

CHAPTER 6

Tackling Informality: Policy Options

Overcoming the challenges of informal economic activity requires a combination of policies tailored to economy-specific circumstances. In countries where informality is predominantly a reflection of poor governance, an appropriate policy package could streamline regulatory and tax frameworks while improving the efficiency of public revenue collection and regulatory enforcement as well as strengthening public service delivery to bolster tax morale. In countries where informality is predominantly a reflection of underdevelopment, an appropriate policy package could include measures to expand access to finance, markets, and inputs to foster firm productivity and growth; better education to facilitate formal sector employment; and enhanced safety nets to cushion household risks. Several such policy improvements have been associated with sustained declines in informality.

Introduction

Widespread informality is a common policy challenge in emerging market and developing economies (EMDEs). Theoretical models present two major reasons for the emergence of informal economic activity: lack of development (Harris and Todaro 1970; Loayza 2016), and poor governance (de Soto 1989). These two reasons suggest different policy approaches to address informality. The former refers to factors such as an inability of an urban, modern, formal sector to absorb rural migrants; limited financial development to provide finance for formal sectors; and insufficient human capital that prevents workers from finding jobs in the formal sector.¹ The latter refers to factors such as excessively burdensome tax and regulatory frameworks that encourage firms to remain informal, excessive labor regulations that increase the cost of formal employment, and poor governance and regulatory quality that discourage formal participation (chapter 2). The former reason emphasizes the inability to benefit from participating in the formal sector, while the latter emphasizes the costs associated with formal-sector participation.²

Many EMDE governments have implemented a wide range of policy reforms in the past few decades that may have helped to reduce informality (figure 6.1; Jessen and Kluge

Note: This chapter was prepared by Franziska Ohnsorge and Shu Yu. Research assistance was provided by Hrisyana Doytchinova and Lorez Qehaja.

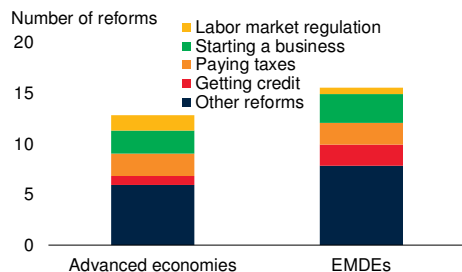
¹ See, for example, Amaral and Quintin (2006); Fields (1975); Harris and Todaro (1970); and Loayza (2016).

² See Loayza (2018); Oviedo, Thomas, and Karakurum-Özdemir (2009); and chapter 2 for a review of costs and benefits associated with formal- (informal)-sector participation and how optimizing participants may choose formality (or informality).

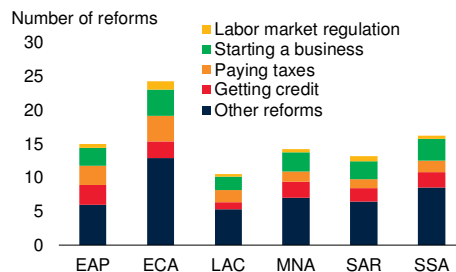
FIGURE 6.1 Policies to address challenges of informality in emerging market and developing economies (EMDEs)

Governments have implemented a wide range of reforms that could affect informality.

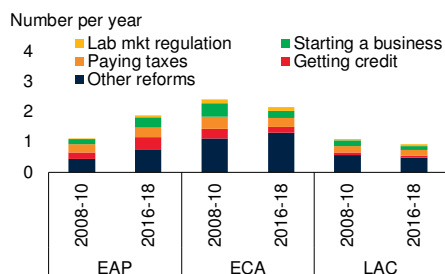
A. Reforms in advanced economies and EMDEs



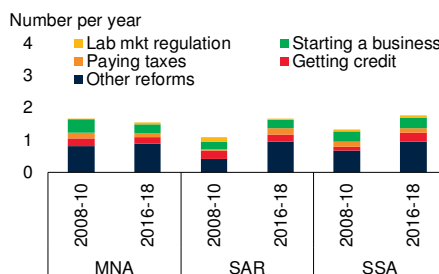
B. Reforms across EMDE regions



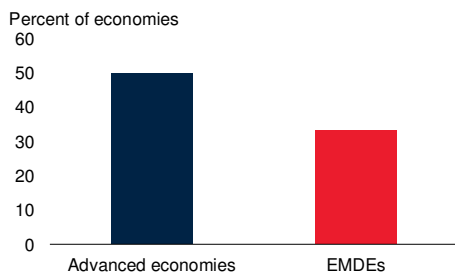
C. Reforms by EMDE region, 2008-18



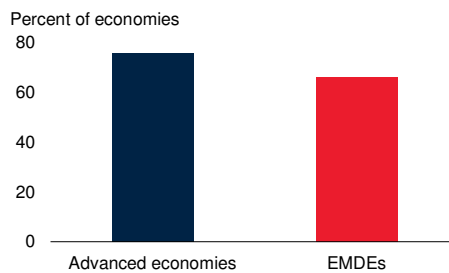
D. Reforms by EMDE region, 2008-18 (continued)



E. Economies with improvement in control of corruption



F. Economies with improvement in the ease of doing business



Sources: International Country Risk Guide (ICRG); World Bank (Doing Business).

Note: See World Bank Doing Business database for reform details. EMDEs = emerging market and developing economies; EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and Caribbean; MNA = Middle East and North Africa; SAR = South Asia; SSA = Sub-Saharan Africa.

A.B. For an average economy, the number of policy reforms that have been implemented after year 2008 and are regarded as "improvement" in the ease of doing business or "neutral" (which only applies to "labor market regulation") by Doing Business 2008-18.

C.D. For an average economy, the average number of policy reforms per year that have been implemented during 2008-10 in comparison to the annual average number of reforms conducted during 2016-18 (shown in bars).

E.F. Bars show the shares of economies with improved control of corruption (the ease of doing business) between 2010 and 2018.

2021).³ These reforms have often been implemented to either increase the benefits of formal-sector participation or reduce the costs of formal activity. For instance, both corporate and personal income tax rates in EMDEs have been reduced, from 37-39 percent on average in the early 1990s to around 24 percent in 2019 (Végh and Vuletin 2015). Time spent on paying taxes was cut by about one-third in EMDEs between 2006 and 2020. Value-added taxes, which can lower tax burdens through a refund on input taxes, had been adopted in 71 EMDEs by 2020 (World Bank 2020a). Access to financial services has broadened, with access to automatic teller machines (ATMs) per 100,000 adults and the share of the population with an account at a financial institution both increasing by more than 50 percent between 2010 and 2018. Over the same period, one-third to two-thirds of EMDEs improved their governance and institutional quality.

A review of past policy reforms indicates that some reforms had unintended consequences for informality. Policy reforms often had more benign effects on informality when they were implemented in a supportive institutional and macroeconomic environment. For instance, trade liberalization programs were often associated with greater informality in the short term—unless they were accompanied by greater labor market flexibility and an upgrading of skills in the labor force (Goldberg and Pavcnik 2003; McCaig and Pavcnik 2015; World Bank 2019 b).

The current pandemic has provided a reminder of the developmental challenges posed by the informal sector. Informal participants have suffered more adverse economic and health consequences from COVID-19 than their formal counterparts (box 2.1). The untapped potential of informal sectors, if harnessed to boost income growth and resilience, can help EMDEs build back better from the severe global recession of 2020. This is especially important against the backdrop of a steady decline in potential growth, the growth an economy can sustain at full employment and capacity, over the past decade as all fundamental drivers of growth weakened (World Bank 2018; World Bank 2020b). Specifically, chapter addresses the following questions:

- Which fiscal measures can help reduce informality?
- Which other policies can help reduce informality?
- What should be the elements of a comprehensive policy package to tackle informality?

Contributions. The chapter makes the following contributions to the literature. First, it offers a systematic review of policies that could affect informality, ranging from fiscal policies to labor market regulations and policies to encourage financial development. It covers both policies that are intentionally designed to encourage formalization and ones that could incidentally affect the informal sector.

³ Some of these reforms had their roots in the “Washington Consensus” (Birdsall, de La Torre, and Caicedo 2010; Naim 1999; Williamson 2000).

BOX 6.1 Financial development and the informal economy

Financial development reduces the costs of accessing external financing and thus incentivizes firms and households to invest, including in higher-productivity projects. It also incentivizes participants of the informal sector to join the formal sector. In emerging market and developing economies (EMDEs) with above-median informality, a significantly larger share of firms rely on internal finance and identify access to finance as a major business obstacle than in EMDEs with below-median informality. Also, in EMDEs with more prevalent informality, a significantly smaller share of households have access to commercial bank branches, automated teller machines (ATMs), and credit. Over the past three decades, growing access to financial services and credit has coincided with a falling share of the informal economy.

Introduction

In recent decades, much research has been devoted to understanding the determinants of informal economic activity, including the role of financial development (Loayza 2018; Ulyssea 2020). Financial development can influence firms' and individuals' choices to engage in informal activity and may also, conversely, be affected by the level of informality (for instance, Capasso and Jappelli 2013; Elgin and Uras 2013; Straub 2005). Easier access to non-cash-based payments—whether via mobile phones, cards, or online—can improve the government's ability to reach and support informal participants during a recession like COVID-19 (Fang, Kennedy, and Resnick 2020; World Bank 2019c).^a

Firms in the informal sector are typically characterized by small scale, low capital-to-labor ratios, lack of investment, a low propensity to implement new, and even high-return, technologies, and unskilled managers (Capasso and Jappelli 2013; Dabla-Norris, Gradstein, and Inchauste 2008; Quintin 2008). By influencing firms' behavior, financial development can encourage capital accumulation and productivity improvements, and thus enhance long-run economic growth, particularly in the presence of informality (Antunes and Cavalcanti 2007).

Against this background, this box addresses the following questions:

- What links between informality and financial development have been identified by the literature?
- How does financial development differ between EMDEs with high and low informality?

Note: This box was prepared by Salvatore Capasso, Franziska Ohnsorge, and Shu Yu.

a. See Fang, Kennedy, and Resnick (2020) for detailed examples.

BOX 6.1 Financial development and the informal economy (continued)

- How has financial development in EMDEs evolved?

The box examines the nexus between financial development and informality both theoretically and empirically. It first provides a short literature review on the channels through which limited financial development can encourage informality, followed by a summary of existing empirical evidence. It then uses both descriptive statistics and regression analysis to show that greater informality is associated with less financial development, and that better access to finance is associated with lower informality. The conclusion offers policy recommendations.

Lessons from the literature

Theoretical models suggest that financial development reduces informality, while the existence of informality could also hinder financial development. Such theoretical findings are supported by empirical studies.

Theoretical models. As informal participants hide all or part of their income and wealth from the authorities, they face high costs of providing collateral or signaling their profitability to lenders and are often credit-rationed (Blackburn, Bose and Capasso 2012; Capasso and Jappelli 2013). The choice of operating formally or informally thus involves a trade-off between higher financial costs, as well as restricted access to public goods, and the benefits of lower tax and regulatory burdens (Franjo, Pouokam, and Turino 2020; Straub 2005). This trade-off can be faced at the level of the firm or household (extensive margin) or at the level of individual transactions within a firm (intensive margin).

Theory predicts that as financial markets develop, the size of the informal sector will decrease. Financial development, which involves innovations ranging from the emergence of new and more efficient monitoring and screening technologies to more intermediated funds, typically reduces the average costs of accessing financial resources and incentivizes firms and entrepreneurs to operate formally. Several mechanisms have been explored.

- *Lower collateral requirements.* By improving screening and monitoring technologies, financial development will tend to reduce the minimum collateral required for borrowing, which will tend to attract entrepreneurs into the formal sector (Straub 2005).
- *Stronger legal enforcement.* By strengthening financial contract enforceability, financial development can lower credit costs, which will also tend to attract entrepreneurs into the formal sector (Amaral and Quintin 2006; Antunes and Cavalcanti 2007; Quintin 2008).

BOX 6.1 Financial development and the informal economy (continued)

- *Expanding pool of formal finance.* By expanding the pool of formal-sector funding, financial development can lower the relative cost of formal finance and attract entrepreneurs into the formal sector (Blackburn, Bose, and Capasso 2012; Capasso and Jappelli 2013).
- *More efficient tax auditing.* Financial development can facilitate the enforcement of tax compliance, which is likely to discourage informal activity (Guo and Hung 2020).

Conversely, some studies point to informality as holding back financial development, through several channels.

- *Tax evasion.* Tax evasion, which is often at the core of informality, erodes government revenue bases. Countries with pervasive tax evasion have often used financial transaction taxes to boost revenues. These taxes increase financial intermediation costs and may slow financial development (Elgin and Uras 2013; Roubini and Sala-i-Martin 1992, 1995).
- *Higher bank monitoring costs.* Where informality is prevalent, the lack of formal, declared incomes and assets may force banks to incur higher screening and monitoring expenses. This raises borrowing costs (Capasso, Monferrà, and Sampagnaro 2015).

Empirical evidence. Several measures of financial development have been found to be statistically significantly associated with smaller informal activity (Bittencourt, Gupta, and Stander 2014; Bose, Capasso, and Wurm 2012; Gatti and Honorati 2008). The empirical association has been robust to different model specifications and estimation methodologies (See table 6.1 for a detailed summary).

- *Firm-level evidence.* Firms that rate financing as a major obstacle to their businesses have, on average, a 16 percent probability of hiding at least 50 percent of their sales, whereas this probability drops below 6 percent for firms that consider financing to be a minor obstacle (Dabla-Norris, Gradstain, and Inchauste 2008). More tax-compliant firms have reported significantly easier access to credit, and this relationship was stronger in more formalized economies (Gatti and Honorati 2008).
- *Household-level evidence.* Italian households reported greater informal activity, especially in the construction sector, in regions with weaker financial development (Capasso and Jappelli 2013).
- *Cross-economy evidence.* Among 137 economies during 1995-2007, both greater efficiency and depth of the banking sector were associated with

BOX 6.1 Financial development and the informal economy (continued)

significantly lower informality (Bose, Capasso, and Wurm 2012). Among 150 economies during 1980-2009, faster broad money growth and a smaller differential between lending and deposit interest rates were associated with statistically significantly smaller informal economies, even when controlling for institutional quality and central bank independence (Bittencourt, Gupta, and Stander 2014).^b

Stylized facts

Firms and workers in the informal sector have less access to credit and financial services in EMDEs with above-median informality than in EMDEs with below-median informality.

Methodology and data. A sample of 122 EMDEs for 1990-2018 (or the latest available year) is split into those with above-median and below-median shares of informality by output (as proxied by the dynamic general equilibrium model-based share of informal output in official GDP) and employment (proxied by the share of self-employment in total employment).^c Financial development is proxied, first, by firms' reported access to bank credit and capital markets, their difficulty in accessing credit and the share of internal finance used in investment. Second, at the household level, financial development is proxied by the number of commercial bank branches, automated teller machines (ATMs), and bank credit as well as account ownership and reported use of mobile payment services. Data are available from World Bank Enterprise Surveys, the World Bank's Global Financial Development Database, and the World Development Indicators. In addition, the International Monetary Fund (IMF)'s Financial Development Index and its sub-components are used as proxies for overall financial development and for development in "financial institutions" and "financial markets".^d Simple averages of the financial development indicators for EMDEs with above-median informality and those with below-median

b. Several studies have found nonlinear relationships between informality and financial development. The impact of financial development on informality is greater in more financially developed economies or when GDP exceeds a certain level (Canh and Thanh 2020; Gharleghi and Jahanshahi 2020) or may even be inverse-U-shaped (Elgin and Uras 2013).

c. The results from output informality and employment informality are largely consistent. This box mainly relies on results from output informality.

d. The "financial markets" development index captures access to, and depth and efficiency of, an economy's stock and debt markets, which is less relevant for informal participants in EMDEs. The "financial institutions" development index measures how developed financial institutions are in terms of their depth (size and liquidity), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues).

BOX 6.1 Financial development and the informal economy (continued)

informality (grouped above) are tested for statistically significant differences. There is no presumption of causality going either from financial development to informality or vice versa.

Firms. Firms in the informal sector have reported more restricted access to credit from the banking sector and capital markets, which limits their ability to invest, including in productivity-enhancing new technologies (Capasso and Jappelli 2013; D’Erasmus 2016; Ferreira-Tiryaki 2008). In the average EMDE with above-median output informality, 36 percent of firms identified access to finance as a major constraint—about 9 percentage points more than in other EMDEs (figure B6.1.1). Firms also rely more on internal finance for operating, starting, or expanding firms in EMDEs with more pervasive informality (Farazi 2014). On average in EMDEs with above-median informality, 75 percent of firms depend on internal finance to invest and 19 percent of firms can utilize bank funds to fulfill their investment needs, compared with 68 percent and 29 percent of firms, respectively, in the average EMDE with below-median informality.

Households. Households in EMDEs with below-median informality have access to significantly more commercial bank branches, ATMs, and credit than those in EMDEs with above-median informality (figure B6.1.1). About 50 percent of the population in EMDEs with below-median informality own an account at a financial institution or recently used a mobile money service—about 17 percentage points more than in EMDEs with above-median informality.

Evolution of financial development and its implications

EMDE financial systems have deepened and financial access has broadened over the past three decades. This has coincided with a steady decline in the shares of informal output and employment.

Methodology. A local projection model is used to estimate the cumulative changes in the share of informal output or informal employment over one to five years following a shift in financial development (annex 6A). Two dimensions of financial development that are particularly relevant for informal participants are examined. The first is the ability of individuals and companies to access financial services, which is proxied by the number of commercial bank branches per 100,000 adults. The second dimension, financial system depth, is proxied by domestic credit to the private sector in percent of GDP (Svirydzenka 2016; World Development Indicators 2020). The estimation controls for per capita GDP. The sample covers 125 EMDEs over 1990-2018.

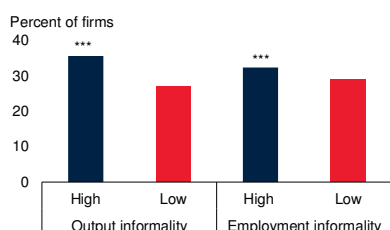
Financial development in EMDEs. Measures to improve access to credit have been a common policy reform in East Asia and the Pacific (EAP), the Middle

BOX 6.1 Financial development and the informal economy (continued)

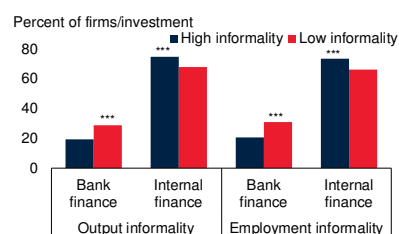
FIGURE B6.1.1 Financial development and informality in EMDEs

Firms and workers in EMDEs with more pervasive informality are more likely to be financially constrained, less likely to obtain bank finance, and more likely to have limited access to other financial services than those in EMDEs with less pervasive informality. As a result, firms in EMDEs with more pervasive informality rely more on internal financing.

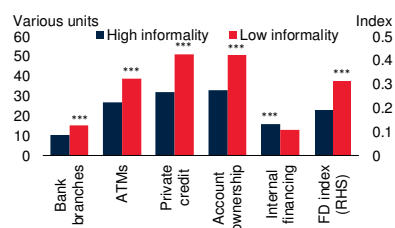
A. Financial constraint facing firms and informality



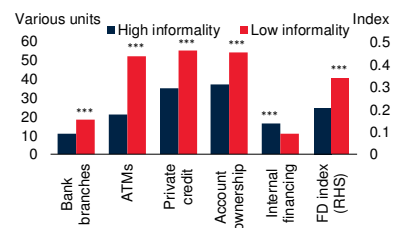
B. Financing options facing firms



C. Access to finance and output informality (households)



D. Access to finance and employment informality (households)



Sources: International Monetary Fund (Financial Development Index Database); World Bank (Enterprise Surveys, Global Financial Development Database, World Development Indicators).

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018. Output informality is measured by dynamic general equilibrium (DGE)-based estimates on informal output (in percent of official GDP). Employment informality is proxied by self-employment in percent of total employment. In A-D, *** denotes that the group differences are not zero at 10 percent significance level. "High informality" ("Low informality") are EMDEs with above-median (below-median) DGE-based informal output measure (or employment informality proxied by self-employment shares) over the period 2000-18 (2010-2018 in C-D).

A.B. Bars are simple group means using data from latest year available for EMDEs with "high informality" and those with "low informality." "Finance constrain" measures the percent of firms identifying access to finance as a major constraint in an economy. "Bank finance" measures the percent of firms using banks to finance investment in an economy. "Internal finance" measures the average share of investment financed internally using personal savings. C.D. Bars are unweighted averages of various financial development indicators for EMDEs with "high informality" and those with "low informality" over the period 2010-2018. Output informality is used in C and employment informality is used in D. "Bank branches" measures the number of commercial bank branches per 100,000 adults. "ATMs" measures the number of automated teller machines (ATMs) per 100,000 adults. "Private credit" measures domestic credit to private sector in percent of GDP. "FD index" is the financial development index from the IMF, which measures the overall level of financial development. "Account ownership" is the percentage of survey respondents (aged 15 or above) who report having an account (by themselves or together with someone else) at a bank or another type of financial institution or report personally using a mobile money service in the past 12 months. "Internal financing" is captured by the percentage of respondents (aged 15 or above) who report saving or setting aside any money in the past 12 months to start, operate, or expand a farm or business.

BOX 6.1 Financial development and the informal economy (continued)

East and North Africa (MNA), South Asia (SAR) and, more recently, Sub-Saharan Africa (SSA, chapter 5). Measures to expand access to finance have included better personal property registration to facilitate borrowing by informal firms (for example, Czech Republic; World Bank 2012) and digital payment systems to encourage a shift away from informal finance (World Bank 2017).

Overall, access to finance and the size of financial institutions increased in more than three-fifths of EMDEs over 2010-2018 (figure B6.1.2). The number of ATMs per 100,000 adults rose from 26 to 40, while the share of population with an account at a financial institution increased from 33 to 51 percent (Svirydzenka 2016). Domestic credit to the private sector in EMDEs increased by more than 4 percentage points of GDP, on average, over the same period.

Changes in informality following financial development. Financial development was associated with significant contractions in both output and employment informality (figure B6.1.3; annex 6A). First, ten more bank branches per 10,000 adults—about the difference between the average EMDEs with above-median and below-median informality—were associated with a 0.1-0.3 percentage point decline in the share of informal output in the following 1 to 5 years. The share of informal employment also declined statistically significantly. Second, a 10-percentage-point-of-GDP increase in domestic credit to the private sector was associated with a significant contraction in the shares of output and employment informality in subsequent years.^e

Conclusion

Both theory and empirical evidence indicate that more advanced financial development is associated with a smaller informal economy, although the direction of causality remains a matter of debate and may run both ways. Financial development is considerably weaker in countries with more pervasive informality. Financial systems have deepened, and access to financial services has broadened, in EMDEs over the past three decades.

Policy measures to reduce informality, however, need to go beyond improving the financial system and facilitating access to credit. Evidence suggests that the impact of financial development on informality depends on the quality of the legal and regulatory systems, the level of economic development, and financial

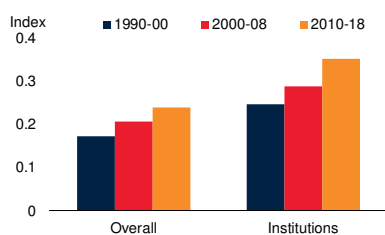
e. The results remained broadly unchanged when levels of informal output and employment are used as robustness checks (see figure 6A.1 for results using levels of informal output). The robust results suggest that any movement in the informal share of output or employment is determined by changes in informal activity (the numerator), not by only changes in formal activity (the denominator).

BOX 6.1 Financial development and the informal economy (continued)

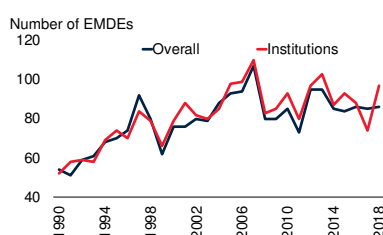
FIGURE B6.1.2 Evolution of financial development in EMDEs

In EMDEs, access to financial institutions and the depth of their activities improved between 1990 and 2018.

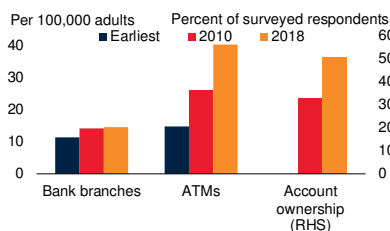
A. Financial development, 1990-2018



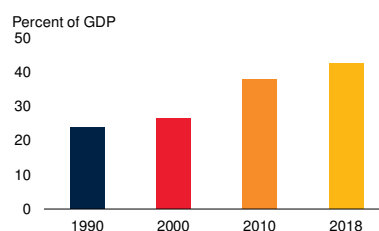
B. EMDEs with improved financial development



C. Access to finance



D. Domestic credit to private sector



Sources: International Monetary Fund (Financial Development Index Database); World Bank (Global Financial Development Database, World Development Indicators).

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018. Output informality is measured by dynamic general equilibrium-based estimates on informal output (in percent of official GDP). Employment informality is proxied by self-employment in percent of total employment.

A.B. Bars (A) and lines (B) show simple EMDEs averages for corresponding time periods. "Overall" is the aggregate financial development index obtained from the IMF. It measures the overall level of financial development and captures development in both "financial institutions" and "financial markets." The latter is about the access, depth, and efficiency of an economy's stock and debt market, which was less relevant for informal participants in EMDEs. The "Institutions" index measures how developed financial institutions are in terms of their depth (size and liquidity), access (ability of individuals and companies to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues). Some of the sub-indicators for "Institutions" are used in C-D to show the access (C) and depth (D) of financial institutions.

C. Bars show simple EMDE averages in earliest possible year (2004), 2010, and 2018. "Bank branches" measures the number of commercial bank branches per 100,000 adults. "ATMs" measures the number of automated teller machines (ATMs) per 100,000 adults. "Private credit" measures domestic credit to private sector in percent of GDP. "Account ownership" is the percentage of survey respondents (aged 15 or above) who report having an account (by themselves or together with someone else) at a bank or another type of financial institution or report personally using a mobile money service in the past 12 months. In the case of "account ownership," data from closest years are used.

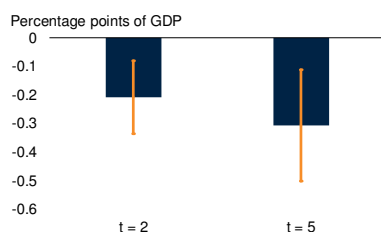
D. Bars show simple EMDE averages in corresponding years. The indicators captures domestic credit to private sector as a share of GDP.

BOX 6.1 Financial development and the informal economy (continued)

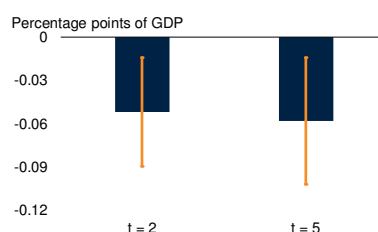
FIGURE B6.1.3 Evolution of output informality following financial development in EMDEs

Financial development is found to have been associated with significant subsequent contractions in output informality. Financial development, especially better access to financial institutions and increased depth of financial institutions, helps reduce output informality.

A. Cumulative changes in output informality following a 10-unit increase in the number of bank branches per 100,000 adults



B. Cumulative changes in output informality following a 10-percentage-point-of-GDP increase in domestic credit to the private sector



Source: World Bank.

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018. Output informality is measured by dynamic general equilibrium (DGE)-based estimates on informal output in percent of official GDP. The results are obtained via a local projection method where informality measures are detrended using Hodrick-Prescott (HP) filter. See annex 6A for detailed model specifications.

A.B. Bars show the cumulative changes in DGE-based output informality in percent of GDP following a 10-unit increase in the number of bank branches per 100,000 people (in A) and 10-percentage-point-of-GDP increase in the share of domestic credit to the private sector in percent of GDP (in B). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. "t = n" shows cumulative changes over the n years after the policy change.

development itself. In addition, the effect of measures to promote financial development may be temporary and differ depending on the structure of financial markets.

In particular, improvements in the legal system may be a precondition for achieving broader access to credit that can draw informal firms into the formal sector. Measures to improve contract enforcement and investor protection may be particularly effective in EMDEs, which often fall well behind best practices.

Greater competition and access to markets may foster the productivity gains that are needed for firms to be able to service debt, one aspect of financial development. The possibility of reverse causality suggests that, in some instances, measures to reduce informality by streamlining regulations and improving their enforcement may create a virtuous circle of lowering informality and spurring financial development.

Second, the chapter describes novel empirical estimates of the cumulative changes in informality following various policy changes, obtained using a local projection model. Policy-related variables examined include tax rates, access to credit by the private sector, labor market efficiency, governance, and regulatory quality. This is the first study to conduct such empirical analysis for a wide range of policies. It is also the first to examine the share of informality in both economic output and employment: earlier studies have tended to focus on either informal output, or informal employment, or informal firms.⁴

Third, the chapter is the first published attempt to comprehensively examine the link between financial development and informality both theoretically and empirically (box 6.1). It reviews the literature identifying the channels through which limited financial development can discourage formalization. It uses both descriptive statistics and regression approaches to show that informality is associated with lack of financial development, and that improvements in access to finance are associated with declining informality.

Main findings. First, macroeconomic policies, governance and business climates have become more conducive to lowering informality over the past three decades. Over that period, EMDEs have reduced tax burdens, improved governance and regulatory quality, and expanded access to finance, education, and public services.

Second, policies that seek to streamline tax regulation, strengthen tax administration, and improve public service delivery have been associated with declines in informality. Separately, policies aimed at invigorating private sector activity broadly, such as measures to increase labor market flexibility, streamline regulatory frameworks for firm start-up, expand access to finance, and improve governance have also been associated with declines in informality.

Third, policy measures can have unintended consequences. For instance, trade liberalization that raised competition in the tradable sector was sometimes associated with greater informality in the short run, unless accompanied by measures that increase labor market flexibility. Also, reductions in informality have tended to be greater for reforms accompanied by business development and training programs, public awareness campaigns, and stronger enforcement.

Fourth, financial development has been associated with declining informality (box 6.1). It reduces the average costs of access to external financing and incentivizes firms to invest in higher-productivity projects and to join the formal sector. Over the past three decades, increased access to financial services and increased credit availability have been followed by declining informality.

Fifth, a comprehensive policy package tailored to country circumstances offers the greatest chance of success in reducing informality. A combination of measures to

⁴ See Bosch, Goñi-Pacchioni, and Maloney (2012); Fajnzylber, Maloney, Montes-Rojas (2011); Ihrig and Moe (2004); and Rocha, Ulyseas, and Rafter (2018).

strengthen economic development, boost productivity in both formal and informal sectors, streamline regulations and ensure effective enforcement can address multiple sources of informality. The relative priorities will depend on the economy-specific features of informality.

The rest of the chapter is organized as follows. It first presents a range of fiscal policy options that may be used to help remove barriers to joining the formal sector. It then discusses a wide range of policies that can ease the transition from the informal to the formal sector. The chapter also illustrates the importance of having a comprehensive and complementary policy package to tackle the challenges posed by informality and how to implement it successfully. In addition, the chapter describes the implications of digital technologies for coping with informality. The final section summarizes the conclusions.

Data and methodology

This chapter relies on the database developed in chapter 1 for measures of output and employment informality. It applies several statistical tests to quantify the linkages between a wide range of policies and informality, without establishing or assuming causality. It then estimates a series of local projection models to help quantify the cumulative response of informality to various policy actions over the short and medium terms.

Data. Both output and employment informality are considered here. Output informality is proxied by dynamic general equilibrium (DGE)-based estimates in percent of official GDP, and employment informality is proxied by self-employment in percent of total employment. Both measures are available for up to 121 EMDEs over the period 1990-2018.⁵ For the local projection estimation, all data series on informality are detrended using the Hodrick-Prescott filter to mitigate concerns that the results are driven by the declining trend in informality (chapter 2). A wide range of policy measures are considered here, ranging from changes in corporate tax rates to actions to improve the ease of doing business (table 6.2). Detailed data descriptions are provided in annex 6A.

Empirical strategy. The chapter applies two empirical approaches to assess the links between informality and policies.

First, differences between average policies in EMDEs with above-median and below-median informality are tested for statistical significance. The sample of EMDEs is grouped into those with an above-median share of informal output and those with a below-median share of informal output, on average during (up to) 1990-2018.⁶ For each

⁵In the case of financial development, absolute levels of informal output and informal employment, rather than their relative share of official GDP or total employment, are used as robustness checks when a local projection model is estimated (figure 6A.1). Using absolute levels of informal output and informal employment avoids the possibility that the results are driven by movements in total official GDP or total employment (the denominator) rather than movements in output or employment in the informal sector (the numerator).

⁶The results are the same when EMDEs are grouped according to employment informality (table 6.3).

subsample, simple averages of policy indicators are generated and the difference between these two group averages is tested for statistical significance. EMDEs with high informality refers to EMDEs with above-median informality, and EMDEs with low informality refers to EMDEs with below-median informality.

Second, a local projection model as in Jordà (2005), Teulings and Zubanov (2014), and World Bank (2018c) is estimated to identify the effects of policy changes on informality over time for a sample of up to 125 EMDEs during 1990-2018. The model estimates the cumulative changes in informality after policy changes over different time horizons while controlling for country fixed effects and per capita income levels (table 6.4).⁷ Policy changes are defined as a unit change in the corresponding policy indicator. For instance, a 1-percentage point increase in the personal income tax rate is considered as a tax policy change. Annex 6A details the model specification.

Fiscal measures

High tax rates or payments, complicated tax codes, and administrative burdens have been commonly cited as reasons for informal activity (Auriol and Warlters 2005; Perry et al. 2007; Waseem 2018). Lax tax enforcement facilitates poor tax compliance (Slemrod 2019). Poor government services—often underfunded and inefficiently delivered—will tend to erode tax morale (Awasthi and Engelschalk 2018). In a sweeping survey of the literature, measures to address such issues have been identified as having been particularly effective at encouraging a shift into formal activity (Jessen and Kluge 2021; World Bank 2019b).

Tax rates

Higher tax rates in more informal EMDEs. On average during 2010-2018, average corporate and personal incomes tax rates were significantly higher, by 3 (corporate) to 4 (personal) percentage points in EMDEs with above-median output informality than in those with below-median output informality. VAT rates were also statistically significantly higher in EMDEs with above-median output informality than in those with below-median output informality.⁸

Over time, shift away from income taxes. Since 1990, both corporate and personal income tax rates have been lowered in EMDEs while the use of value-added tax (VAT) has expanded. Average corporate and personal income tax rates in EMDEs have fallen by 13 and 15 percentage points, respectively, from close to 40 percent in the beginning of

⁷The results are robust to using self-employment as a measure of employment informality (table 6.5). As further robustness checks, both ordinary least squares and quantile regressions are performed using the same set of policy for both output and employment informality measures. The regression results are largely in line with the findings from the group comparison approach (tables 6.6-6.7).

⁸In contrast, EMDEs with high or low informality often do not differ significantly in their average statutory rates for social security contributions nor their revenue collections from such taxes, but they do differ significantly in the amount of social security they provide (see below).

1990s to about 24 percent in 2020 (figure 6.2). Around two-thirds of EMDEs lowered their statutory personal income tax rates and more than three-quarters lowered their statutory corporate income tax rates over the sample period.⁹ These efforts often coincided with a streamlining of tax regulations and a broadening of the tax base (Kopczuk 2005).

While income tax rates were lowered, often to reduce distortions that discourage employment, value added taxes (VAT) were introduced, which could be less distortionary than income tax but may lead to a more regressive tax system (Cnossen 1998).¹⁰ Many economies in Latin America introduced VAT regimes in the 1970s and 1980s, and their ranks were joined by a large number of economies in Europe and Central Asia (ECA) during the 1990s. Between 1990 and 2020, the number of EMDEs with VAT systems increased from 29 to 91 (Végh and Vuletin 2015; World Bank 2020a).

Lower informality after tax rate cuts. Lower corporate or personal income tax rates can reduce the incentives of firms and households to operate in the informal economy to lower their costs. In one EMDE, for example, a tax hike in 2010 reduced the number of formal firms and their sales revenues, to such an extent that tax revenues three years after the hike were lower than they would have been without the tax hike (Waseem 2018). A sweeping review of past government interventions suggests that tax cuts were particularly effective in reducing informality (Jessen and Kluge 2021). Similarly, a review of policies showed that tax simplification and tax cuts were associated with lower informality (World Bank 2019b).

Meanwhile, the introduction of VAT may strengthen incentives to register in order to qualify for VAT refunds—or, conversely, may strengthen incentives to operate informally to offer lower prices excluding VAT. A VAT regime imposes an input tax on informal firms that do not qualify for refunds but source from formal firms, which in the right circumstance can motivate them to register, thus raising government revenue collection (de Paula and Scheinkman 2010; Loayza 2018; World Bank 2018b).¹¹ A requirement to digitalize sales receipts for accelerated VAT refunds could further strengthen incentives to register and correctly report sales (Fan et al. 2020). In one case, electronic invoicing for VAT purposes was rolled out in waves between 2014 and 2018 and resulted in more than 5 percent higher reported firm sales, purchases and value-added in the first year after adoption (Bellon et al. 2019).

Indeed, since 1990, a 10-percentage-point decrease in the corporate income tax rate has been associated with a cumulative decline in output informality of about 0.1 percentage

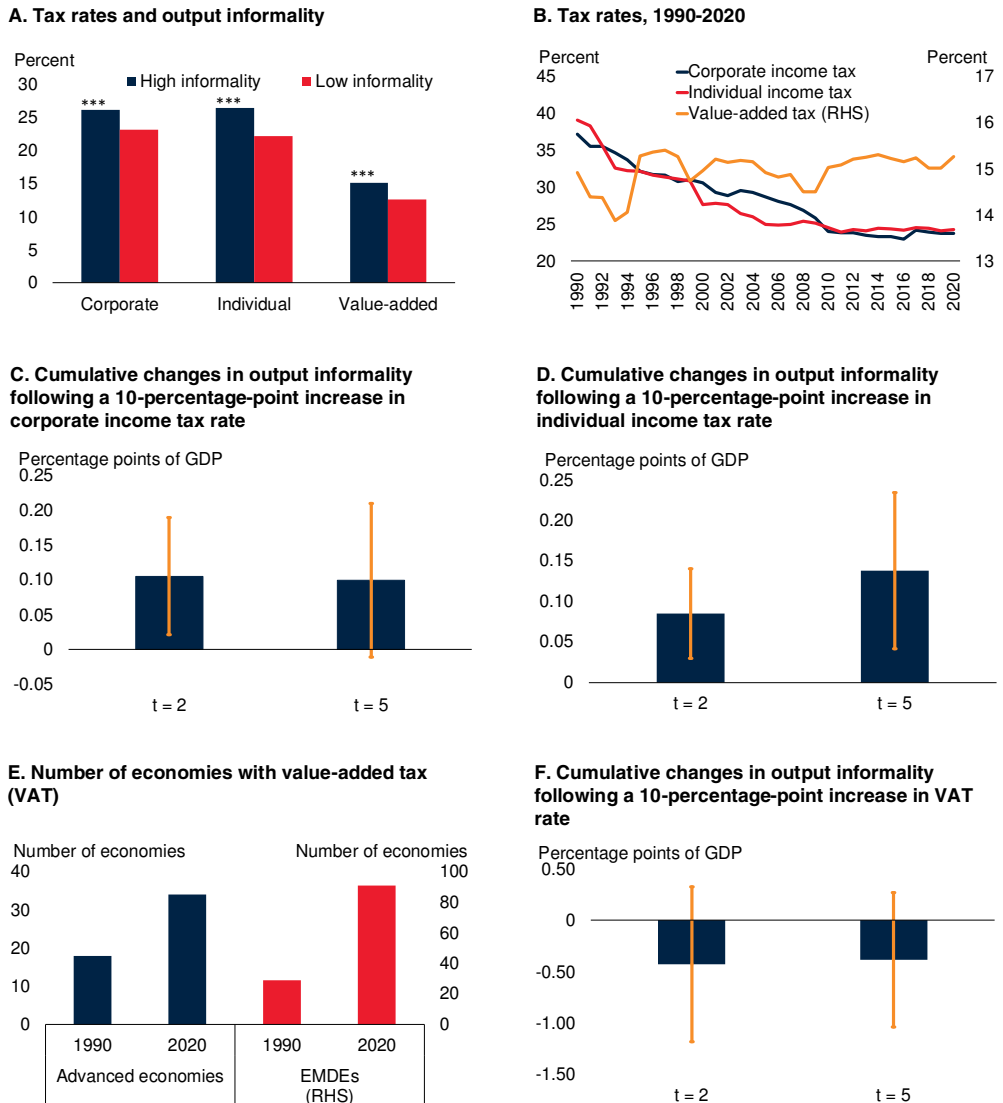
⁹The sample contains up to 53 EMDEs where data are available in 2020 and 1990.

¹⁰That said, the presence of an informal economy could lead to incomplete coverage and inefficiencies in the VAT system (Keen 2008; Piggott and Whalley 2001; Shahe, Emran and Stiglitz 2005). In some case, labor informality was found to be associated with lower overall VAT collection (Caro and Sacchi 2021).

¹¹Poorer households tend to spend a larger share of their budgets in the informal sector than richer households. As a result, households in the richest quintile can face an effective consumption tax rate that is twice that of the poorest quintile (Bachas, Gadenne, and Jensen 2020).

FIGURE 6.2 Tax rates and informality in EMDEs

Income tax rates remain higher in EMDEs with more pervasive informality—even where governments have cut rates and shifted towards value-added taxation. Informality declined after income tax rate reductions but not after value-added tax (VAT) rate reductions.



Sources: Cnossen (1998); KPMG; University of Michigan; Organisation for Economic Co-operation and Development; Végh and Vuletin (2015); World Bank (*Doing Business*).

Note: EMDEs = emerging market and developing economies.

A. *** denotes that the group differences are not zero at 10 percent significance. Bars are group means for EMDEs with above-median dynamic general equilibrium (DGE)-based estimates on informal output (“high informality”) or those with below-median DGE-bases estimates on informal output (“low informality”) over the period 2010-2018. Data are from about 100 EMDEs (in the case of individual tax rate, China is dropped as an outlier). Bolivia, Georgia, Panama, and Zimbabwe are dropped as outliers.

B. Lines are simple group averages for EMDEs.

C.-D., F. Bars show the cumulative changes in DGE-based output informality in percent of GDP following 10-percentage-point increase in corporate income tax rate (C), individual income tax rate (D), and value-added tax rate (F). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. “t = n” indicates the cumulative changes in output informality over the n years after a policy change. Data are for EMDEs over the period 2010-2018. See annex 6A for detailed model specifications.

E. Bars show the number of EMDEs and advanced economies that adopted a value-added tax.

point of GDP, relative to trend, over the following two years (figure 6.2). A similarly-sized reduction in the personal income tax rate has been associated with a slightly stronger, and deepening, fall in output informality in the following five years. Despite finding significant falls in informality following tax cuts, these falls are generally small in size, suggesting that cutting tax rates alone is not enough to move all participants from the formal sector to the informal sector. Other policy measures are needed (Loayza 2018). Meanwhile, increases in VAT have not been associated with any significant change in output informality. This suggests that some informal firms source their inputs from informal markets that operate outside the VAT system. The results are robust to using employment informality, instead of output informality.

Tax compliance

More burdensome tax compliance in more informal EMDEs. Beyond tax rates, tax compliance can be costly and time-consuming and, thus, discourage formal registration by firms, especially those with poor profitability (Morales and Medina 2016; Rocha, Ulyseas, and Rachter 2018; Ulyseas 2018). In the average EMDE with above-median informality during 2010-18, it took the average firm 33 hours longer and required statistically significantly more payments, estimated at 11 per year, to comply with tax regulations than in the average EMDE with below-median informality (figure 6.3). As a result, despite higher corporate and personal income tax rates in EMDEs with above-median informality, revenue collections were lower: In the average EMDE with above-median output informality, personal and corporate income tax revenues were statistically significantly lower, by 0.6 and 0.8 percentage point of GDP, than in the average EMDE with below-median informality.

Similar administrative challenges have troubled the administration of VAT regimes in countries with high informality. During 2016-18, firms spent 29 hours a year, on average, on complying with VAT refund requirements in EMDEs with above-median informality—7 hours more than in EMDEs with below-median informality, though the difference is not statistically significant.¹² It took about 40 weeks for firms in EMDEs with above-median informality to receive VAT refunds—significantly longer than the 31 weeks in EMDEs with below-median informality.

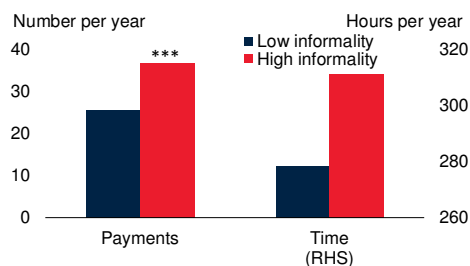
Over time, less burdensome tax compliance. Firms' tax compliance costs have declined in EMDEs in the past few decades. Since 2006, the time spent by firms on paying taxes has fallen by 68 hours a year in the average EMDE and the average number of tax payments per year has declined by one-third, to 26 payments per year in 2020 (figure 6.3). In ECA, the introduction of electronic tax filing and payment systems has reduced the average tax filing time from 473 hours in 2006 to 225 hours in 2020 (World Bank and PwC 2019).

¹² In the case of employment informality, the average annual number of hours spent on complying with VAT refund requirements amounted to 37 in EMDEs with above-median informality—20 hours per year significantly more than in EMDEs with below-median informality (table 6.3).

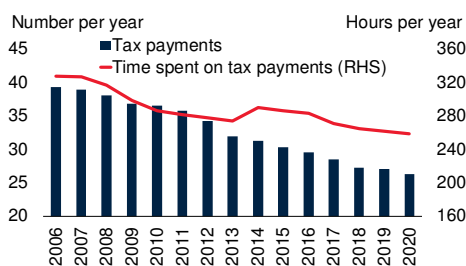
FIGURE 6.3 Firms' tax compliance burdens and informality in EMDEs

Tax compliance burdens on firms remain higher in emerging market and developing economies (EMDEs) with more pervasive informality than in those with less pervasive informality, despite recent declines. Past efforts to lower compliance costs were not followed by immediate declines in informality.

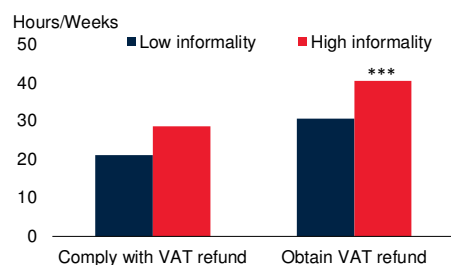
A. Ease of paying taxes and output informality



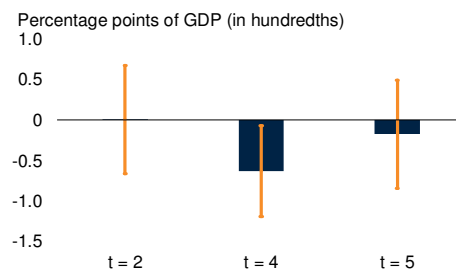
B. Ease of paying taxes over time



C. Time to comply with and obtain VAT refund and output informality



D. Cumulative changes in output informality following a 1-point increase in the score for ease of paying taxes



Sources: World Bank (*Doing Business*).

A.C. *** denotes that the group differences are not zero at 10 percent significance. Bars are group means using data from latest year available for emerging market and developing economies (EMDEs) with "high informality" and those with "low informality." "High informality" ("low informality") are EMDEs with above-median (below-median) dynamic general equilibrium (DGE) model-based informal output measure over the period 2010-2018. Data are from about 100 EMDEs.

B. Bars show the average number of tax payments per year by a medium-size company, while the line shows the average time spent on paying taxes per year by a medium-size company. Data are for EMDEs.

D. Bars show the cumulative changes in DGE-based output informality in percent of GDP following a 1-point increase in the score for ease of paying taxes. Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. "t = n" indicates the cumulative changes in output informality over the n years after a policy change. Data are for EMDEs over the period 1990-2018. See annex 6A for detailed model specifications.

Efforts to lower tax burdens have been among the most common policy reforms in EMDEs, especially in East Asia and Pacific (EAP) and Latin America and Caribbean (LAC). Measures to make tax compliance less burdensome have ranged widely (Awasthi and Engelschalk 2018; Slemrod 2019). Tax bases have been simplified in industries with a high percentage of undeclared workers (for example, domestic work) and tax regulations have been harmonized across different types of firms (Oviedo, Thomas, and Karakurum-Özdemir 2009). At the same time, tax enforcement has been stepped up by expanding the use of information technology and communication tools, encouraging a

switch from cash-based transactions to bank-based ones, and strengthening the capacity of tax administrations (for example, Nguimkeu and Okou 2019; Prichard et al. 2019).¹³

Lower informality after measures to facilitate tax compliance. Measures to reduce the burden of tax compliance or firm registration can lower the cost for informal firms of moving into the formal sector (Rocha, Ulyssea, and Rochater 2018). Coordination of minimum tax thresholds across different types of tax, such as personal income tax, VAT, and social security contributions, could increase tax compliance and improve welfare (Kanbur and Keen 2014). Measures to harmonize tax provisions or other regulations across different types of firms can reduce incentives for firms to evade taxation and remain small and informal (Harju, Matikka and Rouhanen 2019; Dabla-Norris, Gradstein, and Inchauste 2018). Measures to strengthen tax administration can increase the likelihood of detection of informal firms that do not comply with taxes (Carrillo, Pomeranz, and Singhal 2017; Naritomi 2019).

Measures to facilitate tax compliance have been accompanied by statistically significant declines in output informality (figure 6.3). The effects have not been immediate, being insignificant in the first year, but have strengthened over time. Thus four years after reforms that increased the score for the ease of paying taxes by one point, the share of output informality was 0.1 percentage point of GDP lower—a statistically significant difference.

Tax morale

Weaker tax morale in more informal economies. Tax morale is weaker in EMDEs with above-median informality. In the average EMDE with above-median output informality, the average household scores 2.5 points on a scale of 0-10, with 10 indicating that underreporting of income for tax purposes is always justifiable—0.4 index points, and statistically significantly, higher than in the average EMDE with below-median informality (figure 6.4).

Among the many reasons for weaker tax morale is a lack of trust in the government or dissatisfaction with the quality of public service delivery.¹⁴ Indeed, entrepreneurs in EMDEs with above-median output informality report significantly poorer access to government support and programs as well as poorer physical and services infrastructure than entrepreneurs in EMDEs with below-median output informality (figure 6.4; chapter 4). Similarly, significantly better access to commercial and professional infrastructure is reported by businesses in EMDEs with above-median tax morale than those in EMDEs with below-median tax morale. Coverage of unemployment benefits is significantly lower, by about 3 percentage points of the population, in EMDEs with

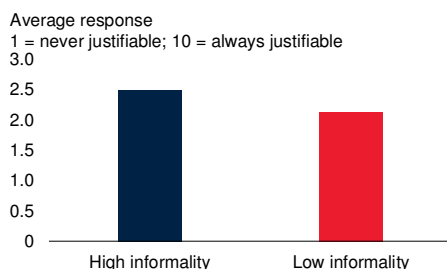
¹³ See Chodorow-Reich et al. (2018); Crouzet, Gupta, and Mezzanotti (2020); and Lahiri (2020) for the impact of demonetization.

¹⁴ See Daude, Gutiérrez, and Mulguizo (2012) for a review of drivers of tax morale. OECD (2019) suggested that there is a positive association between tax morale and public service provision in Africa, while tax morale in Latin America is more linked with trust in the government.

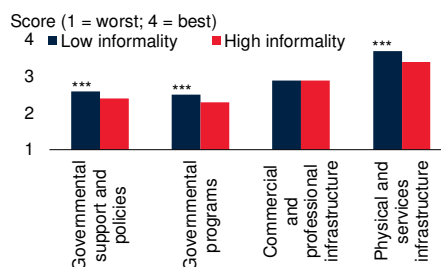
FIGURE 6.4 Tax morale and informality in EMDEs

Tax morale is higher in EMDEs with lower informality. Higher tax morale has been associated with better government services such as social security, infrastructure, education, and health care systems.

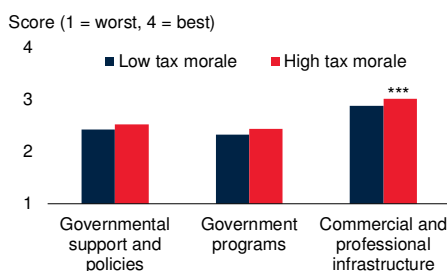
A. Tax morale and informality



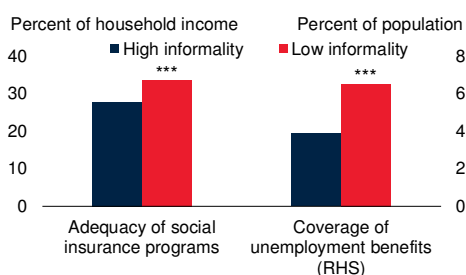
B. Government support and informality



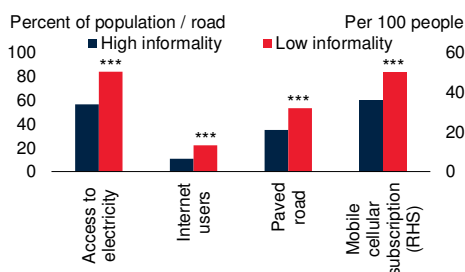
C. Tax morale and access to government services



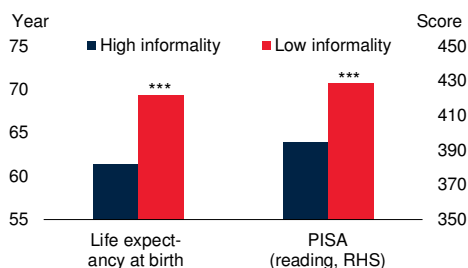
D. Adequacy of social security and informality



E. Access to infrastructure and informality



F. Health and education outcomes and informality



Sources: Global Entrepreneurship Monitor; Programme for International Student Assessment (PISA) database; World Bank (World Development Indicators).

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018. "High (Low) informality" are EMDEs with above (below)-median output informality (proxied by dynamic general equilibrium-based estimates on informal output in percent of GDP). All scores on government support and public infrastructure in B and C are for the period 2000-18 and range from 1 (worst) to 4 (best). *** denotes that the group differences are not zero at 10 percent significance.

A. Bars show simple group averages between 1990 and 2018. World Value Survey (WVS) asks whether cheating on taxes is justifiable, with a higher level suggesting that the economy is more tolerant towards the informal sector.

B.C. Bars show simple group averages. "Governmental support and policies" measures the extent to which policies support entrepreneurship as a relevant economic issue. "Governmental programs" captures the presence and quality of programs directly assisting small and medium-sized enterprises (SMEs) at all levels of government (national, regional, municipal). "Commercial and professional infrastructure" captures the presence of property rights, commercial, accounting, and other legal and assessment services and institutions that support or promote SMEs. "Physical and service infrastructure" measures the ease of access to physical resources at a price that does not discriminate against SMEs.

D. Adequacy of social insurance programs is measured as total transfer amount received by population participating in social insurance programs in percent of total income or expenditures of beneficiary households.

E. Bars show simple group averages.

F. PISA testing scores are for students aged 15.

above-median informality than in those with below-median informality. In an average EMDE with below-median informality, social insurance programs can cover about 34 percent of the annual income or consumption of the beneficiary household, which is significantly lower, by 6 percentage points, than in EMDEs with above-median informality.

Education and health outcomes are significantly poorer in EMDEs with above-median informality, with Programme for International Student Assessment (PISA) test scores for 15-year-old students in EMDEs with above-median informality being lower by about 10 percent than in those with below-median informality, and life expectancy eight years lower in EMDEs with above-median informality. The poorer outcomes are partly due to more limited government expenditures on education and health in EMDEs with more pervasive informality (chapter 4).

Over time, stable tax morale, despite better government services. In contrast to output and employment informality, tax morale has remained stable over the past three decades. In the early 1990s, the average household in EMDEs gave a score of 2.5 to the justifiability of cheating on taxes (where a score of 1 means that cheating on taxes is never justifiable and 10 means that it is always justifiable)—virtually the same as in 2010.¹⁵ As one of the social capital measures with deep roots in culture, tax morale is slow-moving by nature (Luttmer and Singhal 2014). In contrast, entrepreneurs in the average EMDE have perceived statistically significant improvements in government support or programs for small and medium-sized enterprises (SMEs) and in improving commercial and professional infrastructure available to SMEs (figure 6.5).

Meanwhile, actual government service delivery has improved by several measures. The adequacy of social insurance programs has risen in the average EMDE from 31 percent of household income in the 2000s to 34 percent a decade later. Infrastructure—for example, road kilometers, access to reliable power, and access to internet services—has improved considerably since 2000. Mobile cellular subscriptions rose from 28 to 95 per 100 people between the 2000s and the 2010s. EMDEs' test scores on PISA indicators of education outcomes have risen significantly, by 17 points, and life expectancy has risen by 4 years in the average EMDE.

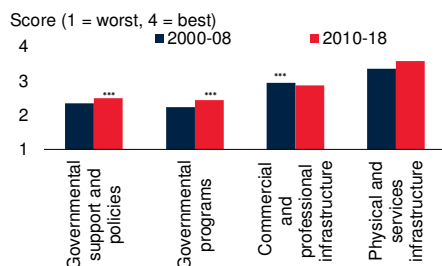
A range of measures have been introduced over the past three decades to cultivate better tax morale, including public appeals to declare activities, campaigns to encourage a culture of commitment to declaration, and efforts to change perceptions of the tax system's fairness (Williams and Schneider 2016). Other measures have included steps to shift the burden of payments of social security contributions from employers to employees (for example, in Latvia, Poland, Slovenia), to reduce employers' social security contributions (for example, in Bulgaria), and to link social benefits to personal

¹⁵The indicator for tax morale is taken from World Value Surveys (WVS), conducted in various years. The current round of WVS will complete its data collection in December 2021.

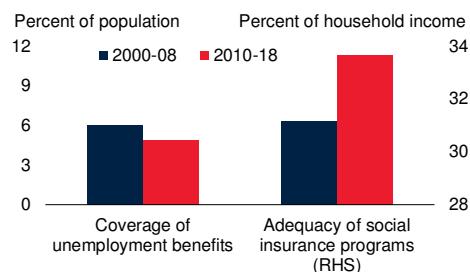
FIGURE 6.5 Government services in EMDEs, 2000-18

Although infrastructure, social security systems, and health care systems have improved in EMDEs over the past several decades, entrepreneurs' perceptions of the adequacy of government services have remained stable and poor.

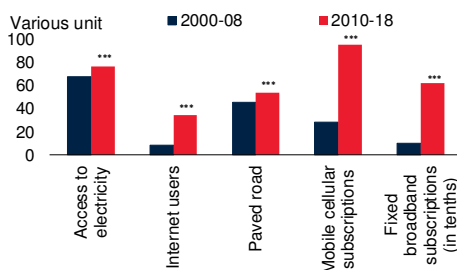
A. Government support perceived by entrepreneurs



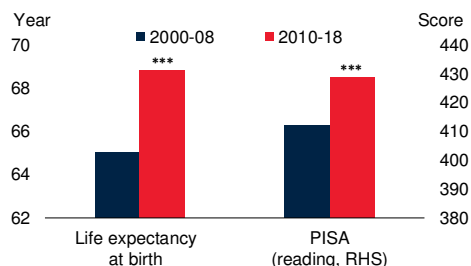
B. Social security



C. Public infrastructure



D. Health and education outcomes



Sources: Global Entrepreneurship Monitor; Programme for International Student Assessment (PISA) database; World Bank (World Development Indicators).

Note: Data are from emerging market and development economies (EMDEs) and the period 2000-2018. All scores on government support and public infrastructure in A are taken from the National Expert Survey of the Global Entrepreneurship Monitor for the period 2000-2018. The scores range from 1 to 4 with a lower score representing poorer entrepreneurial conditions. Bars show simple period averages for 2000-08 and 2010-2018, correspondingly, with *** indicating that the period differences are not zero at 10 percent significance level.

A. "Government support and policies" measures the extent to which policies support entrepreneurship as a relevant economic issue. "Government programs" captures the presence and quality of programs directly assisting small and medium-sized enterprises (SMEs) at all levels of government (national, regional, municipal). "Commercial and professional infrastructure" captures the presence of property rights, commercial, accounting, and other legal and assessment services and institutions that support or promote SMEs. "Physical and service infrastructure" measures the ease of access to physical resources—communication, utilities, transportation, land, or space—at a price that does not discriminate against SMEs.

B. Adequacy of social insurance programs are measured in percent of total welfare of beneficiary households.

C-D. PISA scores are for students aged 15. "Paved road" is calculated as 100 minus the share of unpaved road in percent of total road. "Access to electricity" and "Internet users" are in percent of population, while "mobile cellular subscriptions" and "fixed broadband subscriptions" are measured as per 100 people.

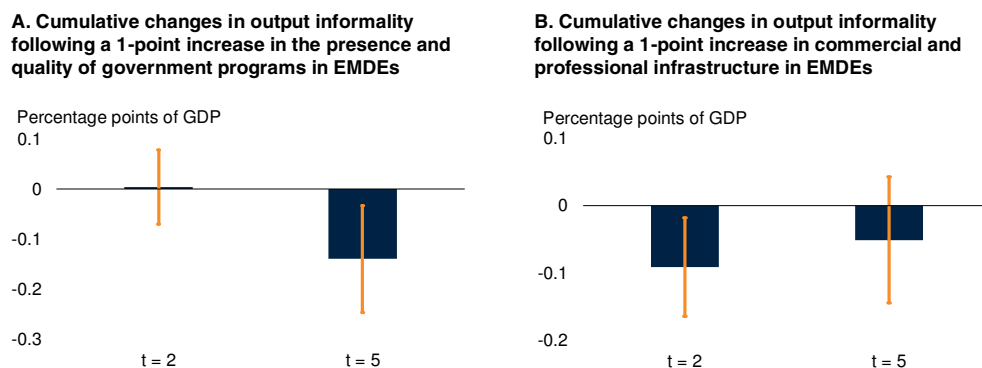
contributions (for example, in most EU 27 economies; Oviedo, Thomas, and Karakurum-Özdemir 2009).¹⁶

Lower informality after improvements in government services. Improvements in the perception that tax dollars are spent judiciously—that is, for appropriate objectives and

¹⁶Transitions from an employment-based social security system to a well-designed model of risk sharing can further improve the safety net for informal workers and help protect both formal and informal workers during economic downturns (World Bank 2013, 2018a).

FIGURE 6.6 Informality after improvements in government services

After improvements in government services, informality has declined.



Source: World Bank.

Note: Data are from emerging market and development economies (EMDEs) and the period 2000-2018. Both scores taken from National Expert Survey of the Global Entrepreneurship Monitor for the period 2000-18. The scores range from 1 (worst) to 4 (best).

A.B. Bars show the cumulative response of dynamic general equilibrium (DGE)-based output informality in percent of GDP to a 1-point increase in “government programs” index (A) and “commercial and professional infrastructure” (B). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. The results are obtained via a local projection method. Output informality in percent of GDP is detrended using Hodrick-Prescott (HP) filter. “t = n” indicates the cumulative changes over the n years after a policy change. See annex 6A for detailed model specifications.

in an efficient way—can encourage greater tax compliance and lessen informality (Sung, Awasthi, and Lee 2017). Better education or infrastructure can help raise labor productivity in both formal and informal activities, thus facilitating a move of previously insufficiently productive, informal firms into the formal sector.¹⁷

Empirically, declines in output informality followed improvements in government services, although the small country sample of data for tax morale blunts the significance of coefficient estimates (figure 6.6). Measures perceived to improve government support for SMEs by 1 standard deviation were followed by a 0.1 percentage point decline in the share of output informality five years later. A similar, 1-standard-deviation improvement in SMEs’ access to quality commercial and professional infrastructure was also followed by an 0.1 percentage point decline in the informal output share after two years, although the effect subsequently dissipated.

Other policies

Many reforms designed to invigorate private sector growth can also help lower informality, such as reducing corruption, improving business climates and governance,

¹⁷ See, for instance, Benjamin and Mbaye (2012); Kim, Loayza, and Meza-Cuadra (2016); Oviedo, Thomas, and Karakurum-Özdemir (2009); and World Bank (2018b). Better access to education or infrastructure may boost productivity growth more in the formal sector than in the informal sector, resulting in a fall in the relative share of informal output in total economic output.

strengthening enforcement of taxes and regulations, and liberalizing labor and product markets, including through trade liberalization.¹⁸ Financial development, by lowering financing costs, can incentivize firms to operate formally, and has often been associated with a shrinking informal sector (box 6.1). Policy measures that narrow the earnings gap between informal and formal workers or reduce the labor productivity gap between informal and formal firms, such as measures that improve access to education or training programs, can also help reduce informal activity.

Labor market regulations

More restrictive regulations in more informal economies. While higher minimum wages may attract informal workers into the formal sector, they are also likely to discourage firms from hiring workers, resulting in unclear effects on employment of minimum wages (especially in the presence of imperfect competition).¹⁹ In a development context, in which agricultural sectors are large and urbanization is still underway, a higher minimum wage can slow capital accumulation and push workers into informal employment (Loayza 2016).

Empirically, labor market regulations in EMDEs with above-median informality are more restrictive than in EMDEs with below-median informality (figure 6.7). Minimum wages in EMDEs with above-median output informality average 5.5 percent of per capita income, which is 1.3 percentage points, and significantly, higher than in EMDEs with below-median output informality. Flexibility of working hours, often measured by the inverse of restrictions on night and overtime work, holiday work, and the length of the work week, is significantly less in EMDEs with above-median output informality than in EMDEs with below-median output informality.

Over time, increased labor market flexibility. Labor market flexibility and efficiency have increased in EMDEs over the past three decades (figure 6.7). EMDEs have lowered their minimum wage by 0.6 percentage points of GDP per capita from its level in the 1990s (Loayza 2016). Between 2010 and 2018 alone, about one-quarter of EMDEs increased their perceived labor market efficiency, which measures the extent to which the labor market matches workers with the most suitable jobs for their skillset (WEF 2020). About 40 percent of EMDEs changed regulations to make the hiring and dismissal of workers more flexibly determined by employers. During the same period, four out of ten EMDEs reduced the costs of advance notice requirements, severance payments, and the penalties due when dismissing a worker with a ten-year tenure.

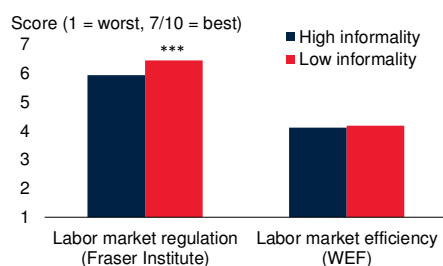
¹⁸ Kuddo (2018) shows that about 60 percent of the reforms implemented between 2007 and 2017 throughout the world aimed at improving labor market flexibility. Among measures to improve product market flexibility, trade liberalization has been associated with increased informality unless complementary reforms improved labor market flexibility (World Bank 2019b).

¹⁹ The employment effects of minimum wages have been unclear (Manning 2021). An increase in the real minimum wage has been associated with a lower probability of being hired in the formal sector, or employment in general (Gindling and Terrell 2007; Maloney and Nuñez Mendez 2004). However, employment effect was not found in studies like Hohberg and Lay (2015); Lemos (2009); and Urzua and Saltiel (forthcoming).

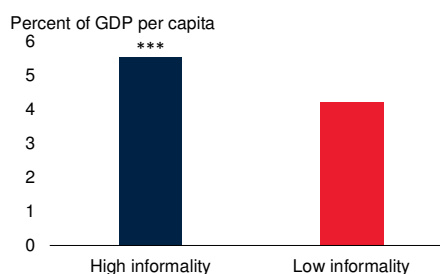
FIGURE 6.7 Labor market reforms and informality in EMDEs

Labor market regulations are more restrictive in EMDEs with high informality than in those with low informality. About one-third of EMDEs have improved their labor market efficiency and eased labor market regulations over the past several decades.

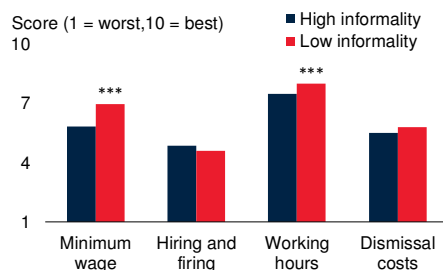
A. Labor market regulations and output informality



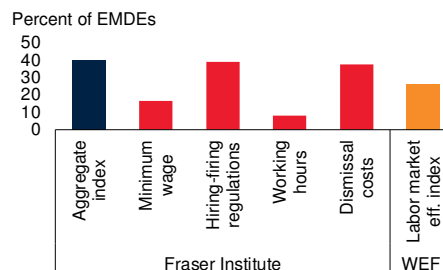
B. Minimum wage and output informality



C. Specific labor market regulations and output informality



D. EMDEs with liberalized labor market regulations between 2010 and 2018



Sources: Fraser Institute; International Labour Organization (ILO); World Economic Forum (WEF).

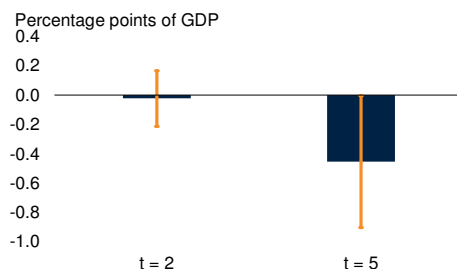
Note: The labor market regulation index from the Fraser Institute covers issues such as minimum wage, hiring and firing regulations, centralized collective bargaining, mandated cost of hiring, mandated cost of worker dismissal, regulation of hours, and conscription. A.-C. *** denotes that the group differences are not zero at 10 percent significance. Bars are group means using data available between 1990 and 2018 for emerging market developing economies (EMDEs) with "high informality" and those with "low informality." "High informality" ("Low informality") are EMDEs with above-median (below-median) dynamic general equilibrium (DGE)-based informal output measure over the period 1990-2018. In B, data are between 1994 and 2018. Data on labor market regulations are obtained from the Fraser Institute (in A and C) and are between 1990 and 2018. The WEF index is available between 2007 and 2017. The labor market efficiency index from WEF measures the extent to which the labor market matches workers with the most suitable jobs for their skillset (1 = worst; 7 = best). The labor market regulation index from the Fraser Institute measures the extent to which these restraints (listed in C) upon economic freedom are present in the labor market (1 = worst; 10 = best). D. Bars show the share of EMDEs with improved labor market regulations between 2010 and 2018. "Labor market eff. index" is the labor market efficiency index obtained from WEF.

These changes reflect several decades of labor market reforms especially in ECA, SSA and, more recently, LAC. Regulations with respect to hiring and dismissal, working hours, and wage rates have been eased in ECA (EBRD 2018). Incentives have been provided for worker registration—for example, legalization of undocumented workers—while enforcement of existing labor laws has been tightened (Anand and Khera 2016; Munkacsi and Saxegaard 2017). In EMDEs, the reduction of minimum wages encouraged formalization of employment (Betcherman, Meltem Daysal, and Pagés 2010; Kugler, Kugler, and Herrera-Prada 2017).

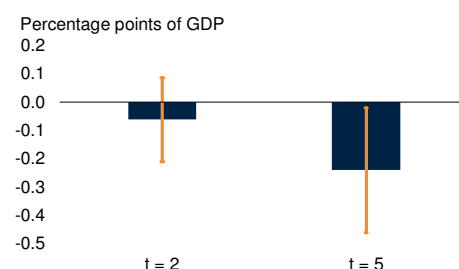
FIGURE 6.8 Informality after labor market reforms in EMDEs

Efforts to increase labor market flexibility and efficiency have been followed by declines in output informality.

A. Cumulative changes in output informality following a 1-point increase in Fraser Institute index of hiring and firing regulations in EMDEs



B. Cumulative response of output informality to a 1-point increase in WEF index of labor market efficiency in EMDEs



Source: World Bank.

Note: The labor market efficiency index from World Economic Forum (WEF) measures the extent to which the labor market matches workers with the most suitable jobs for their skillset (1 = worst; 7 = best). The index on hiring and firing regulations is from the Fraser Institute, which measures the extent to which hiring and firing regulation are restricting economic freedom in the labor market (1 = worst; 10 = best). Data are for emerging market and developing economies (EMDEs) over the period 1990-2018.

A.B. Bars show the cumulative changes in dynamic general equilibrium (DGE)-based output informality in percent of GDP to a 1-point increase in the Fraser Institute's index on hiring and firing regulations (1-point increase in WEF labor market efficiency index in B). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. The results are obtained via a local projection method. Output informality in percent of GDP is detrended using Hodrick-Prescott (HP) filter. "t = n" indicates the cumulative changes in output informality over the n years after a policy change. See annex 6A for detailed model specifications.

Lower informality after labor market reforms. Excessive labor market regulations, such as excessively high minimum wages, can distort the labor market and provide incentives for firms to hire workers informally (Kugler 2004; Loayza 2016; Ulyssea 2010). Increases in labor market flexibility and efficiency have been associated with significant falls in output informality (figure 6.8). A 1-standard-deviation increase in the Fraser Institute's index of hiring and firing regulation, which gauges the extent to which the hiring and dismissal of workers is at the employer's discretion, was associated with a significant drop in output informality, by 0.5 percentage points, over the following five years. A 1-point increase in the World Economic Forum's labor market efficiency index was associated with a cumulative drop in output informality by about 0.2 percentage points of GDP over the following five years.²⁰

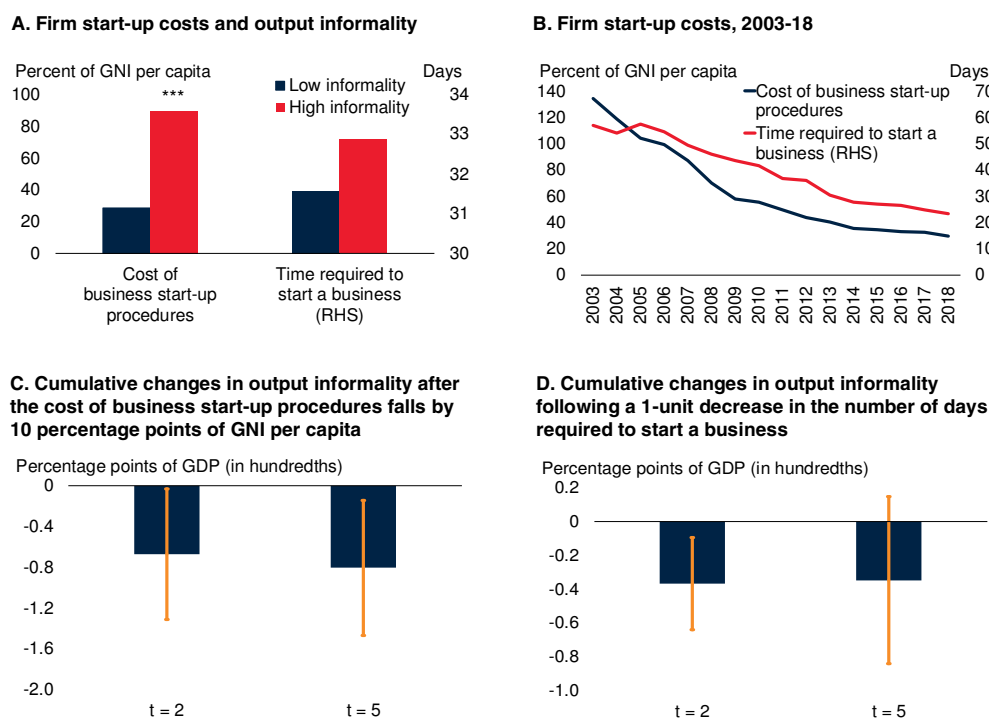
Firm start-up costs

More difficult firm start-up in more informal economies. Starting a new firm is more challenging in EMDEs with more pervasive informality (figure 6.9). On average, the costs of business start-up amount to about 90 percent of per capita gross national income (GNI) in EMDEs with above-median output informality—three times the level

²⁰ A similarly sized increase in labor market efficiency was associated with a decline in employment informality by 2 percentage points of employment, cumulatively, over the following 2-3 years.

FIGURE 6.9 Firm start-up cost and informality in EMDEs

Firm start-ups are more challenging in EMDEs with above-median informality than in those with below-median informality. Over the past two decades, EMDEs have taken measures to facilitate firm start-up. Reduced start-up costs have been followed by significant contractions in informal output.



Source: World Bank (*Doing Business*).

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018.

A. The bars show unweighted group averages. "High-informality" ("Low-informality") are EMDEs with above-median (below-median) dynamic general equilibrium (DGE)-based informal output measures. *** denotes that the group differences between EMDEs with above median informality and those with below-median informality are significant at 10 percent level. The data are from 2003-2018. B. Lines show unweighted averages for EMDEs for the period 2003-2018.

C, D. Bars show the cumulative changes in DGE-based output informality in percent of GDP following a 10-percentage-point-of-GNI-per-capita decrease in the cost of business start-up procedures (C); or following a 1-unit increase in the number of days required to start a business in D). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. "t = n" indicates the cumulative changes in output informality over the n years after a policy change. See annex 6A for detailed model specifications.

in other EMDEs. It takes 33 days to start a business in EMDEs with above-median informality—about 1 day longer than in other EMDEs, although the difference is not statistically significant.

Over time, easier firm start-up. Business start-up costs have fallen steadily in EMDEs over the past two decades. Between 2003 and 2018, the costs of business start-up fell from above 130 percent of per capita GNI to below 30 percent, and the number of days required to start a business declined by two-thirds, to 23 days. There has also been a reduction in the number of procedures needed to start a business (World Bank 2020a).

A variety of regulations have been used to encourage formal firm start-up. “One-stop-shop” registrations have been created (for example, in Ukraine) to simplify the firm start-up process. Similar reforms have been carried out in several other EMDEs (World Bank 2009, 2010, 2011). EMDEs in ECA and SSA have implemented an above-average number of reforms to reduce the costs of starting a business during the past decade.

Lower informality after regulatory easing. Easier and less costly firm registration reduces the costs for firms of entering the formal sector (Haltiwanger, Jarmin, and Miranda 2013; Nguimkeu 2015; Loayza 2018). Empirically, a reduction in the costs of business start-up by 10 percentage points of GNI per capita was associated with a significant reduction in output informality, by 0.1 percentage point of GDP over the following five years. Similarly, a 1-day reduction in the number of days required to start a business was associated with a significant contraction in output informality, by 0.4 percent point of GDP over the following two years.

Governance

Weaker governance in more informal economies. More corruption, less effective government, and weaker law and order have been associated with larger informal sectors in EMDEs (figure 6.10; chapter 4). On average in the past three decades, EMDEs with above-median output informality scored significantly lower (by about half of a standard deviation) on government effectiveness, control of corruption, and rule of law than other EMDEs. Using the ICRG indicators, bureaucracy quality, control of corruption, and law and order in EMDEs with above-median output informality are significantly lower, by 0.4-0.7 standard deviation, than in EMDEs with below-median informality.

Over time, improved governance. Governance has generally improved in EMDEs since 1990. Both bureaucracy quality and law and order improved by 0.2-0.6 standard deviation between 1990 and 2018. Control of corruption, law and order, and bureaucracy quality strengthened in the early 1990s but weakened again in the second half of the 1990s with the economic, social, and political disruptions in transition economies, before stabilizing in the early 2000s.

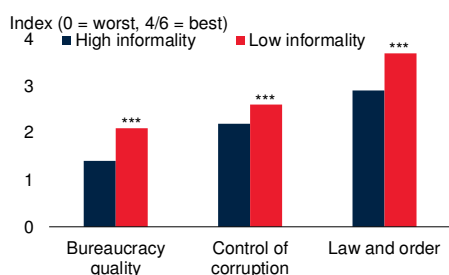
To improve governance and regulatory quality, countries have increased the frequency of inspections (for example, in most EU15 economies and Bangladesh), created a national-level firm or employee registry (Poland), and launched public awareness campaigns regarding tax compliance (for example, China, Republic of Korea).²¹ Such measures have been most effective in reducing informality when implemented in conjunction with steps to improve labor market functioning and when applied evenhandedly to both formal and informal firms (Loayza 2018). In Georgia, during 1996-2016, the transition to a market economy brought significant improvements in government effectiveness, control of corruption, and law and order (World Bank

²¹ See, for instance, Awasthi and Engelschalk (2018); Bruhn and McKenzie (2014); De Giorgi, Ploenzke, and Rahman (2018); and Oviedo, Thomas, and Karakurum-Özdemir (2009).

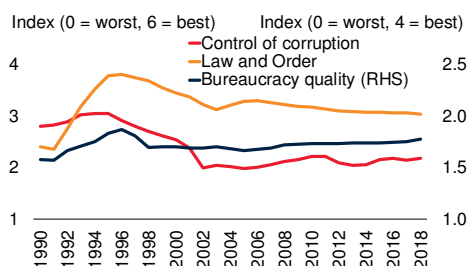
FIGURE 6.10 Governance and informality in EMDEs

Governance and regulatory quality tend to be weaker in EMDEs with more pervasive informality but have improved over the past several decades. Such improvement has often been followed by declines in informality.

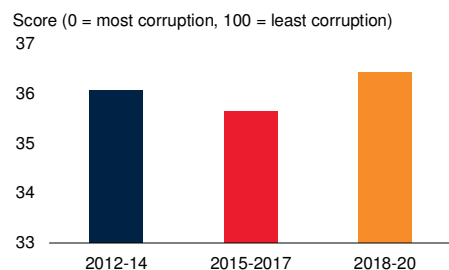
A. Governance and informality: ICRG indicators



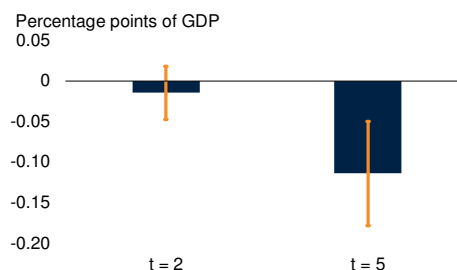
B. Governance in EMDEs, 1990-2018



C. Perceived level of corruption in EMDEs, 2012-20



D. Cumulative change in output informality following a 1-point improvement in control of corruption (ICRG)



Sources: Transparency International - Corruption Perceptions Index (dataset); *International Country Risk Guide (ICRG)* dataset; World Bank.

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018.

A. The bars show the unweighted group averages. "High (Low)-informality" are EMDEs with above-median (below-median) dynamic general equilibrium (DGE)-based informal output measures. *** denotes that the group differences are significant at 10 percent level.

B. Lines show simple averages for EMDEs using various indicators from ICRG. A higher value indicates better governance.

C. Bars show the unweighted averages of the perceived level of corruption in EMDEs. The measure ranges from 0 (the highest level of perceived corruption) and 100 (the least level of perceived corruption).

D. Bars show the cumulative changes in DGE-based estimates on output informality to a 1-point increase in control of corruption. Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. "t = n" indicates the cumulative changes in output informality over the n years after a policy change. The results are obtained via a local projection method. Output informality in percent of GDP is detrended using Hodrick-Prescott (HP) filter. See annex 6A for detailed model specifications.

2019b).²² With output growth averaging about 6 percent per year, the share of informal output fell by 9 percentage points of GDP, and the share of informal employment in total employment fell by a similar magnitude.

Lower informality after governance reforms. Stricter enforcement of government regulations and a better legal framework can increase the costs of remaining in the informal economy (Dabla-Norris, Gradstein, and Inchauste 2008). Anti-corruption

²² From 1996 to 2016, Georgia's global ranking on regulatory quality improved from 150th to 34th place, and its ranking on government effectiveness improved from 123th to 55th place.

efforts and stronger law and order may allow fewer opportunities for informal firms to avoid the obligations of formal firms (Choi and Thum 2005; Dreher and Schneider 2010; Iriyama, Kishore and Talukdar 2016). Better control of corruption can also reduce informality via the tax morale channel (DeBacker, Heim and Tran 2015; Luttmer and Singhal 2014). Empirically, a one-standard-deviation improvement in the control of corruption was associated with a cumulative decrease in output informality by about 0.1 percentage point of GDP in the following three to five years.

Education and training programs

Poorer education associated with greater informality. Informal workers tend to be less skilled, and therefore also less productive, than formal-economy workers (chapter 4; Loayza 2018; Perry et al. 2007). In fact, wage differentials between formal and informal workers have primarily reflected differences in educational backgrounds and experience (box 4.1). Workers in EMDEs with above-median output informality have, on average, one year less of schooling than those in other EMDEs (figure 6.11). Poorer access to schooling and qualified teachers has resulted in significantly poorer education outcomes, measured by PISA test scores, in EMDEs with above-median output informality. Entrepreneurship training, at all levels of education, including education programs aimed at equipping entrepreneurs to create and manage SMEs, are significantly less accessible in EMDEs with above-median output informality.

Over time, improved education and training. Since 1990, education outcomes and skill levels have improved: thus in the average EMDE, average years of schooling have increased by about 2 years (figure 6.11). Entrepreneurship training has also become more accessible in EMDEs, and the improvement has been statistically significantly more pronounced in EMDEs with above-median informality. In some EMDEs, training programs have boosted worker income and firm revenue in the informal sectors (Burki and Abbas 1991; Verner and Verner 2005). These training programs were also supported by general improvements in access to primary education and literacy rates (Aziz et al. 2014; Hathaway 2005).

Lower informality after improvements to training and education. To the extent that workers remain in the informal sector for lack of human capital or skills, better and more accessible public education may help workers (or their dependents) move into better paid formal employment (Andrews, Sánchez, and Johansson 2011; Maloney 2004; Perry et al. 2007).

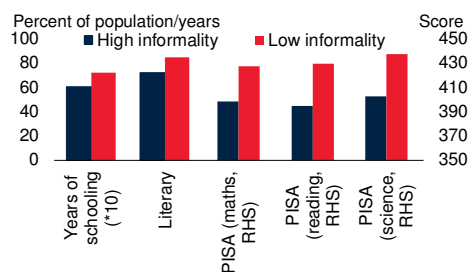
Empirically, additional entrepreneurship training and improved education outcomes have been accompanied by significant declines in output informality. Five years after a two-standard-deviation increase in access to entrepreneurship training and education at primary and secondary levels, output informality was statistically significantly lower, by 0.2 percentage point of GDP.²³ A 10-point increase in the PISA reading score was

²³Such an improvement was accompanied by a significant reduction in employment informality, by 1.3 percentage points of employment, over 3-4 years.

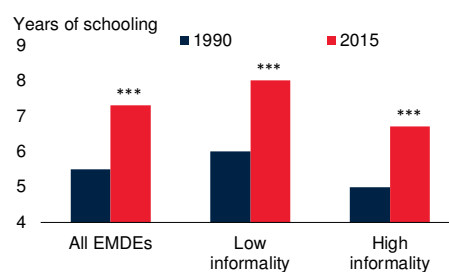
FIGURE 6.11 Education and informality in EMDEs

Workers in EMDEs with more pervasive informality are, on average, less educated and trained than those in EMDEs with less pervasive informality. Training focused on small and medium-sized enterprises (SMEs) has improved over the past two decades, especially in EMDEs with above-median informality. Better education and training have coincided with declines in informality.

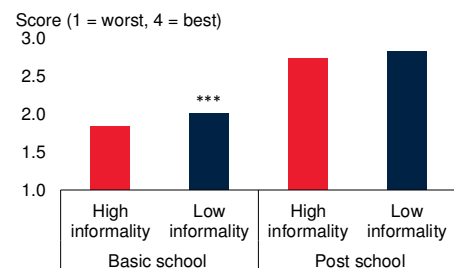
A. Education and informality



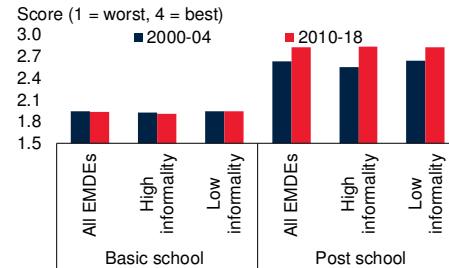
B. Education, 1990 vs. 2015



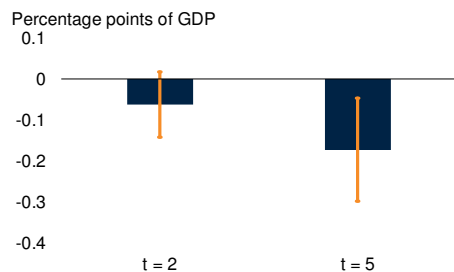
C. Entrepreneurship training and informality



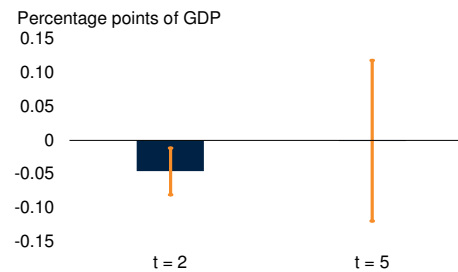
D. Entrepreneurship training, 2000-18



E. Cumulative changes in output informality following a 1-point improvement in basic school entrepreneurial education and training



F. Cumulative changes in output informality following a 10-point increase in national average PISA score on reading



Sources: Barro and Lee (2013); Global Entrepreneurship Monitor; Program for International Student Assessment (PISA) database; World Bank (World Development Indicators).

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018. "High (Low) informality" are EMDEs with above (below)-median output informality proxied by dynamic general equilibrium (DGE)-based estimates in percent of GDP. *** denotes that the group differences are not zero at 10 percent significance. All scores regarding entrepreneurship training and education (in C-F) range from 1 (worst) to 4 (best). "Basic school" measures the extent to which training in creating or managing small and medium-sized enterprises (SMEs) is incorporated within the education and training system at primary and secondary levels. "Post school" measures the extent to which training in creating or managing SMEs is incorporated within the education and training system in higher education.

A.C. Bars show simple group averages. PISA scores are for 15-year-old students.

B.D. Bars show simple group averages for corresponding time periods.

E.F. Bars show the cumulative changes in DGE-based output informality in percent of GDP to a 1-point increase in "Basic school" score from the Global Entrepreneurship Monitor (10-point increase in PISA reading scores). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. "t = n" indicates the cumulative changes in output informality over the n years after a policy change. See annex 6A for detailed model specifications. PISA scores are for 15-year-old students.

associated with a significant decline in output informality, by about 0.1 percentage point of GDP, over the following two years.

Access to finance

Less access to finance in more informal economies. Firms in the informal sector have less access to credit from the banking sector and capital markets, which restricts their ability to invest, including in productivity-enhancing technologies (Capasso and Jappelli 2013; D’Erasmus 2016; Ferreira-Tiryaki 2008; box 6.1; figure 6.12). In EMDEs with above-median informality, about one-third of firms identified access to finance as a major constraint—8 percentage points of firms higher than in EMDEs with below-median informality. Households in EMDEs with below-median informality have access to significantly more commercial bank branches, ATMs, and credit than those in other EMDEs. About half of the population in EMDEs with below-median informality own an account at a financial institution or used a mobile money service recently—about 17 percentage points higher than in EMDEs with below-median informality.

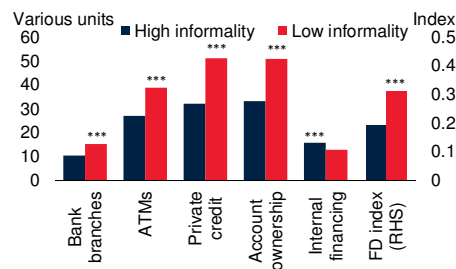
Over time, expanded access to finance. EMDEs, especially in EAP, MNA, SAR and, more recently, SSA, have implemented a series of reforms to improve access to finance. Such reforms mainly aim to strengthen credit reporting systems and improve the effectiveness of collateral and bankruptcy laws (World Bank 2020a). Overall, financial development improved in about 90 out of 142 of EMDEs over the period 2010-2018 (figure 6.12). The number of ATMs per 100,000 adults rose by 50 percent between 2010 and 2018, while the share of population with an account at a financial institution increased from 33 percent to 51 percent. Domestic credit to the private sector increased by about 4 percentage points of GDP over the same period. Access to credit has been facilitated for firms in the informal sector by introducing credit information bureaus and better utilization of information and communication technology (Capasso, Monferrà, and Sampagnaro 2018). Personal property registration has also made loans more accessible for firms operating in the informal economy (for example, in the Czech Republic; World Bank 2012). Digital payment systems have provided an entry point into the formal financial system and encouraged a shift away from informal finance (for example, in Kenya; World Bank 2017).

Lower informality after expanded access to finance. Lower financing costs and easier access to credit can entice informal firms with promising investment projects that require external finance to enter the formal economy (box 6.1). Empirically, adding 10 more bank branches per 100,000 adults was followed by a 0.1-0.3 percentage point decline in the share of informal output in the following 1 to 5 years. A 10-percentage-point-of-GDP increase in domestic credit to the private sector was associated with a significant contraction in output informality, by 0.1 percentage point of GDP over the subsequent 1 to 5 years.

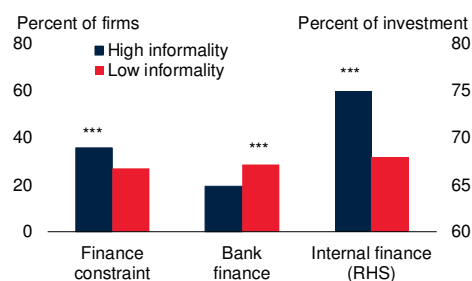
FIGURE 6.12 Access to finance and informality in EMDEs

Firms and workers in EMDEs with more pervasive informality are more likely to be financially constrained, less likely to obtain bank finance, and have limited access to other financial services. Access and depth of financial systems in EMDEs improved between 1990 and 2018. Financial development has been followed by significant declines in output informality.

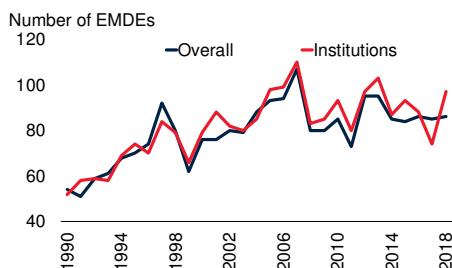
A. Access to finance and output informality



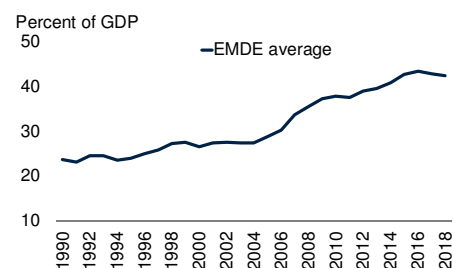
B. Financial constraints facing firms and output informality



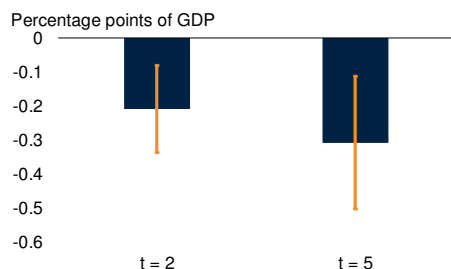
C. EMDEs with improved financial development, 1990-2018



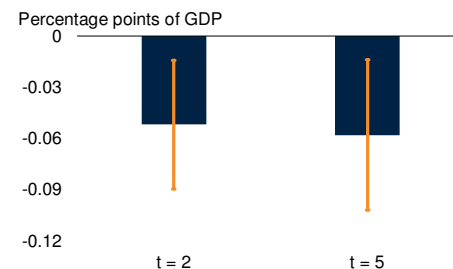
D. Domestic credit to private sector, 1990-2018



E. Cumulative changes in output informality following a 10-unit increase in the number of bank branches per 100,000 adults



F. Cumulative changes in output informality following a 10-percentage-point-of-GDP increase in domestic credit to the private sector



Sources: International Monetary Fund; World Bank.

Note: Data are from emerging market and development economies (EMDEs) and the period 1990-2018. Output informality is measured by dynamic general equilibrium (DGE)-based estimates on informal output (in percent of official GDP). In A-B, *** denotes that the group differences are not zero at 10 percent significance level. See notes below figure B6.1.1 for detailed variable descriptions in A-D. A.B. Bars are unweighted averages for EMDEs with above-median ("high") informality and those with below-median ("low") informality over the period 2010-2018 (A) and 2000-2018 (B). In B, bars are group means using data from latest year available for EMDEs. C.D. Lines show simple EMDEs averages for corresponding time periods. "Overall" is the aggregate financial development index obtained from the IMF. The "Institutions" index subcomponent measures how developed financial institutions are. E.F. Bars show the cumulative changes in DGE-based output informality in percent of GDP to a 1-unit increase in the number of bank branches per 100,000 people (E) or 10-percentage-point-of-GDP increase in domestic credit to the private sector (F). Whiskers show upper and lower bounds of 90 percent confidence intervals. "t = n" indicates n years after the rise in bank branches of private credit. See annex 6A for detailed model specifications.

Conclusion

The COVID-19 pandemic plunged the global economy into an unprecedented contraction in 2020, and it is likely to leave lasting scars on long-term potential output (World Bank 2020b, 2021). Informal sector workers have been among the hardest hit since they are disproportionately employed in the services sector that has been particularly disrupted by the pandemic, work in crowded conditions where the virus can spread easily, and have limited access to savings of government support programs (box 2.1). The limited access to sanitation facilities and medical resources in EMDEs with more pervasive informality illustrates further the development challenges posed by informality. The pandemic has served as a reminder of the longstanding need for policies to address the challenges associated with, and caused by, informality. To achieve the Sustainable Development Goals, policy makers need to boost productivity growth in both formal and informal sectors and reduce the vulnerabilities of firms and workers in the informal economy.

Policies are more likely to succeed in addressing the challenges of informality if they are comprehensive and tailored to country circumstances. Past failures of reforms to lower informality and boost productivity have in part been attributed to reform design that were not tailored to country specifics and not sufficiently embedded in supportive institutional and business environment, in addition to not being consistently implemented (Birdsall, de La Torre, Caicedo 2010; Loayza 2018).

A comprehensive strategy: The right policy mix. Individual policy interventions in isolation may have only a limited impact on informality, and have unwelcome unintended consequences (annex 6A; Oviedo, Thomas, and Karakurum-Özdemir 2009; Ulyseas 2018). A coherent reform strategy is needed, with reforms that complement each other and address the complexity of informality (Loayza 2018). Success also depends on careful monitoring of potential unintended consequences and on a supportive macroeconomic, political and institutional environment. The latter should ensure the political and fiscal viability of reform implementation and reduce the transition costs for workers moving from the informal sector to the formal sector.

A tailored strategy: Addressing economy-specific priorities. Since the causes and features of informality differ considerably across countries, policy makers need to identify economy-specific reform priorities. In countries where informality is predominantly associated with poor governance, a policy package could streamline regulatory and tax frameworks while improving the efficiency of public revenue collection and regulatory enforcement as well as strengthening public service delivery to bolster tax morale. In countries where informality is predominantly a reflection of underdevelopment, a policy package could include expanded access to finance, markets, and inputs to foster firm productivity and growth; better education to facilitate formal sector employment; and enhanced safety nets to cushion household risks. In SSA, SAR, and the non-GCC economies of MNA, for example, general education and training programs to raise human capital could be prioritized (World Bank 2019b; chapter 5). In

LAC, reducing high tax and regulatory costs faced by businesses could incentivize firms to join the formal sector. In ECA, improving government effectiveness and reducing corruption could be policy priorities.

New policy challenges. The emerging “gig” economy poses opportunities and policy challenges with its higher accessibility, more fluid labor arrangements, and greater reliance on digital technology than more traditional forms of informality. Since “gig” workers do not fully participate in the social security system, they are, by some definitions, informal workers (Loayza, Servén, and Sugawara 2010). Regulatory changes, especially in the context of social security systems, can help ensure that “gig” workers’ economic risks are manageable and that they do not permanently lose access to the formal economy (World Bank 2014, 2016, 2018b). Since these workers may take on many different assignments over the course of their careers, the ability to learn and adapt will be essential. Policies can support this adaptability with more provision of education and (re)training programs (Card, Kluve, and Weber 2018; World Bank 2019a). Increased emphasis on the development of cognitive skills in primary and secondary education can also help (Almeida, Behrman, and Robalino 2012; World Bank 2018a, 2018b).

New policy opportunities. New technologies offer governments opportunities both to reduce the incentives for, and increase the cost of, operating informally while also providing boosts to productivity that can propel firms into the formal economy. New technologies can help strengthen tax administration and improve access to finance, including by making it easier to broaden the tax net and assess credit worthiness.²⁴ Digitalization can lower regulatory burdens. For example, Costa Rica reduced the time required to register a business by digitizing tax registration records and company books in 2009 (World Bank 2009). This was followed by a drop in informal employment by 4 percentage points of total employment and a fall in informal output by about 2 percentage points of official GDP during 2009-16 (World Bank 2019b). Similar reforms have been carried out in Guyana (2010) and Kenya (2011; World Bank 2010, 2011).

Safeguarding informal workers during severe shocks. COVID-19 has taken an especially heavy humanitarian and economic toll on EMDEs with large informal sectors (World Bank 2020b). The vulnerabilities of the informal sector, associated with low incomes and limited access to government benefits and public services, have amplified the economic shock from COVID-19 and the related threat to livelihoods (OECD 2020). In many countries, the pandemic has revealed severe shortcomings in social security systems and governments’ ability to support vulnerable groups (Loayza and Busso et al. 2020; Pennings 2020).²⁵ Despite their high costs, untargeted programs may be warranted during such a crisis to maximize the reach to informal-economy

²⁴ See Awasthi and Engelschalk (2018); Capasso, Monferrà, and Sampagnaro (2018); Gupta et al. (2017); and Junquera-Varela et al. (2017).

²⁵ See Fang, Kennedy, and Resnick (2020) for a review of social protection policies implemented under COVID-19.

participants; their long-term fiscal burden can be minimized by prioritizing temporary and reversible measures. To prevent hysteresis in formal-sector job losses, policies can aim to preserve formal-sector employment opportunities while protecting the poor and informal workers through food aid and cash transfers (Alfaro, Becerra, and Eslava 2020).

Future research. Some policy areas remain under-explored in the literature. First, digitalization is a recent development in EMDEs that holds great potential for informal-economy participants and policy makers. Yet little is known about the impact of digitalization of government services or private economic activity on the informal economy, including relative to the formal economy. The possibility that digitalization will disproportionately benefit formal firms, and thus shrink the relative size of the informal sector, deserves examination. Second, past studies have focused on the impact of policies on formalization without looking into their effects on the resilience of the informal economy. Future studies could examine policies that can improve the resilience of the informal economy and prevent informal participants from being tipped into poverty by negative shocks such as COVID-19. Lastly, the chapter has not touched upon some emerging ideas regarding how governments can better engage with informal businesses, such as providing a simplified, intermediate and temporary legal status to informal businesses that could be aligned with both business needs and government goals (Marusic et al. 2020).

ANNEX 6A Policies and informality

The linkage between policies and informality is analyzed via the local projection model. It focuses on showing the cumulative change in informality following policy changes.

Definitions

Both output informality and employment are considered in the regression analyses here. Output informality is proxied by dynamic general equilibrium (DGE)-based estimates in percent of official GDP, and employment informality is proxied by self-employment in percent of total employment. Both measures cover up to 125 EMDEs over the period 1990-2018. For the estimation of the local projection model, all data series are detrended using the Hodrick-Prescott (HP) filter.

Policy indicators

The following policy measures were considered, covering up to 121 EMDEs for 1990-2018 (table 6.2).²⁶

Tax rates. Corporate, individual, and value-added tax rates from Végh and Vuletin (2015; updated to 2019) using data from OECD, University of Michigan, and KPMG.

²⁶ While the data for some indicators are available for more than 121 EMDEs, the regressions cover up to 121 EMDEs.

Cost of tax compliance. Ease of paying taxes score from the World Bank's *Doing Business* database (World Bank 2020a; 0 = worst and 100 = best);

Access to finance. Domestic credit to the private sector in percent of GDP, a common measure for depth of financial institutions, is provided by World Development Indicators (World Bank 2020c); the number of commercial bank branches per 100,000 adults, a common measure for the access to financial institutions, is obtained from Global Financial Development Database (World Bank 2019c);

Labor market regulation. Labor market efficiency index from World Economic Forum's Global Competitiveness Report (ranging from 1 to 7 with a higher score indicating a more efficient labor market) and the index for hiring and firing regulation from Fraser Institute (Fraser Institute 2020; 1 = firing and hiring are most determined by regulations but not by the employer, 10 = firing and hiring are mostly determined by the employer but not by regulations).

Governance. Bureaucracy quality, control of corruption, and law and order are from the *International Country Risk Guide* (ICRG; 1 = worst governance, 4/6 = best governance).

Government services. Survey responses on the presence and quality of programs directly assisting SMEs at all levels of government (national, regional, municipal: "government programs) and on the presence of property rights, commercial, accounting and other legal and assessment services and institutions that support or promote SMEs ("Commercial and professional infrastructure"), taken from the National Expert Surveys of the Global Entrepreneurship Monitor for the period 2000-19 (ranging from 1 to 4 with a lower score representing poorer entrepreneurial conditions). Survey responses on the extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary levels ("basic school") are also taken from the National Expert Surveys of the Global Entrepreneurship Monitor. Mobile phone subscriptions per 100 people are taken from World Development Indicators.

Firm start-up costs. Cost of business start-up procedures in percent of GNI per capita and time required to start a business in days are from *Doing Business* (World Bank 2020a).

Education and health outcomes. Life expectancy at birth and PISA test scores for reading (students aged 15) are from World Development Indicators (World Bank 2020c).

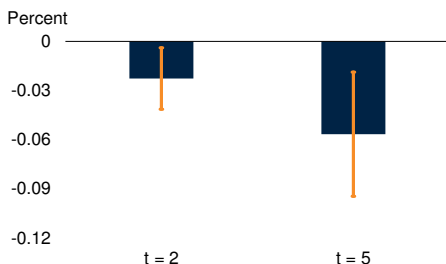
Model specification: The local projection model

A local projection model as in Jordà (2005), Teulings and Zubanov (2014), and World Bank (2018c) is used to identify the effects of policy changes on informality over time. In impulse responses, the model estimates the effect of policy changes on cumulative changes in the cyclical component of (DGE-based) informal output in percent of official

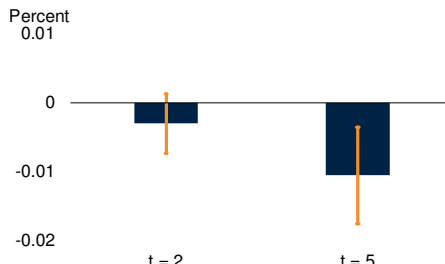
FIGURE 6A.1 Robustness checks: Evolution of informal output levels following financial development in EMDEs

Similarly to the results on ratios of informality, improved access and depth of financial institutions are linked with significant contractions in levels of informal output in the following years.

A. Cumulative changes in informal output levels following a 10-unit increase in the number of bank branches per 100,000 people



B. Cumulative changes in informal output levels following a 10-percentage-point-of-GDP increase in domestic credit to the private sector



Source: World Bank.

Note: Data for the period 1990-2018 and EMDEs. Here informal output level is measured by dynamic general equilibrium (DGE)-based estimates on informal output (in constant 2011 USD). The results are obtained via a local projection method where informality measures are detrended using Hodrick-Prescott (HP) filter. See annex 6A for detailed model specifications. A-B. Bars show the cumulative changes in DGE-based output informality in percent of GDP following a 10-unit increase in the number of bank branches per 100,000 people (A) and 10-percentage-point-of-GDP increase in the share of domestic credit to the private sector in percent of GDP (B). Whiskers show the upper and lower bounds of the corresponding 90 percent confidence intervals. "t = n" indicates the cumulative changes in output informality over the n years after a policy change.

GDP (or self-employment in percent of total employment) over a time horizon h while controlling for country fixed effects and per capita income levels:²⁷

$$y_{i,t+h} - y_{i,t-1} = \alpha^h + \beta^h d.policy_{i,t-1} + \theta^h X_{i,t} + fixed\ effects + \epsilon_{i,t}^h$$

where $y_{i,t}$ is the cyclical component of informality in country i and year t . The variable $d.policy_{i,t-1}$ is the variable of interest, which measures the change in policy indicators in country i and year $t-1$. The policy change variable is lagged here to deal with potential endogeneity issues. Real GDP per capita (constant 2010 US dollars, obtained from World Development Indicators 2020) is included as the control variable (i.e. $X_{i,t}$).²⁸ Results are shown in tables 6.4-6.5.

²⁷ The results are robust to using levels of DGE-based informal output (figure 6A.1).

²⁸ In the case of corporate and individual tax rates, the levels of both tax rates at year t in country i are also included as control variables. The results do not change when these two control variables are dropped. Similarly, when labor tax and contributions is the variable of interest, the level of labor tax and contributions at year t in country i is included as one of the control variables.

TABLE 6.1 A summary of empirical studies on financial development and informality

Paper	Measure of financial development (FD).	Measure of the informal economy (IE)	Estimators	Main database	Results
Gatti and Honorati (2008)	Access to credit, indicating whether the firm has a credit or overdraft line.	Percentage of firms' sales reported to tax authority.	OLS and FE (fixed effects) estimation.	World Bank investment climate surveys.	Less informality is robustly and significantly related with more access to credit. Moreover, the relationship between credit and formality is stronger in high-formality countries.
Dabla-Norris and Inchauste (2008)	Private credit over deposit money at banks and other financial institutions as a share of GDP.	Percent of sales not reported to tax authorities.	OLS with clustered standard errors.	The 2005 Business Environment and Enterprise Performance Survey of the World Bank and the European Bank for Reconstruction and Development.	Firms that rate financing as major obstacles to their business have, on average, a 16 percent probability of hiding 50 percent of their sales.
Bose, Capasso, and Wurm (2012)	Liquid liabilities and total domestic credit provided by depository banks, bank overhead costs, net interest margin, lending-deposit rate spread, and level of bank concentration. All as a percentage of GDP.	Percent of sales not reported to tax authorities DYMIMIC method (Schneider 2007) and WEF (World Economic Forum) measure.	FE (fixed effects) and GMM (generalized method of moments).	Beck, Demirgüç-Kunt, and Levine (2000) database and the World Bank World Development Indicators (WDI).	Improvement in the depth and efficiency of the banking sector leads to a smaller informal economy.
Elgin and Uras (2013)	Money and quasi money, domestic credit provided by financial corporations to the private sector, domestic credit from the financial sector, and net credit to central government.	DYMIMIC approach (Schneider 2007).	GMM	World Bank (WDI).	A non-linear inverse-U relationship between financial development and shadow economy size.
Capasso and Jappelli (2013)	Probability of being credit-rationed (Guiso, Sapienza, and Zingales 2004).	Irregular job rate Share of income paid in cash.	OLS and instrumental variables estimation.	Bank of Italy's Survey of Households Income and Wealth (SHIW).	Negative and significant effect of financial development on the measure of informal economy. The impact is particularly strong in construction but also in the retail and tourism sectors.

TABLE 6.1 A summary of empirical studies on financial development and informality (continued)

Paper	Measure of financial development (FD).	Measure of the informal economy (IE)	Estimators	Main database	Results
Bittencourt, Gupta and Stander (2014)	Domestic credit over GDP; interest rate differential between loans and deposits; liquid liabilities as a percentage of real GDP; market capitalisation of all listed companies as a percentage of real GDP.	DYMIMIC approach (Schneider 2010) and Dynamic general equilibrium (DGE) model (Elgin and Öztunali 2012).	FE and GMM	Schneider et al. 2010; Elgin and Öztunali 2012; World Bank WDI, Global Development Finance, and World Governance Indicators (WGI).	Lower (higher) levels of financial development and higher (lower) levels of inflation lead to a higher (lower) size of the shadow economy.
Berdiev and Saunoris (2016)	Money and quasi money (M2) as percentage of GDP; domestic credit provided by financial corporations to the private sector (private credit) as a percentage of GDP; and domestic credit from the financial sector to various sectors and net credit to the central government (financial credit) as percentage of GDP	Dynamic general equilibrium (DGE) model (Elgin and Öztunali 2012).	GMM and panel vector autoregression (VAR) analysis	World Bank's World Development Indicators and Elgin and Öztunali (2012).	A shock to M2 reduces the size of the shadow economy, and this effect becomes insignificant after eight years. A shock to the shadow economy shrinks financial development.
Bayar and Öztürk (2016)	Domestic credit to private sector.	DYMIMIC approach (Schneider, Raczkowski, and Miröz 2015).	Cointegration analysis	Schneider, Raczkowski, and Miröz (2015), World Bank and Heritage Foundation.	Financial development and improvements in institutional quality reduce the size of the shadow economy, in the long run.
Canh and Thanh (2020)	Overall financial development, overall financial institutions, overall financial markets, financial institutions' depth, financial institutions' access, financial institutions' efficiency, financial markets' depth, financial markets' access, and financial markets' efficiency.	DYMIMIC approach (Medina and Schneider 2018).	Dynamic fixed effects—autoregressive distributed lag	Medina and Schneider (2018), Sviryzhenka (2016), World Bank WDI and WGI; Heritage Foundation	Non-linear negative relationship between financial development and shadow economy for eight out of the nine financial indicators.
Gharleghi and Jahanshahi (2020)	Liquid liabilities, private credit and stock market capitalisation.	MIMIC and PMM (Predictive Mean Matching) method (Medina and Schneider 2018).	Threshold FE.	World Bank WDI and global financial development.	Financial development has a negative and significant effect on the shadow economy, but only for countries that have a per capita GDP of US\$33,600 and higher.

Source: World Bank.

TABLE 6.2 Data sources of variables used in annex 6A

Variable	Source	No. of EMDEs	Years
Corporate income tax rate	Végh and Vuletin (2015; updated to 2019)	118	1990-2018
Individual income tax rate	Végh and Vuletin (2015; updated to 2019)	111	1990-2019
Value-added tax (VAT) rate	Végh and Vuletin (2015; updated to 2019)	95	1990-2020
Ease of paying taxes	<i>Doing Business</i> (2020)	152	2006-2018
Presence and quality of government programs	GEM (2020)	75	2000-2018
Commercial and professional infrastructure	GEM (2020)	75	2000-2018
Life expectancy at birth	WDI (2020)	153	1990-2018
Mobile cellular subscriptions	WDI (2020)	154	1990-2018
Labor market efficiency	WEF (2020)	115	2007-2017
Hiring and firing regulation	Fraser institute (2020)	121	1990-2018
Cost of business start-up procedures (percent of GNI per capita)	<i>Doing Business</i> (2020)	152	2003-2018
Number of days required to start a business	<i>Doing Business</i> (2020)	152	2003-2018
Control of corruption	ICRG (2020)	102	1990-2018
Basic school entrepreneurial education	GEM (2020)	75	2000-2018
PISA score on reading	WDI (2020)	47	2000-2018
Domestic credit to the private sector (percent of GDP)	WDI (2020)	148	2000-2018
Bank branches (per 100,000 adults)	World Bank (2019c)	143	2001-2017

Source: World Bank.

Note: WDI = World Development Indicators. ICRG = *International Country Risk Guide*. GEM = Global Entrepreneurship Monitor. WEF = World Economic Forum.

TABLE 6.3 Policy indicators and employment informality

Policy	High informality	Low informality	P-value for t-test
Corporate income tax rate	26.4	21.4	0.00
Individual income tax rate	28.3	20.0	0.00
Value-added tax (VAT) rate	14.0	13.8	0.84
Number of tax payments per year (2010-18)	34.6	24.3	0.00
Number of hours spent on paying taxes per year (2010-18)	311.6	280.4	0.54
Cost of complying with VAT refund (hours)	36.7	15.4	0.00
Number of days needed to obtain VAT refund	41.0	26.3	0.01
Cost of business start-up procedures (percent of GNI pc)	77.6	21.5	0.00
Number of days required to start a business	35.1	27.9	0.04
Labor market regulation index (Fraser Institute)	6.0	6.6	0.01
Labor market efficiency (WEF)	4.1	4.2	0.60
Minimum wage (percent of GDP pc)	6.4	3.3	0.00
Minimum wage (1 = worst, 10 = best)	5.9	6.9	0.02
Hiring and firing (1 = worst, 10 = best)	4.8	4.6	0.35
Working hours (1 = worst, 10 = best)	8.0	7.6	0.27
Dismissal costs (1 = worst, 10 = best)	5.3	6.2	0.11
Tax morale (1 = highest, 10 = lowest)	2.2	2.4	0.22
Governmental support and policies (1 = worst, 4 = best)	2.5	2.6	0.38
Governmental programs (1 = worst, 4 = best)	2.4	2.5	0.08
Commercial and professional infrastructure (1 = worst, 4 = best)	2.9	2.9	0.27
Physical and service infrastructure (1 = worst, 4 = best)	3.5	3.6	0.14
Adequacy of social insurance programs (percent of household income)	27.4	34.1	0.04
Coverage of unemployment benefits (percent of population)	5.0	5.2	0.91
Access to electricity (percent of population)	56	92.3	0.00
Internet users (percent of population)	10.5	26	0.00
Paved road (percent of road)	31.5	61.0	0.00
Mobile cellular subscriptions (per 100 people)	33.8	55.8	0.00
Nurses and midwives (per 1,000 people)	1.4	3.7	0.00
Physicians (per 1,000 people)	0.6	1.5	0.00
Life expectancy (years)	61.9	71.0	0.00
Bureaucracy quality (ICRG)	1.5	2.0	0.00
Control of corruption (ICRG)	2.3	2.6	0.10
Law and order (ICRG)	3.0	3.6	0.00
Years of schooling	8.2	5.3	0.00
Literacy	69.2	91.1	0.00
PISA score (math)	392.8	432.9	0.00
PISA score (reading)	388.1	434.7	0.00
PISA score (science)	398.2	440.8	0.00
Basic school entrep. edu and training (1 = worst, 4 = best)	1.9	2.0	0.39
Post school entrep. edu and training (1 = worst, 4 = best)	2.8	2.8	0.72
Identify access to finance as a major constraint (percent of firms)	32.3	28.9	0.24

TABLE 6.3 Policy indicators and employment informality (continued)

Policy	High informality	Low informality	P-value for t-test
Percent of firms using banks to finance investments	20.7	30.9	0.00
Proportion of investment financed internally	73.6	66.3	0.00
Commercial bank branches (per 100,000 adults)	10.9	18.5	0.00
Automated teller machines (ATMs) (per 100,000 adults)	21.2	52.2	0.00
Domestic credit to private sector (percent of GDP)	35.0	55.1	0.00
Account ownership (percent of age 15+)	37.2	54.0	0.00
Internal financing (percent of age 15+)	16.6	11.1	0.00
IMF Financial development index	0.2	0.3	0.00

Sources: Global Entrepreneurship Monitor; International Country Risk Guide (ICRG); KPMG; University of Michigan; Organisation for Economic Co-operation and Development; Végh and Vuletin (2015); World Bank (*Doing Business*, World Development Indicators); World Economic Forum (WEF); World Value Surveys.

Note: Data are from emerging market and development economies (EMDEs) over the period 1990-2018. The group differences between EMDEs with "high informality" and those with "low informality" are tested. "High informality" ("Low informality") are EMDEs with above-median (below-median) employment informality (proxied by self-employment shares in percent of total employment) averaged over the period 1990-2018 (or otherwise specified). "Paved road" is calculated as 100 minus the share of unpaved road in percent of total road. Outliers are dropped in the case of individual tax rates, tax morale, nurses, and dismissal costs. Please see details in the notes below figures 6.2-6.12.

TABLE 6.4 Regression results from local-projection models: DGE-based informal output in percent of GDP

	(1)	(2)	(3)	(4)	(5)
Dep. var.=DGE-based output informality (percent of official GDP)	t=1	t=2	t=3	t=4	t=5
Corporate income tax rate	0.006* (0.003)	0.011** (0.005)	0.012** (0.006)	0.011** (0.006)	0.010 (0.007)
Observations	1,289	1,210	1,131	1,053	976
R-squared	0.012	0.014	0.014	0.015	0.019
Number of economies	81	80	79	78	76
Individual income tax rate	0.005* (0.003)	0.009** (0.003)	0.014*** (0.005)	0.018*** (0.006)	0.014** (0.006)
Observations	1,286	1,206	1,127	1,048	971
R-squared	0.012	0.015	0.023	0.030	0.026
Number of economies	82	80	80	78	72
Value-added tax (VAT) rate	-0.024 (0.026)	-0.043 (0.046)	-0.041 (0.044)	-0.049 (0.039)	-0.038 (0.040)
Observations	1,234	1,154	1,075	998	923
R-squared	0.015	0.020	0.018	0.021	0.022
Number of economies	82	80	79	77	73
Ease of paying taxes	-0.002 (0.002)	0.000 (0.004)	-0.002 (0.003)	-0.006* (0.003)	-0.002 (0.004)
Observations	684	603	524	445	375
R-squared	0.013	0.008	0.010	0.013	0.017
Number of economies	83	80	80	71	70
Presence and quality of government programs	0.029 (0.037)	0.001 (0.045)	-0.062 (0.064)	-0.055 (0.072)	-0.142** (0.065)
Observations	484	450	407	363	319
R-squared	0.002	0.001	0.003	0.002	0.016
Number of economies	61	60	56	51	47

**TABLE 6.4 Regression results from local-projection models:
DGE-based informal output in percent of GDP (continued)**

	(1)	(2)	(3)	(4)	(5)
Dep. var.=DGE-based output informality (percent of official GDP)	t=1	t=2	t=3	t=4	t=5
Commercial and prof. infrastructure	-0.016 (0.026)	-0.091** (0.044)	-0.090 (0.057)	-0.020 (0.036)	-0.051 (0.057)
Observations	484	450	407	363	319
R-squared	0.001	0.009	0.007	0.000	0.009
Number of economies	61	60	56	51	47
Life expectancy at birth	0.012 (0.012)	-0.015 (0.019)	-0.060** (0.024)	-0.108*** (0.033)	-0.151*** (0.040)
Observations	3,191	3,072	2,952	2,832	2,712
R-squared	0.000	0.000	0.003	0.011	0.022
Number of economies	121	121	121	121	121
Mobile cellular subscriptions (per 100 people)	-0.002*** (0.000)	-0.002** (0.001)	-0.003* (0.002)	-0.005* (0.003)	-0.010** (0.004)
Observations	3,144	3,026	2,907	2,788	2,669
R-squared	0.001	0.001	0.002	0.010	0.022
Number of economies	120	120	120	120	120
Labor market efficiency (WEF)	-0.031 (0.056)	-0.071 (0.088)	-0.127 (0.138)	-0.203 (0.153)	-0.239* (0.131)
Observations	909	816	721	626	527
R-squared	0.003	0.003	0.003	0.005	0.010
Number of economies	106	105	105	103	98
Hiring and firing regulation (Fraser)	0.005 (0.008)	-0.002 (0.012)	-0.017 (0.017)	-0.028 (0.024)	-0.046* (0.027)
Observations	1384	1283	1180	1079	980
R-squared	0.006	0.012	0.014	0.015	0.015
Number of economies	105	104	102	100	100
Cost of business start-up procedures (in percent of GNI per capita)	-0.000 (0.000)	0.001* (0.000)	0.001* (0.001)	0.001 (0.000)	0.001** (0.000)
Observations	1,496	1,377	1,257	1,137	1,017
R-squared	0.002	0.010	0.008	0.005	0.008
Number of economies	121	121	121	121	112
Nr of days required to start a business	0.001 (0.001)	0.004** (0.002)	0.005** (0.002)	0.006** (0.002)	0.003 (0.003)
Observations	1,478	1,359	1,241	1,124	1,006
R-squared	0.004	0.008	0.006	0.007	0.004
Number of economies	121	121	121	121	112
Control of corruption (ICRG)	0.004 (0.014)	-0.015 (0.020)	-0.057** (0.026)	-0.105*** (0.036)	-0.114*** (0.039)
Observations	2,435	2,343	2,250	2,157	2,064
R-squared	0.001	0.001	0.003	0.006	0.006
Number of economies	94	94	94	94	94
Basic school entrep. edu and training	-0.001 (0.034)	-0.062 (0.049)	-0.041 (0.059)	-0.107 (0.066)	-0.173** (0.076)
Observations	484	450	407	363	319
R-squared	0.000	0.004	0.002	0.006	0.020
Number of economies	61	60	56	51	47

TABLE 6.4 Regression results from local-projection models:
DGE-based informal output in percent of GDP (continued)

	(1)	(2)	(3)	(4)	(5)
Dep. var.=DGE-based output informality (percent of official GDP)	t=1	t=2	t=3	t=4	t=5
PISA score on reading	-0.003** (0.001)	-0.005** (0.002)	-0.004 (0.004)	-0.002 (0.005)	-0.000 (0.007)
Observations	405	374	344	313	282
R-squared	0.016	0.024	0.021	0.008	0.001
Number of economies	35	34	33	33	33
Domestic credit to the private sector (percent of GDP)	-0.005*** (0.002)	-0.005** (0.002)	-0.005*** (0.002)	-0.005** (0.002)	-0.006** (0.003)
Observations	2,515	2,402	2,290	2,178	2,067
R-squared	0.006	0.004	0.009	0.021	0.038
Number of economies	121	118	116	116	116
Bank branches (per 100,000 adults)	-0.013*** (0.004)	-0.021*** (0.008)	-0.024*** (0.009)	-0.029** (0.012)	-0.031** (0.012)
Observations	1,435	1,331	1,224	1,111	997
R-squared	0.005	0.006	0.005	0.007	0.012
Number of economies	118	118	118	118	118

Sources: Global Entrepreneurship Monitor; *International Country Risk Guide (ICRG)*; KPMG; University of Michigan; Organisation for Economic Co-operation and Development; Végh and Vuletin (2015); World Bank (*Doing Business*, World Development Indicators); World Economic Forum (WEF).

Note: Data for the period 1990-2018 and EMDEs. See annex 6A for details. * p < 0.10, ** p < 0.05, *** p < 0.01.

TABLE 6.5 Regression results from local-projection models:
self-employment in percent of total employment

	(1)	(2)	(3)	(4)	(5)
Dep. var.=DGE-based output informality (percent of official GDP)	t=1	t=2	t=3	t=4	t=5
Corporate income tax rate	0.005 (0.036)	-0.037 (0.055)	-0.053 (0.066)	-0.074 (0.064)	-0.043 (0.045)
Observations	1,050	975	901	834	769
R-squared	0.002	0.002	0.002	0.005	0.003
Number of economies	76	75	68	66	65
Individual income tax rate	0.011 (0.027)	0.009 (0.020)	0.004 (0.028)	-0.013 (0.036)	-0.017 (0.037)
Observations	1,044	968	896	830	765
R-squared	0.002	0.001	0.001	0.003	0.003
Number of economies	77	73	67	66	62
Value-added tax (VAT) rate	0.013 (0.119)	-0.004 (0.116)	-0.146 (0.129)	0.025 (0.142)	0.102 (0.111)
Observations	1,008	934	862	795	730
R-squared	0.002	0.000	0.002	0.003	0.003
Number of economies	75	73	68	66	64
Ease of paying taxes	0.029 (0.037)	0.027 (0.029)	-0.009 (0.040)	-0.006 (0.030)	-0.096 (0.076)
Observations	537	461	389	321	264
R-squared	0.011	0.010	0.014	0.044	0.031
Number of economies	77	73	69	58	55

TABLE 6.5 Regression results from local-projection models:
self-employment in percent of total employment (*continued*)

	(1)	(2)	(3)	(4)	(5)
Dep. var.=DGE-based output informality (percent of official GDP)	t=1	t=2	t=3	t=4	t=5
Presence and quality of government programs	-0.172 (0.364)	-1.219 (0.745)	-0.388 (0.963)	-1.517 (1.159)	-0.912 (0.884)
Observations	430	390	346	304	266
R-squared	0.001	0.013	0.009	0.018	0.012
Number of economies	53	52	48	43	39
Commercial and professional infrastructure	0.134 (0.477)	-0.506 (0.744)	-0.907 (0.985)	-0.570 (0.969)	0.286 (0.541)
Observations	430	390	346	304	266
R-squared	0.001	0.006	0.013	0.010	0.009
Number of economies	53	52	48	43	39
Life expectancy at birth	0.005 (0.095)	-0.009 (0.183)	-0.211 (0.357)	-0.229 (0.492)	-0.273 (0.636)
Observations	2,144	2,030	1,916	1,803	1,693
R-squared	0.001	0.000	0.000	0.000	0.000
Number of economies	115	115	114	111	111
Mobile cellular subscriptions (per 100 people)	-0.003 (0.005)	-0.010 (0.010)	-0.012 (0.010)	-0.003 (0.012)	0.004 (0.013)
Observations	2,136	2,020	1,905	1,791	1,680
R-squared	0.001	0.001	0.001	0.000	0.000
Number of economies	117	117	116	113	112
Labor market efficiency (WEF)	-0.511 (0.672)	-1.965* (1.114)	-1.727* (1.026)	1.492 (1.449)	0.309 (1.431)
Observations	667	580	494	415	337
R-squared	0.002	0.004	0.005	0.003	0.001
Number of economies	92	91	83	80	73
Hiring and firing regulation (Fraser)	-0.159 (0.301)	0.000 (0.149)	-0.133 (0.207)	-0.185 (0.195)	0.272 (0.270)
Observations	1,086	995	903	815	731
R-squared	0.001	0.000	0.000	0.001	0.002
Number of economies	93	93	89	85	79
Cost of business start-up procedures (percent of GNI per capita)	-0.021 (0.020)	-0.007 (0.007)	-0.007 (0.011)	0.011 (0.007)	-0.021** (0.010)
Observations	1,039	931	825	722	624
R-squared	0.021	0.004	0.008	0.016	0.029
Number of economies	109	107	104	99	91
Nr of days required to start a business	-0.021 (0.025)	-0.004 (0.036)	-0.040** (0.020)	-0.025 (0.028)	-0.036* (0.018)
Observations	1,031	924	819	718	620
R-squared	0.002	0.002	0.009	0.012	0.013
Number of economies	109	107	104	99	91
Control of Corruption (ICRG)	-0.178 (0.221)	-0.029 (0.318)	-0.100 (0.306)	0.114 (0.409)	0.311 (0.479)
Observations	1,708	1,623	1,538	1,454	1,373
R-squared	0.001	0.000	0.000	0.000	0.000
Number of economies	86	86	85	82	82
Basic school entrep. edu and training	-0.280 (0.411)	-0.681 (0.835)	-1.326* (0.783)	-1.389* (0.758)	-1.099 (0.840)
Observations	430	390	346	304	266
R-squared	0.001	0.007	0.017	0.016	0.014
Number of economies	53	52	48	43	39

TABLE 6.5 Regression results from local-projection models:
Self-employment in percent of total employment (*continued*)

	(1)	(2)	(3)	(4)	(5)
Dep. var.=DGE-based output informality (percent of official GDP)	t=1	t=2	t=3	t=4	t=5
PISA score on reading	0.01 (0.008)	0.014 (0.009)	0.014 (0.012)	0.005 (0.014)	0.003 (0.019)
Observations	395	346	304	273	245
R-squared	0.015	0.016	0.036	0.08	0.043
Number of economies	37	36	35	34	33
Domestic credit to the private sector (percent of GDP)	-0.015* (0.008)	-0.008 (0.013)	0.012 (0.020)	0.010 (0.013)	-0.006 (0.014)
Observations	1,711	1,602	1,495	1,389	1,285
R-squared	0.001	0.000	0.001	0.000	0.000
Number of economies	113	111	109	106	105
Bank branches (per 100,000 adults)	0.010 (0.048)	0.028 (0.066)	0.032 (0.056)	0.064 (0.072)	0.071 (0.074)
Observations	991	891	792	693	598
R-squared	0.002	0.004	0.006	0.007	0.009
Number of economies	104	102	100	96	96

Sources: Global Entrepreneurship Monitor; International Country Risk Guide (ICRG); KPMG; University of Michigan; Organisation for Economic Co-operation and Development; Végh and Vuletin (2015); World Bank (*Doing Business*, World Development Indicators); World Economic Forum (WEF).

Note: Data for the period 1990-2018 and EMDEs. See annex 6A for details. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 6.6 Robustness checks: OLS and quantile regressions
between policy measures and DGE-based output informality

Dep. var.=DGE-based output informality (percent of official GDP)	Quantile regression			
	OLS	Tau=0.25	Tau=0.50	Tau=0.75
Corporate income tax rate	0.226* (0.130)	0.361* (0.216)	0.176 (0.162)	0.221 (0.182)
Observations	102	102	102	102
(Pseudo) R-squared	0.030	0.026	0.022	0.025
Individual income tax rate	0.218** (0.097)	0.300*** (0.108)	0.159 (0.144)	0.214 (0.140)
Observations	92	92	92	92
(Pseudo) R-squared	0.056	0.072	0.021	0.023
Value-added tax (VAT) rate	0.480** (0.189)	0.532** (0.216)	0.589** (0.271)	0.592 (0.377)
Observations	85	85	85	85
(Pseudo) R-squared	0.065	0.097	0.051	0.020
Tax payments number per year	0.254*** (0.057)	0.290*** (0.071)	0.250*** (0.071)	0.265*** (0.071)
Observations	122	122	122	122
(Pseudo) R-squared	0.153	0.114	0.099	0.094
Times spent on tax payment (hours per year)	0.005 (0.004)	0.004 (0.006)	0.001 (0.005)	0.001 (0.005)
Observations	122	122	122	122
(Pseudo) R-squared	0.017	0.022	0.003	0.000

TABLE 6.6 Robustness checks: OLS and quantile regressions between policy measures and DGE-based output informality (continued)

Dep. var.=DGE-based output informality (percent of official GDP)	Quantile regression			
	OLS	Tau=0.25	Tau=0.50	Tau=0.75
Time to comply with VAT refund	0.067 (0.052)	0.087 (0.086)	0.030 (0.084)	0.039 (0.101)
Observations	58	58	58	58
(Pseudo) R-squared	0.023	0.045	0.014	0.003
Time to obtain VAT refund weeks	0.037 (0.064)	0.093 (0.097)	0.057 (0.091)	0.076 (0.113)
Observations	58	58	58	58
(Pseudo) R-squared	0.006	0.036	0.023	0.009
Cheating on taxes	2.688 (1.627)	3.431 (3.225)	3.801 (2.382)	2.107 (3.628)
Observations	60	60	60	60
(Pseudo) R-squared	0.027	0.023	0.042	0.020
Coverage of unemployment benefits and ALMP	-0.509* (0.261)	-0.283 (0.453)	-0.731** (0.347)	-0.662 (0.424)
Observations	59	59	59	59
(Pseudo) R-squared	0.061	0.028	0.032	0.064
Adequacy of social insurance programs	-0.107* (0.060)	-0.102 (0.087)	-0.152** (0.074)	-0.040 (0.086)
Observations	93	93	93	93
(Pseudo) R-squared	0.030	0.022	0.029	0.003
Access to electricity	-0.112*** (0.022)	-0.155*** (0.044)	-0.124*** (0.029)	-0.029 (0.039)
Observations	122	122	122	122
(Pseudo) R-squared	0.123	0.114	0.101	0.011
Mobile cellular subscriptions	-0.181*** (0.046)	-0.265*** (0.064)	-0.217*** (0.054)	-0.055 (0.073)
Observations	121	121	121	121
(Pseudo) R-squared	0.096	0.119	0.096	0.007
Fixed broadband subscriptions	-0.554*** (0.181)	-0.472 (0.297)	-0.855*** (0.222)	-0.338 (0.277)
Observations	120	120	120	120
(Pseudo) R-squared	0.060	0.051	0.071	0.010
Individuals using the Internet	-0.373*** (0.059)	-0.462*** (0.106)	-0.384*** (0.071)	-0.292*** (0.099)
Observations	121	121	121	121
(Pseudo) R-squared	0.167	0.124	0.154	0.057
Paved road	-0.099*** (0.031)	-0.112** (0.052)	-0.114*** (0.037)	-0.082** (0.037)
Observations	113	113	113	113
(Pseudo) R-squared	0.087	0.037	0.077	0.049

TABLE 6.6 Robustness checks: OLS and quantile regressions between policy measures and DGE-based output informality (continued)

Dep. var.=DGE-based output informality (percent of official GDP)	Quantile regression			
	OLS	Tau=0.25	Tau=0.50	Tau=0.75
Life expectancy	-0.440*** (0.088)	-0.650*** (0.167)	-0.446*** (0.096)	-0.208 (0.168)
Observations	122	122	122	122
(Pseudo) R-squared	0.140	0.124	0.127	0.014
Governmental support and policies	-4.395 (2.750)	-3.581 (4.150)	-2.064 (3.287)	-9.491** (4.184)
Observations	67	67	67	67
(Pseudo) R-squared	0.040	0.025	0.010	0.048
Governmental programs	-2.449 (3.429)	-2.754 (5.181)	-2.494 (3.963)	-9.192 (6.068)
Observations	67	67	67	67
(Pseudo) R-squared	0.008	0.008	0.009	0.018
Commercial and professional infrastructure	-0.447 (5.081)	11.103 (8.123)	0.231 (6.682)	-7.960 (10.032)
Observations	67	67	67	67
(Pseudo) R-squared	0.000	0.017	0.000	0.018
Physical and services infrastructure	-4.913* (2.916)	-10.333*** (3.597)	-7.245** (3.147)	-3.501 (5.325)
Observations	67	67	67	67
(Pseudo) R-squared	0.041	0.085	0.036	0.014
Labor market regulations	-1.318** (0.665)	-0.801 (1.136)	-1.108 (0.882)	-0.667 (0.871)
Observations	117	117	117	117
(Pseudo) R-squared	0.029	0.008	0.021	0.005
Labor market efficiency (WEF)	-1.163 (2.627)	-0.919 (4.055)	1.961 (2.986)	0.799 (3.013)
Observations	108	108	108	108
(Pseudo) R-squared	0.002	0.003	0.005	0.002
minimum wage (percent of GDP per capita)	-0.007 (0.093)	0.043 (0.323)	-0.058 (0.169)	-0.171 (0.145)
Observations	90	90	90	90
(Pseudo) R-squared	0.000	0.002	0.003	0.006
Hiring regulations and minimum wage	-1.163*** (0.379)	-1.376** (0.557)	-1.232** (0.490)	-0.459 (0.529)
Observations	117	117	117	117
(Pseudo) R-squared	0.079	0.062	0.041	0.009
Hiring and firing regulations	0.427 (1.287)	0.797 (2.146)	2.083* (1.200)	2.681** (1.240)
Observations	113	113	113	113
(Pseudo) R-squared	0.001	0.003	0.016	0.013
Hours Regulations	-0.874 (0.582)	-0.117 (1.129)	-1.175 (0.779)	-0.732 (0.725)
Observations	117	117	117	117
(Pseudo) R-squared	0.017	0.000	0.024	0.008

TABLE 6.6 Robustness checks: OLS and quantile regressions between policy measures and DGE-based output informality (continued)

Dep. var.=DGE-based output informality (percent of official GDP)	Explanatory var=	Quantile regression			
		OLS	Tau=0.25	Tau=0.50	Tau=0.75
Mandated cost of worker dismissal		0.019 (0.360)	-0.015 (0.524)	0.208 (0.441)	0.081 (0.387)
Observations		117	117	117	117
(Pseudo) R-squared		0.000	0.000	0.000	0.001
Cost of business start-up procedures (in percent of GNI per capita)		0.043*** (0.011)	0.046** (0.019)	0.047*** (0.012)	0.028* (0.015)
Observations		122	122	122	122
(Pseudo) R-squared		0.125	0.097	0.095	0.021
Time required to start a business (days)		0.006 (0.012)	0.016 (0.037)	-0.000 (0.028)	0.009 (0.025)
Observations		122	122	122	122
(Pseudo) R-squared		0.001	0.004	0.000	0.001
Bureaucracy Quality (ICRG)		-6.672*** (0.935)	-6.480** (2.862)	-6.358*** (1.419)	-6.831*** (1.991)
Observations		95	95	95	95
(Pseudo) R-squared		0.193	0.122	0.167	0.091
Control of corruption (ICRG)		-7.268*** (1.491)	-6.200* (3.534)	-8.457*** (1.944)	-7.383*** (2.445)
Observations		95	95	95	95
(Pseudo) R-squared		0.149	0.077	0.105	0.051
Law and order (ICRG)		-4.951*** (1.022)	-6.801*** (1.537)	-4.842*** (1.576)	-3.981*** (1.511)
Observations		95	95	95	95
(Pseudo) R-squared		0.185	0.171	0.101	0.043
Years of schooling (interpolated over 5yr period)		-0.780** (0.319)	-1.383* (0.755)	-1.022** (0.501)	-0.539 (0.544)
Observations		99	99	99	99
(Pseudo) R-squared		0.034	0.046	0.046	0.005
Literacy rate, adult total (percent of people ages 15 and above)		-0.115*** (0.034)	-0.211*** (0.076)	-0.136** (0.053)	-0.039 (0.059)
Observations		119	119	119	119
(Pseudo) R-squared		0.054	0.083	0.062	0.003
PISA: Mean performance on the mathematics scale		-0.050 (0.032)	-0.074 (0.049)	-0.057 (0.042)	0.019 (0.065)
Observations		44	44	44	44
(Pseudo) R-squared		0.048	0.056	0.054	0.004
PISA: Mean performance on the reading scale		-0.075** (0.029)	-0.094* (0.047)	-0.053 (0.042)	-0.016 (0.072)
Observations		44	44	44	44
(Pseudo) R-squared		0.103	0.112	0.062	0.004

TABLE 6.6 Robustness checks: OLS and quantile regressions between policy measures and DGE-based output informality (continued)

Dep. var.=DGE-based output informality (percent of official GDP)	Quantile regression			
	OLS	Tau=0.25	Tau=0.50	Tau=0.75
PISA: Mean performance on the science scale	-0.079** (0.030)	-0.080 (0.049)	-0.058 (0.040)	-0.016 (0.066)
Observations	44	44	44	44
(Pseudo) R-squared	0.114	0.101	0.072	0.005
Basic school entrepreneurial education and training	-1.376 (3.224)	2.037 (5.681)	-1.656 (4.398)	-1.289 (6.114)
Observations	68	68	68	68
(Pseudo) R-squared	0.002	0.001	0.006	0.003
Post school entrepreneurial education and training	1.631 (3.096)	5.478 (5.836)	-0.494 (4.124)	-0.964 (6.222)
Observations	68	68	68	68
(Pseudo) R-squared	0.003	0.011	0.001	0.001
Commercial bank branches (per 100,000 adults)	-0.116 (0.081)	-0.189* (0.111)	-0.205* (0.109)	-0.185 (0.123)
Observations	121	121	121	121
(Pseudo) R-squared	0.017	0.025	0.036	0.007
Automated teller machines (ATMs) (per 100,000 adults)	-0.055* (0.032)	-0.087* (0.045)	-0.103** (0.042)	-0.034 (0.045)
Observations	120	120	120	120
(Pseudo) R-squared	0.026	0.036	0.033	0.003
Domestic credit to private sector (% of GDP)	-0.120*** (0.034)	-0.163*** (0.044)	-0.155*** (0.039)	-0.137*** (0.043)
Observations	120	120	120	120
(Pseudo) R-squared	0.124	0.126	0.086	0.046
Account ownership (% age 15+)	-0.184*** (0.038)	-0.234*** (0.059)	-0.211*** (0.051)	-0.203*** (0.060)
Observations	110	110	110	110
(Pseudo) R-squared	0.146	0.133	0.129	0.058
Internal financing (% age 15+)	0.263* (0.133)	0.222 (0.196)	0.351** (0.166)	0.428** (0.195)
Observations	105	105	105	105
(Pseudo) R-squared	0.034	0.007	0.040	0.023
IMF Financial development index	-28.857*** (6.643)	-37.263*** (8.042)	-35.054*** (6.545)	-25.386*** (8.872)
Observations	119	119	119	119
(Pseudo) R-squared	0.187	0.165	0.158	0.073
Identify access to finance as a major constraint (percent of firms)	0.138** (0.060)	0.219*** (0.079)	0.164** (0.070)	0.010 (0.077)
Observations	109	109	109	109
(Pseudo) R-squared	0.050	0.067	0.060	0.001
Percent of firms using banks to finance investment	-0.197*** (0.064)	-0.163 (0.115)	-0.270*** (0.072)	-0.245*** (0.087)
Observations	109	109	109	109
(Pseudo) R-squared	0.070	0.037	0.102	0.036

TABLE 6.6 Robustness checks: OLS and quantile regressions between policy measures and DGE-based output informality (continued)

Dep. var.=DGE-based output informality (percent of official GDP)	Quantile regression			
	OLS	Tau=0.25	Tau=0.50	Tau=0.75
Proportion of investment financed internally	0.115 (0.073)	0.127 (0.118)	0.239*** (0.088)	0.113 (0.101)
Observations	109	109	109	109
(Pseudo) R-squared	0.019	0.015	0.058	0.016

Sources: Global Entrepreneurship Monitor; International Country Risk Guide (ICRG); KPMG; University of Michigan; Organisation for Economic Co-operation and Development; Végh and Vuletin (2015); World Bank (*Doing Business*, World Development Indicators); World Value Surveys; World Economic Forum (WEF).

Note: Data are from emerging market and development economies (EMDEs) averaged over the period 1990-2018 (or otherwise specified). All regressions here use the same sample of data as in figures 6.2-6.12, please see details above. The cells show the coefficients of regressing various policy measures (listed in the first column on the left) against the share of informal output (dynamic general equilibrium estimates) in percent of official GDP, with standard errors shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 6.7 Robustness checks: OLS and quantile regressions between policy measures and employment informality

Dep. var.=Self-employment (percent of total employment)	Quantile regression			
	OLS	Tau = 0.25	Tau = 0.50	Tau = 0.75
Corporate income tax rate	1.005** (0.383)	0.872** (0.339)	1.042*** (0.352)	1.671*** (0.431)
Observations	96	96	96	96
(Pseudo) R-squared	0.131	0.084	0.090	0.091
Individual income tax rate	0.869*** (0.167)	0.840*** (0.211)	0.958*** (0.222)	1.217*** (0.327)
Observations	87	87	87	87
(Pseudo) R-squared	0.235	0.176	0.152	0.104
Value-added tax (VAT) rate	0.610 (0.408)	0.949* (0.505)	0.094 (0.582)	1.271** (0.634)
Observations	84	84	84	84
(Pseudo) R-squared	0.031	0.027	0.001	0.017
Payments number per year	0.576*** (0.126)	0.470*** (0.159)	0.598*** (0.224)	0.615** (0.242)
Observations	107	107	107	107
(Pseudo) R-squared	0.149	0.093	0.072	0.075
Time hours per year	0.010 (0.011)	0.027** (0.011)	0.019 (0.013)	0.006 (0.017)
Observations	107	107	107	107
(Pseudo) R-squared	0.011	0.017	0.006	0.003
Time to comply with VAT refund	0.367*** (0.089)	0.471*** (0.116)	0.440*** (0.140)	0.210 (0.203)
Observations	57	57	57	57
(Pseudo) R-squared	0.198	0.180	0.190	0.063
Time to obtain VAT refund (weeks)	0.401*** (0.106)	0.304* (0.158)	0.538*** (0.195)	0.243 (0.247)
Observations	57	57	57	57
(Pseudo) R-squared	0.158	0.094	0.135	0.064

TABLE 6.7 Robustness checks: OLS and quantile regressions between policy measures and employment informality (continued)

Dep. var=Self-employment (percent of total employment)	Quantile regression			
	OLS	Tau = 0.25	Tau = 0.50	Tau = 0.75
Cheating on taxes	-2.961 (5.663)	-5.067 (6.863)	-7.284 (6.395)	-9.456 (9.700)
Observations	60	60	60	60
(Pseudo) R-squared	0.006	0.010	0.037	0.008
Coverage of unemployment benefits and ALMP	-0.158 (0.484)	-0.130 (0.749)	-0.740 (0.824)	-0.516 (1.069)
Observations	61	61	61	61
(Pseudo) R-squared	0.001	0.006	0.004	0.005
Adequacy of social insurance programs	-0.409** (0.176)	-0.549*** (0.173)	-0.407* (0.218)	-0.617** (0.246)
Observations	100	100	100	100
(Pseudo) R-squared	0.083	0.066	0.033	0.055
Access to electricity	-0.646*** (0.044)	-0.777*** (0.067)	-0.681*** (0.059)	-0.600*** (0.054)
Observations	135	135	135	135
(Pseudo) R-squared	0.604	0.347	0.396	0.449
Mobile cellular subscriptions	-0.736*** (0.127)	-0.699*** (0.097)	-0.906*** (0.108)	-1.035*** (0.116)
Observations	135	135	135	135
(Pseudo) R-squared	0.392	0.221	0.238	0.302
Fixed broadband subscriptions	-3.270*** (0.370)	-2.765*** (0.403)	-3.454*** (0.522)	-3.802*** (0.579)
Observations	133	133	133	133
(Pseudo) R-squared	0.409	0.221	0.237	0.291
Individuals using the Internet	-1.377*** (0.252)	-1.330*** (0.168)	-1.655*** (0.159)	-1.719*** (0.166)
Observations	135	135	135	135
(Pseudo) R-squared	0.506	0.297	0.340	0.378
Paved road	-0.481*** (0.058)	-0.380*** (0.086)	-0.558*** (0.093)	-0.585*** (0.080)
Observations	123	123	123	123
(Pseudo) R-squared	0.331	0.135	0.164	0.250
Life expectancy	-2.212*** (0.195)	-2.253*** (0.368)	-2.532*** (0.240)	-2.241*** (0.203)
Observations	134	134	134	134
(Pseudo) R-squared	0.513	0.218	0.325	0.412
Governmental support and policies	0.703 (6.145)	3.155 (8.093)	-2.222 (7.662)	9.974 (12.051)
Observations	67	67	67	67
(Pseudo) R-squared	0.000	0.000	0.004	0.020

TABLE 6.7 Robustness checks: OLS and quantile regressions between policy measures and employment informality (*continued*)

Dep. var=Self-employment (percent of total employment)	Quantile regression			
	OLS	Tau = 0.25	Tau = 0.50	Tau = 0.75
Governmental programs	-6.528 (7.281)	7.571 (9.356)	-9.682 (11.291)	-1.630 (13.709)
Observations	67	67	67	67
(Pseudo) R-squared	0.013	0.003	0.028	0.002
Commercial and professional infrastructure	-1.596 (9.923)	-6.546 (14.381)	-11.359 (15.818)	9.077 (22.277)
Observations	67	67	67	67
(Pseudo) R-squared	0.000	0.001	0.015	0.011
Physical and services infrastructure	-14.349** (5.998)	-17.995** (7.641)	-11.027 (8.756)	-20.035* (11.638)
Observations	67	67	67	67
(Pseudo) R-squared	0.083	0.052	0.036	0.028
Labor market regulations	-5.493*** (1.807)	-7.961*** (1.792)	-6.992*** (2.566)	-2.988 (3.500)
Observations	118	118	118	118
(Pseudo) R-squared	0.076	0.113	0.033	0.010
Labor market efficiency (WEF)	-5.669 (5.586)	-22.362*** (6.306)	-1.195 (9.499)	7.654 (10.068)
Observations	111	111	111	111
(Pseudo) R-squared	0.009	0.060	0.000	0.013
Minimum wage (percent of GDP per capita)	2.678*** (0.825)	3.739*** (0.800)	3.729*** (1.065)	2.989** (1.220)
Observations	88	88	88	88
(Pseudo) R-squared	0.163	0.125	0.108	0.083
Hiring regulations and minimum wage	-2.897*** (0.915)	-3.965*** (1.118)	-2.796* (1.633)	-1.898 (1.922)
Observations	118	118	118	118
(Pseudo) R-squared	0.078	0.082	0.044	0.016
Hiring and firing regulations	1.639 (2.441)	-0.599 (3.891)	3.501 (3.476)	6.065 (4.971)
Observations	114	114	114	114
(Pseudo) R-squared	0.004	0.001	0.007	0.005
Hours Regulations	-1.470 (1.480)	-1.495 (2.096)	-0.930 (2.350)	-1.479 (2.919)
Observations	118	118	118	118
(Pseudo) R-squared	0.008	0.008	0.004	0.006
Mandated cost of worker dismissal	-1.360* (0.767)	-3.211*** (0.967)	-1.334 (1.236)	0.528 (1.684)
Observations	118	118	118	118
(Pseudo) R-squared	0.023	0.063	0.017	0.001
Cost of business start-up procedures (in percent of GNI per capita)	0.212*** (0.036)	0.200*** (0.042)	0.214*** (0.038)	0.293*** (0.049)
Observations	128	128	128	128
(Pseudo) R-squared	0.311	0.173	0.185	0.181

TABLE 6.7 Robustness checks: OLS and quantile regressions between policy measures and employment informality (continued)

Explanatory var=	Dep. var=Self-employment (percent of total employment)			
	OLS	Quantile regression		
		Tau = 0.25	Tau = 0.50	Tau = 0.75
Time required to start a business (days)	0.002 (0.064)	-0.037 (0.066)	0.086 (0.081)	0.096 (0.098)
Observations	128	128	128	128
(Pseudo) R-squared	0.000	0.004	0.004	0.005
Bureaucracy quality (ICRG)	-18.151*** (2.818)	-17.404*** (5.502)	-21.895*** (3.827)	-21.096*** (5.172)
Observations	96	96	96	96
(Pseudo) R-squared	0.261	0.136	0.187	0.209
Corruption (ICRG)	-13.561*** (3.836)	-11.653* (6.162)	-18.131*** (6.052)	-19.699** (8.577)
Observations	96	96	96	96
(Pseudo) R-squared	0.087	0.075	0.059	0.049
Law & Order (ICRG)	-12.164*** (2.471)	-12.517*** (2.503)	-13.164*** (4.010)	-15.214*** (4.700)
Observations	96	96	96	96
(Pseudo) R-squared	0.192	0.177	0.085	0.085
Years of schooling (interpolated over 5yr period)	-7.167*** (0.600)	-7.460*** (1.149)	-7.437*** (0.884)	-7.749*** (1.030)
Observations	99	99	99	99
(Pseudo) R-squared	0.492	0.234	0.308	0.372
Literacy rate, adult total (% of people ages 15 and above)	-0.901*** (0.063)	-1.002*** (0.116)	-0.868*** (0.109)	-0.795*** (0.142)
Observations	126	126	126	126
(Pseudo) R-squared	0.514	0.287	0.311	0.325
PISA: Mean performance on the mathematics scale	-0.102* (0.052)	-0.199** (0.080)	-0.134** (0.056)	-0.154 (0.106)
Observations	47	47	47	47
(Pseudo) R-squared	0.077	0.141	0.106	0.046
PISA: Mean performance on the reading scale	-0.136** (0.056)	-0.172** (0.081)	-0.161*** (0.056)	-0.126 (0.105)
Observations	47	47	47	47
(Pseudo) R-squared	0.130	0.136	0.129	0.082
PISA: Mean performance on the science scale	-0.125* (0.068)	-0.228*** (0.083)	-0.137** (0.054)	-0.192* (0.112)
Observations	47	47	47	47
(Pseudo) R-squared	0.108	0.150	0.136	0.077
Basic school entrepreneurial education and training	-10.050 (8.002)	-8.825 (9.540)	-7.669 (10.866)	-9.750 (14.816)
Observations	73	73	73	73
(Pseudo) R-squared	0.025	0.012	0.010	0.010

TABLE 6.7 Robustness checks: OLS and quantile regressions between policy measures and employment informality (continued)

Dep. var=Self-employment (percent of total employment)	Quantile regression			
	OLS	Tau = 0.25	Tau = 0.50	Tau = 0.75
Explanatory var=				
Post school entrepreneurial education and training	-6.402 (8.904)	-1.901 (9.332)	-4.408 (10.969)	-17.024 (15.196)
Observations	73	73	73	73
(Pseudo) R-squared	0.010	0.001	0.001	0.021
Commercial bank branches (per 100,000 adults)	-0.746*** (0.207)	-0.391 (0.241)	-0.841*** (0.249)	-1.131*** (0.276)
Observations	108	108	108	108
(Pseudo) R-squared	0.147	0.051	0.091	0.135
Automated teller machines (ATMs) (per 100,000 adults)	-0.512*** (0.071)	-0.482*** (0.095)	-0.539*** (0.092)	-0.563*** (0.100)
Observations	107	107	107	107
(Pseudo) R-squared	0.405	0.185	0.237	0.257
Domestic credit to private sector (% of GDP)	-0.345*** (0.078)	-0.243*** (0.078)	-0.258** (0.113)	-0.455*** (0.116)
Observations	106	106	106	106
(Pseudo) R-squared	0.181	0.080	0.083	0.139
Account ownership (% age 15+)	-0.655*** (0.098)	-0.681*** (0.102)	-0.646*** (0.131)	-0.882*** (0.189)
Observations	99	99	99	99
(Pseudo) R-squared	0.336	0.222	0.194	0.166
Internal financing (% age 15+)	1.280*** (0.252)	1.210*** (0.390)	1.760*** (0.378)	1.062** (0.469)
Observations	96	96	96	96
(Pseudo) R-squared	0.170	0.087	0.136	0.114
IMF Financial development index	-96.053*** (15.714)	-90.486*** (15.812)	-115.068*** (19.794)	-97.609*** (21.793)
Observations	104	104	104	104
(Pseudo) R-squared	0.341	0.207	0.197	0.210
Identify access to finance as a major constraint (% firms)	0.459*** (0.147)	0.214 (0.183)	0.656*** (0.247)	0.585*** (0.213)
Observations	114	114	114	114
(Pseudo) R-squared	0.084	0.011	0.027	0.109
Percent of firms using banks to finance investments	-0.825*** (0.137)	-0.539*** (0.186)	-0.897*** (0.258)	-1.115*** (0.233)
Observations	114	114	114	114
(Pseudo) R-squared	0.214	0.100	0.129	0.176
Proportion of investment financed internally	0.731*** (0.157)	0.551** (0.253)	0.737*** (0.271)	1.066*** (0.236)
Observations	114	114	114	114
(Pseudo) R-squared	0.149	0.051	0.088	0.153

Sources: Global Entrepreneurship Monitor; International Country Risk Guide (ICRG); KPMG; University of Michigan; Organisation for Economic Co-operation and Development; Végh and Vuletin (2015); World Bank (*Doing Business*, World Development Indicators); World Economic Forum (WEF); World Value Surveys.

Note: Data are from emerging market and development economies (EMDEs) averaged over the period 1990-2018 (or otherwise specified). All regressions here use the same sample of data as in figures 6.2-6.12, please see details above. The cells show the coefficients of regressing various policy measures (listed in the first column on the left) against the share of informal output (Dynamic General Equilibrium estimates) in percent of official GDP, with standard errors shown in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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