CHAPTER 3

REIGNITING GROWTH IN EMERGING MARKET AND LOW-INCOME ECONOMIES: WHAT ROLE FOR STRUCTURAL REFORMS?

Online Annex

Annex 3.1. Data Sources and Sample

A. Data sources and Country Coverage

All data sources used in the chapter (except for the calibration of the model, described in Annex 3.3) are listed in Annex Table 3.1.1. The country coverage and the 2014 values of the structural regulation indicators are presented in Annex Table 3.1.2. The correlation matrix of the changes in the reform indicators and selected macroeconomic variables is reported in Annex Table 3.1.3.

Annex Table 3.1.1. Data sources

Indicator	Source
Gross Domestic Product, Constant Prices	IMF, World Economic Outlook database; and World Bank, World Development Indicators database
Consumer Prices, Period Average	IMF, World Economic Outlook database; and World Bank, World Development Indicators database
Consumer Price Index	IMF, World Economic Outlook database
GDP Deflator	IMF, World Economic Outlook database
Total Employment	IMF, World Economic Outlook database
Gross Fixed Capital Formation, Constant Prices	IMF, World Economic Outlook database
General Government Gross Debt, Percent of Fiscal Year GDP	IMF, World Economic Outlook database
Voice and Accountability	Worldwide Governance Indicators
Political Stability and Absence Of Violence/Terrorism	Worldwide Governance Indicators
Government Effectiveness	Worldwide Governance Indicators
Regulatory Quality	Worldwide Governance Indicators
Rule Of Law	Worldwide Governance Indicators
Control Of Corruption	Worldwide Governance Indicators
Systemic Banking Crisis	Laeven and Valencia (2018), Systemic Banking Crises database
Banking Crisis	Laeven and Valencia (2018), Systemic Banking Crises database
Currency Crisis	Laeven and Valencia (2018), Systemic Banking Crises database
Sovereign Debt Crisis	Laeven and Valencia (2018), Systemic Banking Crises database
Industry-Level Layoff Rate	Calculated based on US CPS Displaced Workers Survey
Industry-Level External Finance Dependence	Choi, Furceri and Jalles (2018)
Industry-Level Employment	UNIDO, Indstat 2 database
Industry-Level Value Added	UNIDO, Indstat 2 database
Informality index	Medina, Jonelis and Cangul (2017)
Labor Market Regulations	Alesina, Furceri, Ostry, Papageorgiou and Quinn (2019)
Domestic Finance Regulations	Alesina, Furceri, Ostry, Papageorgiou and Quinn (2019)
Capital Account Regulations	Alesina, Furceri, Ostry, Papageorgiou and Quinn (2019)
Trade Regulations	Alesina, Furceri, Ostry, Papageorgiou and Quinn (2019)
Product Market Regulations	Alesina, Furceri, Ostry, Papageorgiou and Quinn (2019)

Source: IMF staff compilation.

Note: Data is aggregate unless specified otherwise.

Annex Table 3.1.2. Sample of Economies Included in the Analysis and 2014 Values of the Structural Regulation Indicators

Country	Region	Income Group	Domestic Finance	External Finance	Trade	Product Market	Labor Market	Governance
Bangladesh	Asia-Pacific	LIDC	0.78	0.25	0.79	0.62	0.82	0.35
China	Asia-Pacific	EM	0.50	0.63	0.87	0.23	0.54	0.41
Hong Kong SAR	Asia-Pacific	Former EM	0.94	1.00	1.00	0.62	0.61	0.73
India	Asia-Pacific	EM	0.72	0.50	0.77	0.77	0.50	0.44
Indonesia	Asia-Pacific	EM	0.72	0.63	0.90	0.46	0.51	0.44
Malaysia	Asia-Pacific	EM	0.89	0.63	0.91	0.69	0.54	0.56
Nepal	Asia-Pacific	LIDC	0.61	0.38	0.80	0.31	0.70	0.36
Pakistan	Asia-Pacific	EM	0.72	0.25	0.77	0.77	0.69	0.31
Philippines	Asia-Pacific	EM	0.78	1.00	0.90	0.77	0.60	0.45
Singapore	Asia-Pacific	Former EM	0.89	1.00	1.00	0.77	0.99	0.76
Sri Lanka	Asia-Pacific	EM	0.83	0.50	0.87	0.69	0.69	0.44
Thailand	Asia-Pacific	EM	0.78	0.75	0.86	0.54	0.91	0.45
Vietnam	Asia-Pacific	LIDC	0.50	0.75	0.89	0.46	0.30	0.41
Albania	Europe	EM	0.89	0.63	0.98	0.92	0.63	0.46
Belarus	Europe	EM	0.50	0.50	0.90	0.00	0.48	0.36
Bulgaria	Europe	EM	0.89	1.00	0.91	0.77	0.66	0.52
Czech Rep	Europe	Former EM	0.94	1.00	0.92	0.85	0.57	0.64
Estonia	Europe	Former EM	0.94	1.00	0.97	0.85	0.62	0.68
Hungary	Europe	EM	0.94	1.00	0.91	0.92	0.68	0.61
Latvia	Europe	Former EM	1.00	1.00	0.97	0.85	0.53	0.62
Lithuania	Europe	Former EM	0.94	1.00	0.92	0.92	0.50	0.64
Poland	Europe	EM	0.78	0.75	0.92	0.85	0.56	0.64
Romania	Europe	EM	0.89	1.00	0.91	0.92	0.63	0.52
Russia	Europe	EM	0.83	0.88	0.89	0.62	0.44	0.38
Turkey	Europe	EM	0.67	0.75	0.96	0.77	0.67	0.49
Ukraine	Europe	EM	0.83	0.25	0.93	0.54	0.40	0.38
Argentina	LAC	EM	0.78	0.25	0.79	0.92	0.63	0.44
Bolivia	LAC	LIDC	0.94	0.63	0.83	0.69	0.00	0.41
Brazil	LAC	EM	0.78	0.75	0.77	0.92	0.88	0.50
Chile	LAC	EM	0.89	1.00	0.90	1.00	0.68	0.70
Colombia	LAC	EM	0.83	0.50	0.91	0.92	0.91	0.45
Costa Rica	LAC	EM	0.50	1.00	0.93	0.31	0.97	0.61
Dominican Rep	LAC	EM	0.72	1.00	0.88	0.77	0.82	0.45
Ecuador	LAC	EM	0.56	0.88	0.87	0.69	0.85	0.40
El Salvador	LAC	EM	0.83	0.88	0.93	0.92	0.85	0.47
Guatemala	LAC	EM	0.78	1.00	0.94	0.92	0.88	0.40
Jamaica	LAC	EM	0.72	0.75	0.82	0.77	0.71	0.50
Mexico	LAC	EM	0.94	0.63	0.89	0.62	0.48	0.47
Nicaragua	LAC	LIDC	0.72	1.00	0.94	0.92	0.89	0.41
Paraguay	LAC	EM	0.72	1.00	0.86	0.38	0.89	0.39
Peru	LAC	EM	0.89	1.00	0.95	0.92	0.44	0.46
Uruguay	LAC	EM	0.72	1.00	0.84	0.54	0.88	0.63
Venezuela	LAC	EM	0.83	0.25	0.82	0.38	0.35	0.28

Country	Region	Income Group	Domestic Finance	External Finance	Trade	Product Market	Labor Market	Governance
Algeria	MENAP	EM	0.44	0.38	0.80	0.38	0.23	0.36
Azerbaijan	MENAP	EM	0.56	0.75	0.86	0.08	0.51	0.38
Egypt	MENAP	EM	0.83	1.00	0.87	0.54	0.41	0.35
Georgia	MENAP	EM	0.94	1.00	0.97	1.00	0.79	0.53
Israel	MENAP	Former EM	0.94	1.00	0.98	0.38	0.82	0.60
Jordan	MENAP	EM	0.94	1.00	0.90	0.69	0.84	0.47
Kazakhstan	MENAP	EM	0.50	0.75	0.89	0.69	0.75	0.39
Kyrgyz Rep	MENAP	LIDC	0.72	1.00	0.95	0.46	0.40	0.37
Morocco	MENAP	EM	0.89	0.38	0.93	0.54	0.50	0.44
Tunisia	MENAP	EM	0.67	0.50	0.89	0.62	0.49	0.45
Uzbekistan	MENAP	LIDC	0.44	0.50	0.80	0.31	0.49	0.29
Burkina-Faso	SSA	LIDC	0.72	0.25	0.80	0.38	0.70	0.42
Cameroon	SSA	LIDC	0.67	0.50	0.69	0.46	0.58	0.34
Cote d Ivoire	SSA	LIDC	0.67	0.38	0.80	0.54	0.65	0.35
Ethiopia	SSA	LIDC	0.44	0.25	0.70	0.31	0.67	0.35
Ghana	SSA	LIDC	0.67	0.75	0.79	0.69	0.70	0.51
Kenya	SSA	LIDC	0.83	0.75	0.80	0.62	0.66	0.39
Madagascar	SSA	LIDC	0.78	0.25	0.82	0.46	0.55	0.36
Mozambique	SSA	LIDC	0.72	0.38	0.88	0.23	0.52	0.41
Nigeria	SSA	LIDC	0.72	0.63	0.80	0.77	0.90	0.31
Senegal	SSA	LIDC	0.78	0.63	0.78	0.77	0.49	0.47
South Africa	SSA	EM	0.89	0.75	0.90	0.62	0.63	0.54
Tanzania	SSA	LIDC	0.83	0.38	0.78	0.62	0.55	0.42
Uganda	SSA	LIDC	0.83	1.00	0.80	0.62	0.80	0.40
Zimbabwe	SSA	LIDC	0.67	0.38	0.75	0.38	0.63	0.28

Source: IMF staff compilation.

Note: EM = Emerging market economies; LIDC = Low-income developing economies. MENAP = Middle East, North Africa, Afghanistan, and Pakistan; SSA = sub-Saharan Africa; LAC = Latin America and the Caribbean. Each value is the 2014 score for each index (2013 for governance index). Scale between 0 and 1; higher score indicates greater liberalization.

Annex Table 3.1.3. Correlation Matrix of the Changes in the Reforms Indicators and Selected Macroeconomic Variables

	Domestic Finance	External Finance	Trade	Product Market	Labor Market	Governance	GDP Growth	Inflation	Crises	Fiscal Consolidations
Domestic Finance	1.00									
External Finance	0.16	1.00								
Trade	0.06	-0.02	1.00							
Product Market	-0.07	-0.04	0.03	1.00						
Labor Market	0.06	-0.01	-0.01	-0.02	1.00					
Governance	0.11	0.18	0.00	-0.03	-0.04	1.00				
GDP Growth	-0.03	0.12	-0.02	-0.02	0.01	0.18	1.00			
Inflation	0.04	0.00	0.00	0.03	-0.01	0.00	-0.19	1.00		
Crises	0.09	-0.11	0.00	0.00	-0.01	-0.08	-0.20	0.13	1.00	
Fiscal Consolidations	-0.11	-0.05	0.02	-0.05	-0.07	0.00	-0.08	0.12	-0.04	1.00

Source: IMF staff calculations.

B. Reform Data

Reform data come mainly from the narrative IMF database on regulations, reforms and major policy actions described in Alesina and others (2019). This data set covers a sample of 90 advanced and developing economies (41 are current EMs, 7 are former EMs, and 20 are LIDCs) over the past 40 years or so.

Two main advantages of this data set relative to previous ones are that: (1) it covers a larger set of policy areas and years; and (2) it documents the exact nature and precise timing of major reforms.

Structural reforms typically involve policy measures that reduce or remove impediments to the efficient allocation of resources. In many cases, the efficient allocation may involve a reduction in government intervention. But structural reforms may also encompass measures to address market failures not due to government intervention, or barriers to domestic and international competition. Following this broader view, the indicators of structural reform described below are constructed using disaggregated information capturing different components of effective regulation.

The indicators constructed for this chapter cover both financial and real sector reforms.[1] The financial sector reforms are in the areas of domestic finance, financial current account, and capital account. Real sector reforms cover the areas of trade as well as product and labor markets. All indicators are scaled to vary between zero and one, with higher values representing easier regulation (greater liberalization). Differences in the values of each indicator across countries and over time provide information on the variation in the magnitude of economic reform within each sector. However, indices are not strictly comparable across areas, so for example, a higher indicator value in trade than in domestic finance does not necessarily imply that an economy is more deregulated in the former area than it is in the latter.

The experience of the largest EMDEs is that of a liberalization trend from the 1990s, although with differences across areas and wide cross-country heterogeneity (Annex Figure 3.1.1).

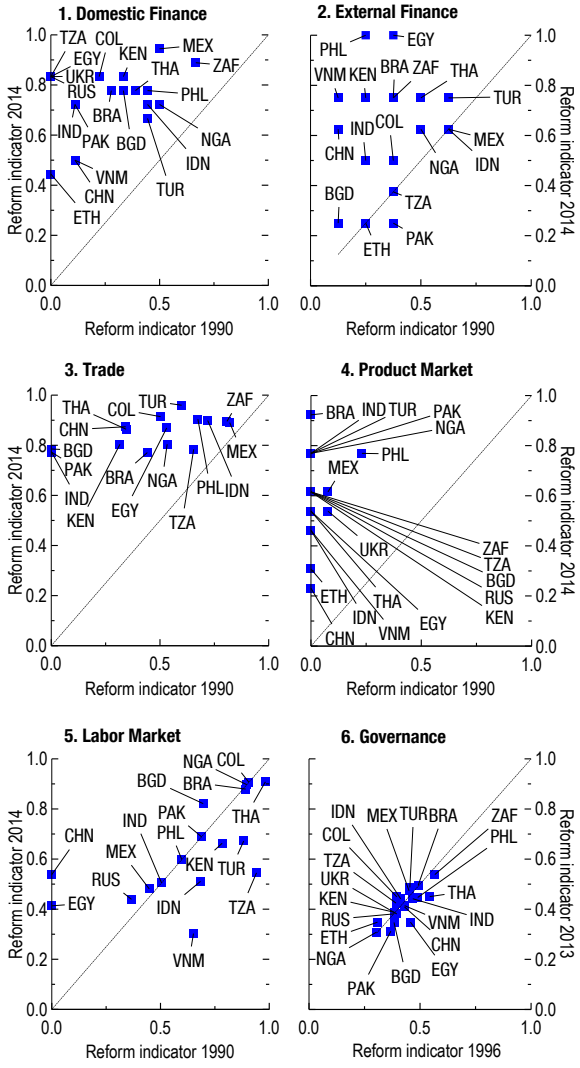
Liberalization indicators in domestic finance, external finance, and trade correlate rather well with related outcomes such as the share of credit in GDP, financial openness, and trade openness (Annex Figure 3.1.2).

[1] The dataset that is most comparable to that used in this chapter is Ostry, Prati and Spilimbergo (2009). Compared to Ostry, Prati and Spilimbergo (2009), the new dataset has a larger country coverage, covers the post-crisis period, includes additional areas of regulation (employment protection), and provides more granular information regarding the regulatory stance in some areas (e.g., it provides a decomposition of capital account openness in several sub-categories, that is, foreign direct investment, portfolio investment, bonds and other debt securities, money market instrument and financial credits).

Annex Figure 3.1.1. Experience with Reforms in the Largest EMDEs

(Scale, 0–1; higer score indicates greater liberalization)

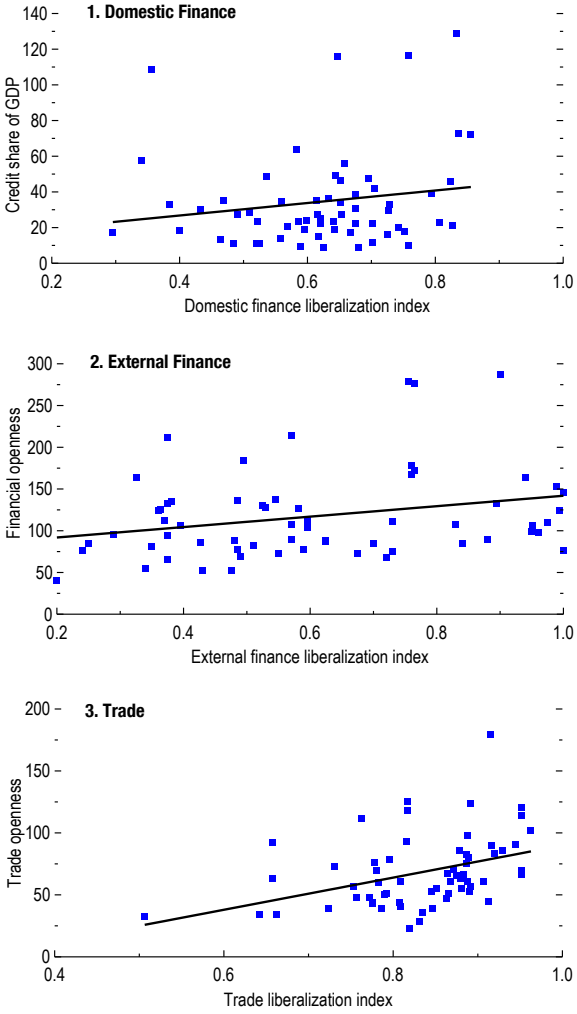
In most areas the largest EMDEs recorded a liberalization trend from the 1990s, although with wide cross-country heterogeneity.



Sources: Alesina and others (forthcoming); and IMF staff calculations.
Note: Data labels use International organization for Standardization (ISO) country codes. Markers represent the largest 20 EMDEs by population. The dashed lines represent the 45-degree line. EMDEs = emerging market and developing economies.

Annex Figure 3.1.2. Reform Indicators and Related Outcome Variables

(Percent of GDP)



Sources: Alesina and others (forthcoming); World Bank World Development Indicators; Lane and Milesi-Ferretti (2017); and IMF staff calculations.
Note: Each index ranges from 0 to 1, with higher values denoting greater liberalization. Markers represent cross-sectional averages of emerging market and developing economies between 1990 and 2014. Credit share of GDP is the ratio between domestic credit to private sector divided by GDP. Financial openness is given by the sum of total assets and liabilities (Lane and Milesi-Ferretti, 2017) divided by GDP. Trade openness is the sum of exports and imports divided by GDP.

Domestic Finance

The construction of the indicator for domestic finance follows the approach used in Abiad, Detragiache and Tressel (2010). We consider six dimensions of domestic finance regulation[2]:

- *Credit Controls*. It considers aspects of regulation related to the existence of reserve requirements, minimum amount of credit that is channeled to certain sectors, credit subsidies and ceilings.

- *Interest Rate Controls*. It captures government interventions in setting deposit and lending rates.

- *Bank Entry Barriers*. It quantifies the degree of domestic competition among banks, as well as the range of financial activity that a bank can engage with.

- *Banking Supervision*. It examines whether a country has adopted a capital adequacy ratio based on the Basel standards, and whether there is an independent banking supervisory agency.

- *Privatization*. It captures the extent of state-owned banks in the domestic financial system.

- *Security Market Development*. It considers whether a country has taken measures to develop securities markets.

The questions used to examine the degree of financial regulation as well as the coding rules are those used in Abiad, Detragiache and Tressel (2010). Along each dimension, a country is given a score on a graded scale from zero to three, with zero corresponding to the highest degree of repression and three indicating full liberalization. We aggregate the various sub-indicators using their sum, normalized between zero and one.

The identification of financial policy changes in the six abovementioned categories is carried through a detailed reading of available financial reports and relevant research articles produced by the IMF, such as Article IV Consultations, Financial System Stability Assessments (FSSA), Global Financial Stability Report (GFSR), IMF Selected Issues, and IMF Working Papers. Relying on IMF reports does not only provide necessary country information on financial reforms, but it also implicitly provides a unified scoring standard, and consolidated evidence across countries and over time. This ensures comparability across countries and over time.

[2] Compared with Abiad, Detragiache and Tressel (2010), we do not include capital account restrictions, a dimension that is covered in the *Capital Account* indicator.

External Finance

The construction of the indicator for the capital and current accounts follows the approach used in Quinn (1997) and Quinn and Toyoda (2008).[3] We extend the database of Quinn and Toyoda (2008) to 126 countries from 1950 (or independence) to 2014. In addition, we also construct sub-indicators of the capital account for inward and outward Foreign Direct Investment, Portfolio Investment, Bond Markets, Money Markets, and Finance and Lending Markets. The decomposition of the capital account indicator is available for 60 countries from 1980 to 2014.

These *de jure* indicators are based on the laws and regulations described in the International Monetary Fund's *Annual Report on Exchange Arrangements and Exchange Restrictions*. *AREAER* reports the laws governing the proceeds of transactions and the underlying transactions themselves. It contains information about policy based on six categories: payment for imports; receipts from exports; payment for invisibles; receipts from invisibles; capital flows by residents; and capital flows by non-residents. Since the 1980s, the text of the *AREAER* has contained enough information to distinguish further between and among components of the capital account.[4]

We consider restrictions on *exchange payments* (imports, invisibles, capital) and on *exchange receipts* (exports, invisibles, capital). In the development of new indicators, capital account transactions are broken down into five sub-categories: *foreign direct investment*, *portfolio investment, bonds and other debt securities, money market instruments, and financial credits*. For each category, resident and non-resident transactions are distinguished. Other components of the capital account are available but are not coded.[5]

Trade

The construction of the indicator for trade is based on trade tariff rate data at the product level. The main sources are the World Integrated Trade Solution (WITS) and World Development Indicators (WDI). Data in WITS and WDI are available from 1988-2014. Other data sources include: i) the World Trade Organization (WTO) for the period 1993-2014; ii) The General Agreement on Tariffs and Trade (GATT) for the period 1978 to 1987; and the Brussels Customs Union database (BTN) for the period 1966-1995.

We aggregate product-level tariff data by calculating simple and weighted averages, with weights given by the import shares of each product. These averages are normalized between

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[3] This underlying project on the capital account extension and decomposition is joint work with Haillie Lee, Amy Pond, and A. Maria Toyoda.

[4] A key concept in *AREAER* is the distinction between residents and nonresidents, which implies the direction of flows. An outward movement occurs when a resident either pays for goods or services from abroad or acquires an external capital asset in return for cash. Conversely, an inward flow occurs when a non-resident pays for goods, services, or capital assets domestically. Another important distinction is between capital account transactions, which are defined as international transfers of ownership of financial assets, and financial current account transactions, which are all other transactions

[5] We omit restrictions on real estate, personal capital transactions, and commercial credits because of the already expansive nature of this exercise.

zero (closed to trade) and 1 (fully open to trade). The chapter uses the weighted version of the index.

Product Market

The indicator for product markets considers liberalization in two network sectors: telecommunications and electricity. For each of these components four (sub-)dimensions of regulation are considered.

Telecommunications:

- *Competition*. It captures the market structure of the sector—that is, competitive versus, duopoly or monopoly.
- *Ownership*. It quantifies the extent of state-owned firms in the market.
- *Regulation*. It examines whether there is an independent regulatory agency.
- *Access*. It captures the degree of government intervention in the access to telecommunications.

Electricity

- *Unbundling*. It captures the degree of vertical integration in the market—that is, whether generation, transmission, and distribution are unbundled.
- *Ownership*. It quantifies the extent of state-owned firms in the market.
- *Regulation*. It examines whether there is an independent regulatory agency.
- *Wholesale*. It captures the degree of liberalization in the wholesale market.

Along each dimension, a country is given a score on a graded scale from zero to two, with zero corresponding to the highest degree of repression and two indicating full liberalization.

The identification of policy changes in the telecommunications market is facilitated by regulatory information from the International Telecommunication Union (ITU), a specialized agency of the United Nations for information and communication technologies (ICTs) that directly collects yearly data from member countries.[6] Supplementary documents include assessments and surveys from multinational institutions, such as the European Bank for Reconstruction and Development (EBRD) and the Organization for Economic Co-operation and Development (OECD), annual reports from countries' regulatory authorities, and telecommunication-related laws promulgated by countries' legislative bodies.

[6] http://www.itu.int/net4/itu-d/icteye/Default.aspx

The main sources for the construction of the electricity market indicator are the annual issues of *Electricity Regulation*, the website of the International Energy Agency (IEA) and country profiles from the Clean Energy Info Portal (reegle).[7] Additional sources include evaluations and reports from the EBRD, the OECD, the World Bank and the Council of European Energy Regulators (CEER), and annual reports from countries' regulatory authorities.

The aggregate index of product market liberalization is computed by adding up all 8 sub-indices, and then normalizing the sum between 0 (fully restricted markets) and 1 (fully liberalized markets).

Labor Market

The labor market liberalization (LML) indicator provides a new measure of employment protection legislation (EPL) related to termination of full-time indefinite contracts for objective reasons, in a typical firm of 250 workers.[8] Three dimensions of EPL are considered:

- *Procedural requirements*. It includes provisions such as consultation with workers' representatives and third-party approval.
- *Layoff costs*. It consists of minimum notice periods and severance payments.
- *Valid grounds for dismissal and redress measures (in case of unfair dismissal)*. Redress measures concern provisions such as the possibility for a worker to be reinstated in employment or receive compensation following an unfair dismissal.

Each sub-index is constructed by taking the simple average of several indicators and it is normalized to range from 0 (tightest regulation) to 1 (greatest liberalization). In some cases, different regulations apply to: (i) individual and collective objective-reason dismissals, and (ii) white- and blue-collar workers. Therefore, each of the three sub-indexes is first constructed for each combination of worker collar and dismissal situation.[9] This gives a total of 4 indicators per sub-index. The 4 sub-indexes are then aggregated over collar and dismissal types. We aggregate the various sub-indicators using their sum, normalized between zero and 1.

The identification of policy changes is based on statutory legislation setting minimum requirements. The main sources of legislations are the ILO EPLex and NATLEX databases. These are supplemented by government gazettes and parliamentary records. To reconstruct the history of EPL in each country, the most recent laws are used as a reference point. Next, three distinct approaches are followed to backtrack older legislation. First, it is checked whether the most recent laws specify which older laws they repealed or amended upon their entry into force.

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[7] reegle is an information gateway maintained by the Renewable Energy and Energy Efficiency Partnership (REEEP) and the Renewable Energy Policy Network for the 21st Century (REN21). Link to the website is: http://www.reegle.info/about

[8] The choice of the firm size follows from previous work by Botero and others (2004).

[9] A worker is defined as blue (white) collar if performing mostly manual (office) tasks. Botero and others (2004) instead focus only on blue collar workers. Concerning the different dismissal situations, Botero and others (2004) consider both objective-reason and no-reason dismissals.

Second, the coverage of older legislation provided by NATLEX is checked. Third, country-specific databases and other documents, such as for instance the collection of government gazette and parliamentary records, are used as additional sources. Finally, the information gathered from each of these different sources is cross-checked with each other.

Governance

These indicators are complemented by a composite governance indicator computed as the average of the six Worldwide Governance Indicators (WGIs): (1) voice and accountability, (2) political stability and absence of violence, (3) government effectiveness, (4) regulatory quality, (5) rule of law, (6) control of corruption.

The WGIs summarize views of many enterprises, citizens and expert survey respondents on the quality of governance in a country. The data are gathered from survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms.

In particular, the Control of Corruption indicator (CCI) is a perceptions-based measure that is based on over 30 individual measures of corruption produced by a variety of survey institutes, think tanks, NGOs, international organizations and private sector firms drawing on a range of survey sources. The CCI uses all the variables used by Transparency International's Corruption Perceptions Index, plus others. These include surveys of firms and individuals (e.g. Gallup World Poll), expert assessments collected by civil society groups (e.g. Freedom House, Bertelsmann Foundation, World Justice Project), the private sector (e.g. Economist Intelligence Unit, Global Insight), and government and international organizations (e.g. World Bank Country Policy and Institutional Assessments.) The weighting scheme gives higher weight to data sources estimated to have a higher signal-to-noise ratio. WGI reports margins of error to encourage caution in making comparisons across countries and across time. Caution is also needed as the quality of underlying data can vary across countries and data sources. There is no internationally accepted statistical standard for these indicators. The compilation of the indicators is well-documented, but is unlikely to capture all relevant concepts. The compiler makes efforts to validate source data, although some data may be outdated or imperfect proxies. Users should avoid using country rankings on measures of corruption.

The WGIs are produced by Daniel Kaufmann—affiliated with the Brookings Institution and Natural Resource Governance Institute (NRGI)—and Aart Kraay, affiliated with the World Bank (Development Research Group). The compilers acknowledge financial support from the Knowledge for Change Program of the World Bank. However, as noted by the compilers, the WGIs do not reflect the official views of the Natural Resource Governance Institute, the Brookings Institution, or the World Bank.

Annex 3.2. Empirical Analysis—Methodological Details and Robstness Checks

A. Aggregate Cross-Country Analysis

The aggregate cross-country analysis relies on the local projection method by Jordà (2005). The regression specification takes the following form:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \gamma_t + \beta_k R_{i,t} + \theta X_{i,t} + \epsilon_{i,t}, \quad (3.2.1)$$

where $y_{i,t}$ is the log of output (log of employment, log of labor productivity, or log of investment); *t* and *i* are the time and country dimensions, respectively; *k*=0,1,2,…6; α_i denotes country fixed effects, included to control for unobserved cross-country heterogeneity; γ_t denotes time fixed effects, included to take account of global factors such as shifts in oil prices or the global business cycle; $R_{i,t}$ denotes the structural reform defined as the change in the structural regulation indicator; $X_{i,t}$ is a set a of control variables including lags of the dependent variable, past economic growth and past reforms.

To check how the responses change with the state of the economy, equation (3.2.1) is modified as follows:

$$y_{i,t+k} - y_{i,t-1} = \alpha_i + \gamma_t + \beta_k^L F(z_{i,t}) R_{i,t} + \beta_k^H [1 - F(z_{i,t})] R_{i,t} + \theta X_{i,t} + \epsilon_{i,t}, \quad (3.2.2)$$

with $F(z_{i,t}) = \frac{exp(-\gamma z_{i,t})}{1+exp(-\gamma z_{i,t})}$ and $\gamma > 0$, in which $z_{i,t}$ is an indicator of the state of the economy normalized to have zero mean and unit variance.[1]

This approach is equivalent to the smooth transition autoregressive (STAR) model developed by Granger and Teravistra (1993). The advantage of this approach is twofold. First, compared to a model where each dependent variable is interacted with business cycle measures, it permits a direct test of whether the effect of reforms varies across different regimes such as recessions (for example, output growth below a given threshold) and expansions. Second, compared with estimating structural vector autoregressions for each regime it allows the effect of reforms to change smoothly by considering a continuum of states to compute the impulse response functions, therefore making the response more stable and precise.

To examines whether the responses varies with the occurrence of crises, $F(z_{i,t})$ is substituted by a dichotomic variable taking value 1 if a crises occurred in year *t* in country *i* and value 0 otherwise. The crisis dummy variable cover systemic, banking, currency and sovereign debt crises identified in Laeven and Valencia (2018).

Equations (3.2.1) and (3.2.2) are estimated for each *k*=0,..,6. Impulse response functions are computed using the estimated coefficients β_k (or β_k^L and β_k^H), and the confidence bands

[1] Following Auerbach and Gorodichencko (2013), we use $\gamma = 1.5$.

associated with the estimated impulse-response functions are obtained using the estimated standard errors of the coefficients, based on robust standard errors clustered at the country level.

The macroeconomic series used in the analysis come from sources listed in Annex 3.1 and cover an unbalanced sample of 75 emerging and low-income countries over 1973–2014.

B. Industry-Level Analysis

To provide additional insights on the transmission channels of structural reforms, the chapter also carries out a difference-in-difference analysis at the industry level as in Rajan and Zingales (1998) using an unbalanced panel of 19 manufacturing industries at the 2-digit level from 1973 to 2014.

The analysis again relies on the local projection method. Exploiting the three-dimensional nature of the data set, the specification includes country-year ($\alpha_{i,t}$), industry-year ($\alpha_{j,t}$) and country-sector ($\gamma_{i,j}$) fixed effects, where *i*, *j*, and *t* denote country, industry, and year. The reforms are identified at the industry level by interacting relevant industry-specific characteristics (denoted by D_j) to the reform variable. Since the inclusion of country-year fixed effects control for the aggregate effects of reforms, the estimated coefficients measure the differential effects of the reforms across industries.

The specification takes the following form:

$$y_{i,j,t+k} - y_{i,j,t-1} = \alpha_{i,t} + \tau_{j,t} + \gamma_{i,j} + \beta_k D_j R_{i,t} + \theta X_{i,j,t} + \epsilon_{i,j,t}, \quad (3.2.3)$$

in which $y_{i,j,t}$ is either the log of real value added or the log of employment; k=0,1,2,…5; $R_{i,t}$ is the (domestic/external finance or labor market) reform indicator; D_j is either a measure of industry-specific layoff rates (when $R_{i,t}$ is the labor market reform indicator) or an industry-specific measure of external finance dependence (when $R_{i,t}$ is the domestic/external finance reform indicator); $X_{i,j,t}$ is a vector containing two lags of the dependent variables and of reforms; and $\epsilon_{i,j,t}$ is a residual term assumed to be uncorrelated with the regressors.

The estimation is performed through OLS and standard errors are computed using the Driscoll-Kraay methodology. Impulse response functions are obtained plotting the estimated β_k coefficients for the point estimate and respective standard errors to construct 90 percent confidence levels. The coefficients are rescaled to show the differential effects of a reform between industries in the 75th and 25th percentiles of the D_j distribution.

Real value added is measured as the nominal value added divided by the GDP deflator. Labor productivity is measured as real value added per employed individual. Data on value added and employment comes from the UNIDO INDSTAT2 database. Data on the GDP deflator comes from the IMF WEO dataset.

The computation of industry-specific layoff rates follows the methodology proposed in Micco and Pages (2006) and Bassanini and others (2009). Layoff rates are computed as the number of workers dismissed for business reasons in total employment. Data on laid-off workers and employed individuals comes from the US CPS Survey covering 2003–2007. US data is used

because employment protection legislation is almost absent there and therefore this is the closest empirical example to a frictionless labor market in which employers can freely dismiss workers.

Following Rajan and Zingales (1998), the degree of dependence on external finance in each industry is measured as the median across all US firms, in each industry, of the ratio of total capital expenditure minus the current cash flow to total capital expenditure.[2]

The industry-level analysis greatly enhances the causal interpretation of the results as the potential for endogeneity biases is very limited. First, the inclusion of country-year and industry-year fixed effects reduces the potential for omitted variables. Second, reverse causality is unlikely to be an issue in this set-up since the explanatory variable is the interaction between the reform indicator and industry-specific characteristics such as the degree of external finance dependence or the layoff rates. Given the inclusion of country-time fixed effects, reverse causality would imply that cross-industry differences in the dependent variable would drive the likelihood of reforms at the aggregate level. This is highly implausible.

C. Bayesian Hierarchical Analysis

To explore cross-country heterogeneity in the response to reforms, the chapter uses a Bayesian Hierarchical Model along the lines of Boz, Gopinath, and Plagborg-Møller (2017). The difference relative to the specification in equation (3.2.1) is that the coefficient attached to each reform varies with each country and is conditional on country characteristics. Given the computationally-intensive procedure needed to estimate this type of model, the analysis focuses on the five-year effect of the reforms. Therefore the econometric specification reads as follows:

$$y_{i,t+5} - y_{i,t-1} = \alpha_i + \gamma_t + \beta_i R_{i,t} + \theta X_{i,t} + \epsilon_{i,t}, \tag{3.2.1}$$

where β_i is the cross-sectionally varying coefficient conditional on a given country characteristic (for example, the level of governance or informality).

The main advantage of using this approach is that it does not impose a functional form to the interaction between the country characteristic and the reform coefficient but uses a non-parametric specification for the distribution of the coefficient conditional on the country characteristic (see Boz, Gopinath, and Plagborg-Møller (2017) for more details).

The hierarchical model lets the data determine how much the effect of reforms varies across countries and can be thought of striking a balance between running country-by-county times series regressions and constant coefficient panel regressions estimated earlier in the chapter. Estimates from country-by-country times series regressions would be noisy given the relatively limited yearly coverage. Constant-coefficient panel regressions are useful to determine average effects but are not suitable for assessing the extent of the overall cross-sectional heterogeneity in the experience with reforms. The Bayesian hierarchical approach allows the entire panel dataset to inform the estimates of distribution of the impact of reforms as well as the individual impacts.

[2] Hui Tong has kindly provided the updated data. For details, see Tong and Wei (2011).

D. Robustness Checks

The empirical results presented in the chapter are subjected to several robustness checks, primarily to tackle endogeneity concerns.

A first concern is that the adoption of structural reform is influenced not only by past economic growth (included as a control in the baseline specification), but also by current or expectations of growth, or by economic crises. Although this is unlikely to be a major source of bias, given the long lags typically associated with the implementation of structural reforms, these variables are added (one at a time) as controls to the baseline specification (equation 3.2.1). To overcome the problem of current growth being contemporaneous to the dependent variable at time 0, responses are computed from time 1 onward, when controlling for current growth.

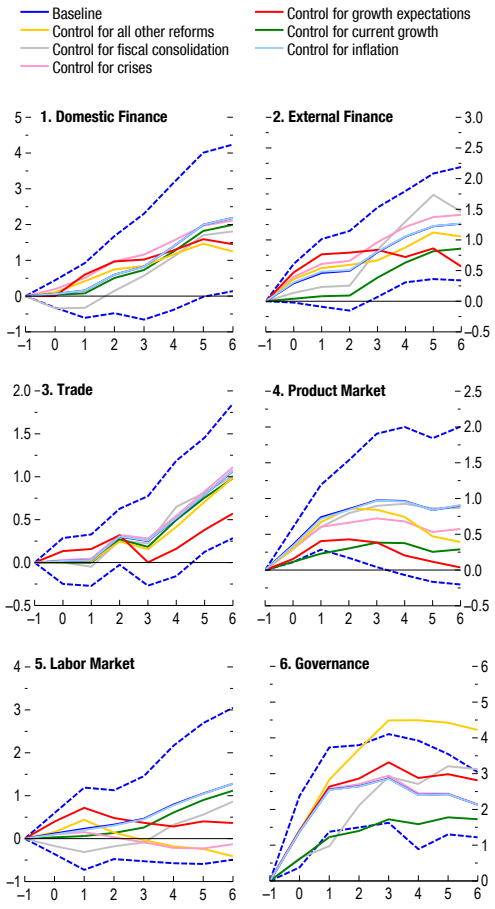
A second concern is that the baseline analysis considers the impact of structural reforms one at a time, raising potential concerns about omitted variables—reforms could be carried out across different areas at the same time. Therefore, the main regression equation (equation 3.2.1) is modified to include all reforms simultaneously.

An additional concern is that reforms may be implemented as a part of a broader stabilization package, aimed at reducing public debt and inflation. To control for this potential omitted bias, the main regression equation (equation 3.2.1) is augmented to include, alternatively, inflation and episodes of fiscal consolidations as controls. Following Alesina and Ardagna (2009), fiscal consolidation episodes are identified as those years in which the cyclically-adjusted primary fiscal balance improves by at least 1.5 percentage points of GDP relative to the previous year (this definition follows).

The results of these alternative specifications are reported in Annex Figure 3.2.1 (panels 1–6). The results suggest that, while point estimates vary to an extent across specifications, the effects are not statistically different from those reported in the baseline.

Annex Figure 3.2.1. Average Effects of Reforms on Output: Robustness Checks
(Percent)

Average effects of reforms obtained with alternative specifications are generally close to the those obtained with the baseline specification.



Source: IMF staff calculations.
Note: *X*-axis in years; $t = 0$ is the year of the shock and dashed lines denote 90 percent confidence bands of the baseline results.

Annex 3.3. Model Analysis

The model is a general equilibrium model of a small open economy with heterogeneous entrepreneurs facing various frictions, that in turn can be thought of as related to regulations. There are no aggregate shocks; one of the implications is that the model cannot be used to explore the short-term impact of changes in various regulations—structural reforms—under alternative macroeconomic conditions. In this section, the main features of the model are presented. More details are in Midrigan and Xu (2014), whose model provides the core structure for the model developed here.

A. Agents

There are two types of agents in the model; workers and entrepreneurs. Both workers and entrepreneurs invest in a risk-free asset, and they consume homogeneous goods produced by entrepreneurs.[1] The aggregate labor supply is fixed. Each period the labor productivity of workers and the number of entrepreneurs grow at a (exogenous) rate γ. Entrepreneurs' productivity levels differ permanently, and they are also subject to idiosyncratic temporary shocks in every period. Entrepreneurs operate in either the formal or informal sector.

Entrepreneurs

Entrepreneurs maximize their discounted lifetime utility, which is given by:

$$E_0 \sum_{t=0}^{\infty} \beta^t \log(c_t)$$

where E_0 stands for the expectation at time 0, c_t is consumption in period t, and β is agents' discount factor.

Entrepreneurs in the informal sector produce output Y_t using only labor L_t, subject to permanent productivity z and transitory productivity ε_t. All variables in the model can be normalized by an entrepreneur's permanent productivity, which will be denoted with lower case letters: $y_t \equiv \frac{Y_t}{e^z}$. Entrepreneurs' production function has returns to scale $\eta < 1$ and is given by:[2]

$$y_t = e^{\varepsilon_t(1-\eta)} l_t^{\eta}$$

Informal sector entrepreneurs can save in the risk-free asset a_t but cannot borrow. Their budget constraint is given by:

$$c_t + a_{t+1} = y_t - w l_t + (1 + r)\, a_t$$

[1] Workers cannot transition into entrepreneurship.

[2] The choice of a decreasing returns to scale technology is common in the literatures on firm dynamics, misallocation, and financial frictions (see Midrigan and Xu 2014). The parameter is calibrated to estimates from Basu and Fernald (1997) and Atkeson and Kehoe (2007). The firm's problem would be identical under the assumption of constant returns to scale and monopolistic competition with a constant elasticity of demand.

where w represents the wage rate per unit of labor, and r is the real interest rate paid on assets.

Entrepreneurs in the formal sector produce using labor, capital K_t, and a more productive technology than in the informal sector. They can save and borrow at the risk-free rate, subject to a collateral constraint. Their production function is given by:

$$y_t = e^{(\varepsilon_t + \phi)(1-\eta)}(l_t^{\alpha} k_t^{1-\alpha})^{\eta}$$

where ϕ governs the relative productivity of the formal sector relative to the informal sector. ϕ can be seen as capturing various factors that, all else equal, can make a formal firm more productive than an informal one; such as access to higher-quality inputs or the better production techniques used by other formal firms. α represents the labor elasticity if output.

The budget constraint of formal entrepreneurs is given by:

$$c_t + k_{t+1} + (1+r)d_t + \theta\chi\pi_t^m = (1 - \tau_y)y_t - (1+\tau_W)wl_t + (1-\delta)k_t + d_{t+1}$$

where entrepreneurs take the interest rate r, which in turn is exogenous to the small open economy, as given; d_t is the debt holdings of a formal sector entrepreneur and π_t^m is their per-period profits; $\theta\chi$ is equity issuance of the entrepreneur—the fraction of future profits that had been previously issued; and δ represents the depreciation rate of capital. Formal sector entrepreneurs also face a collateral constraint given by:

$$d_{t+1} \leq \theta k_{t+1}$$

Formal sector entrepreneurs face two additional distortions that informal sector entrepreneurs do not have to deal with. First, they face a 'revenue wedge' τ_y which can be thought of as capturing the output lost due to corruption and other governance problems. Second is a 'labor wedge', which captures the additional cost firms face when hiring workers due to employment protection laws.[3]

Entry into the informal and formal sectors

All new entrepreneurs start in the informal sector. Motivated by higher potential profits from the use of capital and an exogenously higher total factor productivity in the formal sector, entrepreneurs in the informal sector can formalize at the end of any period by paying a sunk regulatory entry cost f_m. The entrepreneur who enters the formal sector can finance this entry cost using internal funds and/or by issuing equity claims to a fraction $\theta\chi$ of future profits.[4] The entrepreneur's entry decision is therefore affected by all the frictions in the model: the financial frictions, labor wedge, revenue wedge and entry costs.

[3] These frictions are wasteful, in that any revenues from these wedges are not rebated to agents in the model. They may be seen as the non-transfer components of governance and employment protection legislation costs, respectively. Even though the effect of (the non-rebated component of) actual labor taxation—social security contributions and personal income taxes—is not specifically studied here, it would be qualitatively similar to that of employment protection laws in this model.

[4] Entrepreneurs can only issue equity claims once, when entering the formal sector.

Workers

Workers face uninsurable idiosyncratic unemployment risk.[5] They can save through financial markets but cannot borrow. They maximize their discounted lifetime utility given by:

$$E_0 \sum_{t=0}^{\infty} \beta^t \log(c_t)$$

and face the following budget constraint:

$$c_t + a_{t+1} + \int P_t^i \omega_{t+1}^i \, di = w\gamma^t \nu_t + (1+r)a_t + \int (P_t^i + \pi_t^{m,i})\omega_t^i \, di$$

where ω_t^i is the number of shares the worker holds of producer i and P_t^i is the price of the stream of profits from firm i. Workers cannot become entrepreneurs and the total number of them is fixed.

Productivity and Misallocation in the Modern Sector

The formal sector entrepreneur's choice of capital reduces to the following equation, which equalizes the marginal productivity of capital to the sum of its actual and shadow costs:

$$(1-\alpha)\eta\left(1-\tau_y\right)\frac{y(a,\varepsilon)}{k(a,\varepsilon)} = r + \delta + \mu(a,\varepsilon)$$

where $\mu(a,\varepsilon)$ is the entrepreneur's shadow cost of capital. All dispersion in the entrepreneur's average product of capital $\frac{y(a,\varepsilon)}{k(a,\varepsilon)}$ is the result of dispersion in $\mu(a,\varepsilon)$ due to the collateral constraint θ. This creates a misallocation of resources across formal sector entrepreneurs.[6] Misallocation is amplified when transitory productivity shocks ε_t show higher dispersion or lower persistence, pushing firms against their financial constraints more often, and when entering the formal sector firms start with insufficiently large capital. Under the assumption (for exposition) that ε and $\frac{y(a,\varepsilon)}{k(a,\varepsilon)}$ are jointly lognormally distributed, the total factor productivity loss due to static misallocation within the formal sector (taking as given the number of producers in the modern sector) can be expressed as:

$$\ln(TFP_{loss}) = \frac{1}{2}\frac{(1-\alpha\eta)(1-\alpha)\eta}{1-\eta}\, var[\ln\left(\frac{y}{k}\right)]$$

[5] With probability λ_0 an unemployed worker will stay unemployed ($\nu_t = 0$), and with probability λ_1 an employed worker will stay employed ($\nu_t = 1$).

[6] The revenue and labor wedges are not a source of capital misallocation across formal sector firms in the model. They are the same for all firms, and therefore distort all firms' marginal product of capital equally in the absence of financial constraints ($\mu(a,\varepsilon) = 0$). To the extent that job protection legislation and poor governance entail different costs across different formal sector firms, the gains from reforms in each of these areas will tend to be underestimated.

This simplified case illustrates the fact that the perfect allocation of resources implies that all firms should have the same marginal product of capital.

In addition, the collateral constraint distorts the decision of informal entrepreneurs to enter the formal sector, therefore also misallocating resources between the informal and formal sectors.

B. Data and Calibration of the Benchmark Economy

Calibration

The model is calibrated to match a rich set of data moments from both micro and macro data for a large sample of emerging market and developing economies. The benchmark calibration is designed to be representative of a "typical" emerging market and developing economy with median values of key moments such as the Debt-to-GDP ratio, regulatory entry costs, the 'labor wedge' associated with employment protection legislation, or the level of informality; as such, the benchmark economy bears important similarities with countries such as Colombia, Peru, and Mexico.[7] The procedure to construct the targeted moments for the benchmark calibration follows two steps. First, the time-series average of each data moment between 2013 and 2018 is calculated for each available country.[8] Second, the median value of each moment across the sample of emerging market economies and low-income countries is considered. This calibration strategy is meant to reflect the long-run equilibrium of the simulated economies with respect to the reform areas studied in the empirical analysis.

Parameter Identification

The first set of parameters are chosen based on standard values and estimates from the literature. The capital share α, returns to scale η and discount factor β are set to their standard values in the literature (Midrigan and Xu 2014). The global (real) interest rate R that agents in the small open economy face is set to 4% following Buera and Shin (2017). The relative efficiency of the formal sector ϕ is set to $0.2/(1-\eta)$, the estimated value from Midrigan and Xu (2014).

The second set of parameters are directly set equal to their calculated values in the data. The rate of capital depreciation δ is set equal to its value in the *Penn World Tables*. The exogenous growth rate of the economy γ is set to match average real GDP growth over 2013–2018 from the *Penn World Tables*. The transition probabilities in and out of unemployment λ_0 and λ_1 are set to match employment rate estimates and the 12-month unemployment duration from *International Labour Organization* data. The labor wedge τ_w is calculated using data on the monetary costs of employment protection legislation from Furceri and others, forthcoming.

The third set of parameters are jointly calibrated to match a set of targeted data moments. While this joint calibration does not allow for a one-to-one mapping between parameters and moments, the key data moment identifying each parameter is described in Annex Table 3.3.1.

[7] The Debt-to-GDP ratio, regulatory entry costs, employment protection 'labor wedge' and level of informality in the benchmark economy are comparable to those for these countries.

[8] 2013 is chosen as the starting year because not all moments are available in all years. The moments are averaged over time to reduce noise.

The collateral constraint θ is identified by the nonfinancial private sector debt-to-GDP ratio from the *IMF Global Debt Database*. The equity issuance constraint χ is identified by the market capitalization-to-GDP ratio from the *World Bank Financial Structures Database*. The standard deviations of permanent and transitory firm productivity (σ_z and σ_ε) are respectively identified by the standard deviations of ln(employment) and employment growth from the *World Bank Enterprise Surveys*. The persistence of firm productivity ϱ is identified by the two-year serial correlation of ln(employment) from the *World Bank Enterprise Surveys*. The governance/corruption wedge τ_y is identified by the non-agricultural employment share of the informal sector from the International Labour Organization. Finally, the regulatory entry costs for the formal sector f_m are identified by the costs of entry regulations as a share of GDP, calculated using the *World Bank Doing Business Surveys*.

Annex Table 3.3.1. Jointly Calibrated Parameters

Parameter	Description	Value	Moment	Source	Countries	Target
θ	Collateral constraint	0.238	Nonfinancial Private Sector Debt / GDP	IMF Global Debt Database	46	31.5%
f_m	Formal sector regulatory entry cost	0.185	Monetized cost of entry regulations as % GDP/capita	World Bank Doing Business Surveys	150	30.9%
τ_y	Governance/corruption wedge	0.234	Non-agricultural informal employment share	International Labour Organization	66	68%
χ	Equity issuance constraint	1.275	Market capitalization / GDP	World Bank Financial Structures Database	37	37.6%
σ_z	Standard deviation of permanent firm productivity	0.658	Standard deviation of ln(employment)	World Bank Enterprise Surveys	89	1.04
σ_ε	Standard deviation of transitory firm productivity	0.224	Standard deviation of Δln(employment)	World Bank Enterprise Surveys	89	0.15
ρ	Persistence of transitory firm productivity	0.965	Serial correlation of ln(employment)	World Bank Enterprise Surveys	89	0.96

Monetary cost of entry regulations and employment protection laws

The regulatory formal sector entry cost measures are constructed using data from the *World Bank Doing Business Surveys*. The procedure follows Ebell and Haefke (2009) and Cacciatore, Duval, Fiori, and Ghironi (2015). It aggregates the financial cost of opening a business with the required number of days and procedures, converted into a fraction of GDP per capita. In a first step, the average number of procedures per day in the sample is calculated. In a second step, a time-cost index is calculated which combines the days and procedures measures as follows: index = (days + procedures/average procedures per day)/2. In a final step, this time-cost index is converted into a share of lost per capita GDP (assuming 220 working days per year), and then added to the financial cost of starting a business (as a share of per capita GDP).

Our measure of the labor wedge τ_w is constructed from country-specific estimates of the cost of laying off a worker from Furceri and others (2019). The cost is measured in number of months of salary and incorporates both the financial costs of laying off a worker and the length (in months) of the notice required. This is then divided by 12 to express the cost of laying off an employee as a fraction of the yearly salary, and then multiplied by the average yearly US layoff rate in the private sector between 2013 and 2018 to obtain τ_w. The US layoff rate is used because the United States have the least regulated labor market of any country in the sample and are therefore closest to having 'undistorted' layoff rates.[9]

C. Main Reform Simulation Exercises

Size of Reforms in the Benchmark Economy

The following procedure is used to make the size of the reforms in the model counterfactuals as comparable as possible to the size of the reforms in the empirical section of the chapter. Financial reforms are used as an example.

Intuitively, the approach entails changing the financial friction in the model—the share of pledgeable capital θ that drives the collateral constraint—such that the debt-to-GDP ratio shifts across the cross-country distribution (of the debt-to-GDP ratios) the same way the domestic finance regulation indicator does across its cross-country distribution when a major reform is implemented. Concretely, in a first step, the magnitude of a major domestic financial reform is gauged by dividing the standard deviation of a change in the reform index by the standard deviation of the cross-country distribution of the level of the index:

$$R = \frac{\text{standard deviation of changes in reform index}}{\text{standard deviation of level of reform index}}$$

In a second step, the targeted change in the debt-to-GDP ratio is constructed by multiplying the standard deviation of the cross-country distribution of debt-to-GDP ratios by 2R—to make this change comparable to a domestic financial reform of a magnitude equal to two standard deviations of the distribution of changes in the reform index:

$$\text{targeted change in } \frac{Debt}{GDP} = 2R \times \text{standard deviation of } \frac{Debt}{GDP}$$

In the data, such a reform would be equivalent to enabling Mexican formal sector firms to increase their borrowing such that Mexico's corporate sector's debt-to-GDP ratio would become roughly equal to that of Poland. The same procedure is followed for the other reforms.

Channels through which Reforms Affect Output

Figure 3.10 contrasts the model-based gains from reforms to those in the empirical section. In this model, the main channels through which reforms can increase output are: (1) incentivizing

[9] Note that this approach to constructing τ_w presumes that workers are unproductive while they are on notice. In addition, using the 'undistorted' US layoff rate will overstate the size of costs borne by firms. However, the labor wedge used here does not incorporate the many other aspects of employment protection laws costly to firms, most notably the cost and uncertainty of administrative procedures. Therefore it may well be that this wedge understates rather than overstates the true costs of employment protection laws.

entry from the informal sector into the formal sector, (2) incentivizing formal sector firms to grow, and (3) reducing misallocation across firms in the formal sector.

As in Midrigan and Xu (2014), the third channel (misallocation) is quantitatively much smaller than the other two (entry and formal firm growth). The reason is that financial frictions are the only source of misallocation across formal firms in this model; there are no additional firm-specific 'wedges'—unlike in Hsieh and Klenow (2009), for example. In addition, the low variance of employment growth in the data implies a low variance of transitory productivity shocks in the model, limiting the role that financial frictions play in generating misallocation.

Reducing regulatory entry costs in the formal sector does not affect the incentives of (already existing) formal sector firms to grow. However, it does encourage informal firms to enter the formal sector. There are three sources of gains from such entry. First, a direct total factor productivity gain from becoming a formal firm (ϕ). Second, formal-sector total factor productivity increases through a product variety gain ('love of variety') from the increase in the number of firms.[10] Third, the aggregate capital stock increases as new entrants invest and accumulate capital. Both the total factor productivity and investment effects are quantitatively important in driving the aggregate output response to a reduction in entry costs.

Labor market reforms and governance reforms operate through the same channels in this model. By increasing the profitability of firms in the formal sector, they incentivize entry into the formal sector and incumbent formal firms to grow. The former channel leads to the type of output gains previously described. The latter raises aggregate output by both increasing the aggregate capital stock and reallocating resources from less productive informal firms to larger more productive formal firms.

Financial reforms operate through the same channels. Improving domestic finance makes it easier for informal firms to pay the regulatory entry costs into the formal sector because they can borrow more and issue more equity. In addition, new formal sector entrants will be able to finance a larger starting capital stock and therefore will be less likely to be credit-constrained. Finally, formal sector incumbents will face a less binding collateral constraint, leading some of those to expand.

For most reforms, the model predicts larger output gains than those found in the empirical analysis. While this may stem in part from differences in approaches and difficulties in translating the size of reforms in the empirical section into parameter changes in the model, it may also reflect the longer implicit horizon of the model-based analysis. Formal sector entry and capital accumulation may take considerably longer than six years to occur following a reform, in which case the empirical analysis—unlike the model—might underestimate the size of long-term gains from reforms. The only exception is governance reform, for which larger gains are found

[10] This `love of variety' effect can be thought of as resulting from heterogeneous consumer preferences over different products (for example, different makes of cars). Note, however, that there is a partly offsetting reduction in informal-sector total factor productivity from the reduced number of informal firms.

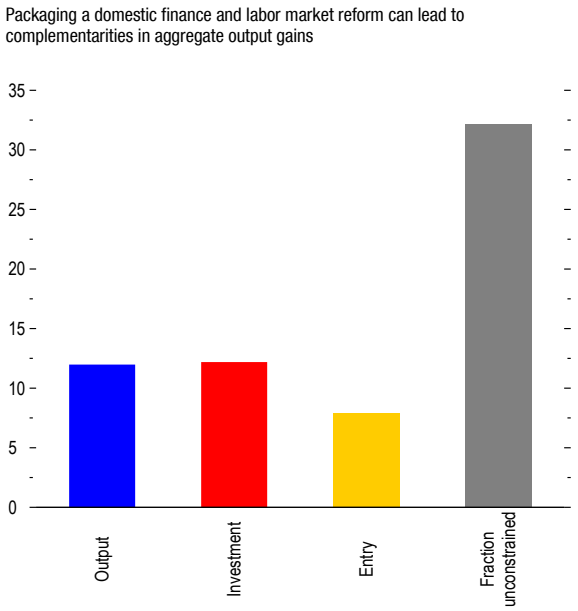
in the empirical analysis. This may be a consequence of the limited scope through which governance affects firms in the model.[11]

Initial Conditions and Reform Interactions

As described in the chapter, both the initial magnitudes of the frictions and the interaction of different policy reforms can matter for the output gains from individual or packaged reforms.

Annex Figure 3.3.1. illustrates the mechanisms through which a simultaneous liberalization of the labor market and domestic finance can lead to additional output and investment gains, relative to the implementation of each reform in isolation. Labor market reforms increase informal entrepreneurs' incentives to formalize, but to do so many of these entrepreneurs will need to seek external financing. A simultaneous domestic finance reform alleviates these external financing constraints, generating complementarities along the entry margin. Indeed, the model shows that these complementarities amount to an additional 5 percent increase in entry from the reform package. A lower labor wedge also incentivizes formal entrepreneurs to expand operations; but to increase their capital holdings they might once again need to apply for external financing. This in turn increases the number of constrained entrepreneurs. A simultaneous domestic finance reform reduces the share of formal entrepreneurs for whom these constraints are binding. These intensive margin complementarities amount to a 30 percent reduction in the fraction of unconstrained entrepreneurs from the reform package.

Annex Figure 3.3.1. Domestic Finance and Labor Market Reform Package
(Percent gain from packaging reforms)



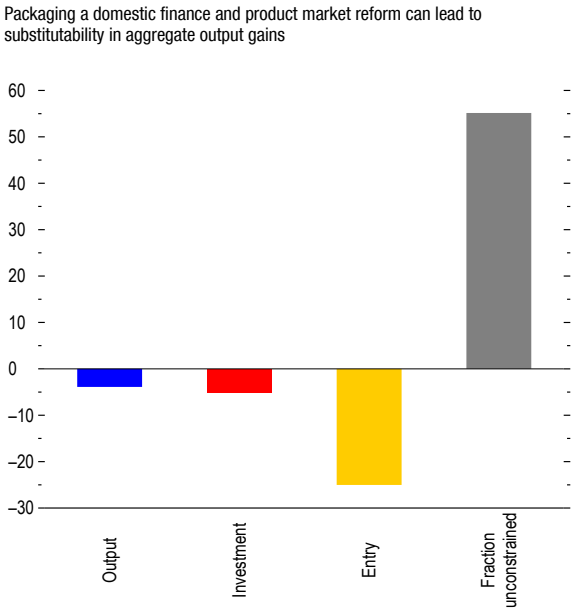
Source: IMF staff calculations.
Note: Bars represent the difference between the impact from a package combining both reforms and the sum of the impacts from each reform in isolation, in percent.

Despite the presence of complementarities between reforms in some cases, there are also forces pushing in the opposite direction. As discussed in the chapter, lower initial levels of informality are associated with lower gains from reforms. This is because the entry channel becomes less important as a source of output gains—it is not possible for more than 100% of entrepreneurs to be in the formal sector. This suggests that reforms which encourage formalization may eventually hit some diminishing returns. One such example, illustrated in Annex Figure 3.2.2, concerns the simultaneous implementation of a domestic finance and a product market reform. Both reforms on their own create an incentive for informal

[11] While the modeling choice for governance is conventional, it ignores other potential gains from strengthening governance, such as lower costs of doing business also in the informal sector, lower operational uncertainty for all firms, and—to the extent that poor governance entails larger costs for some firms than for others—reduced misallocation across firms in the formal sector.

entrepreneurs to enter the formal sector, by alleviating potential entrants' financial constraints or by directly reducing costs of entry into the formal sector. This makes the policies effective substitutes in promoting entry: when implementing the package, entry rates are more than 20 percent lower than the sum of entry rates from implementing each reform in isolation. On the other hand, the fraction of unconstrained entrepreneurs in the formal sector performs better under the package because the domestic finance reform alleviates the financial constraints that entering entrepreneurs face after a fall in entry costs. On balance however, the substitutability in entry outweighs the complementarity in formal firms' financial conditions, and therefore the package exhibits substitutability between the reforms in investment and output.

Annex Figure 3.3.2. Domestic Finance and Product Market Reform Package
(Percent gain from packaging reforms)



Source: IMF staff calculations.
Note: Bars represent the difference between the impact from a package combining both reforms and the sum of the impacts from each reform in isolation, in percent.