MENAP and CCA countries). Downswings (upswings) are defined as any country-year observation with GDP growth less (higher) than the specified cutoff in all years of the sample. Average changes in unemployment rate, labor force participation rate, and employment (total, formal, and informal) are then computed for upswings and downswings across MENAP and CCA. The algorithm of Harding and Pagan (2002) is also used as a robustness check. The results are broadly in line with Figure 2.4.

Online Annex 2.3. Okun's Law

Okun's law postulates that an inverse relationship exists between cyclical fluctuations in output and the unemployment rate, which can be represented by the following equation:

$$u_t - u_t^* = \beta^g(y_t - y_t^*) + \varepsilon_t \qquad \text{(Online Annex Equation 2.3.1)}$$

Where u_t and y_t are the unemployment rate and the logarithm of output, u_t^* and y_t^* are the trend components of the unemployment rate and output, respectively, computed using a standard Hodrick-Prescott filter with a smoothing parameter of 100.[1] β^g is the Okun's coefficient. Okun's coefficient is expected to be

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[1] As a robustness check, an alternative smoothing parameter value of 6.25 is used in the Hodrick-Prescott filter (see Ravn and Uhlig 2002). The results are qualitatively similar to those of the baseline specifications. To address the end-point problem associated with the Hodrick-Prescott filter, the GDP and unemployment rate series were extended to 2023 using the IMF's October 2019 *World Economic Outlook* projections.

negative, so a positive (negative) cyclical output is associated with falling (rising) unemployment. The term ε_t captures factors that shift the cyclical unemployment-output relationship, such as unusual movements in productivity and labor force participation. Equation (1) is referred to as the gap specification. Another version of Okun's law is expressed as a relationship between changes in the unemployment rate and the growth rate of output:
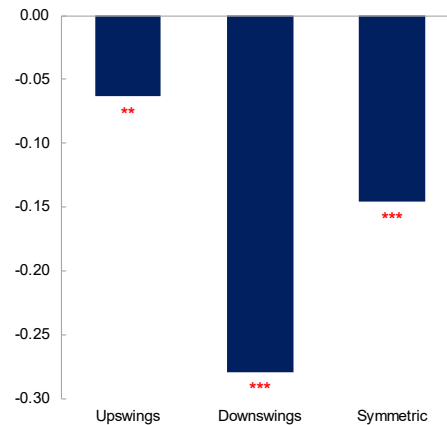
$$\Delta u_t = \alpha + \beta^c \Delta y_t + \omega_t \qquad \text{(Online Annex Equation 2.3.2)}$$

where Δ is the change from the previous period. The ratio α/β^c measures the rate of output growth consistent with a stable unemployment rate, given productivity growth and labor force—that is, how fast output would need to grow to maintain a given level of unemployment (growth threshold). Equation (2.3.2) is referred to as the change specification. The two versions are equivalent if potential growth and the natural rate of unemployment are constant.[2]

Online Annex 2.4. Asymmetric Okun's Coefficients

A panel model is estimated for the Middle East and Central Asia region's emerging markets and reveals that historically, on average, unemployment has been more responsive to downswings than upswings, with estimated coefficients that are highly statistically significant (Online Annex Figure A.2.4). This evidence supports the hysteresis hypothesis in that not all job losses during downturns are recouped in upturns.

Online Annex 2.5. Determinants of Okun's Coefficient

Once Okun's coefficients are estimated, they are regressed on a variety of structural variables motivated by the literature. Online Annex Figure A.2.5 shows the results of the regressions. Estimates are derived from bivariate regressions, given the high degree of collinearity among the structural concepts involved. They are all statistically significant. All right-hand side variables are standardized by subtracting their mean and dividing by their standard deviation. Business bureaucracy and bribes/favoritism are defined such that higher values imply better outcomes. Since Okun's coefficient is negative, a negative number means that increases in the right-hand side variables contribute to strengthening Okun's coefficient or making it more negative. A

Figure A.2.4 Okun's Coefficients for ME&CA EM

Source: IMF Staff calculations

Figure A.2.5. Okun's Coefficients Determinants
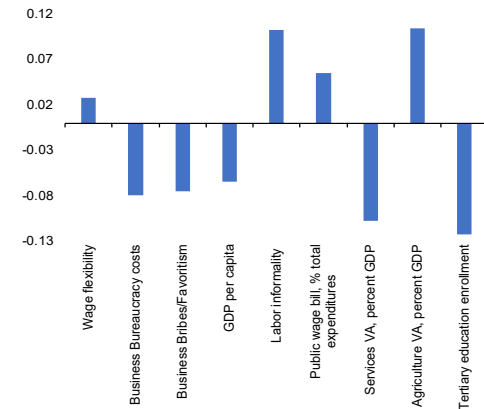
Source: IMF Staff Estimates, IHS Markit, Global Competitiveness Report (Executive Opinion Survey), IMF world economic outlook, ILOSTAT, ILO modelled esimates, World Bank national accounts, World Bank Development Indicators, UNESCO Institute for Statistics.
* Estimates are from bivariate regressions. All right hand side variables are standardized, by subtracting their mean and dividing by their standard deviation. Structural variables are defined such that higher values imply better outcomes. Since Okun's coefficient is negative, a negative number means that increases in a given variable contributes to strengthening Okun's coefficient or making it more negative (e.g. higher development level, higher services share, and higher education). A positive number means that increases in a given variable contributes to weakening Okun's coefficient or making it less negative (e.g., higher informality, larger public sector, larger agriculture share).

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[2] See Ball, Leigh, and Loungani (2017) for discussions on Okun's law in advanced economies, and Ball and others (2019) for advanced and developing economies.

positive number means that increases in the variables contribute to weakening Okun's coefficient or making it less negative. The results show that a stronger Okun's coefficient (more negative) is correlated with the following:

- Lower: informality, public sector employment and wage premiums, wage flexibility, business bureaucracy costs, bribes and favoritism, and agriculture share of output; and

- Higher: development stage, educational levels, and services share of output.

References

Ball, Laurence, Daniel Leigh, and Prakash Loungani. 2017. "Okun's Law: Fit at Fifty?" Journal of Money, Credit, and Banking 49 (7): 1413–41.

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