

CHAPTER 2

Understanding the Informal Economy: Concepts and Trends

By its nature, informal economic activity—referred to in this study simply as “informality”—is difficult to observe systematically and to measure. This chapter introduces a comprehensive database of informality measures. This database shows that informality remains pervasive in emerging market and developing economies (EMDEs), notwithstanding a declining trend over the past three decades. Like the formal economy, the informal economy undergoes business cycles, which resemble those in the formal economy. Informal-economy output fluctuations tend to be more pronounced in EMDEs than in advanced economies, whereas employment fluctuations are more limited and do not differ significantly between the two groups.

Introduction

The livelihoods of the poor in emerging market and developing economies (EMDEs) often depend on informal economic activity. In these economies, informal-economy output on average accounts for about one-third of GDP and informal employment constitutes about 70 percent of total employment (of which self-employment accounts for more than one-half; figure 2.1). In some economies in Sub-Saharan Africa (SSA), informal employment accounts for more than 90 percent of total employment and informal output for as much as 62 percent of official GDP (ILO 2018a).

Depending on country circumstances and worker characteristics, workers may choose informal employment for a wide range of reasons. Thus informal workers range from agricultural day laborers to self-employed firm owners with a few employees.

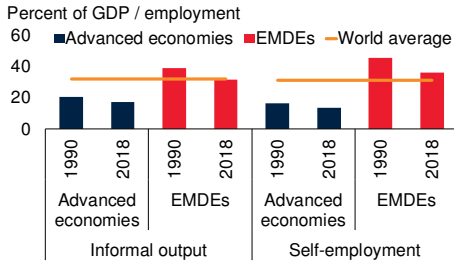
A large informal sector has tended to be associated with unfavorable macroeconomic and development outcomes (figure 2.1; chapter 4). On average, economies with larger informal sectors have tended to have less access to finance for the private sector, lower productivity, slower physical and human capital accumulation, less educated workforces, and smaller fiscal resources (Docquier, Müller, and Naval 2017; La Porta and Shleifer 2014; World Bank 2019a). Some studies show that informality is associated with higher income inequality and poverty (Chong and Gradstein 2007; Loayza, Servén, and Sugawara 2010; Perry et al. 2007; Rosser, Rosser, and Ahmed 2000). Lower physical investment in the informal sector could reflect an unwillingness of informal firms to adopt technologies or larger scales of production that might make them visible to tax and other authorities (Dabla-Norris, Gradstein, and Inchauste 2008; Gandelman and

Note: This chapter was prepared by Ceyhan Elgin, M. Ayhan Kose, Franziska Ohnsorge, and Shu Yu. Research assistance was provided by Zhuo Chen, Lorez Qehaja, and Xinyue Wang.

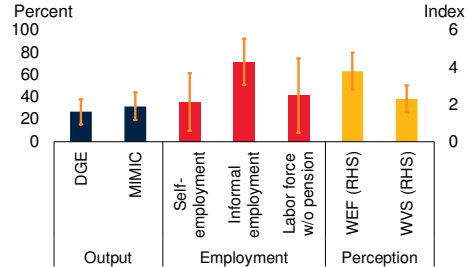
FIGURE 2.1 Informality: Magnitude, variety, and development challenges

The informal sector accounts for about a third of GDP and more than 70 percent of employment (of which self-employment accounts for more than one-half) in emerging market and developing economies (EMDEs). A large informal sector is often associated with lack of development and weak governance as well as greater poverty and income inequality. In some cases, informal workers voluntarily choose informal activity.

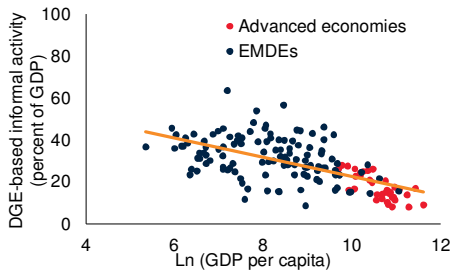
A. Shares of informal output and self-employment



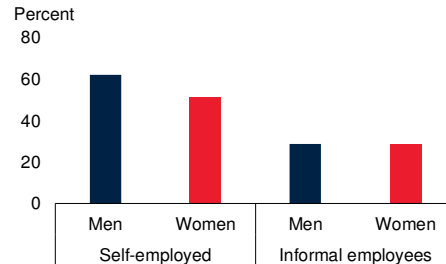
B. Informality: Output, employment, and perception



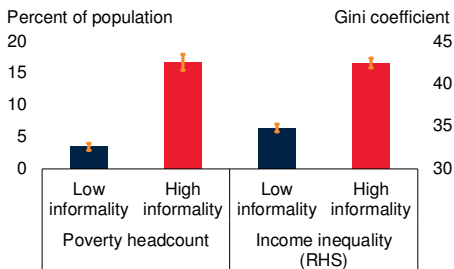
C. Informal output and development



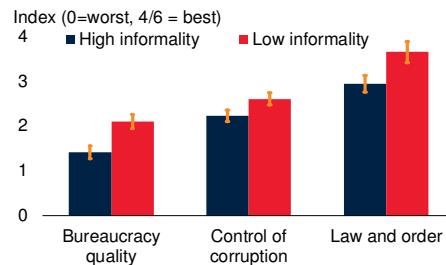
D. Brazil: Share of informal workers preferring informal over formal employment



E. Informality, poverty, and income inequality



F. Governance in EMDEs, by informality



Sources: *International Country Risk Guide* (ICRG); International Labour Organization; Maloney (2004); World Bank (World Development Indicators, WDI; World Governance Indicators, WGI); World Economic Forum; World Values Survey (WVS).
 Note: "High informality" ("Low informality") indicates economies with above- (below-) median informal output (using DGE-based estimates). DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; EMDEs = emerging market and developing economies; MIMIC = multiple indicators multiple causes model-based estimates of informal output in percent of GDP; WEF = World Economic Forum estimates; WVS = World Values Survey estimates.
 A. Unweighted averages. Informal employment uses self-employment shares (in percent of total employment). Missing values are interpolated or filled using the latest available observations. World averages between 1990-2018 are in orange.
 B. Unweighted averages for latest available year. Whiskers are +/-1 standard deviation. Measures are grouped into output informality, employment informality, and perception-based informality. Data on informal employment are for EMDEs. See table 2.1.A for details.
 C. Latest available year (2018). Orange line shows fitted values. "Ln (GDP per capita)" is the logarithm of GDP per capita (in constant 2010 U.S. dollars).
 D. The share of informal workers preferring informal over formal employment (Maloney 2004).
 E. Data are for 1990-2018. Group means (bars) and 90 percent confidence intervals (whiskers) are shown for poverty headcount ratio (percent of population living on \$1.90 a day at 2011 PPP) and Gini coefficients.
 F. Data for 1990-2018 and EMDEs. Bars show unweighted averages of ICRG data; whiskers show 90 percent confidence intervals.

Rasteletti 2017). The informal sector, on average, is characterized by lower productivity than the formal sector because it tends to employ less-skilled workers; use less capital; have restricted access to funding, services and markets; and lack economies of scale (Amaral and Quintin 2006; Galiani and Weinschelbaum 2012; Loayza 2018). These long-term economic correlates of informality are explored in chapter 4.

Over the business cycle, informal employment can provide a safety net when the formal sector sheds jobs (Loayza and Rigolini 2011). But workers in the informal economy are largely excluded from the social security system and less protected against negative shocks than workers in the formal sector, which could amplify business cycles (box 2.1; chapter 3).

Against this backdrop, this chapter reviews conceptual and measurement issues regarding the informal economy and documents its main features across countries and over time. Specifically, it addresses the following questions:

- How is the informal economy defined?
- How has informality evolved?
- What are the features of the informal economy?

The chapter makes the following contributions to the literature. First, it compiles a comprehensive database of informality measures developed in the literature, with a focus on measures that have broad cross-country and long historical coverage. The resulting dataset combines 12 cross-country databases and data provided by almost 90 national statistical agencies.¹ Second, the chapter presents two applications of this database. In a first step, it distills stylized facts about the informal economy, such as its size and evolution over time, using a wide range of informality measures, and tests the consistency of these stylized facts across these measures. In a second step, the chapter documents the cyclical features of the informal economy, such as the duration and amplitude of its recessions and recoveries.

The chapter presents several new findings. First, the chapter summarizes the advantages and drawbacks of existing informality measures. Most of the macroeconomic literature on informality has relied solely on either survey-based or model-based estimates. Survey-based measures can cover many dimensions of the informal economy, but they suffer from poor country and year coverage (especially for EMDEs), reporting bias, and lack of consistency in survey methods.² Indirect, model-based measures of informal output

¹ Official GDP statistics often make an adjustment for informal activity. However, the magnitude of such adjustments is rarely specified. In a survey in 2008, national statistical agencies for about 40 mostly advanced economies or economies in transition reported adjusting their official GDP statistics by amounts ranging from 0.8 to 31.6 percent for activity in the non-observed economy (NOE), which is a broader concept than the informal economy (United Nations 2008). For all reporting economies, the adjustments were well below those suggested by the measures of informality presented in this chapter.

² Survey-based informality measures are based on income data from surveys or audits that differ from incomes declared for tax purposes (Binelli and Attanasio 2010; McCaig and Pavcnik 2015), or earnings from firm surveys (Almeida and Carneiro 2012; Putnins and Sauka 2015).

BOX 2.1 How does informality aggravate the impact of COVID-19?

COVID-19 has taken an especially heavy humanitarian and economic toll on emerging market and developing economies (EMDEs) with large informal sectors. Large informal sectors make lockdowns and social distancing particularly challenging, thus reducing governments' ability to stem the spread of the virus. Informal workers tend to be employed in activities and locations where social distancing is difficult to implement. With few savings and lack of access to formal social benefits, many struggle to comply with government lockdown orders. Economies with large informal sectors are also associated with weak health care systems that can result in a larger number of fatal outcomes of infections. These vulnerabilities amplify the economic shock to livelihoods from COVID-19 and threaten to raise global extreme poverty. It is therefore critical to implement effective delivery channels for support to informal workers and firms. Unconditional support programs may be appropriate. Given their limited resources, low-income countries may require increased international funding for the effective implementation of such programs.

Informal activity is widespread in emerging market and developing economies (EMDEs; figure B2.1.1; World Bank 2019a). Large informal sectors are often associated with underdevelopment, with activity typically characterized by labor-intensive production, less educated and more poorly paid workers, limited access to financial and medical service, and poor or non-existent coverage by social security. These features are likely to intensify the spread of COVID-19 among informal workers and worsen its adverse health and economic impacts (Nguimkeu and Okou 2020). Starting from a relatively lower level, confirmed COVID-19 cases have been rising rapidly in EMDEs with extensive informality since the end of March 2020, despite a lower level of testing.

Against this background, this box addresses the following questions.

- Which features of the informal economy can amplify or dampen the impact of the pandemic?
- How may widespread informality alter the impact of the pandemic?
- How do policies to mitigate the impact of the pandemic need to be tailored to the presence of large informal sectors?

Features of the informal economy

The informal economy has several features that tends to facilitate the spread of the pandemic. Other features worsen the economic impact of adverse shocks more generally.

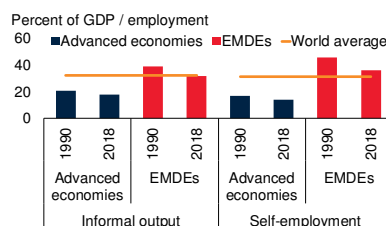
Note: This box was prepared by Shu Yu.

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

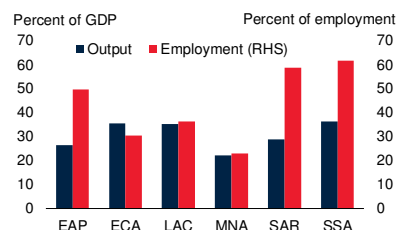
FIGURE B2.1.1 Informality in EMDEs

Informality is particularly prevalent in emerging market and developing economies (EMDEs). In Sub-Saharan Africa, Europe and Central Asia, and Latin America and the Caribbean, informal output averaged about 35 percent of GDP in 2010-18. Self-employment in Sub-Saharan Africa, South Asia, and East Asia and the Pacific, ranged from about 50 percent of employment to more than 60 percent. Confirmed COVID-19 cases have grown rapidly since the end of March 2020 in EMDEs, with some concern about lack of testing in EMDEs with above-median informality.

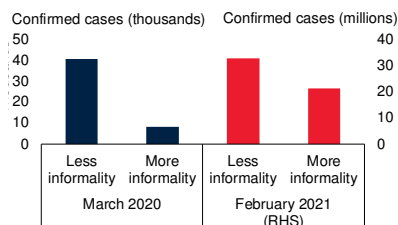
A. Informality in EMDEs



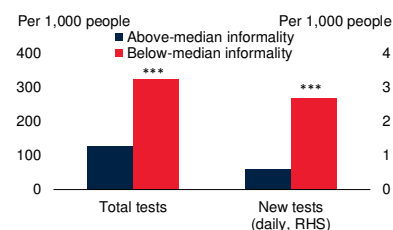
B. Informality across EMDE regions



C. COVID-19 cases and the extent of informality



D. Informality and COVID-19 tests



Sources: Haver Analytics; International Monetary Fund (Government Finance Statistics); *Our World in Data*; World Bank (World Development Indicators).

Note: EAP = East Asia Pacific, ECA = Europe and Central Asia, MNA = Middle East and North Africa, SAR = South Asia, SSA = Sub-Saharan Africa. In C-D, informality is measured by DGE-based informal output in percent of official GDP in 2018. DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; EMDEs = emerging market and developing economies.

A. Simple averages. Informal employment uses self-employment shares with missing value interpolated in EMDEs for earlier years and filled using the latest available observation in recent years. World averages between 1990 and 2018 are orange.

B. Simple averages of informal output (DGE-based estimates) and employment estimate (share of self-employment) in each region during 2010-18.

C. Bars show the total number of confirmed COVID-19 cases (in thousands or millions) for EMDEs (excluding China) with less informality (that is, above group median) and EMDEs (excluding China) with less informality (that is, below group median) on March 24, 2020, and on February 12, 2021 (RHS).

D. Bars show the simple average number of COVID-19 tests per 1,000 people for EMDEs (excluding China) with less informality (that is, above group median) and EMDEs (excluding China) with less informality (that is, below group median) on February 12, 2021. The left two bars show the total number of COVID-19 tests done so far, and the right two bars show the daily number of COVID-19 tests performed. *** indicates that group averages are significantly different at 10 percent level.

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

Widespread informality in EMDEs. The informal sector, on average, accounts for about a third of official GDP and about 70 percent of total employment in EMDEs (of which self-employment accounts for more than one-half; figure B2.1.1; World Bank 2019a). Informal enterprises account for 8 out of every 10 enterprises in the world (ILO 2020a). The size of the informal economy varies widely across regions and countries. The share of informal output is highest in Sub-Saharan Africa (SSA), Europe and Central Asia (ECA), and Latin America and the Caribbean (LAC), averaging near 40 percent of GDP in those regions between 2010 and 2018. The share of self-employment, another measure of informality, is highest in SSA, South Asia (SAR), and East Asia and the Pacific (EAP), ranging from 50 percent to 62 percent of total employment. In 2018, the informal economy accounted for more than 50 percent of GDP in Bolivia and Zimbabwe.^a The sector accounted for about 90 percent of total employment in Mali, Mozambique, and India. In economies like Kenya, 8 out of 10 workers were self-employed.^b

Characteristics of informal workers. Workers in the informal sector tend to be lower-skilled and lower-paid, with less access to finance and social safety nets than workers in the formal sector (Loayza 2018; Perry et al. 2007; World Bank 2019a). They often live and work in crowded conditions and conduct all transactions in cash—factors that facilitate the spread of disease (Chodorow-Reich et al. 2020; Surico and Galeotti 2020). Informal workers on average have incomes 19 percent lower than formal workers and have limited savings (figure B2.1.2; World Bank 2019a). In the one-third of EMDEs with the most pervasive informality, more than one third of the population would be driven into poverty if they had to cover direct out-of-pocket payments for an unexpected health care emergency. On average, unemployment benefits are only available to a small fraction of the population (less than 4 percent) in EMDEs with above-median output informality between 1990 and 2018.

Characteristics of informal firms. Informal firms tend to be characterized by labor-intensive production and are more prevalent in the services sector. These have been hard hit by measures to curtail social interactions (Benjamin and Mbaye 2012; Surico and Galeotti 2020). In EMDE service sectors, about 72

a. Here, DGE-based estimates are used to capture output in the informal sector. MIMIC-based estimates of informal output indicate that other economies also have informal output exceeding 50 percent of GDP.

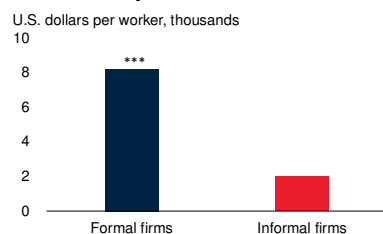
b. Common employment measures of informality are ratios of *self-employment* and *informal employment* to total employment. The *self-employed* work on their own account, or with one or a few partners, or in a cooperative. *Informal employment* comprises all workers of the informal sector and informal workers outside the informal sector (World Bank 2019a).

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

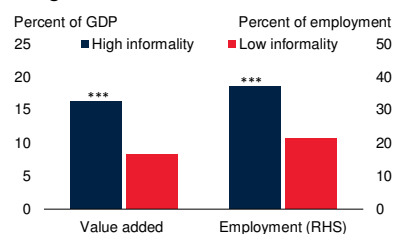
FIGURE B2.1.2 Features of the informal sector

Many informal workers are employed in the agricultural or services sectors, poorly paid, with limited access to social benefits, and at risk of impoverishing health spending.

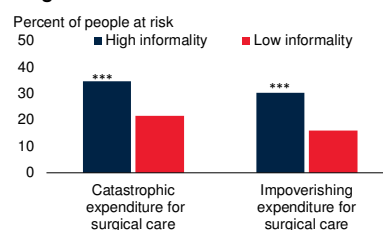
A. Productivity in the informal sector



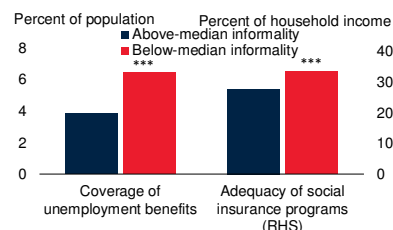
B. Agricultural sector



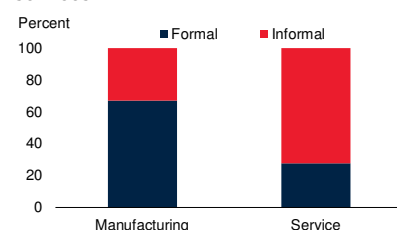
C. Risk of impoverishing expenditure for surgical care



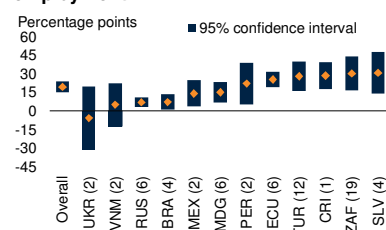
D. Social insurance



E. Informality in manufacturing and services



F. Wage premium for formal over informal employment



Sources: Amin, Ohnsorge, and Okou (2019); Program in Global Surgery and Social Change (PGSSC) at Harvard Medical School; World Bank (Enterprise Surveys, World Development Indicators); World Bank.

Note: *** indicates the group differences are not zero at 10 percent significance level. DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP.

A. Firm productivity is measured as sales per worker.

B.C. Bars are simple group mean for EMDEs. "High informality" are the highest one-third of EMDEs by DGE-based informal output and "low informality" are the lowest one-third over 2010-18.

D. Bars are simple group mean for EMDEs. "High informality" are the highest half of EMDEs by DGE-based informal output and "low informality" are the lowest half over 1990-2018. Adequacy of social insurance programs are measured in percent of total welfare of beneficiary households.

E. Data coverage as in Amin, Ohnsorge, and Okou (2019).

F. The wage premium is obtained from 18 empirical studies. See World Bank (2019a) for details. BRA = Brazil, CRI = Costa Rica, ECU = Ecuador, MEX = Mexico, MDG = Madagascar, PER = Peru, SLV = El Salvador, RUS = Russian Federation, TUR = Turkey, UKR = Ukraine, VNM = Vietnam, ZAF = South Africa. The number of studies or estimates for each country is shown in parenthesis; country means are calculated using a random-effects meta-analysis model.

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

percent of firms are informal, compared with 33 percent in EMDE manufacturing sectors (see Amin, Ohnsorge, and Okou 2019 for sample coverage). Agricultural employment in EMDEs is roughly 90 percent informal. Epidemic-control measures have already disrupted access to markets and inputs and may also eventually threaten the food security of smallholder farmers (Cullen 2020; FAO 2020; ILO 2018b).

Broader development challenges. Economies with larger informal sectors are associated with weaker economic, fiscal, institutional, and developmental outcomes. GDP per capita in economies with above-median informality is about one-quarter that of economies below-median informality (Chapter 1). Health systems in EMDEs with more informality are relatively underdeveloped, and government capacity to mount an effective policy response to pandemics is limited.

- *Health and sanitation.* Although the populations of EMDEs with the most pervasive informality tend to be younger, they also tend to be less healthy, live in less sanitary conditions, and only have access to weak public health and medical systems (figure B2.1.3).^c In the one third of EMDEs with the most pervasive informality, sanitation facilities are accessible to only 36 percent of the population, and clean drinking water is available to only 54 percent of the population, compared to about 75 percent in the one third where informality is least pervasive. Hand-washing facilities are available for only 40 percent of the population in the former group. Access to medical care is also extremely limited in EMDEs with above-median informality, with only three-fourths the number of doctors and nurses per 1,000 people that the EMDEs with below-median informality have. In economies like Malawi and Kenya, thousands of people share access to only one or two ICU beds (Murthy, Leligdowicz, and Adhikari 2015).
- *Government policy effectiveness.* Economies with pervasive informality are less likely to have the institutional and fiscal capacity to mount an effective policy response to the pandemic. Tax avoidance is prevalent in the informal sector, resulting in limited fiscal resources (Besley and Persson 2014). For example, government revenues and expenditures in the EMDEs with the most pervasive informality are 5-10 percentage points of GDP, on average, below

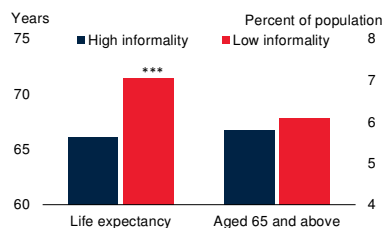
c. In the one-third of EMDEs with the most pervasive informality, life expectancy at birth is 66.2 years, compared with 71.4 years in the one-third with the least pervasive informality. In the one-third of EMDEs with the most pervasive informality, the number of deaths per 1,000 people caused by communicable diseases and maternal, prenatal, and nutrition conditions are about twice as high as in the one-third with the least pervasive informality.

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

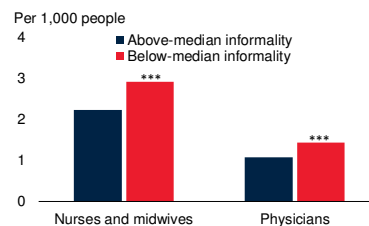
FIGURE B2.1.3 Development challenges

Pervasive informality is associated with short life expectancy, lack of access to medical resources, limited sanitation facilities, and other health-system shortfalls. Economies with widespread informality have significantly lower government revenues and expenditures, substantially less effective governments, and greater corruption.

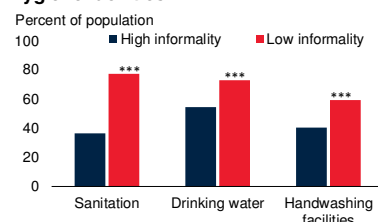
A. Life expectancy



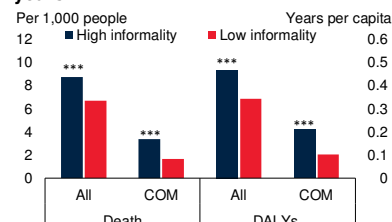
B. Access to medical resources



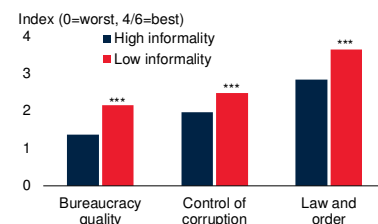
C. Access to water, sanitation, and hygiene facilities



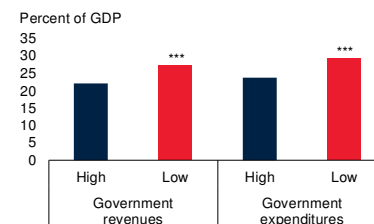
D. Mortality and disability adjusted life years



E. Government effectiveness



F. Fiscal indicators



Sources: International Monetary Fund (Government Finance Statistics); *International Country Risk Guide* (ICRG); Program in Global Surgery and Social Change (PGSSC) at Harvard Medical School; WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene; World Health Organization; World Bank (World Development Indicators); World Bank (2019a).

Note: *** indicates statistically significant group differences at 10 percent significance. "High informality" are the highest one-third of EMDEs by DGE-based informal output and "low informality" are the lowest one-third over 2010-18.

A.C. Simple group means for EMDEs with "high informality" and those with "low informality" over 2010-18.

B. Simple group means for EMDEs over 2010-18. "Above-median informality" are EMDEs with above-median informality by the share of DGE-based informal output. Two outliers, Belize and Belarus, are dropped.

D. Simple group means for EMDEs with "high informality" and those with "low informality" over 2010-18 (2016 for DALYs). DALYs refers to disability adjusted life years -- the number of healthy life years per person lost to diseases. "COM" indicates years lost to communicable diseases and maternal, prenatal, and nutrition conditions.

E. Simple group means for EMDEs with "high informality" and those with "low informality" over 2010-2018. A higher value means better governance. "Bureaucracy quality" ranges from 0 to 4. The rest measures range from 0 to 6.

F. Simple average fiscal indicators for EMDEs with "high" informality and those with "low" informality over 2000-18. Sample includes 69 nonenergy-exporting EMDEs with populations above 3.5 million people.

**BOX 2.1 How does informality aggravate the impact of COVID-19?
(continued)**

those with the least pervasive informality (World Bank 2019a; figure B2.1.3). In addition, governments are less effective, and corruption is more rampant, in economies with more pervasive informality (Loayza, Oviedo, and Servén 2006). Moreover, less than a quarter of informal firms use bank accounts and about one-half of small informal firms identified lack of access to finance as a major obstacle to their operations, which makes it difficult to use the financial system to channel support to the informal economy (Farazi 2014; Schneider, Buehn, and Montenegro 2010). The rising availability of digital payments—whether on mobile phones, cards, or online—provides an alternative financial channel for governments to reach the informal sector. However, it is doubtful whether sufficient cash-in and cash-out points are in place to allow people using digital payments to deposit and withdraw cash safely and reliably (World Bank 2017).^d The lack of registration also makes it a challenge to provide effective support to informal workers and firms via official fiscal measures (such as tax deductions).

Impact of the COVID-19 outbreak

As a result of these features of the informal sector, the impact of COVID-19 is likely to be worse in EMDEs with widespread informality. It can intensify the pandemic's adverse health and economic consequences while weakening the ameliorative effects of policies.

Health consequences. Health consequences of the pandemic are more adverse in EMDEs with more pervasive informality. In these countries, lack of adequate public health systems worsens the transmission of infectious disease. Access to clean water and handwashing facilities is often difficult or unfeasible. Living quarters and working environments are often overcrowded and insanitary. In SSA, where informality is pervasive, 70 percent of city dwellers live in crowded slums (World Bank 2019b). Lack of medical facilities and a generally less healthy population can worsen the severity of infections and limit the ability to treat those infected (Dahab et al. 2020). The absence of social safety nets means that informal market participants are unable to afford to stay at home, or to adhere to social distancing requirements, which undermines policy efforts to slow down the spread of COVID-19 (Loayza and Pennings 2020).

Economic consequences. Lockdowns hit informal market participants in the service sector, where informality is particularly common, especially hard (ILO 2020a; Panizza 2020). In SAR, about one of four households currently living in

d. These cash-in and cash-out points are often in the form of a bank agent, a mobile money agent, or an automated teller machine (ATM; Klapper and Singer 2017).

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

poverty is engaged in informal activities in the service or construction sectors, which have been significantly affected by closures and disruptions (World Bank 2020a). Women are overrepresented in sectors that are subject to high risks during the pandemic: 42 per cent of women workers are in such sectors, compared to 32 per cent of men (ILO 2020a). Also, about 80 percent of informal firms rely on internal funds and financing from family and moneylenders for working capital, making them especially vulnerable to the disruption to cashflows caused by mitigation and other control measures (Farazi 2014). Informal workers too have limited financial resources to buffer temporary income losses during the containment period, making them more likely to be pushed into poverty.^e The health crisis also causes immediate revenue losses for firms, forcing them to temporarily or permanently close their businesses. This could trigger an unprecedented surge in unemployment and a potential expansion of the informal economy (ILO 2020b).

Past pandemics, such as the Ebola epidemic in West Africa in 2014-15, provide a stark illustration of the vulnerability of smallholder farmers (World Bank 2015).^f The agricultural sector has the highest share of informal employment—estimated at more than 90 percent (ILO 2018b). Farmers producing for the urban market may experience massive income losses as they are unable to sell their produce during the lockdowns (ILO 2020d).^g Small informal firms play a critical role in the food supply chain and are likely to run into operational distress and insolvency due to logistical breakdowns during containment periods (FAO 2020; ILO 2020b; World Bank 2020b). Since they are among the poorest and most vulnerable groups of society, informal workers, especially farmers, may have reduced access to food in the event of sharp income losses.

In countries with widespread informality, governments typically have neither the resources nor the administrative structures in place to effectively deliver well-targeted relief to those most in need (Muralidharan, Niehaus, and Sukhtankar 2016). In a number of EMDEs with widespread informality, social benefit

e. Without alternative income sources, lost labor income during the containment period could result in an increase in relative poverty for informal workers and their families of more than 21 percentage points in upper-middle-income countries and 56 points in lower and low-income countries (ILO 2020a). This could increase income inequality among workers (ILO 2020c).

f. In 2014-2016, the Ebola outbreak was followed by an economic crisis in West Africa, triggered by massive health and social spending to cope with the outbreak and compounded by the almost simultaneous collapse in commodity prices (Cangul, Sdravovich, and Sian 2017; World Bank 2014).

g. Farmers may be increasingly impacted by the health crisis if the virus spreads further into rural areas (ILO 2020a). In the case of India and Senegal, the inability of informal (or self-employed) workers to earn a living and gain access to health care has led to migration from urban to rural areas, which may cause the virus to spread further.

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

systems, such as ration cards, are plagued by corruption that weakens their capacity to deliver support to the most vulnerable (Peisakhin and Pinto 2010; World Bank 2004).

Policy implications

Informality adds to the challenges of dealing with the Covid pandemic. Fiscal resources need to be used to strengthen public health systems to prevent, contain, and treat the virus, and to support the livelihoods of participants in the informal economy during the outbreak. As conventional measures—such as wage subsidies and tax relief—would hardly reach informal firms and workers, innovative emergency measures should be considered to deliver income support to informal workers, and credit support to informal firms (World Bank 2020b).^h When managing the tradeoff between coverage and costs, policy makers need to strive for a maximum reach to informal participants during the crisis, prioritizing temporary and reversible measures to minimize the longer-term fiscal burden. In some situations, however, the crisis has exposed gaps in a patchwork of social security facilities that should be filled, perhaps in the context of a thorough reform.

Expand social safety nets. The first line of response includes existing social protection and social assistance programs that could be quickly scaled up to provide immediate but temporary relief to families whose earnings have been adversely affected by the outbreak (World Bank 2020c, 2020d). Food aid, cash (or in-kind) transfers, and rent or utility bill waivers can be particularly effective in countries with pervasive informality, as they are easy to implement and have wide reach outside the formal sector (Özler 2020).ⁱ

Utilize flexible platforms and technologies to reach informal workers. Cash transfer and other support programs could utilize various existing registries and platforms that have wider coverage than banking or tax systems (Aker et al. 2016; Aron 2018). Such platforms should have sufficient coverage, provide possibilities to establish identities, and connect accounts with beneficiaries (World Bank 2020e). Examples include existing national social registries (for example, Brazil), new online platforms (Brazil and Thailand), new mobile payment devices

h. See World Bank (2020b) for details on the conventional measures. See ILO (2020b) for details on the importance of reducing the exposure of informal workers and their families to the virus and the risks of contagion and while ensuring their access to health care.

i. Where conditional programs exist, waiving conditionality for a period could ensure wider coverage in the context of a health emergency (World Bank 2020c). See World Bank (2020e) for a summary of country examples.

BOX 2.1 How does informality aggravate the impact of COVID-19? (continued)

(Morocco), and databases in health (Morocco) and energy (El Salvador) sectors. Public transfers via mobile money have been shown to improve food security and assets as compared to manual cash transfers in the short-term (Aker et al. 2016; Haushofer and Shapiro 2016).^j “Big data” analyses and geographic (or age-group or social group) targeting may help expand program coverage by identifying vulnerable groups that are not on any existing registry (Loayza and Pennings 2020; World Bank 2019a, 2020a, 2020e).

Facilitate access to finance for informal firms. To support informal firms, access to finance should be provided to help them stay in business, keep jobs, and maintain links to local and global value chains (World Bank 2020c, 2020f). Such support could be provided, potentially under government guarantees, by commercial banks, microfinance institutions, digital lending platforms, corporate supply chains, or other intermediaries. Easier access to credit, collateralization of existing properties, and online or mobile banking could help owners of informal firms to tap available financial resources, especially with the help of digital technologies.

Consider untargeted and unconditional programs when needed. Targeted programs reduce the risk that payments end up with those who do not need them, especially in the absence of effective targeting and delivery systems (Gentilini 2020; Loayza and Pennings 2020). In EMDEs where informality is pervasive and most of the population is either poor or near-poor, simple untargeted transfers may be better. Attempts to exclude the relatively few who are not in need would likely slow relief down and reduce the desired coverage of informal workers (Özler 2020). In practice, support programs that made formalization a condition of assistance have reduced the number of intended beneficiaries and have not offered net benefits to many informal enterprises (Campos, Goldstein, and McKenzie 2018). During the height of the pandemic and economic downturn, and the potentially weak recovery right afterwards, the need is to quickly reach as many informal workers and firms as possible. To this end, in many EMDEs, unconditional support programs would be advisable. Given their limited resources, low-income countries may require international funding for the effective implementation of such programs.

j. Mobile money is a technology that allows people to receive, store, and spend money using a mobile phone. Cash-in and cash-out points—a bank agent, a mobile money agent, or an automated teller machine—should be provided to ensure the success of public transfers via digital platforms (World Bank 2018).

stand out in their potentially comprehensive country and year coverage and their consistent economic meaning, but they rely on strong assumptions. The chapter highlights the circumstances in which the various individual informality measures could be particularly helpful. This adds to earlier work that has focused on the limitations of a confined number of estimation methods.

Second, the chapter argues that the combination of direct, survey-based indicators with indirect, model-based estimates can overcome the limitations of each. Informal employment measures tend to cover either the number of hours worked per day in informal employment (“intensity” of participation in informal employment) or, regardless of the number of hours worked per day, the presence of informal employment (“extent” of participation; Meghir, Narita, and Robin 2015). Since the extent of participation in the informal economy and its intensity may evolve differently, informal production may move asynchronously with informal employment.³ Thus measures of informal output are an important complement to measures of informal employment.

Third, the chapter distills the main features of the informal economy and its evolution over time. Three different dimensions of informality are identified in the chapter: output, employment, and perception. Cross-country rankings of informal output and employment are typically consistent. Both output and employment measures of informality have trended downward since 1990 and have shown some cyclicality. In contrast, perception-based measures have tended to be highly stable over time and could, therefore, be more appropriate for cross-country comparisons.

Fourth, the chapter describes the first study to document the cyclical features of the informal sector in both advanced economies and EMDEs. Cyclical movements in informal economy output do not differ statistically significantly from those in formal economy output. Like the formal economy, the informal economy undergoes larger output movements over the business cycle in EMDEs than in advanced economies. Steeper recessions and stronger recoveries in EMDEs contribute to greater output volatility, as shown in previous studies (Aguilar and Gopinath 2007). Meanwhile, unlike formal employment, which contracts significantly in advanced economies during formal economy recessions, informal employment in both advanced economies and EMDEs appears largely acyclical during informal output business cycles. This may reflect wage movements or changes in intensity (measured as number of hours worked per day) in labor markets, which may bear the brunt of adjustment during business cycles (Guriev, Speciale, and Tuccio 2019; Meghir, Narita, and Robin 2015).

The following section discusses how informality is defined and describes various measures of informality. Then, the chapter documents the main features of the informal economy across EMDE regions and the main similarities and differences across various

³For example, during a recession, labor may move from the formal sector to the informal sector and raise participation in the informal economy (Loayza and Rigolini 2011). However, due to the fall in demand during a recession, the intensity of participation, captured by the number of hours worked in informal employment, may remain the same or even drop, reducing informal output.

measures of informality. Next, it documents informal-economy business cycles, followed by concluding remarks.

Definition of informality

Informality is typically defined as market-based and legal production of goods and services that is hidden from public authorities for monetary, regulatory, or institutional reasons (Schneider, Buehn, and Montenegro 2010). Monetary reasons include the avoidance of taxes and social security contributions, regulatory reasons include the avoidance of government bureaucracy or regulatory burdens, and institutional reasons include corruption, related often to the poor quality of political institutions and weak rule of law. These factors affect firms and workers' decisions to participate in the formal sector (Perry et al. 2007; Ulyssea 2020). For the purposes of this book, the informal economy involves activities that, if recorded, would contribute to GDP, and does not cover illegal activities or household production (Medina and Schneider 2018; Schneider, Buehn, and Montenegro 2010). This section summarizes the definitions and classifications of informality used by previous studies.

Motivations for informal economic activity. The definition and classification of informality are highly context-specific. Similarly, the choice of informality measures will depend on the question being explored. The general definition referred to above encompasses many types of informal activities by workers and firms.

- *Exit versus exclusion.* Some workers and firms are “excluded” from the modern economy or from state benefit systems due to burdensome entry regulations and lack of human capital (de Soto 1989; Loayza, Oviedo, and Servén 2006; Perry et al. 2007). This type of informality is frequently associated with low productivity and with poorly paid and low-skilled employment (La Porta and Shleifer 2014; Loayza 2018). Other informal workers voluntarily “exit” the formal sector and choose informal activity for its flexibility, independence and lower regulatory compliance burdens (figure 2.1; Blanchflower, Oswald, and Stutzer 2001; Falco and Haywood 2016; Günther and Launov 2012; Maloney 2004). Both “excluded” and “exiting” types of informality could coexist in an economy (Bosch and Maloney 2008, 2010; Lehmann and Pignatti 2007; Nordman, Rakotomanana, and Roubaud 2016).
- *Subsistence informality.* Other studies focus on “subsistence informality,” which is pervasive in lower-income countries and characterized by low-skilled technology and the fact that in the absence of such informal economic activity the incomes of the workers involved would fall below subsistence levels (Docquier, Müller, and Naval 2017).
- *Evaders, avoiders and outsiders.* Yet another group of studies classify informal workers and firms into evaders, avoiders, and outsiders depending on their compliance with regulations and regulations' applicability (Kanbur 2009; Kanbur and Keen 2015). Evaders are firms that are covered by regulations but do not comply; avoiders are firms that adjust to be outside the remit of regulations; outsiders are firms that are simply not covered by regulations.

- *Margins.* More recent studies distinguish different types of informality by the entities engaged in informal activity, without focusing on their motivation: firms that do not register their business (the extensive margin) and or registered firms that hire workers “off the books” (the intensive margin; Ulysea 2018, 2020).

Informal workers. Informal employment covers all workers in the informal sector and informal workers outside the informal sector (Perry et al. 2007; ILO 2018a). The former comprises all persons who were employed in at least one informal firm. The latter group consists of some self-employed and workers who are not employed in formal contractual arrangements or not subject to social security or employment benefits.⁴ Some have defined informal employment more specifically as referring to workers who do not contribute to retirement pension schemes, which form part of social security (Loayza, Servén, and Sugawara 2010).

The most commonly used proxy for the relative size of informal employment is the share of self-employment in total employment, capturing workers who, working on their own account or with one or a few partners or in a cooperative, hold the type of jobs defined as “self-employment jobs” (annex 2A; ILO 1993; La Porta and Shleifer 2014). The other popular measure of informal employment comprises all workers in the informal sector (workers in at least one informal sector enterprise, irrespective of their status in employment and whether it was their main or a secondary job) together with informal workers outside the informal sector (the self-employed and employees holding informal jobs). For the remainder of the chapter, informal employment will be proxied by self-employment since data on informal employment is not available for advanced economies. The numbers throughout this chapter refer to the latest available years.

Informal firms. Some studies use the following criteria to define an informal firm (ILO 2018a). First, it is not an incorporated enterprise that is a legal entity separate from its owners, with its own complete set of accounts, and it is not owned or controlled by one person or a few household members. Second, it is a market enterprise that sells its goods or services. Third, it falls into one of the following categories: it keeps the number of workers employed on a continuous basis and below a threshold determined by the state; it is not registered; or its workers are not registered. Other studies provide an alternative definition of degrees of firm informality on a continuum depending on size, registration, honesty of accounting, tax payments, mobility of workplace and access to bank credit (Benjamin and Mbaye 2012; Mbaye, Benjamin, and Gueye 2017).

Database of informality measures

Reflecting the difficulty of measuring informality, researchers have developed a wide range of estimation methods to capture its scale. The database compiled for this study includes the twelve measures most commonly used in the literature. These can be

⁴ See the annex of Hussmanns (2003) for the overlap between informal employment and self-employment.

categorized into two groups based on their estimation methods. The first group encompasses indirect model-based estimates of the relative size of informal output (that is, informal output in percent of official GDP). The second group encompasses direct measures gathered from surveys, such as labor force, household, firm, or opinion surveys. In the database, indirect and direct measures together cover up to 196 economies (36 advanced economies and 160 EMDEs) and for periods as long as 1950-2018 (table 2.1.A).

This section describes the informality database and the limitations and advantages of each measure included in it. Indirect measures stand out for their broad country and long year coverage, but they suffer from their narrow focus on economic production and strong reliance on model specifications and assumptions. Direct measures capture more dimensions of informality and do not involve particular model specifications and assumptions, but they tend to have limited country and year coverage, making them less well suited to cross-country, time-series analyses. Indirect measures provide only a macro perspective on the extent of informality in an economy, whereas direct measures can also provide a micro perspective on how firms and workers behave in the informal sector.

Indirect estimates

Previous studies have used various indirect approaches to estimate the size of the informal sector, including the currency-demand approach (Ardizzi et al. 2014), the electricity-demand approach (Schneider and Enste 2000), the Multiple Indicators Multiple Causes (MIMIC) model (Schneider, Buehn, and Montenegro 2010), and the dynamic general equilibrium (DGE) model (Elgin and Oztunali 2012; Ihrig and Moe 2004; Orsi et al. 2014). Among all indirect estimation methods, the MIMIC and DGE models stand out in terms of their long time-series and broad country coverage. For this reason, the focus here is mainly on the use of MIMIC and DGE models to estimate the size of informal economic activity. To make the measures comparable with those in the literature, both DGE-based and MIMIC-based estimates are reported in percent of official GDP.

The multiple indicators multiple causes model (*MIMIC*). This is a type of structural equations models that can be used to estimate the relative size of informal economic activity. Two features of MIMIC are particularly important: first, it explicitly takes into account multiple possible causes of informal activity and captures multiple outcome indicators of it; second, it can readily be used to estimate informal activity across countries and over time. Other indirect approaches, like the currency-demand approach and the electricity-demand approach, condense all the features of informal activity across product and factor markets into just one indicator.⁵ The informal sector, however,

⁵The electricity-demand and currency-demand approaches suffer from limited data availability and are each subject to specific caveats. The electricity-demand model rests on the strong assumptions that all informal economic activity requires only the use of electricity, and the association between informal production and use of electricity is constant over time. The currency-demand approach rests on the assumption that transactions in the informal sector are paid in cash and that there is no informal sector in the base year (Ahumada, Alvaredo, and Canavesa 2007).

shows its effects in various markets, which can be captured better in a MIMIC model (Schneider, Buehn, and Montenegro 2010). The data on causes and indicators of informal activity identified in the literature are largely macroeconomic data in a panel setting and can be updated annually.

The limitations of the standard MIMIC model, used by Schneider, Buehn, and Montenegro (2010) and others, have been widely discussed in the literature (Feige 2016; Medina and Schneider 2018). The limitations include: 1) the use of GDP (that is, GDP per capita and its growth rates) as both cause and indicator variables, 2) its reliance on another, independent study's base-year estimates of the informal economy to calibrate the size of the informal economy in percent of GDP, and 3) the sensitivity of the model's estimated coefficients to alternative model specifications and sample coverage.⁶ These limitations can open the MIMIC estimates to charges of manipulation and misrepresentation (Breusch 2005).

The most cited MIMIC study, Schneider, Buehn, and Montenegro (2010), is replicated here to estimate the size of the informal sector in percent of official GDP. Six causes and three indicators are used in the estimation to capture the hypothesized relationships between the informal sector (the latent variable) and its causes and indicators (annex 2A). Once the relationships are identified and the parameters are estimated, the estimation results are used to calculate the MIMIC index, which gives the absolute values of the size of the informal sector after a benchmarking or calibration procedure. The estimates from the model specification that ensures maximum data coverage are used here (annex 2A). The MIMIC approach delivers a panel of estimates for 160 economies (36 advanced economies and 124 EMDEs) over the period 1993-2018.

The MIMIC estimates capture the combination of both employment and productivity in the informal sector, whereas measures of informal employment only reflect the level of employment in the informal sector. Despite the comprehensive country and long time-series coverage, MIMIC estimates do not fluctuate much over time, which makes the estimates less suited for time-series analyses (including the business cycle analysis below).

The DGE model (DGE). The dynamic general equilibrium (DGE) model considers how optimizing households will allocate labor between formal and informal economies in each period and how the allocation changes over time (Ihrig and Moe 2004; Elgin and Oztunali 2012). In comparison with other estimation methods, the DGE approach stands out in the comprehensive country and year coverage that it allows, its clear theoretical basis, and its applicability to policy experiments and projections (Loayza 2016).

The DGE approach has some limitations. First, it relies on strong assumptions about the functional form of activity in the informal and formal sector and about the

⁶ Medina and Schneider (2018) try to overcome the limitation of using official GDP (which may capture part of the informal economy) by using night-light data to independently capture economic activity.

relationship between formal and informal productivity (Orsi, Raggi, and Turino 2014; Schneider and Buehn, 2016). Second, like the MIMIC approach, it requires base-year estimates of the informal economy from another independent study to calibrate the size of informal economy (Elgin and Oztunali 2012; Ihrig and Moe 2004). Third, a computable DGE model only captures some of the stylized facts of the informal sector. Data availability, especially for EMDEs, presents a challenge to matching DGE models with all aspects of informality.

Here, a deterministic DGE model proposed by Elgin and Oztunali (2012) is used to estimate the size of the informal sector. The model captures the essence of labor allocation between the formal and informal sectors and provides a mapping between the formal and informal economies in a dynamic setting. The model relies on two key equilibrium conditions for calibration and data construction processes (annex 2A). The two key equilibrium conditions are one that connects the formal and informal economies through labor allocation, and another that captures intertemporal substitution. The model results in estimates of informal output in percent of official GDP for 158 economies (36 advanced economies and 122 EMDEs) over the period 1950-2018.

The DGE estimates reflect the levels of both employment and productivity in the informal sector and stand out in their broad country and long year coverage. The time variation of the DGE estimates is sufficient for time-series analysis, including the business cycle analysis in the following sections. But the time variation of the DGE estimates relies partially on strong assumptions. For instance, in Elgin and Oztunali (2012), the growth rate of productivity in the informal sector is assumed to be a function of the growth rates of capital and productivity in the formal sector.⁷

Survey-based estimates

Four existing informality measures are labor-related, of which three are related to employment and one to pension coverage. These measures are gathered mainly from labor force surveys but sometimes from household surveys.

Labor force surveys. Labor force survey-related measures have the advantages of not relying on strong assumptions, having no need for base-year estimates for calibration, and having sufficient time variation for time-series analysis. But they also have several limitations: the data are costly to gather, contributing to limited country and year coverage; survey methodologies may vary over time and across countries, limiting the comparability of the data; there are the typical drawbacks of survey-based data (such as sample bias); and employment measures cannot reflect other changes in the informal sector, such as in productivity and the number of working hours.

⁷In the case of Elgin and Oztunali (2012), the heavy reliance of DGE estimates on assumptions and base-year estimates on the informal economy for calibration could be reduced by using other sources of information on the informal economy (survey-based estimates of informal employment).

Despite the limitations, survey-based labor-related measures can provide useful guidance for the construction and use of indirect informality measures. Among all labor-related measures, self-employment stands out in its year and country coverage and sufficient time variation, making it suitable for time-series analysis and cross-country comparisons.⁸ For labor-related questions (employment creation and destruction in the informal sector, or social security issues), labor-related measures are typically preferred.

The most frequently used measure is the share of self-employment in total employment (in the database used here labeled *SEMP*; La Porta and Shleifer 2014; Maloney 2004). As defined by the 1993 International Classification of Status in Employment, self-employed workers include four sub-categories of jobs, as classified in the World Bank's World Development Indicators (WDI) and by the International Labour Organization (ILO): employers, own-account workers, members of producers' cooperatives, and contributing family workers.⁹ Self-employed workers are those who, working on their own account (own-account workers or employers) or with one or a few partners or in a cooperative, hold "self-employment jobs" as defined above. These are jobs where the remuneration is directly dependent upon the profits derived from the goods and services produced.

Two other measures are informal employment and employment outside the formal sector.¹⁰ These are usually expressed in percent of total employment (or non-agricultural employment) and refer to different aspects of informality.¹¹ Whereas employment outside the formal sector is an enterprise-based concept that includes persons employed by informal sector enterprises or in households, informal employment is a job-based concept and has a broader definition. Informal employment comprises all workers in the informal sector and informal workers outside the informal sector. Almost all persons employed in the informal sector are in informal employment. But not all informal employment is in the informal sector. For example, informal employment includes internships in the formal sector without contracts or pension contributions.

⁸ ILO also produces model-based estimates which it uses to construct an internationally comparable data set on the share of self-employment in total employment (<https://www.ilo.org/ilostat-files/Documents/TEM.pdf>). Such model-based estimates largely rely on collected survey-based estimates but still could be sensitive to model specifications. Over the period 1990-2018, the pairwise correlation between survey-based estimates on self-employment shares and model-based estimates is 0.95. For the purpose of this book, survey-based estimates of self-employment shares are preferred.

⁹ Self-employment largely overlaps with informal employment, but not all self-employed workers are in informal employment. For example, the owner of a formally registered firm is both self-employed and formally employed. Whereas contributing family workers are always classified as informal, workers who hold other types of "self-employment jobs" are classified as informal employment when their production units are informal sector enterprises or households. See 17th ICLS guidelines for details (<https://www.ilo.org/public/libdoc/ilo/2013/480862.pdf>).

¹⁰ ILO presents detailed definitions of these two measures (ILO 2021a, b). Here, the harmonized series of these two measures, which allow for cross-country comparisons, are preferred, despite some remaining limitations (ILO 2021c).

¹¹ ILO reports these two measures both in percent of total employment and in percent of non-agricultural employment. Due to space limitations, the analysis here focuses on these two measures in percent of total employment, which are comparable with the self-employment measure.

For a comprehensive dataset on labor-related measures on informality, cross-country databases, provided by the WDI, ILO and OECD, are combined, with additional data gathered from various sources (annex 2A). The resulting dataset on self-employment is a panel of 180 economies or regions over the period 1955-2018. The dataset on informal employment covers 72 EMDEs from various years during 2000-2018 whereas the dataset on employment outside the formal sector contains 76 EMDEs from various years during 1999-2018. Data on informal employment and on employment outside the formal sector are obtained from the ILO.

Data on pension coverage are gathered from various issues of the WDI (book version, reported until 2012). The measure is defined as the fraction of the labor force that contributes to a retirement pension scheme (Loayza, Servén, and Sugawara 2010). It yields a panel that covers 135 economies from 1990 to 2010. The measure is suitable for analyzing social security issues related to the informal economy.

Firm opinion surveys. Two datasets based on surveys of firms have outstanding coverage and data quality: the World Bank's Enterprise Surveys, and the Executive Opinion Surveys conducted by the World Economic Forum. The World Bank Enterprise Surveys cover 140 economies over the period 2006-2018 whereas Executive Opinion Surveys cover 154 economies over the period 2008-2018.¹²

Both surveys are answered by top managers and business owners, who can be expected to be familiar with the business climate in the country concerned. The surveys could reveal some dimensions of informality (for example, regarding the ease of doing business in the informal sector) that are not captured in the output or labor-related measures of informality. Similar to labor-related measures, measures from firm surveys also have the advantages of being independent of strong assumptions and base-year estimates for calibration.

There are two particular drawbacks of informality measures based on firm surveys. First, data from firm surveys tend to have limited year coverage. Second, since perceptions tend not to move much over time, these types of measures do not have much time variation. Both drawbacks limit their application in time-series analysis. Nonetheless, they shed light on the perceived extent of informality in a country and can provide useful guidance for constructing and validating indirect model estimates.

World Bank Enterprise Surveys compile responses on various topics (including informality) from face-to-face interviews with top managers and business owners in over 161,000 companies in 144 economies. The surveys yield the following measures of informality that have been used in the literature (La Porta and Shleifer 2014; World Bank 2019a): percent of firms competing against unregistered or informal firms (*WBI*),

¹² Due to survey design changes, the data collected by the Executive Opinion Surveys over the period 2004-2007 are not comparable with those for subsequent years. The World Bank also conducts Productivity and Investment Climate Surveys at the firm level. Although these surveys occasionally report measures of informality, they are obtained from various sources and use different methodologies.

percent of firms formally registered when they started operations in the country (*WB2*), (average) number of years firms operating without formal registration (*WB3*), and percent of firms identifying practices of competitors in the informal sector as a major constraint (*WB4*). Higher values of *WB1*, *WB3* and *WB4* and a lower value of *WB2* indicate higher levels of informality. *WB1* and *WB4* also provide some insights into informal firms' competitiveness whereas *WB2* and *WB3* are considered indicative of constraints imposed by registration requirements.

In comparison to Enterprise Surveys, Executive Opinion Surveys provide a more balanced panel dataset, making them more suitable for business cycle analysis. The World Economic Forum (*WEF*) has been conducting Executive Opinion Surveys every year since 1979. As reported in the 2014 edition, over 13,000 executives in 144 economies were surveyed. From 2006, the survey has asked the question, "In your country, how much economic activity do you estimate to be undeclared or unregistered? (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered)." The average responses at the country-year level constitute a series of informality measures with a lower average indicating a relatively larger informal economy.

Household surveys. Household surveys may report perceptions of the extent of informality in an economy or opinions on informal economic activities. The World Values Survey (*WVS*) stand out in terms of their extensive country and year coverage; others household surveys mainly focus on European economies.¹³ The *WVS* asked whether respondents considered it justifiable to cheat on taxes, with the data averaged for five periods from 1981-1984 to 2010-2014. The responses could range from 1 (never justifiable) to 10 (always justifiable). In total, 317,750 respondents from 96 economies participated in the survey. The average responses at the country and year level are used as a measure for attitudes towards informality. A higher average at the country level implies that people find cheating on taxes more justifiable and thus consider informal activity more acceptable. It is regarded as an indirect measures of informality as a lack of tax morality is associated with a higher level of informality (Oviedo, Thomas, and Karakurum-Özdemir 2009).

Comparison of statistical features across measures

For any economy, the various measures of informality will differ somewhat, both in the level of informality implied and in its variation over time. In general, MIMIC estimates indicate lower and less volatile informal sector activity than DGE estimates. This partly reflects the differences in the assumed underlying drivers of informality in the two approaches: MIMIC is based on slow-moving variables such as ones relating to institutional quality whereas DGE is based on more volatile variables such as employment, investment and productivity. In EMDEs, the share of informal activity in

¹³ These surveys, which include the Eurobarometer Survey, European Values Survey, and the European Social Survey, are not used in this study because of their limited coverage of EMDEs. Details about other social surveys are shown in annex 2A (tables 2.1.A and 2.9).

GDP (by either measure) tends to be well below the share of self-employment in total employment, which may reflect lower labor productivity in the informal economy than the formal economy or some self-employed workers contributing to the formal economy (Loayza 2018).¹⁴ Survey-based measures tend to be stable over decades, potentially reflecting a profound rigidity in perceptions.

Size and evolution of the informal economy

This section distills the empirical findings on the main features of the informal economy and its evolution over time. The informal economy is more prevalent in EMDEs than in advanced economies but is widely heterogeneous across countries and regions. Both output and employment measures of informality have trended downward since 1990. In contrast, survey-based measures relating to perceptions have tended to be highly stable, making them more appropriate for cross-country comparisons than for over-time analyses.

About one-third of activity. Globally, the informal economy accounted for 32-33 percent of GDP and 31 percent of employment over the period 1990-2018 (table 2.1.B). As shown in previous studies, a higher level of development, as measured by per capita income, is associated with lower informality, virtually regardless of the measure of informality, other than survey-based ones, or the year chosen (La Porta and Shleifer 2014). Thus informality tends to be considerably more pervasive in EMDEs than in advanced economies (figure 2.2): in advanced economies, it accounts for about 19 percent of GDP and 16 percent of employment, on average, whereas in EMDEs it accounts for 36-37 percent of GDP and 39 percent of employment.

Wide cross-country heterogeneity. There is wide heterogeneity in informal activity among EMDEs (figure 2.2). For example, the informal economy's share in GDP, while depending on the measure used, ranged from around 10 percent to 68 percent, and the share of self-employment in total employment ranged from near-zero to 96 percent.

Widespread informality across all EMDE regions. Informality is common in all EMDE regions but takes different forms (World Bank 2012). On average, the informal economy's share of output is highest in SSA, Europe and Central Asia (ECA), and Latin America and the Caribbean (LAC). The share of self-employment, however, is highest in SSA, South Asia (SAR), and East Asia and the Pacific (EAP; figure 2.3).

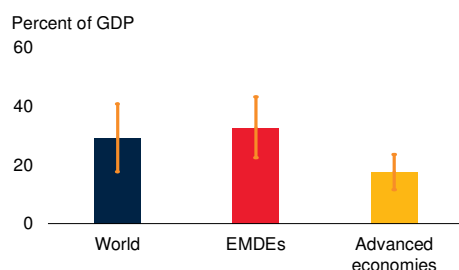
Declining employment and output informality over time. The shares of both informal output and employment have declined since 1990, especially in EMDEs (figure 2.4).

¹⁴In this section and below, self-employment is used to proxy for informal employment as in La Porta and Shleifer (2014), unless otherwise specified. In the following sections, "in percent of GDP or output" is used as the equivalent of "in percent of official GDP" in the context of the share of informal output (both DGE-based and MIMIC-based estimates), and "in percent of employment" is used as the equivalent of "in percent of total employment."

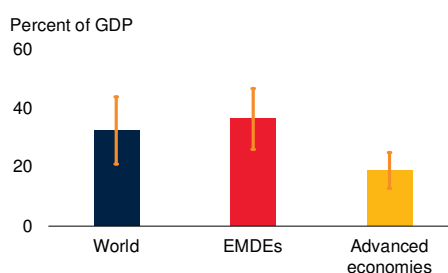
FIGURE 2.2 Informality and development

Informality is more pervasive in emerging market and developing economies (EMDEs) than in advanced economies, indicating a positive link between development and informality. But informality varies widely among EMDEs.

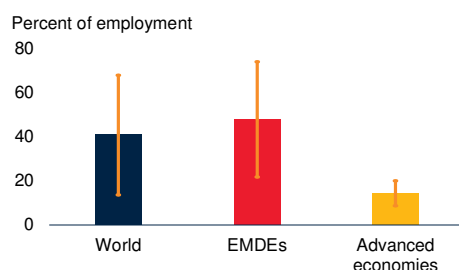
A. DGE-based informal activity



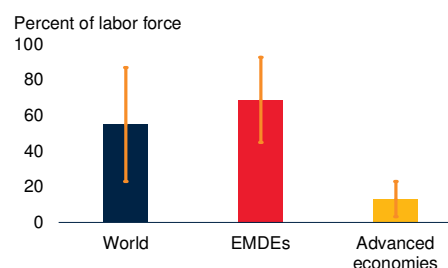
B. MIMIC-based informal activity



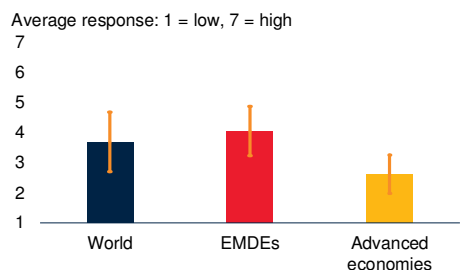
C. Self-employment



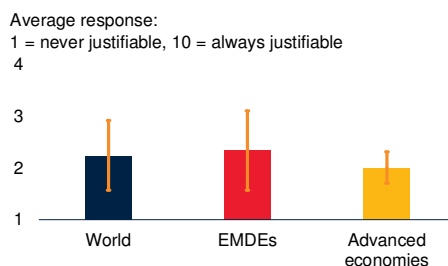
D. Labor force without pension



E. Perceived informal activity



F. Attitudes to informality



Sources: World Bank; World Economic Forum; World Values Survey.

Note: See table 2.1.A for details on data definitions. Simple group means for the period 2010-2018 (2000-2010 for D and F due to data availability) are shown in bars with their -1 and +1 standard deviation (SD) shown by orange whiskers. DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; EMDEs = emerging market and developing economies; MIMIC = multiple indicators multiple causes model-based estimates of informal output in percent of GDP.

C. Missing data for self-employment in percent of total employment are interpolated in EMDEs for earlier years and filled using the latest available observation in recent years.

D. "Labor force without pension" is in percent of labor force, averaged over 2000-2010, given data availability.

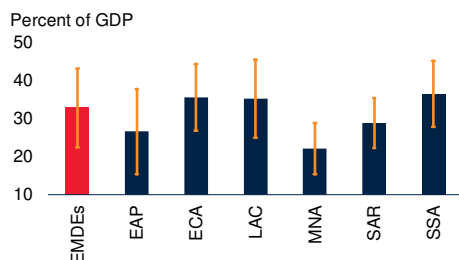
E. WEF (World Economic Forum) index of perceived informality is used.

F. Data from World Values Survey on the attitude towards cheating on taxes are used here and averaged over 2000-2010, given data availability.

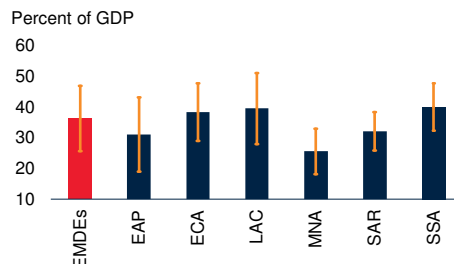
FIGURE 2.3 Informality in EMDE regions

Informality is common in all EMDE regions but takes different forms. On average, the share of informal output is highest in Sub-Saharan Africa, Europe and Central Asia, and Latin America and the Caribbean. The share of self-employment is highest in Sub-Saharan Africa, South Asia, and East Asia and the Pacific.

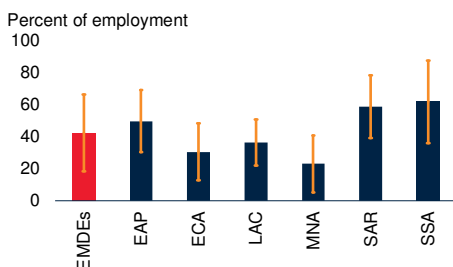
A. DGE-based informal activity



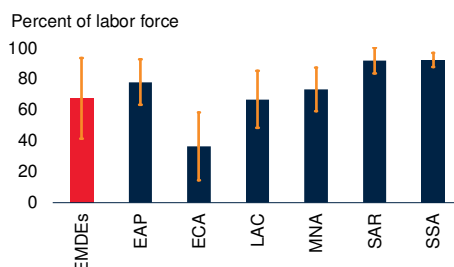
B. MIMIC-based informal activity



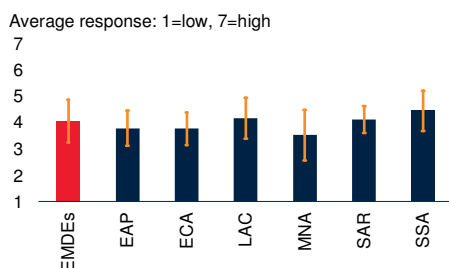
C. Self-employment



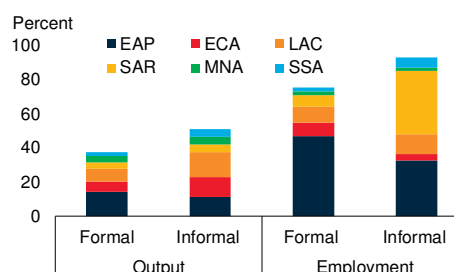
D. Labor force without pension



E. Perceived informal activity



F. Shares of EMDE regions in world output and employment



Sources: International Labour Organization; World Bank (World Development Indicators); World Economic Forum.

Note: Blue and red bars indicate group means for 2010-18 (2006-2016 for D), with whiskers indicating ± 1 standard deviation. DGE = dynamic general equilibrium model-based estimates on informal output; EAP = East Asia and Pacific; ECA = Europe and Central Asia; EMDEs = emerging market and developing economies; LAC = Latin America and the Caribbean; MIMIC = multiple indicators multiple causes model-based estimates on informal output; MNA = Middle East and North Africa; SAR = South Asia; SSA = Sub-Saharan Africa.

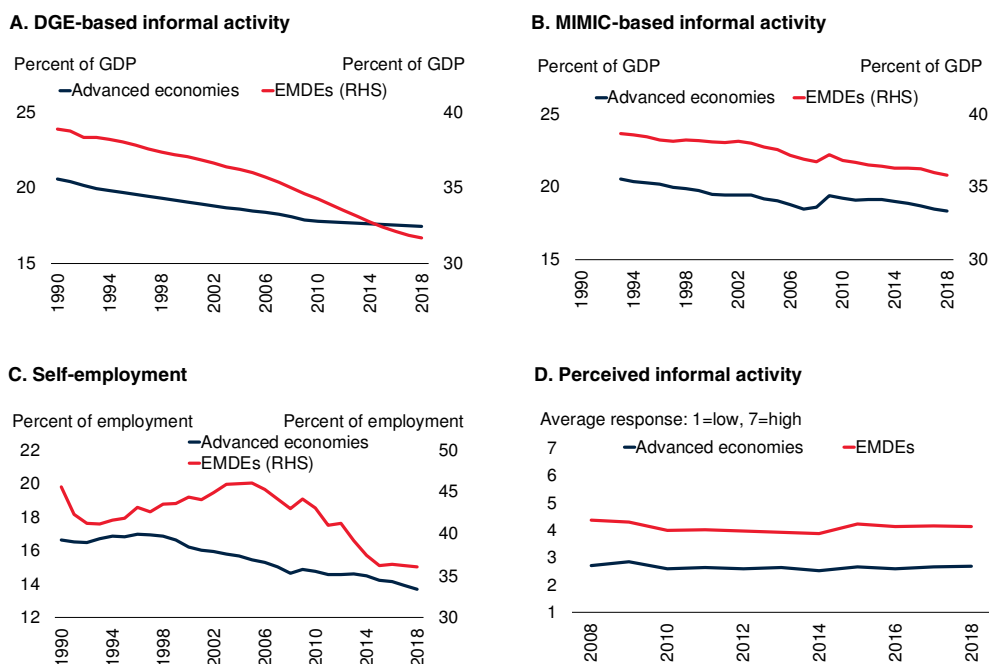
C. Self-employment shares (in percent of total employment) is used here.

E. Perceived informal activity is proxied by World Economic Forum Index, which ranges from "1= Most economic activity is undeclared or unregistered" to "7 = Most economic activity is declared or registered". See table 2.1.A for details on data definitions.

F. The stacked bars show the formal and informal output (employment) in each EMDE region as a share of the world's total formal or informal output (employment) using data averaged from 2010-18. Formal output is proxied by official GDP, while DGE-based estimates are used to capture the level of informal output. Informal employment is proxied by self-employment, while formal employment is the difference between total employment and self-employment.

FIGURE 2.4 Evolution of informality in advanced economies and emerging market and developing economies, 1990-2018

The shares of informal employment and output have declined in both advanced economies and emerging market and developing economies (EMDEs) since 1990, despite largely unchanged perceptions of the size of the informal sector.



Source: World Bank; World Economic Forum.

Note: See table 2.1.A for details on data definitions. Group means are calculated for advanced economies (in blue) and emerging market and developing economies (EMDEs, in red). DGE = dynamic general equilibrium model; MIMIC = multiple indicators multiple causes model.

C. Informal employment is proxied by self-employment in percent of total employment. Missing data for self-employment are interpolated in EMDEs for earlier years and filled using the latest available observation in recent years.

D. WEF (World Economic Forum) index of informality is used, which ranges from "1= Most economic activity is undeclared or unregistered" to "7 = Most economic activity is declared or registered".

Between 1990 and 2018, on average, the share of informal output in GDP fell by about 8 percentage points in EMDEs, to 31 percent, and by 3 percentage points in the advanced economies, to 17 percent. Over the same period, the average share of self-employment in total employment declined by about 3 percentage points in the advanced economies, to 14 percent, and by about 10 percentage points in EMDEs, to 36 percent. In EMDEs, the largest declines in the shares of informal output and employment occurred from the early-2000s, in a reversal of a decade of a rising share of informal employment and barely shrinking share of informal output.¹⁵ In advanced

¹⁵The persistence of high levels of informality in EMDEs in the early 1990s in part reflects the expanding informal sector in Eastern and Central European economies during their economic transition (Kaufmann and Kaliberda 1996). By construction, slow-moving indicators for institutional quality in MIMIC estimates dampen these estimates' movements over time.

economies, the largest declines in the share of informal employment occurred between the late 1990s and the global financial crisis of 2008-09; they have since partly reversed, amid anemic post-crisis growth (figure 2.4).

Broad-based declines. The declines in informality between 1990 and 2018 were broad-based, especially for output- and employment-based measures. Country-specific regressions of the shares of the informal economy in GDP and employment on a time trend were estimated to capture this secular decline (figure 2.5). In 69 (*SEMP*)-100 (*DGE*) percent of advanced economies (depending on the measure) and 54 (*SEMP*)-81 (*MIMIC*) percent of EMDEs, statistically significant downward trends in the share of the informal economy in GDP (or employment) were found. The trend decline in the share of informal output suggests that economic growth may be associated with more rapidly rising labor productivity in the formal economy than in the informal economy. As economies grow, formal-sector productivity growth may benefit from greater technological improvements and availability of capital than can be accessed by the informal sector (Amaral and Quintin 2006). In only a few cases did output and employment informality move in different directions. Noticeable drops in the share of informal output were associated with only moderate falls in the share of informal employment in some EMDEs, and even with increases in the share of informal employment in others (see chapter 5 for detailed discussion).

Stable perceptions of informality over time. Perceptions of informality appear to have changed much more slowly than actual informal output and employment.¹⁶ In the majority of advanced economies and EMDEs, perceptions of the scale of informality—as measured by the *WEF* and *WVS* indices—have not declined significantly since 1990. There are, however, a few exceptions. This often coincided with rapid GDP growth and reductions in the shares of both informal output and employment.

Consistency among the various measures of informality

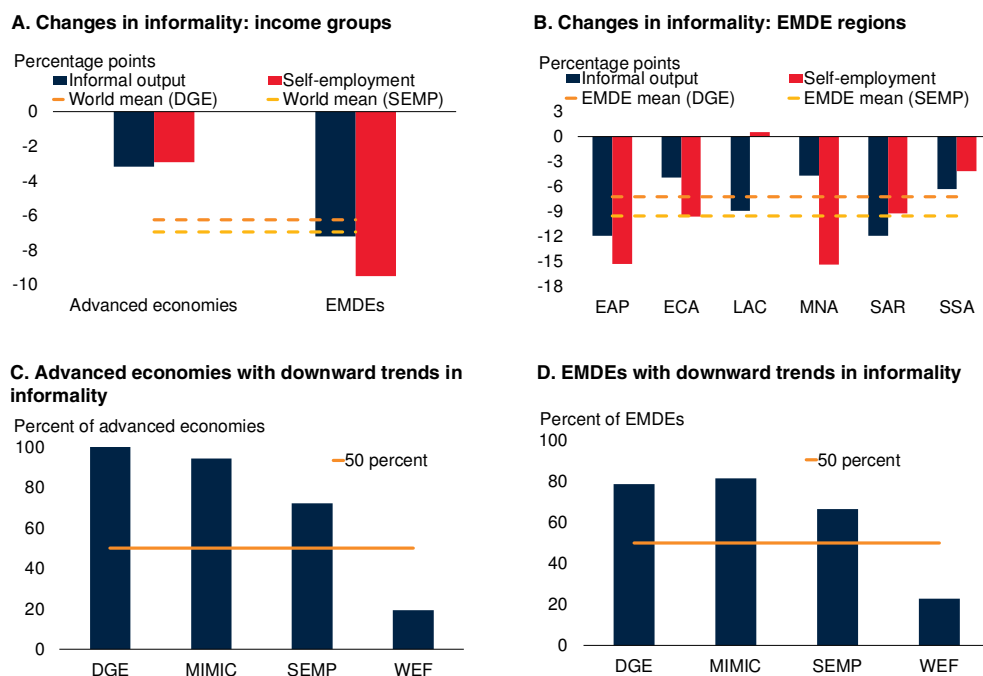
The various measures of informality refer to three distinct aspects of it: output (*DGE* and *MIMIC* estimates), employment (for example, self-employment and workers without pensions), and perception (for example, the *WEF* and *WVS* surveys). This section explores the consistency among the various measures of informality.

Correlations in cross-country rankings: Output and employment. The various measures for informality are generally positively correlated with each other, with the correlations within each block (output, employment, perception) being stronger than correlations between blocks (table 2.2). The cross-country rank correlation between the two model-based estimates of informal output is close to 1 and significantly different

¹⁶ Guiso, Sapienza, and Zingales (2009) demonstrate that perceptions of trustworthiness are largely historically determined with limited time-variance.

FIGURE 2.5 Downward trends in informality, 1990-2018

Informality declined in both advanced economies and emerging market and developing economies (EMDEs) during 1990-2018. The share of informal output dropped in all EMDE regions, but by most in East Asia and Pacific, Latin America and the Caribbean, and South Asia.



Source: World Bank; World Economic Forum.

Note: Data are for the period 1990-2018. DGE = dynamic general equilibrium model; EAP = East Asia and Pacific; ECA = Europe and Central Asia; EMDEs = emerging market and developing economies; LAC = Latin America and the Caribbean; MIMIC = multiple indicators multiple causes model; MNA = Middle East and North Africa; SAR = South Asia; SEMP = self-employment in percent of total employment; SSA = Sub-Saharan Africa; WEF = World Economic Forum estimates.

A. The bars indicate the simple group means for advanced economies and EMDEs, with the red bars for self-employment (in percent of total employment) and blue bars for DGE-based informal output (in percent of official GDP). Lines show world averages.

B. The bars indicate the simple group means for EMDE regions, with red bars for self-employment (in percent of total employment) and blue bars for DGE-based informal output (in percent of official GDP). Lines show EMDE averages.

C,D. Data for the period 1990-2018. Based on country-specific linear regressions of the share of informality on each of the four measures of informality with a sufficiently long-time dimension. Figures show the share of advanced economies (C) and EMDEs (D) for which the time trend is statistically significantly negative (at least at the 10 percent level). In D, missing values for self-employment are interpolated. Horizontal line indicates 50 percent.

from zero at the 1 percent level. In addition, the rank correlations between DGE estimates and both employment measures and some perception measures are also positive and significant (figure 2.6). The correlations among the various measures of informal employment range from 0.20 to 0.94 and are mostly significant at the 10 percent level. On average, the correlation between an estimate of informal output and employment-based measures is above 0.60 and significant at the 1 percent level.

Correlations in cross-country rankings: Perceptions. Perception-based estimates of informality tend to be more correlated with each other than with estimates of informal output or employment. The *WVS* is an exception; it tends to be uncorrelated or little

correlated with all other measures, including perception-based ones. This suggests that a large informal sector reflects more than citizens' weak tax morality, which *WVS* purports to capture. Among the perception-based measures, the *WEF*, which purports to capture perceptions of the extent of informal economic activities, is the one most correlated with the other measures, both output-based (about 0.70) and employment-based (about 0.5-0.7 with the share of labor force without pension and self-employment as a share of total employment).

Correlation in direction of movements over time. To examine the consistency of movements over time among various measures, the coincidence of the directions of movements in different variables is checked by looking at the shares of country-pairs in which first differences in two measures have the same sign (figure 2.6; table 2.3).¹⁷ This is the case in about 50 percent of all the country pairs—and highest, at 82 percent of country-year pairs, for informal employment and employment outside the formal sector. The directions of changes in output measures and employment measures coincide in 55-65 percent of country-year pairs, suggesting that output measures capture important additional factors to employment measures, such as changes in labor productivity or intensity of work.

Cyclical features of the informal economy

Like formal economies, informal economies feature business cycles, which share some features with those in the formal economy: They are stronger in EMDEs than in advanced economies, and they feature downturns and recoveries with similar speeds. That said, they are not fully synchronized with business cycles in the formal economy. This section distills the main cyclical features of the informal economy. Building on this section, chapter 3 explores the links between formal and informal business cycles in greater detail and their implications for macroeconomic policy.

Volatility of formal and informal economies

Employment and output volatility. The business cycles of formal and informal economies are not entirely synchronous (as discussed in detail in chapter 3). Employment growth in the informal sector is slightly, but statistically significantly, negatively correlated with employment growth in the formal sector (-0.2 percent). As a result, formal and informal employment alone are each more volatile than total employment (the sum of formal and informal employment).¹⁸

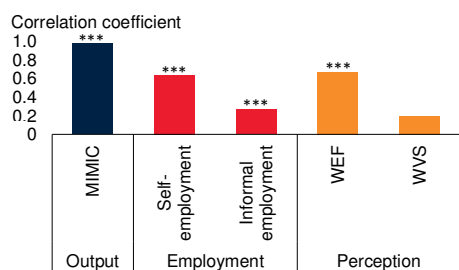
¹⁷As a robustness check, the pairwise correlations of first-differenced informality measures over time for each country are calculated, with their medians computed across countries. The results are in line with table 2.3. Whereas significant and positive correlations are observed among pension coverage, informal employment, and employment outside the formal sector, no significant correlations between informal employment (or perception) measures and informal output measures are found.

¹⁸This supports earlier findings that the informal sector may help stabilize total employment over business cycles (Fernández and Meza 2015; Loayza and Rigolini 2011).

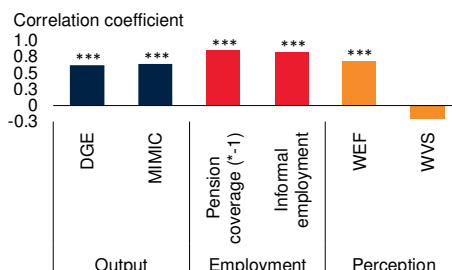
FIGURE 2.6 Consistency among various informality measures

The various measures for informality are generally positively correlated with each other, with the correlations within each block (output, employment, perception) being stronger than correlations between blocks.

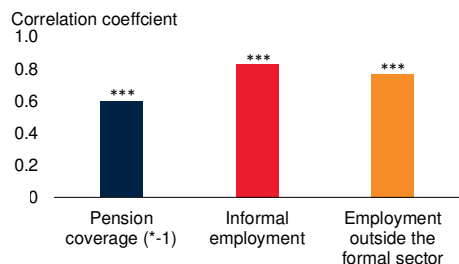
A. Correlations between DGE estimates and other informality estimates



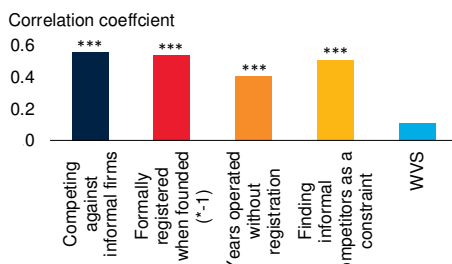
B. Correlations between self-employment and other informality measures



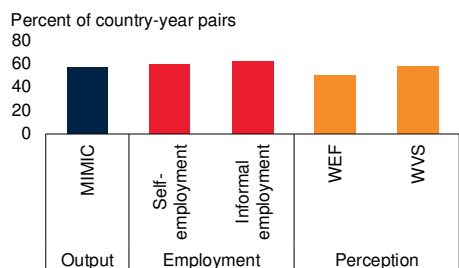
C. Correlations between self-employment and other labor-related informality measures



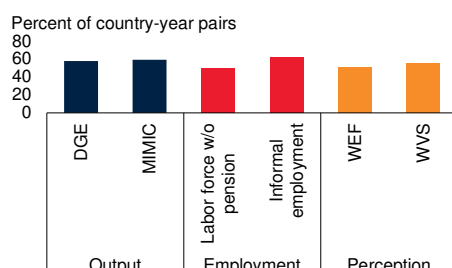
D. Correlations between WEF index and other perception-related informality measures



E. Coincidence of signs of first differences: DGE estimates and other informality estimates



F. Coincidence of signs of first differences: Self-employment estimates and other informality estimates



Sources: World Economic Forum (WEF); World Bank (Enterprise Surveys); World Values Survey.

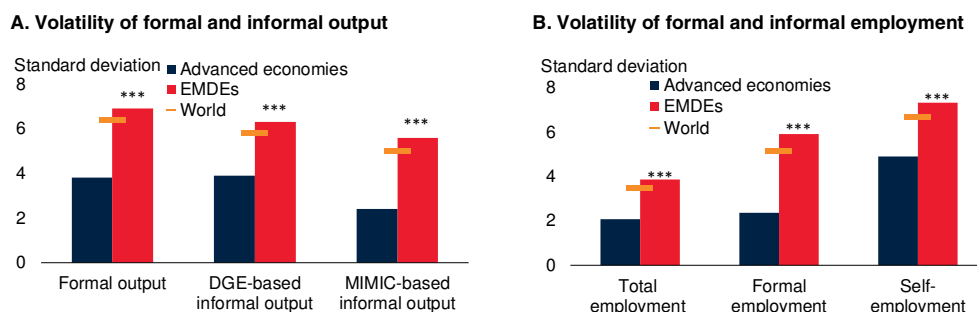
Note: Data for the period 1990-2018. DGE = dynamic general equilibrium model; MIMIC = multiple indicators and multiple causes model; SEMP = self-employment in percent of total employment; WEF = World Economic Forum estimates; WVS = World Values Survey. Pension coverage is in percent of labor force, while informal employment and employment outside the formal sector are in percent of total employment. WVS asks whether cheating on taxes is justifiable (1 is "never justifiable" and 0 is "always justifiable") and reports average responses at the country-year level. A higher level indicates a country is more tolerant of informality. WEF asks, "In your country, how much economic activity do you estimate to be undeclared or unregistered? (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered) and reports average responses at the country-year level. Here, the average responses have been reordered to make "7 = most economic activity is undeclared or unregistered" and "1 = most economic activity is declared or registered" such that a higher score indicates more informality (see also tables 2.1 and 2.2).

A.-D. Medians of rank correlations of data across countries within each year. All survey-based measures are interpolated. *** implies significance at 10 percent level. The responses from World Bank Enterprise Surveys are shown in D (see table 2.3 for details).

E.F. Shares of country-year pairs where first differences of DGE estimates (E) or self-employment (F) coincide with first differences of other informality estimates. Survey-based estimates are interpolated to fill gaps in data series.

FIGURE 2.7 Volatility of formal and informal economies, 1990-2018

Formal and informal output and employment are significantly more volatile in EMDEs than in advanced economies, possibly reflecting larger shocks to, or less resilience to shocks in, EMDEs.



Source: World Bank.

Note: Data are for the period 1990-2018. DGE = dynamic general equilibrium model; MIMIC = multiple indicators and multiple causes model. Formal output is captured by official GDP, while informal output uses DGE-based or MIMIC-based estimates. "Total employment" is the sum of formal employment and self-employment. Volatility shows the standard deviations (SDs) of the concerning variables' annual growth rates. *** indicates significant differences at 5 percent level between advanced economies and emerging market and developing economies (EMDEs).

Volatility in EMDEs and in advanced economies. Formal and informal output and employment are significantly more volatile in EMDEs than in advanced economies, possibly reflecting larger shocks, or lesser resilience to shocks, in EMDEs (figure 2.7; table 2.4; Aguiar and Gopinath 2007; Neumeyer and Perri 2005; Restrepo-Echavarría 2014).¹⁹ In addition, in both EMDEs and advanced economies, self-employment is somewhat more volatile than formal employment (that is total employment excluding self-employment), perhaps reflecting greater rigidity in the formal labor market (Djankov and Ramalho 2009).

Informal-economy business cycles

Dating informal business cycles. Formal and informal business cycles were identified using the commonly used algorithm of Harding and Pagan (2002). Business cycle turning points are years in which output peaks or troughs. When there are several peaks or troughs within a five-year interval, the deepest trough or steepest peak was used. A recession is defined as the period from peak to trough, whereas an expansion is the converse, the period from trough to peak. A recovery, the early part of an expansion, is defined as the period during which output rebounds from the trough to its pre-recession peak. The main characteristics of the recession and recovery phases, including duration, amplitude, and slope, are defined as in Claessens, Kose, and Terrones (2012; annex 2A). Following Kose, Otrok, and Whiteman (2003), employment was logged, first differenced and demeaned to remove trend employment growth.

¹⁹ Detailed results on the volatility of formal and informal economies are presented in table 2.4.

The results are in line with earlier studies (Bajada 2003; Birinci and Elgin 2013) of informal business cycle recessions and expansions in advanced economies.²⁰ In contrast to these studies, however, the main focus here is on recessions and recoveries. Since recoveries are the early parts of expansions, they reflect more of an economy's short-term cyclical movements rather than its long-term growth path.

Output movements through informal-economy business cycles. Neither recessions nor recoveries in the informal economy differ statistically significantly from those in the formal economy (figure 2.8; tables 2.5.A and 2.5.B). The duration of both formal- and informal-economy recoveries was slightly longer than formal- and informal-economy recessions in EMDEs but not in advanced economies.²¹ The speed of recessions resembled that of recoveries in both formal and informal economies. As for formal economies, informal-economy recessions were steeper and informal economy recoveries were stronger in EMDEs than in advanced economies. As a result, output and employment in EMDEs tended to be more volatile than in advanced economies—a feature well documented in the literature (Aguiar and Gopinath 2007). One of the reasons could be the tendency for fiscal policy to be procyclical in EMDEs, exacerbating the underlying business cycle (Frankel, Végh, Vuletin 2013).

- *Recessions.* The average DGE-based informal economy recession lasted 1.5 years, with a GDP contraction, on average, of 3.5 percent per year, 5.2 percent from peak to trough, and 5.7 percent cumulatively—broadly in line with formal economy recessions.²² Both formal-economy and informal-economy recessions were significantly shallower in advanced economies than in EMDEs.
- *Recoveries.* On average, output in both formal and informal economies took about 2 years to return to their pre-recession peaks, expanding by 2–6 percent in the first year and by 2–5 percent per year during the entire recovery phase.²³ Like formal-economy recoveries, informal-economy recoveries were significantly shallower in advanced economies than in EMDEs.

Informal employment during informal-economy business cycles. Informal employment, proxied by self-employment, in both advanced economies and EMDEs was broadly stable in informal recessions as well as recoveries. This finding applies to both formal and informal economy business cycles (figure 2.9; table 2.6.A). This may be because wage movements or changes in work intensity (measured as number of hours

²⁰ A comparison between findings here and former studies will be provided upon request.

²¹ The differences in durations between recessions and recoveries are not significant for EMDEs when using MIMIC-based estimates.

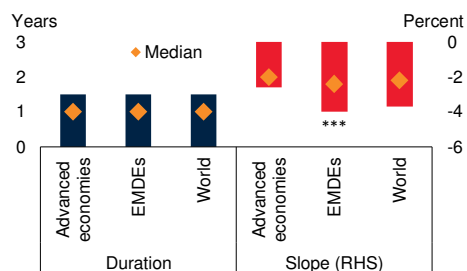
²² The recessions of MIMIC-based informal output are slightly shallower and more prolonged than those of formal output and DGE-based informal output (tables 2.5.A and 2.5.B). The slightly shallower recessions of MIMIC-based informal output could be due to the slow-moving institutional measures embedded in MIMIC's estimation methods (for example, government effectiveness).

²³ MIMIC-based informal recoveries were significantly shorter, occurred less frequently, and were less pronounced than DGE-based informal recoveries and formal recoveries.

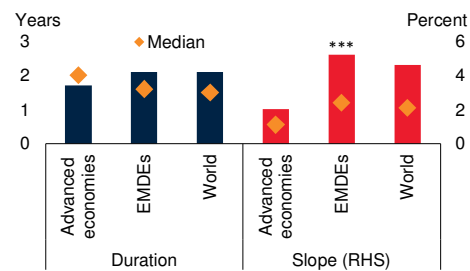
FIGURE 2.8 Cyclical features of formal and informal business cycles

In most cases, informal-economy recessions and recoveries do not differ statistically significantly from formal-economy recessions and recoveries. Meanwhile, both formal- and informal-economy recessions and recoveries are less pronounced in advanced economies than in EMDEs.

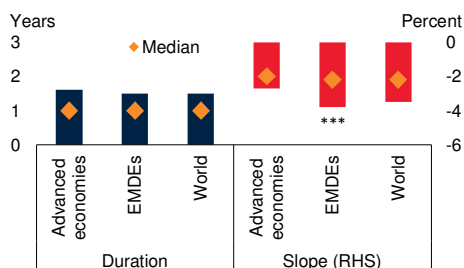
A. Recessions in formal output



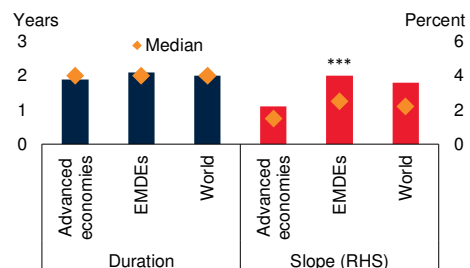
B. Recoveries in formal output



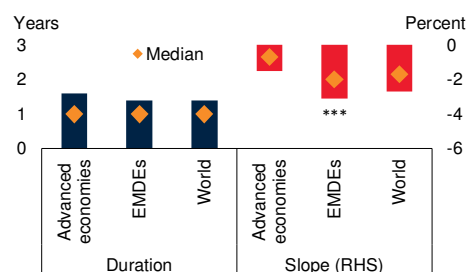
C. Recessions in DGE-based informal output



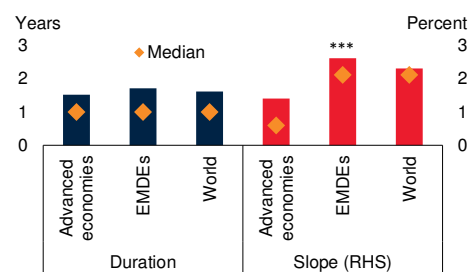
D. Recoveries in DGE-based informal output



E. Recessions in MIMIC-based informal output



F. Recoveries in MIMIC-based informal output



Source: World Bank.

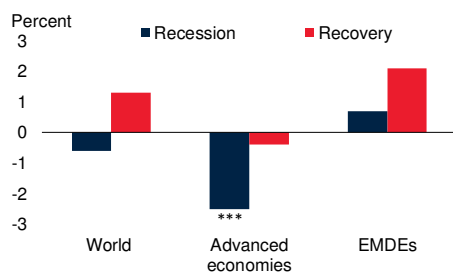
Note: Data for recession (recovery) episodes starting and ending in the period 1990-2018. Business cycle turning points determined on the basis of formal and informal GDP levels (that is, official GDP statistics for formal output, and DGE and MIMIC estimates for informal output) using the algorithm of Harding and Pagan (2002). DGE = dynamic general equilibrium model; MIMIC = multiple indicators and multiple causes model. Recession is defined as the phase from peak to trough, while recovery is defined as the phase from the trough in output to its peak level before the recession (Claessens, Kose, and Terrones 2012). The "duration" captures the period from peak to trough for a recession, and the period it takes for output to return to its pre-trough peak for a recovery. The "amplitude" of a recession measures the change in output from a peak to the next trough. The amplitude of a recovery measures the change in output during the first year of an expansion, which is the period between a trough and its following peak. EMDEs = emerging market and developing economies.

A-F. Bars show simple group means and diamonds show group medians. *** implies that differences between advanced economies and EMDEs are significant at 10 percent level.

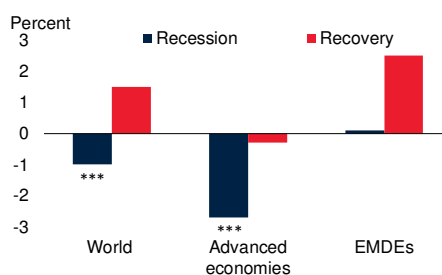
FIGURE 2.9 Employment changes during formal and informal business cycles

Total and formal employment contracted significantly during formal economy recessions in advanced economies but remained largely stable in emerging market and developing economies (EMDEs). Self-employment in both advanced economies and EMDEs did not change significantly in either recessions or recoveries. The lack of response was found in cycles in both formal and informal economies.

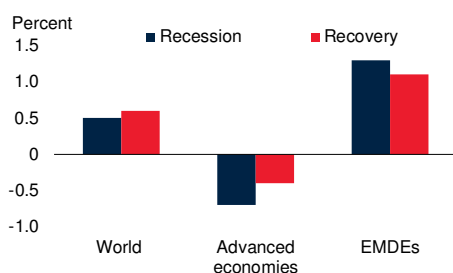
A. Changes in total employment during formal business cycles



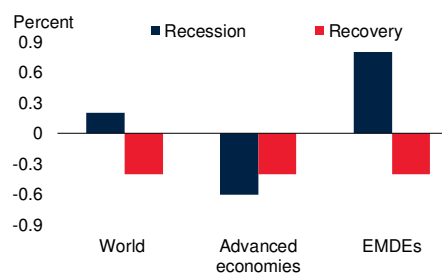
B. Changes in formal employment during formal business cycles



C. Changes in self-employment during formal business cycles



D. Changes in self-employment during informal business cycles



Source: World Bank.

Note: Data for the period 1990-2018. Business cycle turning points determined based on formal and informal GDP levels (that is, official GDP statistics for formal output and DGE-based estimates for informal output) using the algorithm of Harding and Pagan (2002). Recession is defined as the phase from peak to trough, while recovery is defined as the phase from the trough in output to its peak level before the recession (Claessens, Kose, and Terrones 2012). DGE = dynamic general equilibrium model; EMDEs = emerging market and developing economies.

A.-D. Bars show simple group means of overall changes in employment during business cycle phases. *** implies that numbers that significantly differ from zero at 10 percent significance level. EMDEs with poor statistical capacity and three outliers (Democratic Republic of Congo, Gabon, and Zimbabwe) were dropped.

worked per day) bore the brunt of the adjustment in labor markets during business cycles (Guriev, Speciale, and Tuccio 2019; Meghir, Narita, and Robin 2015).

Formal and total employment during formal-economy business cycles. Total and formal employment in advanced economies behaved significantly differently from in EMDEs during formal economy recessions and recoveries (tables 2.6.A and 2.6.B). Both total and formal employment contracted significantly (by 2.5 and 2.7 percent, respectively) in advanced economies during formal economy recessions, while neither

total nor formal employment fell significantly in EMDEs. Employment changes during formal-economy recoveries were insignificant in both advanced economies and EMDEs. The lack of significant responses in employment during formal economy recoveries suggests delayed responses in the labor market and the emergence of “jobless” recoveries in recent decades (Farbar 2012; Hall 2005; Shimer 2010 and 2012).

Conclusion

The compilation of a comprehensive database of model-based and survey-based estimates of informal economic activity provides a rich set of measures available for cross-country analysis and a more limited set of measures available for time-series or panel analysis. Among all the measures, DGE-based estimates and survey-based estimates of self-employment stand out in their cross-country and year coverage. In contrast, survey-based measures of perceptions tend to be highly stable over time and, therefore, are mainly useful for cross-country comparisons. Lastly, for cross-country analyses of narrowly-defined questions, measures from labor, firm, and household surveys may be more suitable, especially when surveys are done consistently.

Two applications of the constructed database are illustrated in this chapter. First, using the widest possible range of measures, the chapter illustrates the broad-based and steady decline in the shares of informal output and employment since 1990. Three somewhat distinct aspects of informality are identified: output, employment, and perceptions. Cross-country rankings of informal output or employment are typically consistent with each other while varying over time.

Second, the chapter documents that informal economies experience business cycles just as formal economies do. Like formal-economy output cycles, informal-economy output cycles tend to be shallower in advanced economies than in EMDEs. Informal employment tends to behave acyclically in EMDEs and advanced economies, largely invariant to both output recessions and recoveries. In contrast to distinct cyclical movements in informal output, perceptions of the scale of informality shown by surveys are highly persistent.

Several possible areas for further research are worth noting. First, the limitations and weaknesses of all existing measures of informality remain, despite the richness of the database compiled here. More work is needed to improve the quality of existing measures and to explore new approaches to better capture the extent of informality in EMDEs. Second, the chapter distills the main features of informal economy business cycles. It does not look into the factors and policies that could affect informal economy business cycles. Further analyses in this direction would be valuable.

ANNEX 2A Estimation methodologies

The following section describes the estimation methodologies for concerning informality measures. Detailed data description is listed in table 2.7.

The multiple indicators multiple causes model (MIMIC model)

To estimate the size of the informal sector in percent of official GDP with the MIMIC model, this study closely follows Schneider, Buehn, and Montenegro (2010) and includes six causes and three indicators used in their study.²⁴ The six cause variables used are: 1) size of government (general government final consumption expenditure as a percent of GDP, from UN spliced with WDI); 2) share of direct taxation (direct taxes in percent of overall taxation, WDI); 3) fiscal freedom index from Heritage Foundation; 4) business freedom index from Heritage Foundation; 5) the unemployment rate and GDP per capita to capture the state of the economy (WDI, the latter is spliced with WEO); and 6) government effectiveness (Worldwide Governance Indicators). The three indicator variables include: 1) growth rate of GDP per capita (WDI, spliced with WEO); 2) the labor force participation rate (people over 15 economically active in percent of population, WDI, spliced with Haver Analytics), and 3) currency as a ratio of M0 (currency outside the banks) over M1 (IMF IFS and Haver Analytics).

The estimation results are shown in table 2.8. The model specification that ensures maximum data coverage, which is shown in column 5 of table 2.8, is used to generate the MIMIC index of the share of informal output relative to official GDP ($\tilde{\eta}_t$). Then an additional benchmarking procedure is carried out where t is converted into absolute values of the informal sector ($\hat{\eta}_t$) using the following equation:²⁵

$$\hat{\eta}_t = \frac{\tilde{\eta}_t}{\tilde{\eta}_{2000}} \eta_{2000}^*, \quad (1)$$

where t denotes year, $\tilde{\eta}_{2000}$ is the value of the estimated index in the base year 2000, and η_{2000}^* is the exogenous estimate (base value) of the shadow economies in 2000. While the estimates ($\tilde{\eta}_t$) determine the movement of the absolute values of the informal sector over time, the base values η_{2000}^* decide the rankings of the countries' informal sector within the sample in year 2000. The base values η_{2000}^* are taken from Schneider (2007) or, for another 10 economies, from Schneider, Buehn, and Montenegro (2010).

The dynamic general equilibrium model (DGE)

In the model of Elgin and Oztunali (2012), an infinitely lived representative household is endowed with K_0 units of productive capital and a total of $H_t > 0$ units of time. The

²⁴ MIMIC is a type of Structural Equation Model (SEM). The estimation of a SEM with latent variables can be done by means of LISREL (used by Schneider, Buehn, and Montenegro 2010), SPSS, and Stata. Here, Stata is used.

²⁵ Calibration is performed separately for each country. Following Schneider, Buehn, and Montenegro (2010), the MIMIC index has been adjusted to the positive range by adding a positive constant.

household has access to two productive technologies, denoted formal and informal, and maximizes its lifetime utility by solving the following optimization problem:

$$\max_{\{C_t, I_t, K_{t+1}, N_{Ft}, N_{It}\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t U(C_t)$$

$$s.t. \quad C_t + I_t = (1 - \tau_t) A_{Ft} K_t^\alpha N_{Ft}^{1-\alpha} + A_{It} N_{It}^\gamma \quad (2)$$

$$K_{t+1} = I_t + (1 - \delta) K_t \quad (3)$$

$$N_{It} + N_{Ft} = H_t \quad (4)$$

$\beta < 1$ is a discount factor and the instantaneous utility function $U(\cdot)$ is strictly increasing and strictly concave. Eq(2) defines the household's resource feasibility constraint: the sum of consumption C_t and investment I_t should equal the amount produced using the formal and informal technologies. The right-hand side of Eq(2) shows that the formal technology (A_{Ft}) follows a standard Cobb-Douglas specification and is exclusive to the formal sector. K_t is the household's capital stock while N_{Ft} is the number of hours the household devotes to the formal sector. τ_t captures the tax rate imposed on formal output. Informal output depends on the number of hours the household devotes to the informal sector, N_{It} , and its technology, A_{It} .²⁶

The rest of the household's problem is standard: Eq(3) specifies the law of motion for capital, where $\delta \in [0; 1]$ is the depreciation rate. Eq(4) is the household's time constraint. In this simple model, the government's policy τ_t is assumed to be exogenously given and the tax revenue is assumed to be used to finance an exogenous stream of government spending, G_t . Then, given the government policy variable tax burden, $\{\tau_t\}$ a competitive equilibrium of the two-sector model is a set of sequences $\{C_t, I_t, K_{t+1}, N_{Ft}, G_t\}_{t=0}^{\infty}$ that maximize the expected utility from consumption, which is $\sum_{t=0}^{\infty} \beta^t U(C_t)$.

The model provides a mapping between the formal economy and informal economy in a dynamic setting. The two key equilibrium conditions are the equilibrium condition that connects the formal and informal economy through labor allocation, and the equilibrium condition that captures the intertemporal substitution. The calibration and data construction processes rely on these two conditions to estimate the ratio, $\frac{Y_{It}}{Y_{Ft}}$, which can be further expressed as $\frac{A_{It} N_{It}^\gamma}{A_{Ft} K_t^\alpha N_{Ft}^{1-\alpha}}$.

The calibration follows Elgin and Oztunali (2012) and takes parameter values suggested by the earlier literature (for example, Ihrig and Moe 2004).²⁷ α is assumed to be equal to 0.36, and γ takes the value of 0.425. Data are gathered from PWT 9.1 for capital stock (K_t), private consumption (C_t), formal employment (N_{Ft}), depreciation rates (δ , country averages), and tax rates (τ_t). By matching the productivity in the informal sector to the

²⁶ The model also assumes no cost for hiding income, that the government cannot enforce payment of taxes, and the household will attempt to hide any income received from the informal sector.

²⁷ Elgin and Oztunali (2012) are not using the model to do a full calibration exercise (where each equilibrium condition is satisfied for every period). Since only two of the equilibrium conditions are utilized, stationarity of empirical data for calibration is a lesser concern. Their approach is followed here.

informal economy size in 2007 of the series reported in Schneider, Buehn, and Montenegro (2010) and assuming that A_{It} grows at the average growth rate of K_t and A_{Ft} ,²⁸ the DGE estimates are computed for 158 economies over the period 1950-2018.

The estimation results are qualitatively robust to different model specifications like using alternative values for δ , α , γ , or adding labor-leisure choice, tax enforcement parameter to informal sector income. See Elgin and Oztunali (2012) for details.

Labor-related measures of Informality

Several cross-country databases report the survey-based estimates on the share of self-employment in total employment:²⁹ 1) the 2016 World Development Indicators (World Bank 2016), which cover 175 economies from 1980 (mainly from 1990s) to 2014; 2) the International Labour Organization (2016), which covers 109 economies from 1997 to 2014; and 3) aPeOECD (updated in 2016, 2018, and 2020), which covers 34 OECD countries from 1955 to 2018. When regarding employment outside the formal sector and informal employment, ILO compiled statistics for up to 76 middle- and low-income countries for 1999-2018.

For a comprehensive dataset on labor-related measures on informality, we combine the cross-country databases, provided by WDI, ILO, and OECD, and gather additional data from the national statistical bureaus (offices), Haver Analytics, the disclosed Living Standards Measurement Studies (LSMS, World Bank), and spliced data from IADB and Eurostat to fill some gaps in years. Data priority is first given to cross-country databases (World Bank, ILO, and OECD) and then national statistical bureaus (offices), Haver Analytics, and LSMS, followed by estimates obtained from previous studies, IADB and Eurostat. IADB reports the share of self-employment in total employment (15-64 years old) for 19 Latin American economies between 1990 and 2018, while Eurostat reports the same measure for 29 EU economies and 5 non-EU economies for the period 1983-2018. By focusing on employment of the 15-64 years old groups, their data are systematically lower than those from other cross-country databases. The final step adds 105 more observations to the sample (3 percent of the full sample).

The national statistical bureaus (offices) that provided data or were contacted are: Angola, Argentina, Azerbaijan, The Bahamas, Bahrain, Belarus, Belize, Benin, Bhutan, Bosnia and Herzegovina, Botswana, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Central African Republic, Chad, China, Comoros, Croatia, Cyprus, Democratic Republic of Congo, Republic of Congo, Arab

²⁸ This assumption implies that growth in the formal sector can spill over to the informal sector via capital accumulation and technological diffusion.

²⁹ Both ILO and WDI only report model-based estimates from 2018 onward, which may suffer from caveats such as strong economic assumptions and reliance on other studies' independent estimates to do the benchmarking. Due to the issues related with model-based estimates, historical WDI and ILO reports are collected to obtain survey-based estimates. The model-based estimates from ILO and WDI were used to update the share of self-employment when no other source of information is available.

Republic of Egypt, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Guinea, Guinea-Bissau, Guyana, Haiti, Islamic Republic of Iran, Jamaica, Jordan, Kenya, Kuwait, Kyrgyz Republic, Lao People's Democratic Republic, Latvia, Lebanon, Libya, Lithuania, Malawi, Maldives, Malta, Mauritania, Moldova, Morocco, Mozambique, Myanmar, Nepal, Niger, Nigeria, North Macedonia, Oman, Papua New Guinea, Qatar, Romania, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Sudan, Suriname, Swaziland, Syrian Arab Republic, Tajikistan, Tanzania, Togo, Trinidad and Tobago, Tunisia, United Arab Emirates, República Bolivariana de Venezuela, Vietnam, and Republic of Yemen.

Dating informal business cycles

Identifying turning points. Following Claessens, Kose, and Terrones (2012), Berge and Jorda (2011), and Harding and Pagan (2002), the Bry and Boschan (1971)'s algorithm is applied to date the business cycles of formal and informal sectors. Peaks (troughs) are defined as occurring at time t whenever $\{\Delta y_t > (<) 0, \Delta y_{t+1} < (>) 0\}$. As the censoring rule, if there are additional peaks/troughs within a 5-year period around a peak, the one with the deepest contraction/expansion is picked. When calculating characteristics of business cycles, the closest peaks (troughs) before troughs (peaks) are used when there are several peaks (troughs) in a row.

Characteristics of business cycle phases. The main characteristics of the recession and recovery phases, including duration, amplitude, and slope, are defined as in Claessens, Kose, and Terrones (2012):

- The *duration* captures, for a recession, the period from peak to trough and, for a recovery, the period it takes for output to return to its pre-trough peak.
- The *amplitude* of a recession measures the change in output from a peak to the next trough. The amplitude of a recovery measures the change in output during the first year of an expansion, which is the period between a trough and its following peak.
- The *slope* measures the speed of a given cyclical phase. It is defined as the ratio of amplitude over duration for a recession phase and the ratio of the change from the trough to the last peak divided by the duration for a recovery phase.

For recessions only, another widely used measure, cumulative loss, is calculated. It captures the overall cost of a recession. The cumulative loss is defined as the difference between the sum of annual changes in output and half of the amplitude during a recession.

TABLE 2.1.A Summary statistics

Estimation method	Aspect	Measures	# of obs	# of Econ.	Time period	Mean	Median	Min	Max	
Indirect	Output (a)	DGE (percent of GDP)	4,540	158	1990-2018	31.8	31.6	8.0	67.7	
		MIMIC (percent of GDP)	4,150	160	1993-2018	33.3	33.5	8.1	69.3	
Direct (survey-based)	Labor force surveys	Pension coverage (percent of labor force)	359	135	1990-2010	44.4	36.0	1.1	99.0	
		Self-employment (percent of total employment)	2,711	179	1990-2018	31.0	25.8	0.0	95.5	
		Informal employment (percent of total employment)	369	72	2000-2018	64.7	67.9	18.9	99.7	
		Employment outside the formal sector (percent of total emp.)	386	76	1999-2018	55.4	56.4	9.8	95.7	
	Firm surveys	Perception	WEF (1-7; 7 = most informal)	1,548	154	2008-2018	3.7	3.8	1.4	6.6
			WB: Percent of firms competing against informal firms	248	140	2006-2018	55.7	57.4	7.2	95.2
Household surveys	Perception	WB: Percent of firms formally registered when founded	233	138	2006-2018	89.0	91.3	29.1	100.0	
		WB: Number of years operated without registration	233	138	2006-2018	0.7	0.5	0.0	6.8	
Household surveys	(b)	WB: Percent of firms that found competitors in the informal sector as a constraint	249	139	2006-2018	30.0	29.2	0.0	76.0	
		WVS: Cheating on taxes (justifiable)	200	94	1994-2010	2.3	2.1	1.0	4.7	

Sources: World Bank (Enterprise Surveys); World Economic Forum; World Values Survey.

Note: Data for the period 1990-2018. DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; MIMIC = multiple indicators multiple causes model-based estimates on informal output in percent of GDP. World Values Survey (WVS) asks whether cheating on taxes is justifiable (1 is "never justifiable" and 10 is "always justifiable") and reports average responses at the country-year level, with a higher level suggesting that the country is more tolerant toward the informal sector. World Economic Forum (WEF) asks, "In your country, how much economic activity do you estimate to be undeclared or unregistered?" (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered) and reports average responses at the country-year level. Here, the average responses have been reordered to make "7 = Most economic activity is undeclared or unregistered; 1 = Most economic activity is declared or registered," where a higher level suggesting a larger informal sector in the country. WB shows the results for World Bank Enterprise Surveys. (a) stands for "Output" and (b) stands for "Opinions/Tax Morality." Since the data on self-employment for Equatorial Guinea is only for year 1989, the data on self-employment are available for 179 economies (instead of 180 economies) here.

TABLE 2.1.B Summary statistics by country groupings

	World			AEs			EMDEs		
	Mean	Median	Mean	Mean	Median	Mean	Mean	Median	Mean
Output									
DGE (percent of GDP)	31.8	31.6	18.7	17.2	35.7	36.0			
MIMIC (percent of GDP)	33.3	33.5	19.3	18.2	37.3	36.8			
Employment									
Pension coverage (percent of labor force)	44.4	36.0	86.5	90.0	30.5	24.0			
Self-employment (percent of total employment)	31.0	25.8	15.7	13.9	39.4	37.1			
Informal employment (percent of total employment)	64.7	67.9			64.7	67.9			
Employment outside the formal sector (percent of total employment)	55.4	56.4			55.4	56.4			
Perception									
WEF (1-7; 7 = most informal)	3.7	3.8	2.7	2.6	4.1	4.2			
WB: Percent of firms competing against informal firms	55.7	57.4	35.8	35.0	57.0	59.7			
WB: Percent of firms formally registered when founded	89.0	91.3	98.1	98.4	88.4	91.0			
WB: Number of years operated without registration	0.8	0.5	0.2	0.1	0.8	0.6			
WB: Percent of firms that found competitors in the informal sector as a constraint	30.0	29.2	18.1	17.7	30.7	29.9			
WVS: WVS: Cheating on taxes (justifiable)	2.3	2.1	2.2	2.1	2.3	2.1			

Source: World Economic Forum; World Bank (Enterprise Surveys); World Values Survey.

Note: Data for the period 1990-2018. AEs = advanced economies; DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; EMDEs = emerging market and developing economies; MIMIC = multiple indicators multiple causes model-based estimates of informal output in percent of GDP. World Values Survey (WVS) asks whether cheating on taxes is justifiable (1 is "never justifiable" and 10 is "always justifiable") and reports average responses at the country-year level, with a higher level suggesting that the country is more tolerant toward the informal sector. World Economic Forum (WEF) asks "in your country, how much economic activity do you estimate to be undeclared or unregistered? (1= Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered)" and reports average responses at the country-year level. Here, the average responses have been reordered to make "7= Most economic activity is undeclared or unregistered; 1 = Most economic activity is declared or registered" where a higher level suggesting a larger informal sector in the country. WB shows the results for World Bank Enterprise Surveys. Detailed information is listed in table 2.1.A. Country groupings follow the method used by World Bank (2020).

TABLE 2.2 Spearman rank correlations (across countries within individual years)

	DGE	MIMIC	PENSION	SEMP	IF_EMP	EMP_NF	WEF	WB1	WB2	WB3	WB4	WVS
Output												
DGE (percent of GDP)	1											
MIMIC (percent of GDP)	0.98***	1										
Employment												
Pension coverage (percent of labor force)	-0.60***	-0.60***										
Self-employment (percent of total employment)	0.64***	0.62***	-0.86***	1								
Informal employment (percent of total employment)	0.27*	0.31**	-0.86***	0.83**	1							
Employment outside the formal sector (percent of total emp.)	0.20	0.25	-0.60	0.77***	0.94***	1						
Perception												
WEF (1-7; 7 = most informal)	0.67***	0.70***	-0.47***	0.68***	0.54***	0.50***	1					
WB: Percent of firms competing against informal firms	0.40***	0.40***	-0.07	0.33***	0.38*	0.36	0.56***	1				
WB: Percent of firms formally registered when founded	-0.28**	-0.29**	0.67***	-0.54***	-0.53***	-0.57***	-0.54***	-0.60***	1			
WB: Number of years operated without registration	0.28**	0.28**	-0.30	0.40***	0.23	0.31*	0.41***	0.38***	-0.72***	1		
WB: Percent of firms that found competitors in the informal sector as a constraint	0.40***	0.33***	0.08	0.19*	0.28	0.32*	0.51***	0.77***	-0.36***	0.26*	1	
WVS: WVS: Cheating on taxes (justifiable)	0.20	0.27*	0.31*	-0.21	-0.2	-0.26	0.11	-0.21	0.33	-0.12	-0.21	1

Source: World Economic Forum; World Bank (Enterprise Surveys); World Values Survey.

Note: Data for the period 1990-2018. Medians of rank correlation of data across countries within each year. All survey-based measures are interpolated. DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; MIMIC = multiple indicators model-based estimates on informal output in percent of GDP; PENSION = pension coverage in percent of labor force; SEMP = self-employment in percent of total employment; IF_EMP = informal employment in percent of total employment; EMP_NF = employment outside the formal sector in percent of total employment; World Values Survey (WVS) asks whether cheating on taxes is justifiable (1 is "never justifiable" and 10 is "always justifiable") and reports average responses at the country-year level, with a higher level suggesting that the country is more tolerant toward the informal sector. World Economic Forum (WEF) asks, "In your country, how much economic activity do you estimate to be undeclared or unregistered?" (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered)" and reports average responses at the country-year level. Here, the average responses have been reordered to make "7 = Most economic activity is undeclared or unregistered; 1 = Most economic activity is declared or registered" where a higher level suggesting a larger informal sector in the country. "WB" here stands for "World Bank Enterprise Surveys." Detailed information is listed in table 2.1.A. ***, **, *, and 10 percent significance levels.

TABLE 2.3 Coincidence of signs of first-differences

	DGE	MIMIC	w/o PENSION	SEMP	INF_EMP	EMP_NF	WEF	WVS
DGE	100							
MIMIC	56.9	100						
Labor force without pension	53.2	53.5	100					
Self-employment	59.1	58.1	50.0	100				
Informal employment	61.9	59.4	51.4	61.3	100			
Employment outside the formal sector	64.5	57.8	55.0	63.7	82.4	100		
WEF (1-7; 7 = most informal)	50.3	56.2	50.0	50.3	57.9	54.5	100	
WVS: Cheating on taxes (justifiable)	57.8	55.9	42.3	55.1	47.4	50.0	51.1	100

Source: World Bank.

Note: Data for the period 1990-2018. Shares of country-year pairs in which the first difference in the two measures has the same sign are shown. Survey-based estimates are interpolated to fill the gaps in data series. DGE is benchmarked to Schneider, Buehn, and Montenegro (2010). DGE = dynamic general equilibrium model-based estimates of informal output in percent of official GDP; MIMIC = multiple indicators multiple causes model-based estimates on informal output in percent of GDP. w/o PENSION = the share of labor force without pension (that is, 100 minus pension coverage in percent of labor force). SEMP = self-employment in percent of total employment. INF_EMP = informal employment in percent of total employment. EMP_NF = employment outside the formal sector in percent of total employment. World Values Survey (WVS) asks whether cheating on taxes is justifiable (1 is "never justifiable" and 10 is "always justifiable") and reports average responses at the country-year level, with a higher level suggesting that the country is more tolerant towards the informal sector. World Economic Forum (WEF) asks, "In your country, how much economic activity do you estimate to be undeclared or unregistered? (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered)" and reports average responses at the country-year level. Here, the average responses have been reordered to make "7 = Most economic activity is undeclared or unregistered; 1 = Most economic activity is declared or registered" where a higher level suggesting a larger informal sector in the country. WB shows the results for World Bank Enterprise Surveys. Detailed information is listed in table 2.1.A.

TABLE 2.4 Volatility of formal and informal economies

	Output		
	[1]	[2]	[3]
	Formal output	DGE-based informal output	MIMIC-based informal output
World	6.42	5.83***	5.04***
AEs	3.82^	3.89^	2.42****
EMDEs	6.92	6.27***	5.55***
	Employment		
	[4]	[5]	[6]
	Total employment	Formal employment	Self-employment
World	3.46	5.16***	6.69***
AEs	2.05^	2.34****	4.88****
EMDEs	3.84	5.90***	7.31***

Source: World Bank.

Note: Data are for the period 1990-2018. Formal output is captured by official GDP, while informal output uses dynamic general equilibrium (DGE)-based or multiple indicators multiple causes model (MIMIC)-based estimates. Total employment is the sum of formal employment and self-employment. Volatility shows the standard deviations (SDs) of the concerning variables' annual growth rates. *** implies significant differences at 1 percent level in the SDs of the annual growth rates of formal output and those of informal output in row [1]-[3] (in the SDs of the annual growth rates of total employment and those of formal/self-employment in row [4]-[6]). The shaded areas indicate that the SDs of the annual growth rates of DGE-based informal output (formal employment) significantly differ from those of MIMIC-based informal output (self-employment). ^ indicates significant differences at 5 percent level between advanced economies (AEs) and emerging market and developing economies (EMDEs).

TABLE 2.5.A Cyclical features of recessions in formal and informal economy

Formal Output					
	# of observations	Duration (years)	Amplitude (percent)	Cumulative loss (percent)	Slope (percent)
World	307	1.5 [1.0]	-5.6 [-3.1]	-6.5 [-1.8]	-3.7 [-2.2]
AEs	72	1.5 [1.0]	-4.0* [-2.4]**	-4.0 [-1.4]*	-2.6** [-2.0]
EMDEs	235	1.5 [1.0]	-6.0 [-3.1]	-7.3 [-2.0]	-4.0 [-2.4]
DGE-based Informal Output					
	# of observations	Duration (years)	Amplitude (percent)	Cumulative loss (percent)	Slope (percent)
World	336	1.5 [1.0]	-5.2 [-2.9]	-5.7 [-1.8]	-3.5 [-2.2]
AEs	87	1.6 [1.0]**	-4.2 [-2.7]	-4.8 [-1.6]	-2.7** [-2.0]
EMDEs	249	1.5 [1.0]	-5.6 [-3.2]	-6.1 [-1.9]	-3.8 [-2.2]
MIMIC-based Informal Output					
	# of observations	Duration (years)	Amplitude (percent)	Cumulative loss (percent)	Slope (percent)
World	155	1.4 [1.0]	-4.2 [-2.1]	-5.6 [-1.1]	-2.7 [-1.7]
AEs	44	1.6 [1.0]	-2.7* [-0.7]**	-3.1 [-0.4]***	-1.5*** [-0.7]***
EMDEs	111	1.4 [1.0]	-4.7 [-2.4]	-6.4 [-1.3]	-3.1 [-2.0]

Source: World Bank.

Note: Data for recession episodes starting and ending in the period 1990-2018. Business cycle turning points determined based on formal and informal GDP levels (that is, official GDP statistics for formal output, dynamic general equilibrium (DGE)-based and multiple indicators multiple causes model (MIMIC)-based estimates for informal output) using the algorithm of Harding and Pagan (2002). Recession is defined as the phase from peak to trough while its corresponding "Duration," "Amplitude," "Cumulative loss," and "Slope" are defined as in Claessens, Kose, and Terrones (2012). All statistics correspond to sample means. Medians are in brackets. Asterisks refer to the significant differences in means (or medians) between advanced economies (AEs) and emerging market and developing economies (EMDEs). ***, **, * denote significance at the 1, 5, and 10 percent significance levels. Differences between informal and formal economies that are significant at 10 percent level are highlighted in shaded gray.

TABLE 2.5.B Cyclical features of recoveries in formal and informal economy

Formal Output				
	# of observations	Duration (years)	Amplitude (percent)	Slope (percent)
World	194	2.1 [1.5]	5.4 [3.3]	4.6 [2.1]
AEs	37	1.7 [2.0]	2.7** [2.3]**	2.0* [1.1]**
EMDEs	157	2.1 [1.6]	6.1 [3.6]	5.2 [2.4]
DGE-based Informal Output				
	# of observations	Duration (years)	Amplitude (percent)	Slope (percent)
World	236	2.0 [2.0]	4.1 [3.1]	3.6 [2.2]
AEs	58	1.9 [2.0]	2.4*** [1.8]***	2.2** [1.5]***
EMDEs	178	2.1 [2.0]	4.7 [3.7]	4.0 [2.5]
MIMIC-based Informal Output				
	# of observations	Duration (years)	Amplitude (percent)	Slope (percent)
World	87	1.6 [1.0]	3.5 [3.0]	2.3 [2.1]
AEs	22	1.5 [1.0]	1.9*** [1.7]***	1.4* [0.6]***
EMDEs	65	1.7 [1.0]	4.1 [3.4]	2.6 [2.1]

Source: World Bank.

Note: Data for recovery episodes starting and ending in 1990-2018. MIMIC = multiple indicators multiple causes model; DGE= dynamic general equilibrium model. Business cycle turning points determined based on formal and informal GDP levels (that is, official GDP statistics for formal output, DGE-based and MIMIC-based estimates for informal output) using the algorithm of Harding and Pagan (2002). Recovery is defined as the time it takes for output to rebound from the trough to the peak level before the recession while its corresponding "Duration," "Amplitude," and "Slope," are defined as in Claessens, Kose, and Terrones (2012). All statistics correspond to sample means. Medians are in brackets. Asterisks refer to the significant differences in means (or medians) between advanced economies (AEs) and emerging market and developing economies (EMDEs). ***, **, * denote significance at the 1, 5, and 10 percent significance levels. Differences between informal and formal economies that are significant at 10 percent level are highlighted in shaded gray.

TABLE 2.6.A Informal employment during formal and informal business cycles

	Formal output		DGE-based informal output		MIMIC-based informal output	
	Recession	Recovery	Recession	Recovery	Recession	Recovery
World	0.5 [1.1]	0.6 [0.3]	0.2 [0.7]	-0.4 [0.2]	-0.7 [0.5]	0.9 [0.1]
AEs	-0.7 [-0.2]**	-0.4 [0.03]	-0.6 [-0.3]*	-0.4 [-0.1]	-1.3 [-1.1]**	-0.3 [0.4]
EMDEs	1.3 [2.1]	1.1 [0.9]	0.8 [1.2]	-0.4 [0.2]	-0.3 [1.4]	1.5 [-0.9]

Source: World Bank.

Note: Data for the period 1990-2018. MIMIC = multiple indicators multiple causes model; DGE= dynamic general equilibrium model. Business cycle turning points determined based on formal and informal GDP levels (that is, official GDP statistics for formal output, DGE and MIMIC estimates for informal output) using the algorithm of Harding and Pagan (2002). Recession is defined as the phase from peak to trough while recovery is defined as the time it takes for output to rebound from the trough to the peak level before the recession (Claessens, Kose, and Terrones 2012). Expansion is defined as the period from trough to next peak (Claessens, Kose, and Terrones 2012). All statistics correspond to the sample means of the overall percentage changes in self-employment over the corresponding business cycle phases. Medians are in brackets. EMDEs with poor statistical capacity and three outliers (Democratic Republic of Congo, Gabon, and Zimbabwe) were dropped. Shaded cells represent numbers that significantly differ from zero. Asterisks refer to the significant differences in means (or medians) between advanced economies (AEs) and emerging market and developing economies (EMDEs). ***, **, * denote significance at the 1, 5, and 10 percent significance levels.

TABLE 2.6.B Formal and total employment during formal business cycles

	Total employment		Formal employment	
	Recession	Recovery	Recession	Recovery
World	-0.6 [-0.3]	1.3 [0.6]	-1.0 [-1.0]	1.5 [0.6]
AEs	-2.5*** [-1.4]***	-0.4** [-0.5]***	-2.7*** [-1.6]	-0.3** [-0.3]***
EMDEs	0.7 [1.2]	2.1 [1.6]	0.1 [-0.0]	2.5 [2.1]

Source: World Bank.

Note: Data for the period 1990-2018. Formal employment is proxied by total employment excluding self-employment. Business cycle turning points determined based on official GDP statistics for formal output using the algorithm of Harding and Pagan (2002). Recession is defined as the phase from peak to trough while recovery is defined as the time it takes for output to rebound from the trough to the peak level before the recession (Claessens, Kose, and Terrones 2012). All statistics correspond to the sample means of the overall percentage changes in total (formal) employment over the corresponding business cycle phases. EMDEs with poor statistical capacity and three outliers (Democratic Republic of Congo, Gabon, and Zimbabwe) were dropped. Medians are in brackets. Shaded cells represent numbers that significantly differ from zero. Asterisks refer to the significant differences in means (or medians) between advanced economies (AEs) and emerging market and developing economies (EMDEs). ***, **, * denote significance at the 1, 5, and 10 percent significance levels.

TABLE 2.7 Summary of data coverage

Data	Method	Sources	Measure	# of Ctry	Period	Setup
MIMIC-based informal output	Indirect estimates (MIMIC)	Author's calculations	Size of the informal sector as a percentage of official GDP estimated using the model of Schneider, Buehn, and Montenegro (2010).	160	1993-2018	Balanced panel
DGE-based informal output	Indirect estimates (DGE)	Author's calculations	Size of the informal economy as a percentage of official GDP estimated using the approach of Elgin and Oztunali (2012).	158	1950-2018	Balanced panel
Share of self-employment	Labor force survey and household survey	WDI, ILO, OECD, National Statistical Offices, Eurostat, IADB, Haver Analytics, and LSMS	The share of self-employment in total employment (survey-based estimates).	180	1955-2018	Unbalanced panel
Share of informal employment	Labor force survey and household survey	ILO	The share of informal employment in percent of total employment (harmonized)	72	2000-2018	Repeated cross-sections
Share of employment outside the formal sector	Labor force survey and household survey	ILO	The share of employment outside the formal sector in percent of total employment (harmonized).	76	1999-2018	Unbalanced panel
Pension coverage	Labor force survey and household survey	WDI	The fraction of the labor force that contributes to a retirement pension scheme.	135	1990-2010	Unbalanced panel
World Bank Enterprises Survey	Firm survey	World Bank Enterprise Survey	Four measures on informality: percent of firms competing against unregistered or informal firms, percent of firms formally registered when they started operations in the country, (average) number of years a firm operated without formal registration, and percent of firms identifying practices of competitors in the informal sector as a major constraint.	140	2006-2018	Repeated cross-sections

TABLE 2.7 Summary of data coverage (continued)

Data	Method	Sources	Measure	# of Econ.	Period	Setup
World Economic Forum (Executive Opinion Survey)	Firm survey	World Economic Forum	The extent of informal economy based on the question: "In your country, how much economic activity do you estimate to be undeclared or unregistered? (1 = Most economic activity is undeclared or unregistered; 7 = Most economic activity is declared or registered)."	154	2008-2018	Balanced panel dataset
Informal Market Index (Heritage Foundation)	Firm survey	Heritage Foundation	The subjective perceptions of general compliance with the law, with particular emphasis on the role played by official corruption. The index ranges from 1 to 5 with higher values indicating more informal market activity.	165	1995-2005	Balanced panel dataset
Non-observed activities (percent of GDP)	National account approach	UN (2008)	Non-observed activities (percent of GDP).	44	Various years	Cross-sectional data
The Eurobarometer Survey: Indirect measure of the informal economy	Household surveys and social opinion surveys	The Eurobarometer Survey	Interviewers ask respondents whether he/she has purchased goods or serviced embodied undeclared work or supplied labor in the informal economy. The survey also includes information on whether the respondents receive all or part of their regular salary or the remuneration for extra work or overtime hours as cash-in-hand and without declaring it to tax or social security authorities. Finally, the survey shows whether respondents find informal economic activities acceptable.	27	2007 and 2013	Repeated cross-sections
World Values Survey: Tax morale	Household surveys and social opinion surveys	World Values Survey	Interviewers ask whether respondents can justify cheating on taxes. Detailed descriptions are reported in table 2.9.	94	81-84, 94-98, 99-04, 05-09, 10-14	Repeated cross-sections
European Values Survey: Tax morale	Household surveys and social opinion surveys	European Values Survey	Interviewers ask whether it is justifiable for the respondents or their compatriots to cheat on taxes or pay cash to avoid taxes.	16-47	1981, 1990, 1999, and 2008	Repeated cross-sections
European Social Survey: Indirect measure of the informal economy	Household surveys and social opinion surveys	European Social Survey	Interviewers ask whether respondents paid cash for goods or services with no receipt so as to avoid VAT or taxes over the past five years and whether respondents have a written employment contract.	24	Every two years from 2004-2014	Repeated cross-sections

TABLE 2.8 MIMIC model estimation results (1993-2018)

	[1]	[2]	[3]	[4]	[5]
	88 EMDEs	98 EMDEs	120 economies	151 economies	160 economies
Size of government	0.134*** (0.024)	0.144*** (0.020)	0.149*** (0.022)	0.161*** (0.018)	0.152*** (0.018)
Share of direct taxation	0.016 (0.025)		0.013 (0.020)		
Business freedom	0.047** (0.022)	0.029 (0.018)	0.050** (0.022)		
Fiscal freedom	0.008 (0.024)	-0.018 (0.019)	-0.038 (0.023)		
Unemployment rate	0.077*** (0.024)	0.104*** (0.019)	0.059*** (0.021)	0.073*** (0.018)	0.071*** (0.018)
GDP per capita	-0.311*** (0.034)	-0.239*** (0.026)	-0.348*** (0.029)	-0.327*** (0.021)	-0.334*** (0.021)
Government effectiveness			-0.070*** (0.019)	-0.059*** (0.017)	-0.060*** (0.017)
Growth rate of GDP per capita	-0.679*** (0.119)	-0.738*** (0.105)	-0.421*** (0.079)	-0.312*** (0.060)	-0.298*** (0.060)
Labor force participation rate	-0.297*** (0.089)	-0.222*** (0.084)		-0.194*** (0.053)	-0.166*** (0.052)
Growth rate of labor force			-0.100 (0.066)		
Currency (M0/M1)	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)	1.000 (0.000)
Statistical tests					
RMSEA	0.066	0.054	0.073	0.081	0.082
p(RMSEA<=0.05)	0.027	0.268	0.000	0.000	0.000
Chi ² (p-val)	77.975 (0.000)	61.510 (0.000)	147.337 (0.000)	147.305 (0.000)	154.978 (0.000)
AIC	30360.170	37812.139	46480.999	48963.901	50399.970
BIC	30437.337	37888.618	46568.955	49040.351	50476.798
CFI	0.755	0.827	0.733	0.781	0.773
TLI	0.572	0.689	0.543	0.589	0.574
SRMR	0.034	0.029	0.043	0.042	0.043
CD	0.602	0.930	0.975	1	1
Observations	1,267	1,742	1,803	2,646	2,724

Source: World Bank.

Note: Absolute z-statistics in parentheses. ***, **, * denote significance at the 1, 5, and 10 percent significance levels. All variables are used as their standardized deviations from the mean. Data sources for variables used in the model are listed in Section II footnote 6. Following the MIMIC models' identification rule, the currency (M0/M1) variable is fixed to an a priori value. The currency variable shows the level of money (cash) in circulation. "AIC" = Akaike's information criterion; "BIC" = "Bayesian information criterion; "CD" = coefficient of determination; "CFI" = comparative fit index"; "RMSEA" = root mean square error of approximation; "TLI" = "Tucker Lewis index"; "SRMR" = "standardized root mean square residual." These are goodness-of-fit statistics.

TABLE 2.9 World Values Survey

Survey	Coverage
World Values Survey (WVS)	Questions: “Justifiable: cheating on taxes”. 1 is “never justifiable” and 10 is “always justifiable”
WVS 1981-1984	9 economies, such as: Argentina; Australia; Finland; Japan; Korea, Rep.; Mexico; South Africa; Sweden; United States.
WVS 1989-1993	16 economies, such as: Argentina; Brazil; Belarus; Chile; China; India; Japan; Korea, Rep.; Mexico; Nigeria; Poland; Russian Federation; South Africa; Spain; Switzerland; Turkey.
WVS 1994-1999	52 economies, such as: Albania; Argentina; Armenia; Australia; Azerbaijan; Bangladesh; Bosnia and Herzegovina; Belarus; Bulgaria; Chile; China; Colombia; Croatia; Czech Republic; Dominican Republic; El Salvador; Estonia; Finland; Georgia; Hungary; India; Japan; Korea, Rep.; Latvia; Lithuania; Mexico; Moldova; Montenegro; New Zealand; Nigeria; North Macedonia; Norway; Peru; Philippines; Poland; Puerto Rico; Romania; Russian Federation; Serbia; Slovak Republic; Slovenia; South Africa; Spain; Sweden; Switzerland; Ukraine; United States; Uruguay.
WVS 2000-2004	37 economies, such as: Albania; Algeria; Argentina; Bangladesh; Bosnia and Herzegovina; Canada; Chile; China; Egypt, Arab Rep.; India; Indonesia; Iran, Islamic Rep.; Japan; Jordan; Korea, Rep.; Kyrgyz Republic; Mexico; Moldova; Montenegro; Morocco; Nigeria; North Macedonia; Pakistan; Peru; Philippines; Puerto Rico; Serbia; Singapore; South Africa, Spain; Tanzania; Uganda; United States; Vietnam; Zimbabwe.
WVS 2005-2009	56 economies, such as: Andorra; Argentina; Australia; Brazil; Bulgaria; Burkina Faso; Canada; Chile; China; Colombia; Cyprus; Egypt, Arab Rep.; Ethiopia; Finland; France; Georgia; Germany; Ghana; Guatemala; Hungary; India; Indonesia; Iran, Islamic Rep.; Italy; Japan; Jordan; Korea, Rep.; Malaysia; Mali; Mexico; Moldova; Morocco; Netherlands; New Zealand; Norway; Poland; Romania; Russian Federation; Rwanda; Serbia; Slovenia; South Africa; Spain; Sweden; Switzerland; Thailand; Trinidad and Tobago; Turkey; Ukraine; United Kingdom; United States; Uruguay; Vietnam; Zambia.
WVS 2010-2014	57 economies, such as: Algeria; Argentina; Armenia; Australia; Azerbaijan; Brazil; Belarus; Chile; China; Colombia; Cyprus; Ecuador; Egypt, Arab Rep.; Estonia; Georgia; Ghana; India; Iraq; Japan; Kazakhstan; Jordan; Korea, Rep.; Kuwait; Kyrgyz Republic; Lebanon; Libya; Malaysia; Mexico; Morocco; Netherlands; New Zealand; Nigeria; Pakistan; Peru; Philippines; Poland; Romania; Russian Federation; Rwanda; Singapore; Slovenia; South Africa; Spain; Sweden; Thailand; Trinidad and Tobago; Tunisia; Turkey; Ukraine; United States; Uruguay; Uzbekistan; West Bank and Gaza; Yemen, Rep.; Zimbabwe.

Sources: World Bank; World Values Survey.

Note: See World Value Survey, European Values Survey, and European Social Survey for details.

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