Global Economic Prospects

Shades of Gray:
Measuring the Informal Economy Business Cycles

M. Ayhan Kose, Franziska Ohnsorge, Shu Yu
(World Bank)
and
Ceyhun Elgin
(Columbia University)

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

November 2019

Three Questions

1. **What are the limitations and advantages of existing measures of informality?** *Model-based estimates have better coverage and economic reasoning than survey-based estimates, but rely on assumptions and base-year estimates.*

2. **What are the main features of the informal economy?** *Strongly associated with under-development, heavy regulatory burden, and weak governance. But the informal economy has shrunk over time.*

3. **What are the cyclical features of the informal economy?** *Informal recessions (recoveries) last about 2 years with output contracting by 3-4 percent (expanding by about 2-5 percent) per year. Similar to business cycles in the formal economy.*

Definitions of Informality

Capture Multiple Dimensions of Informality

- Motives (e.g., Perry et al. 2007)
  - "Exclusion" vs voluntary "Exit".
- Subsistence levels (e.g., Docquier et al. 2017):
  - "subsistence informality".
- Compliance and applicability (e.g., Kanbur and Keen 2015):
  - Some classify informal workers and firms into evaders, avoiders, and outsiders depending on their compliance with regulations and regulations' applicability.
- Margins (e.g., Maloney 2006; Ulyssea 2018):
  - "intrafirm margin", "intersectoral margin" etc.
  - "intensive margin", "extensive margin".

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Measures of Informality-1

Model-Based Estimates

Multiple Indicators Multiple Causes (MIMIC) model

- Schneider et al. (2010):
  - Causes
  - Indicators
  - Latent variable for the informal economy
  - Benchmarking process

Dynamic General Equilibrium (DGE) model

- Elgin and Oztunali (2012):
  - Formal and informal sectors
  - The household maximization problem
  - Calibration and data construction process

Measures of Informality-2

Survey-Based Estimates

Labor-related estimates

- Self-employment (Maloney 2004)
  - WDI, OECD, ILO, National Statistical Offices (90 countries) and LSMS (WB)
- Informal employment etc. (ILO)
  - International Labor Organization
- Pension coverage (Loayza et al. 2010)
  - WDI (book version, until 2012)

Perception-related estimates

- Firm surveys
  - World Bank Enterprise Survey
    - Percent of firms competing against unregistered or informal firms
  - Executive Opinion Survey (WEF)
    - "In your country, how much economic activity do you estimate to be undeclared or unregistered?"
- Household surveys
  - World Value Survey
    - "Is cheating on taxes justifiable?"

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Measures of Informality-3

Limitations and Advantages

Model-based estimates

- Limitations
  - Rely on assumptions and base-year estimates
  - Focus on one dimension of informality: informal output
  - MIMIC- / DGE-specific limitations
- Advantages
  - Better economic reasonings
  - Richer country and year coverage
  - Allow for time-series analysis
  - Capture both employment and productivity

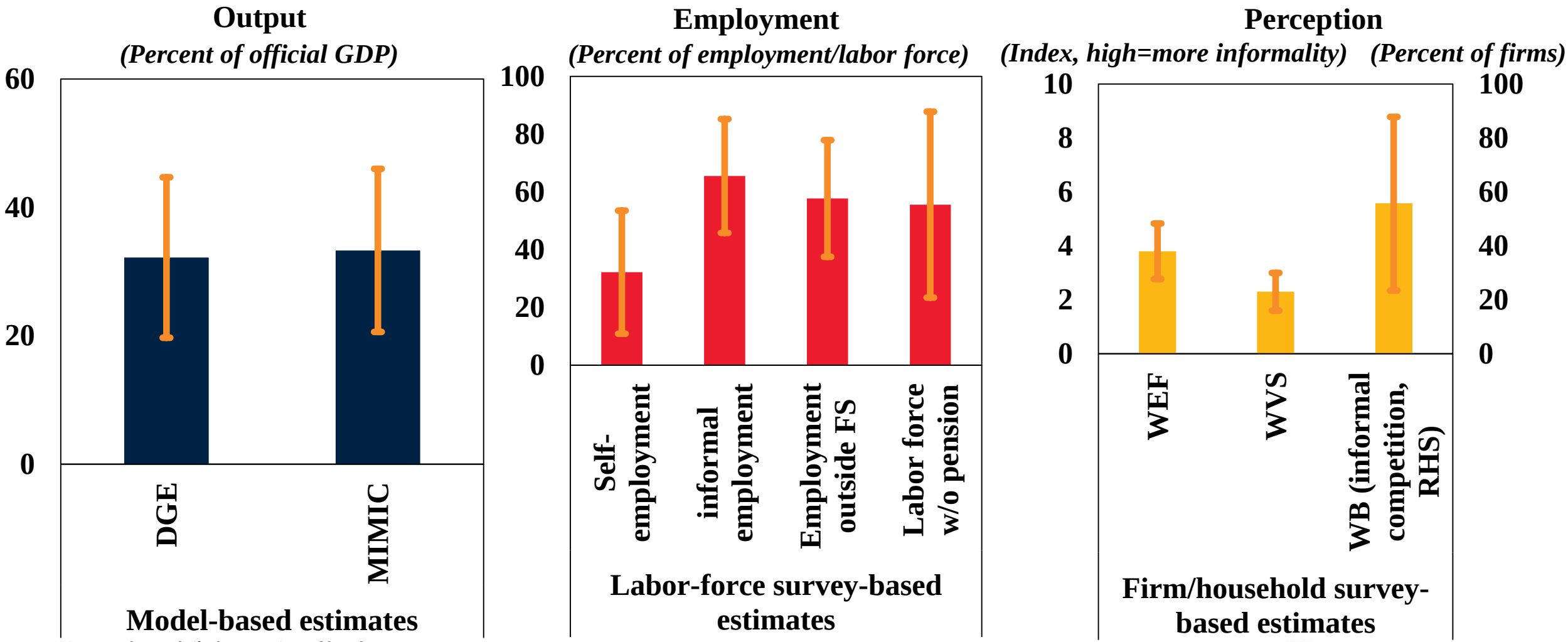
Survey-based estimates

- Limitations
  - Limited country and year coverage
  - Inconsistent methodologies
  - Self-employment-specific limitations (e.g., the inability to capture changes in productivity)
- Advantages
  - Capture multiple dimensions of informality
  - Do not rely on assumptions nor base-year estimates

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Measures of Informality-4

A Variety of Methods and Aspects



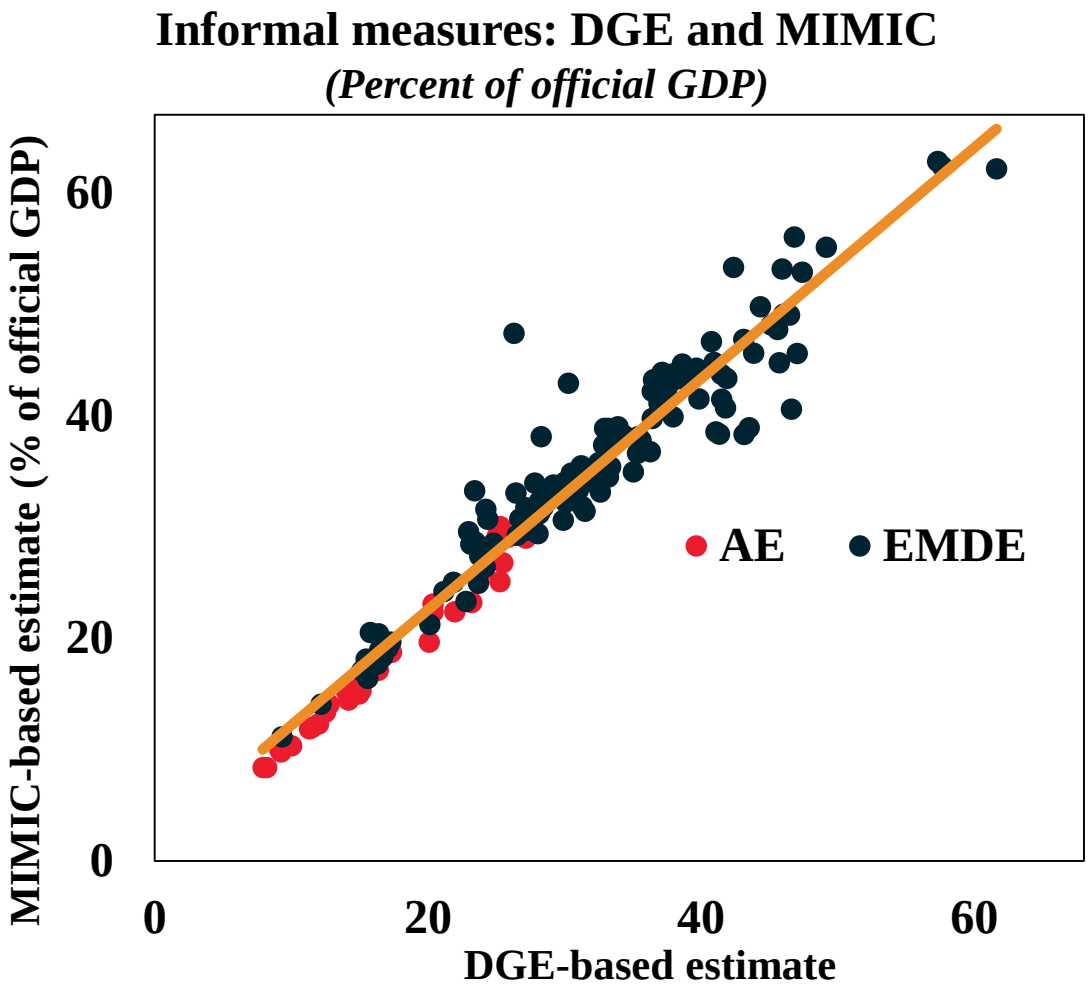
Sources: Elgin et al. (forthcoming a); World Bank.

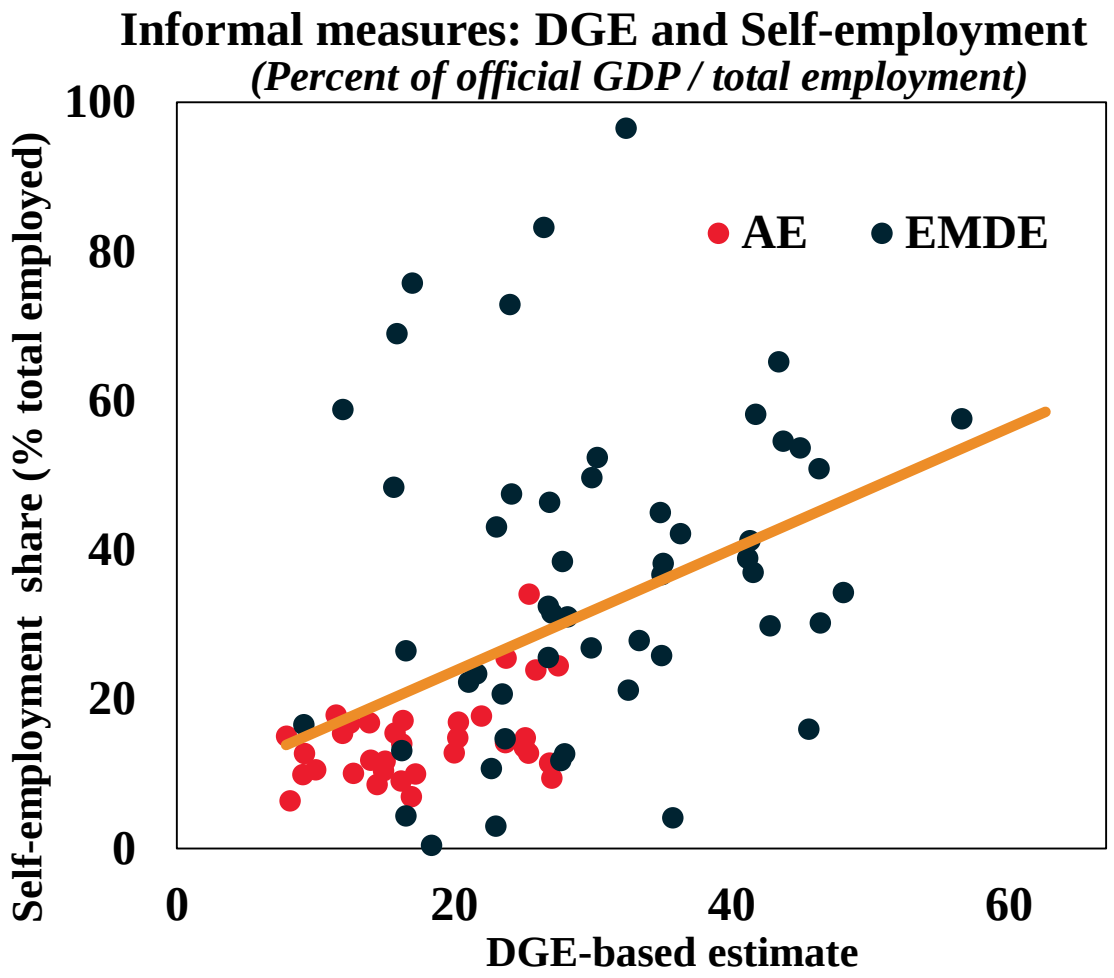
Notes. Bars show simple averages with whiskers showing one standard deviation around the mean. Data are for the period 1990-2016 Left Panel. Bars for DGE-based and MIMIC-based informal output shares (in percent of official GDP). Middle Panel. Bars for self-employment (in percent of employment), informal employment (in percent of employment), employment outside the formal sector (in percent of employment), and labor force without pension (in percent of labor force). Right Panel. Bars for World Economic Forum (WEF) index (1-7=most informal), World Value Surveys (WVS) (Cheating on taxes is justifiable), and percent of firms competing against informal firms (World Bank Enterprise Surveys).

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Measures of Informality-5

Broadly Consistent, but Somewhat Different Dimensions of Informality



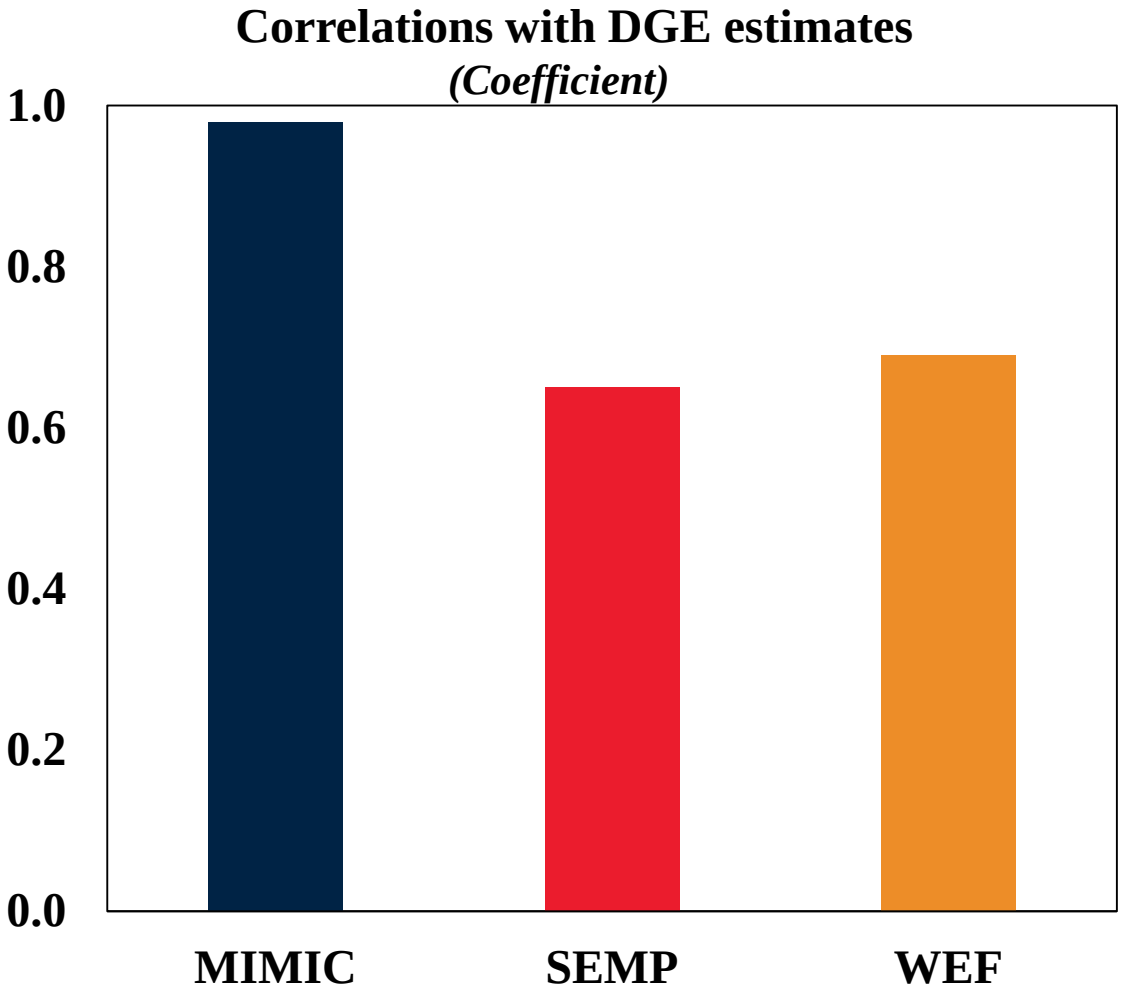


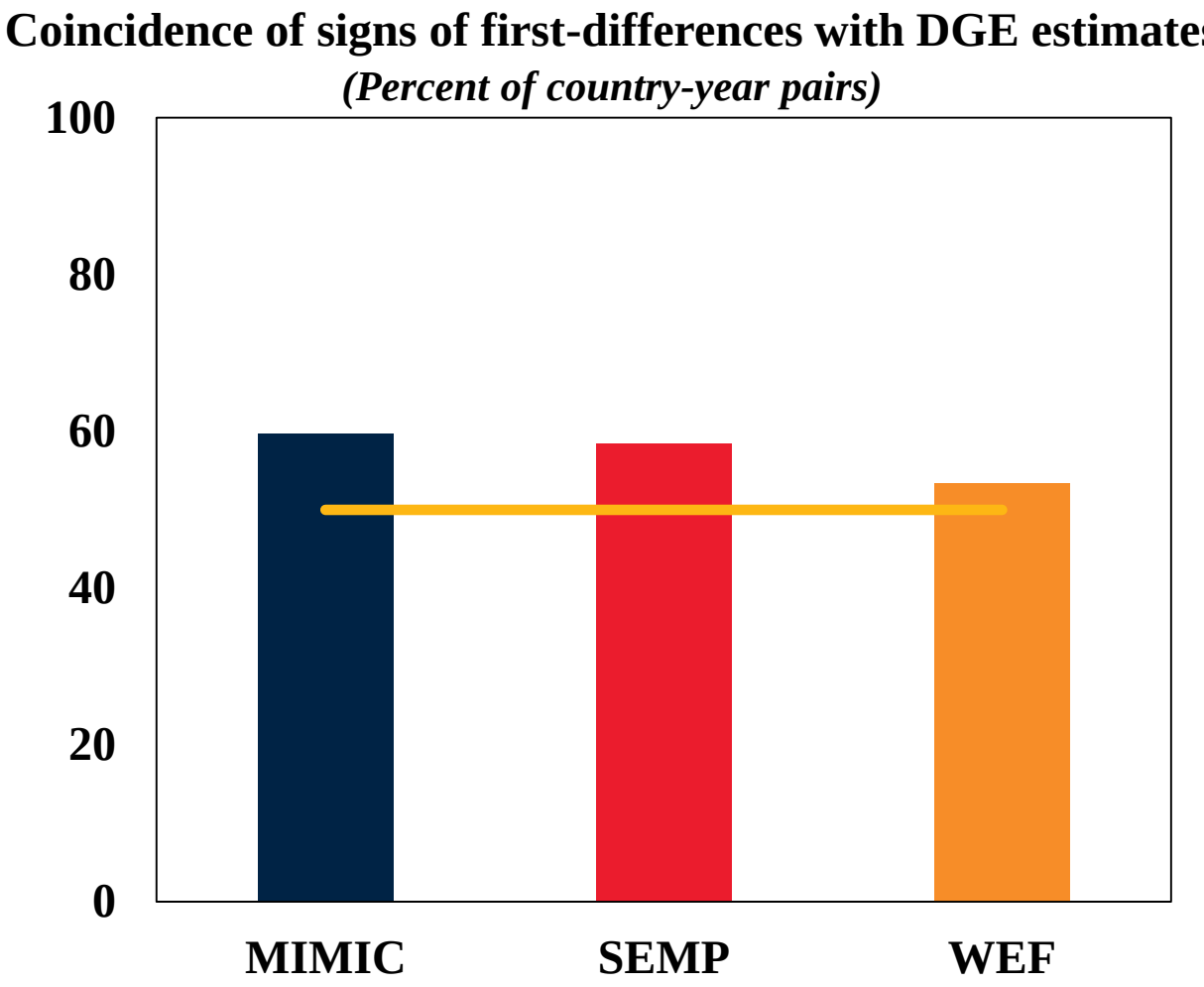
Sources: Elgin et al. (forthcoming a); World Bank.
Left Panel. Scatterplots for DGE-based and MIMIC-based estimates on informal output shares (in percent of official GDP). Data are from the latest available year. AE=Advanced economies; EMDEs= Emerging markets and developing economies. Right Panel. Scatterplots for DGE-based estimates and self-employment shares (in percent of total employment). Data are from the latest available year.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Measures of Informality-6

Broadly Consistent, but Somewhat Different Dimensions of Informality





Sources: Elgin et al. (forthcoming a); World Bank.
Note. Data are over 1990-2016. Left Panel. Medians of the correlations between DGE estimates and MIMIC / SEMP / WEF estimates of each country. Right Panel. The percent of country-year pairs where the first difference of DGE estimates and the first difference of MIMIC/ SEMP / WEF share the same sign. The yellow line represents 50 percent.

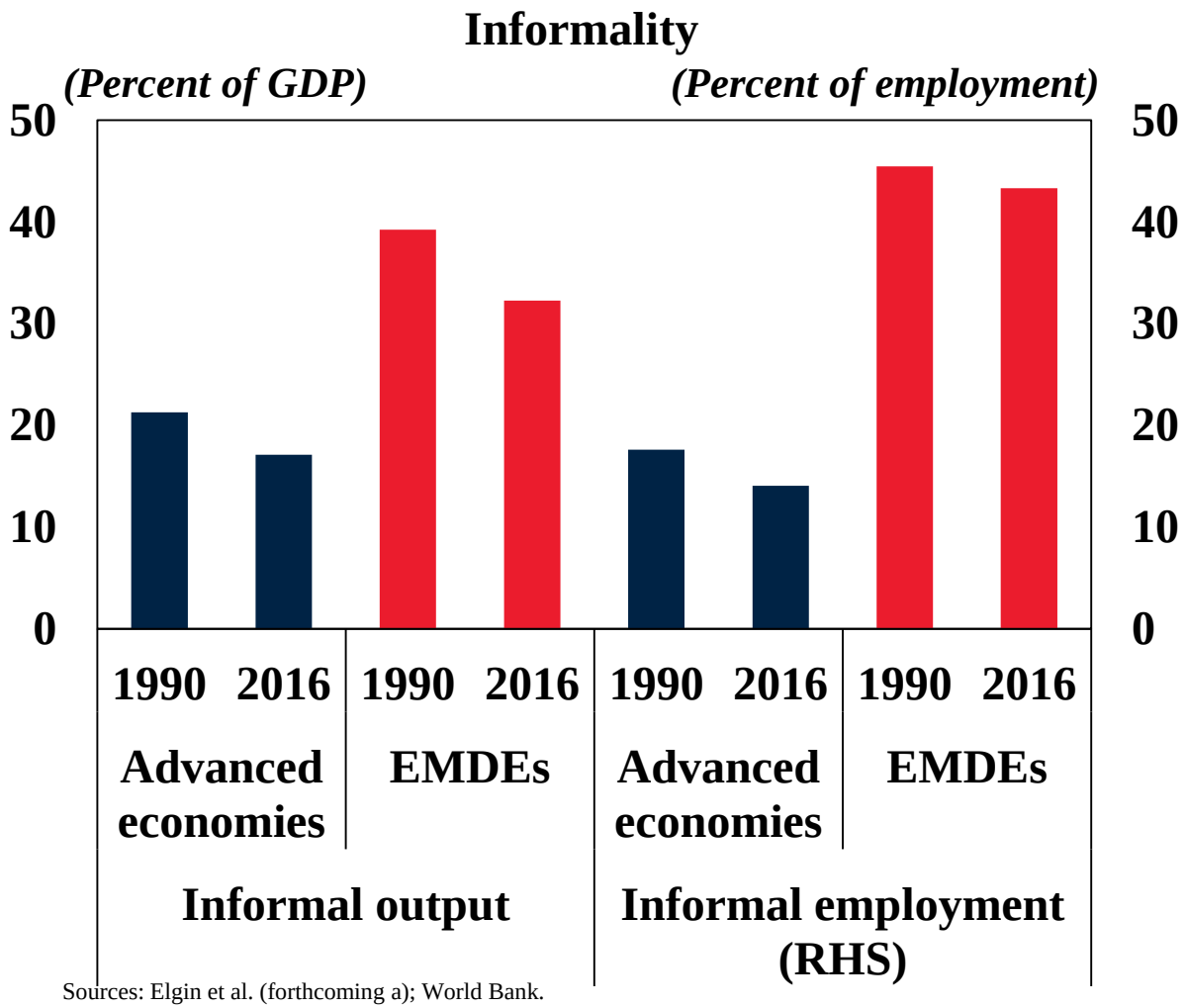
WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

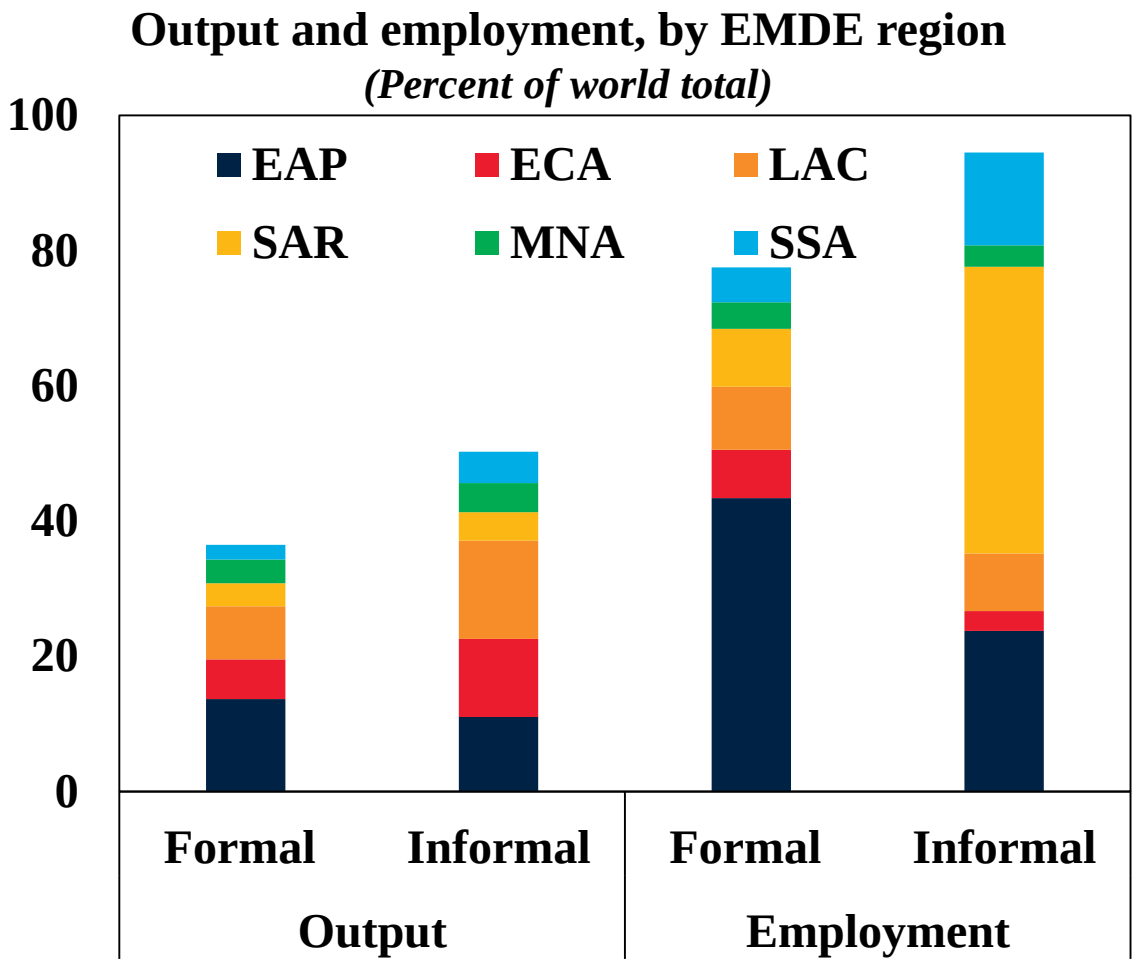
Three Questions

2 **What are the main features of the informal economy?** *Strongly associated with under-development, heavy regulatory burden, and weak governance. But the informal economy has shrunk over time.*

Informality

Prominent in EMDEs, especially in LAC (Output) and SAR (Employment)





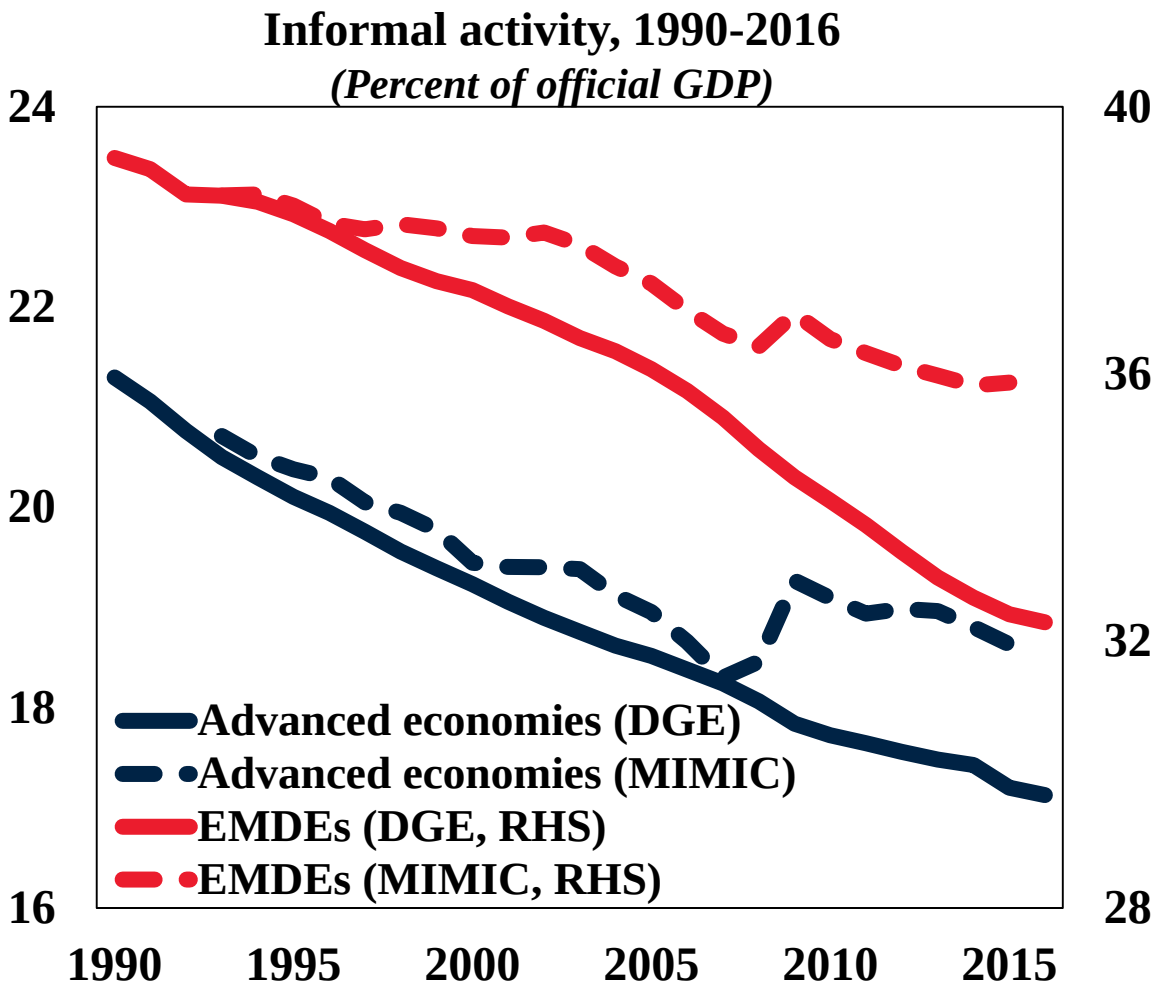
Sources: Elgin et al. (forthcoming a); World Bank.

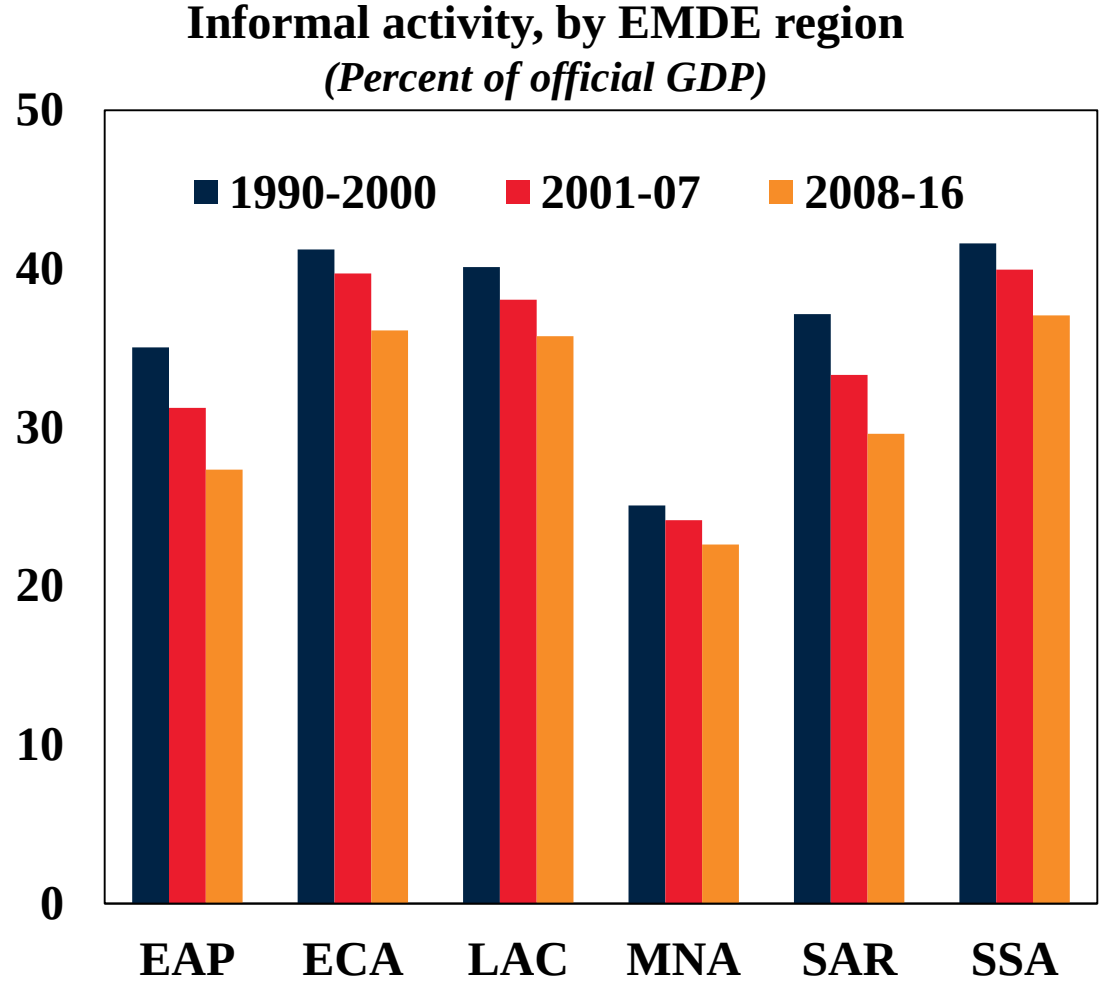
Left Panel. Unweighted averages. Informal output is measured as DGE-based informal output estimates. Informal employment is represented by self employment (with additional informal employment in shaded red). World aggregates refer to global averages between 1990-2016. Right Panel. Data are averaged over 2010-16. Formal output refers to official GDP and informal output is DGE-based estimates. Formal employment is obtained as total employment minus informal employment (represented by self employment). EAP, ECA, LAC, MNA, SAR, and SSA refer to, respectively, East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Evolution of Informality

Declining Trend



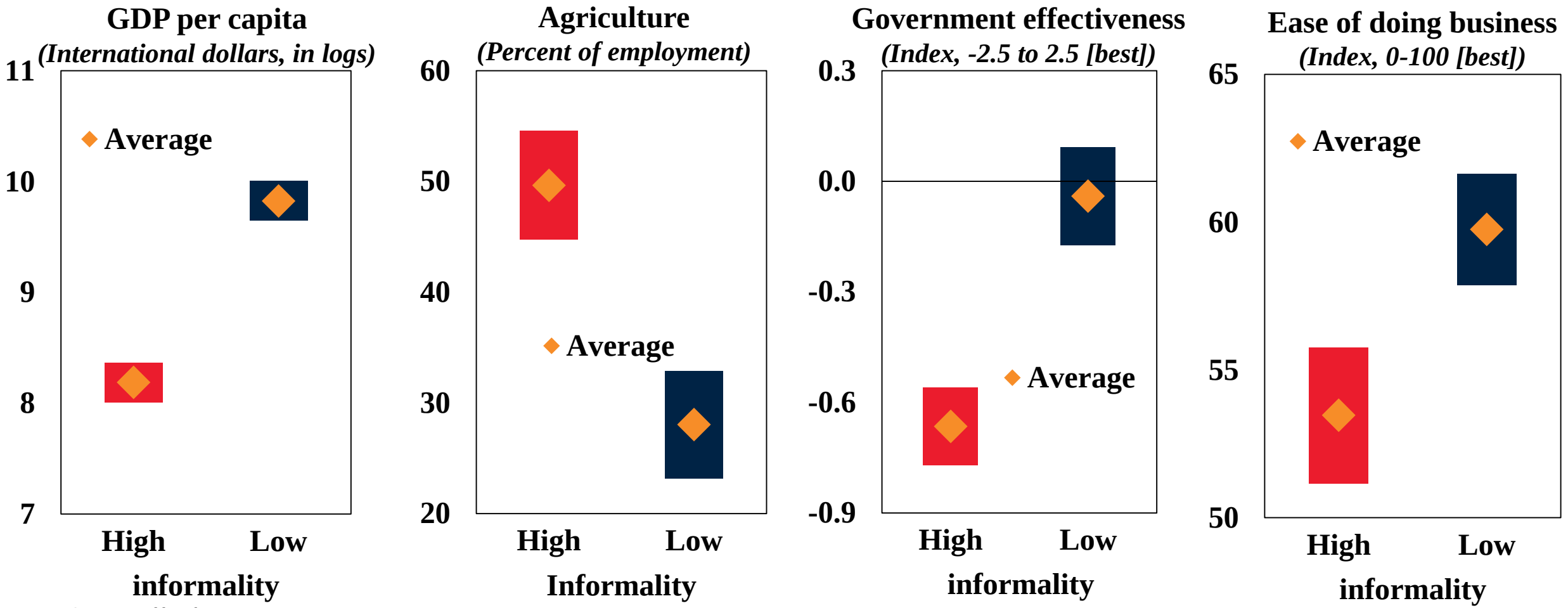


Sources: Elgin et al. (forthcoming a and b), World Bank.
Left Panel. Unweighted group averages for advanced economies and EMDEs. Right Panel. Unweighted averages of changes in formality (DGE-based estimates) for each EMDE region. Data are period averages. EAP = East Asia and Pacific, ECA = Europe and Central Asia, LAC = Latin America and the Caribbean, MNA = Middle East and North Africa, SAR = South Asia, and SSA = Sub-Saharan Africa.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Correlates of Informality in EMDEs

Lack of Development; Regulatory Burden; Weak Governance; Large Agriculture



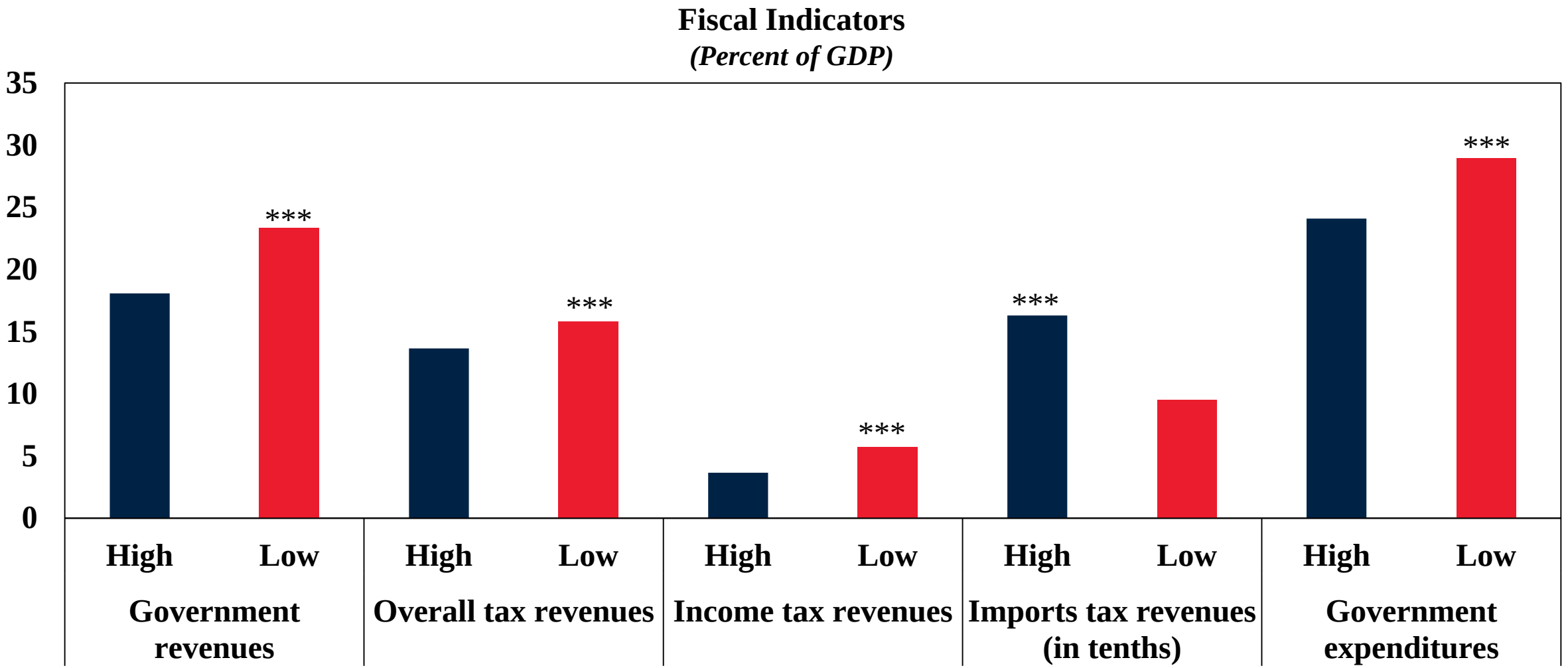
Sources: World Bank.

Note: "High informality" and "Low informality" refer to EMDEs with above-median and below-median DGE-based informal output over 1990-2016. Orange diamonds show averages of respective groups and blue and red bars show 90 percent confidence intervals (except for the fourth panel, which uses 95 percent confidence intervals). First Panel. GDP per capita is in constant 2011 international dollars, PPP, and expressed in logs. Second Panel. Employment in agriculture in percent of total employment, averaged over 1990-2016. Third Panel. Government effectiveness is as defined in the Worldwide Governance Indicator. Fourth Panel. Ease of doing business is measured as the overall distance to frontier, with 100 being the frontier and zero being the farthest from the frontier, as reported in *Doing Business* report 2017.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Fiscal Outcomes When Informality is High

Lower Government Revenues; Less Redistributive Taxes



Source: Elgin et al. (forthcoming-a); International Monetary Fund, World Economic Outlook; World Bank, World Development Indicators.
Note: Fiscal indicators are 2000-16 averages and in percent of GDP. Sample includes 70 nonenergy exporting EMDEs with populations above 3 million people. "High" and "Low" are the third of EMDEs with the highest and lowest informality by the share of informal output (as measured by the DGE methodology) in percent of official GDP. "***" indicates significantly (at 10 percent level) higher values.

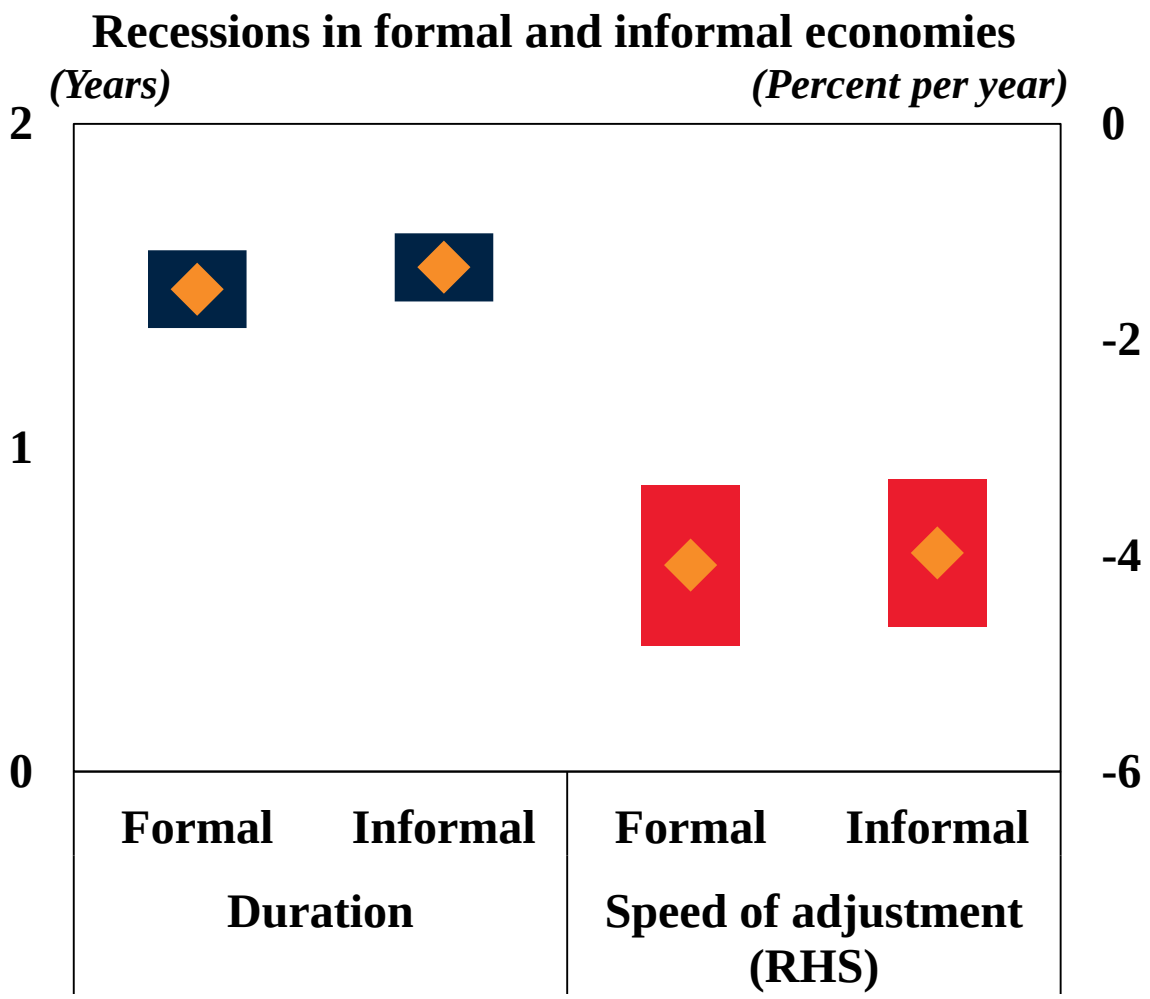
WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

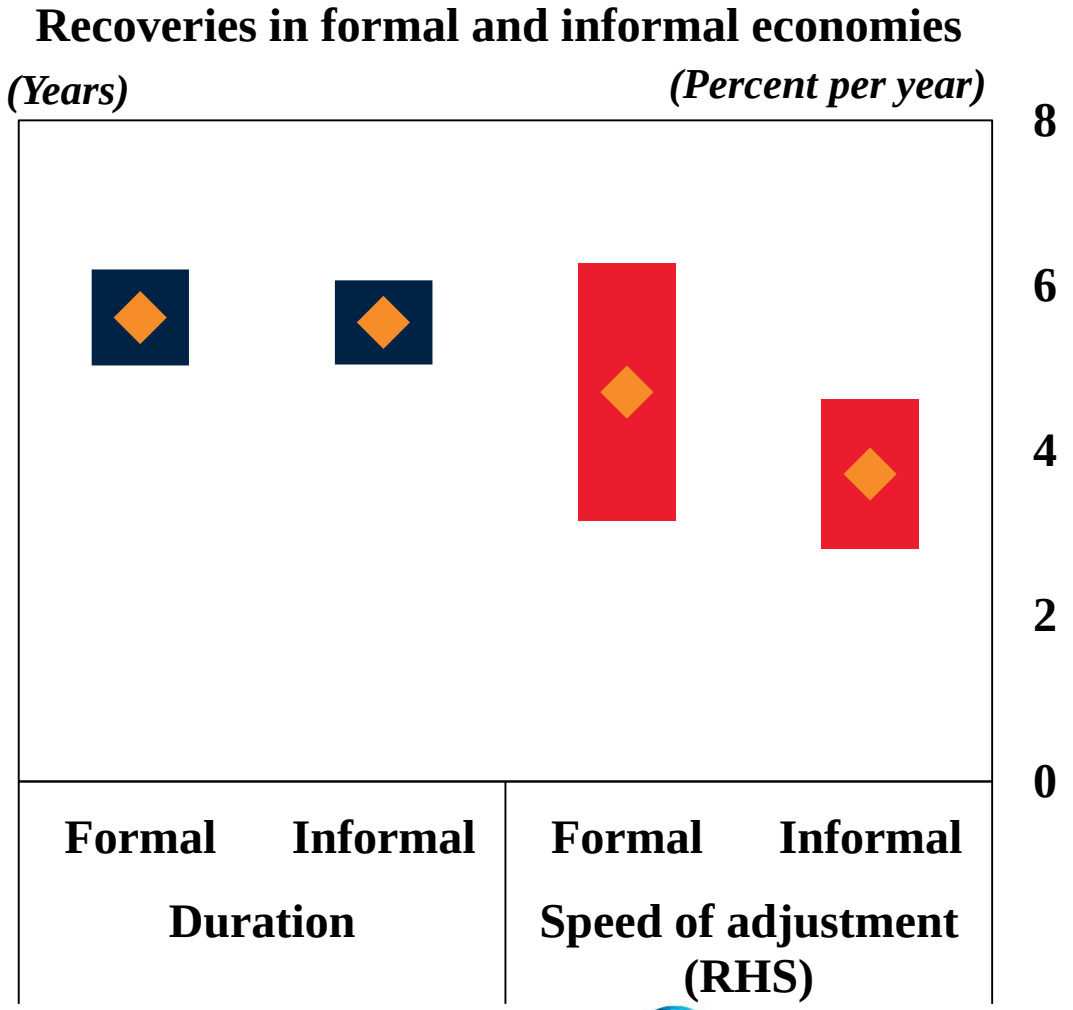
Three Questions

3 **What are the cyclical features of the informal economy?** *Informal recessions (recoveries) last about 2 years with output contracting by 3-4 percent (expanding by about 2-5 percent) per year. Similar to business cycles in the formal economy.*

Informal Economy Business Cycles-1

Similar Cycles in Informal and Formal Economy





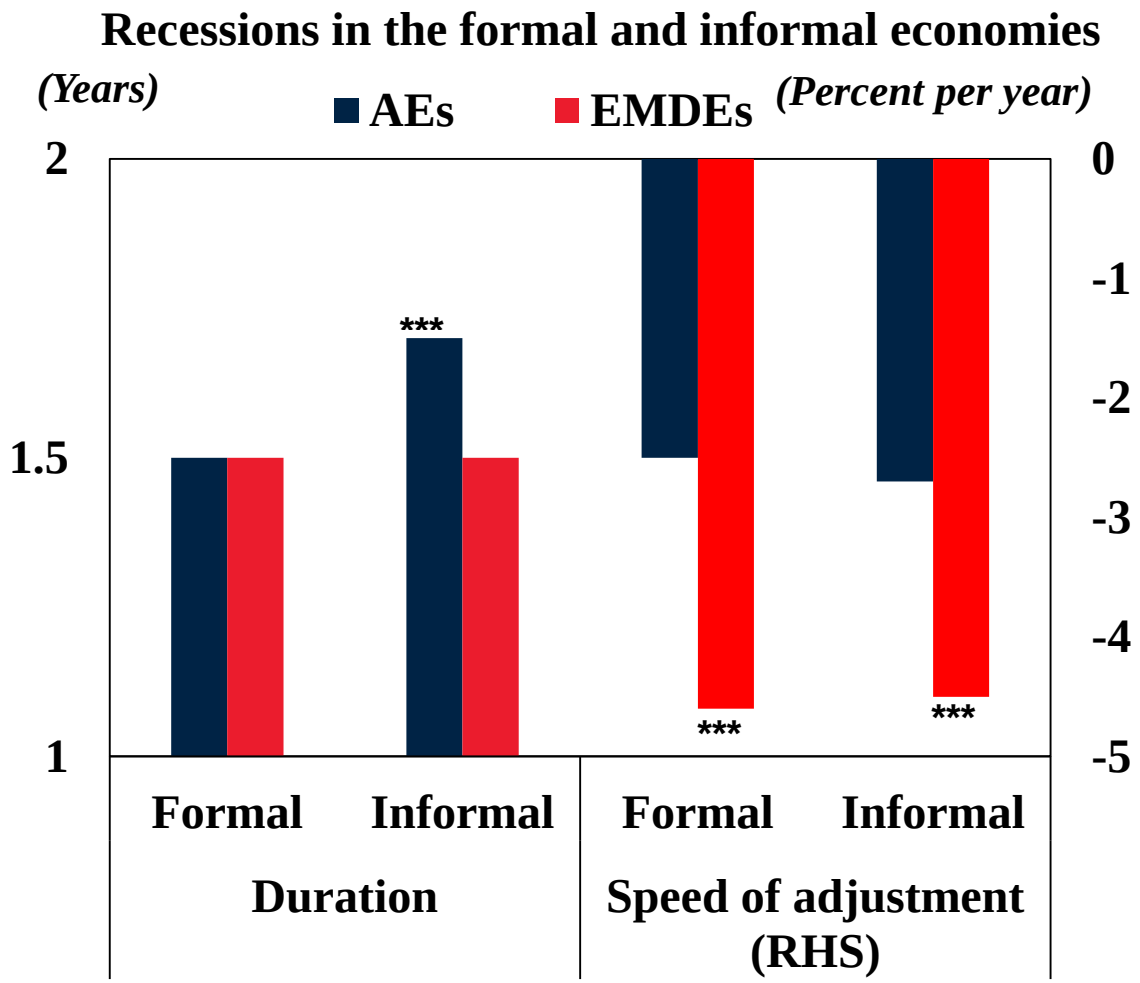
Sources: Elgin et al. (forthcoming a); World Bank.

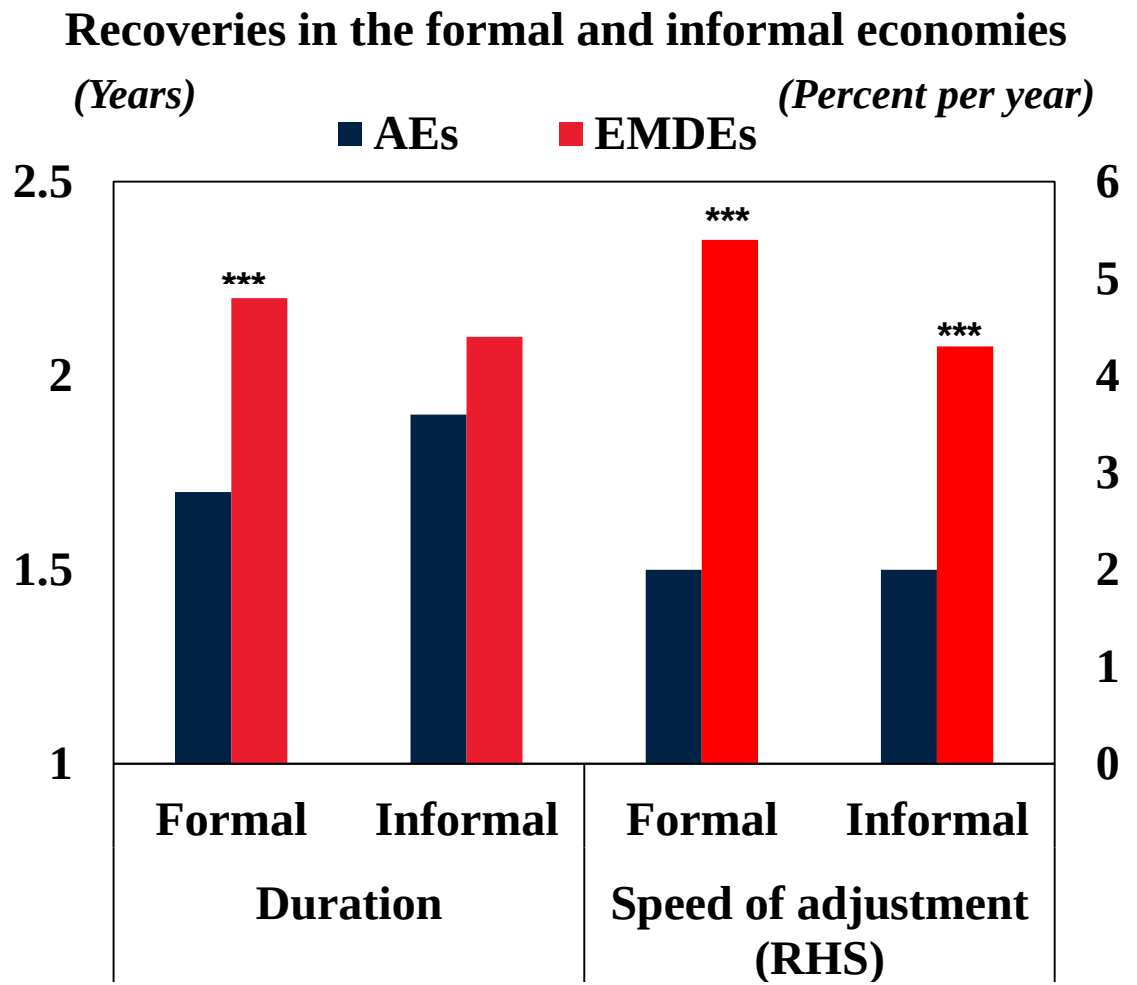
Note. Data are for the period 1990-2016. Diamonds indicate sample means with bars indicating 95 percent confidence intervals. Business cycle turning points are determined based on official GDP statistics and DGE estimates using the algorithm of Harding and Pagan (2002). Left Panel. Recession is defined as the phase from peak to trough with the speed of adjustment (often known as "slope") being defined as in Claessens et al. (2012). Right Panel. Recovery is defined as the phase from trough to its pre-recession level with the speed of adjustment being defined as in Claessens et al. (2012).

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Informal Economy Business Cycles-2

Shallower Recessions and Recoveries in Advanced Economies





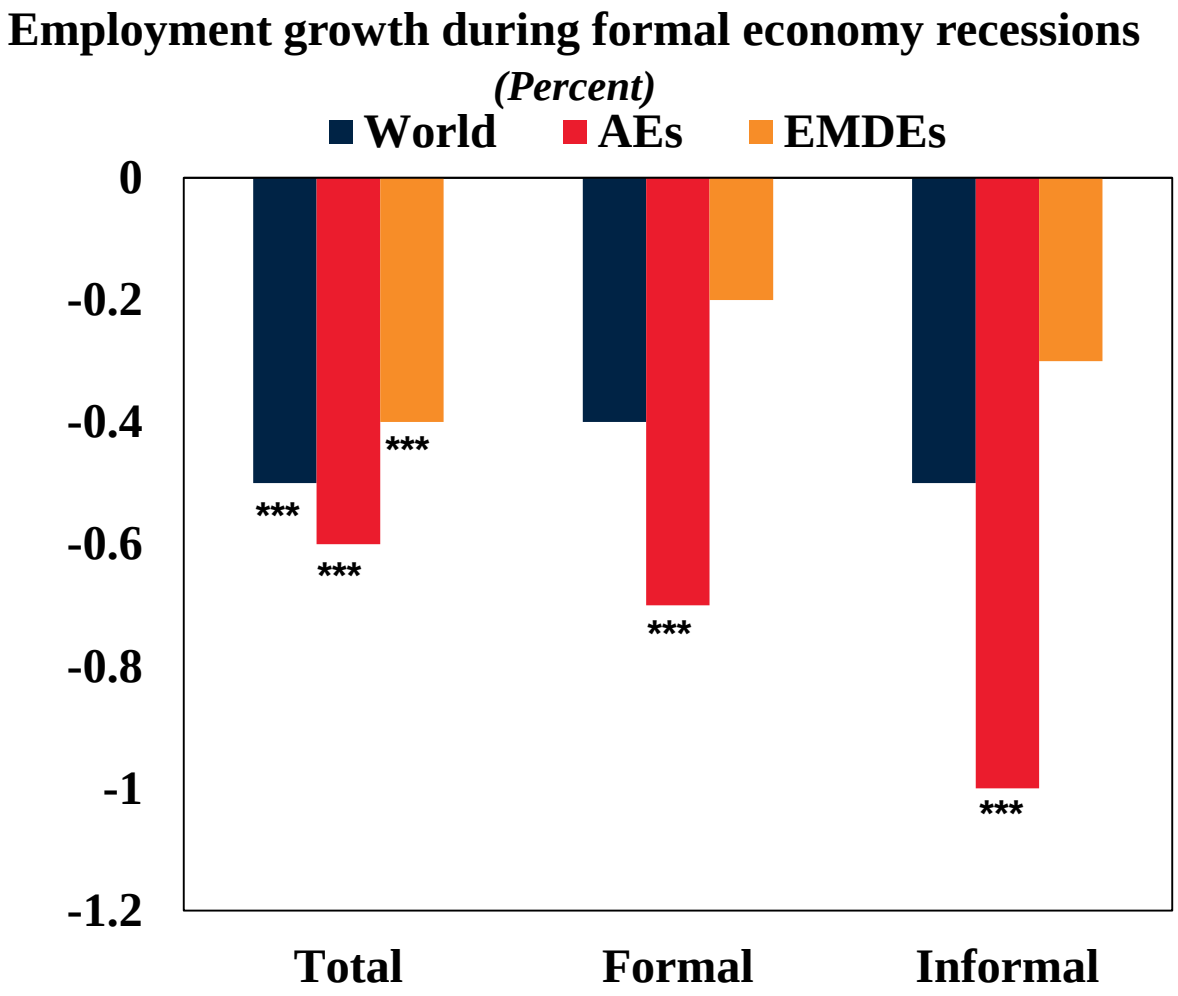
Sources: Elgin et al. (forthcoming a); World Bank.

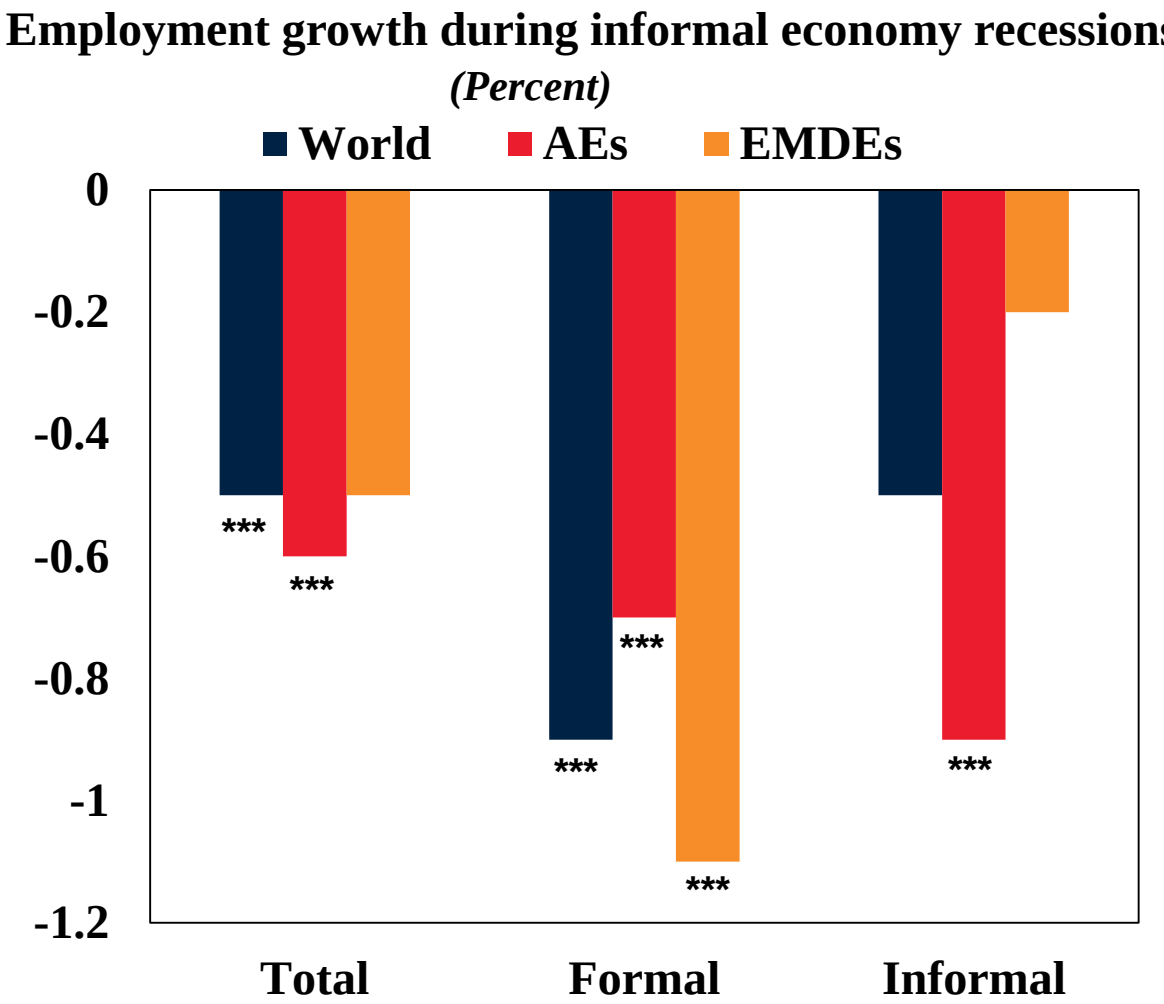
Note. Data are for the period 1990-2016. Diamonds indicate sample means with bars indicating 95 percent confidence intervals. Business cycle turning points are determined based on official GDP statistics and DGE estimates using the algorithm of Harding and Pagan (2002). Left Panel. Recession is defined as the phase from peak to trough with the speed of adjustment (often known as "slope") being defined as in Claessens et al. (2012). Right Panel. Recovery is defined as the phase from trough to its pre-recession level with the speed of adjustment being defined as in Claessens et al. (2012).

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Informal Employment during Recessions

Stable Employment during Recessions (esp. in EMDEs)





Sources: Elgin et al. (forthcoming a); World Bank.

Note. Data for the period 1990-2016. Business cycle turning points determined based on formal and informal GDP using the algorithm of Harding and Pagan (2002). Recession is defined as the phase from peak to trough (Claessens et al. 2012). All statistics correspond to the sample medians of demeaned, first differenced, and logged employment. "***" implies that employment growth is significantly different from 0 at 10 percent level. Left Panel. Employment during formal economy recessions. Right Panel. Employment during informal economy recessions.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Summary

1. **What are the limitations and advantages of existing measures of informality?** *Model-based estimates have better coverage and economic reasoning than survey-based estimates, but rely on assumptions and base-year estimates.*

2. **What are the main features of the informal economy?** *Strongly associated with under-development, heavy regulatory burden, and weak governance. But the informal economy has shrunk over time.*

3. **What are the cyclical features of the informal economy?** *Informal recessions (recoveries) last about 2 years with output contracting by 3-4 percent (expanding by about 2-5 percent) per year. Similar to business cycles in the formal economy.*

Questions & Comments

Thanks!

M. Ayhan Kose, Franziska Ohnsorge, Shu Yu

Prospects Group— World Bank

akose@worldbank.org, fohnsorge@worldbank.org, syu2@worldbank.org

and

Elgin Ceyhun

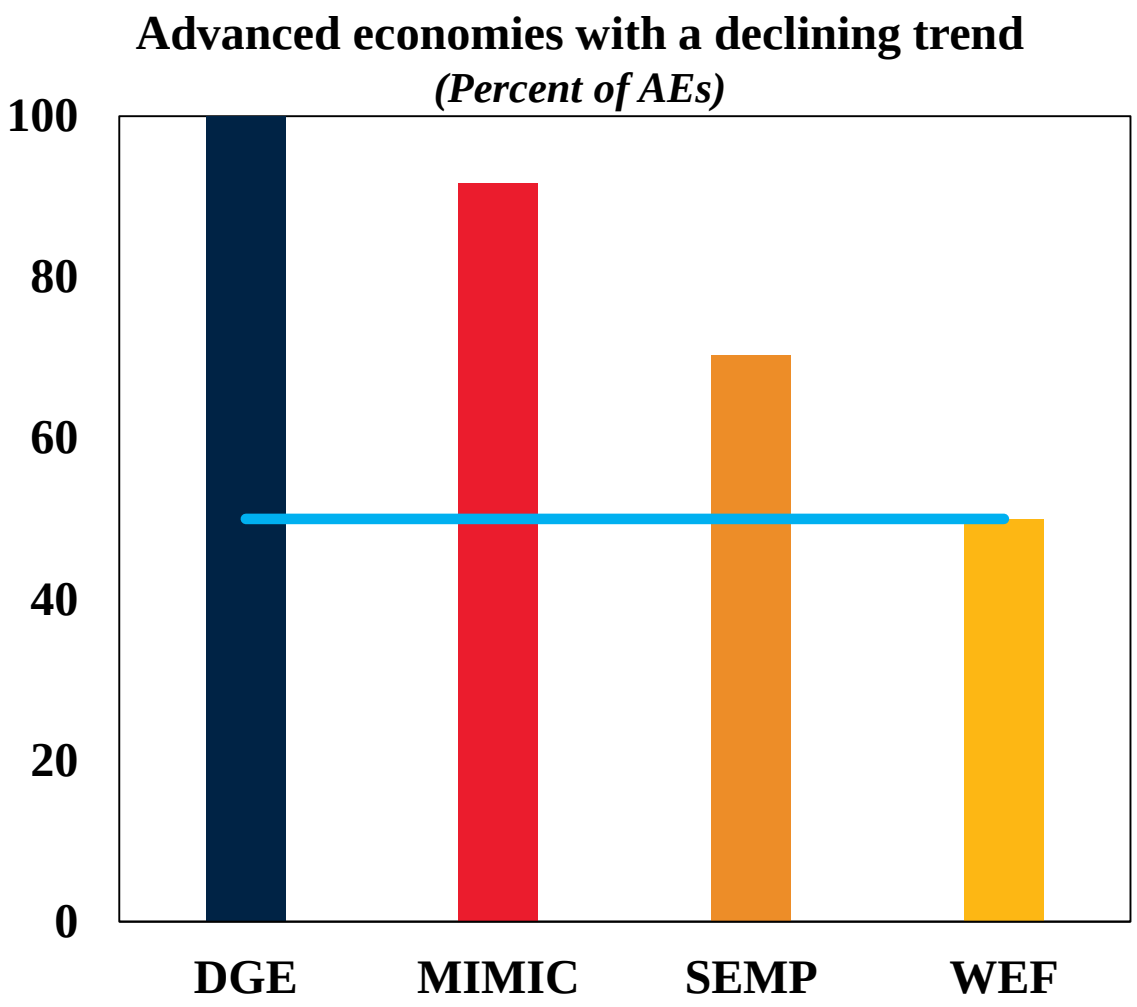
Columbia University

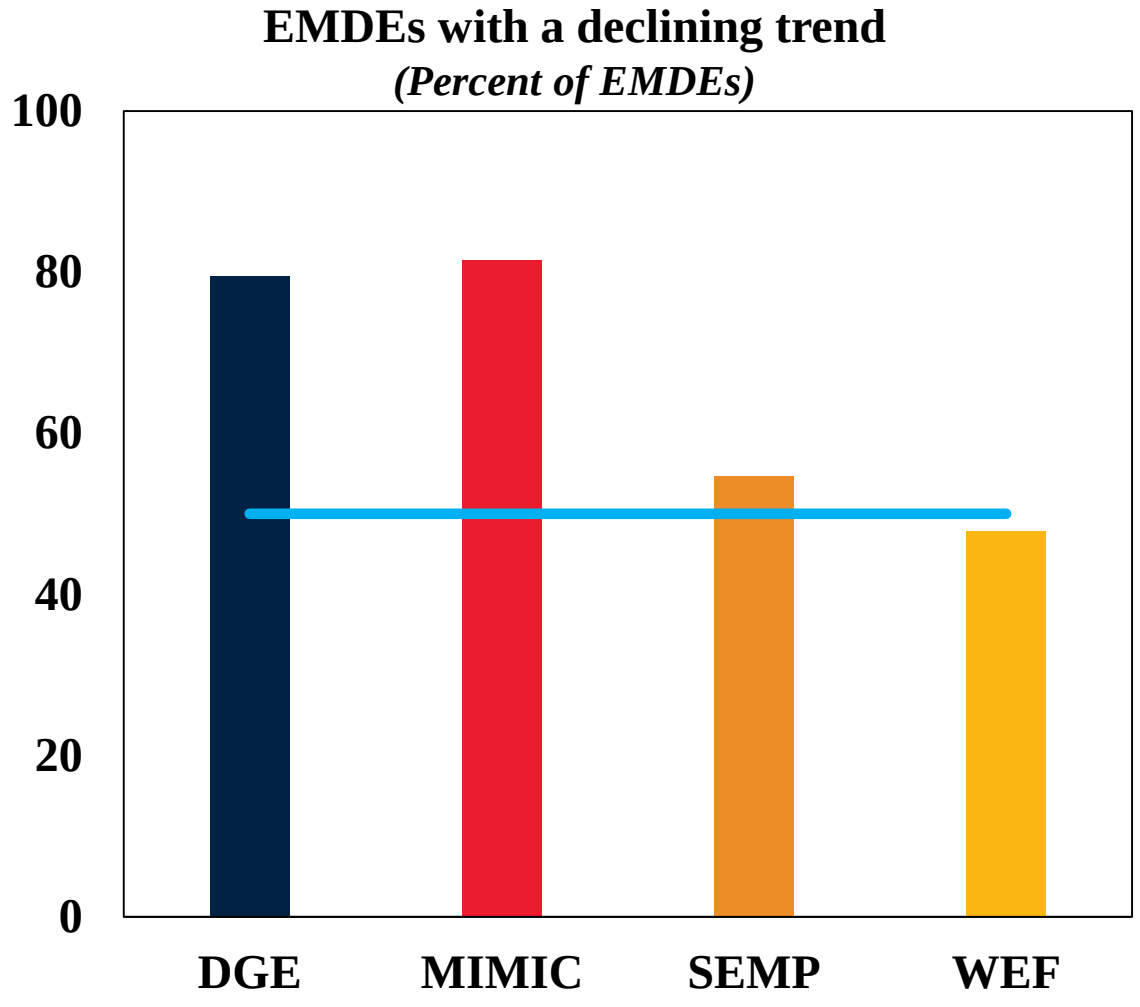
ce2403@columbia.edu

www.worldbank.org/prospects

Evolution of Informality

Declining Trend since 1990



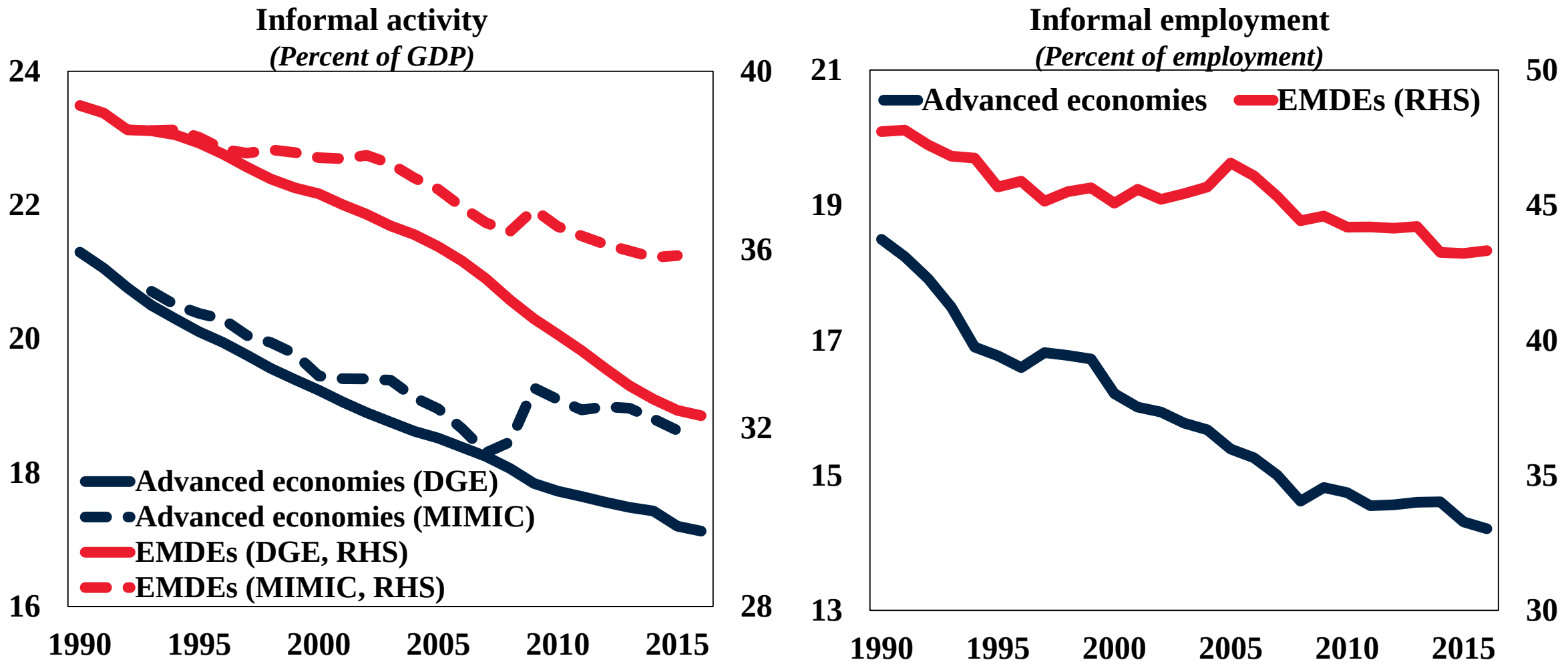


Sources: Elgin et al. (forthcoming a and b), World Bank.
Left Panel. Percent of advanced economies with a declining time trend. Right Panel. Percent of EMDEs with a declining time trend.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Evolution of informality

Declining Trend since 1990

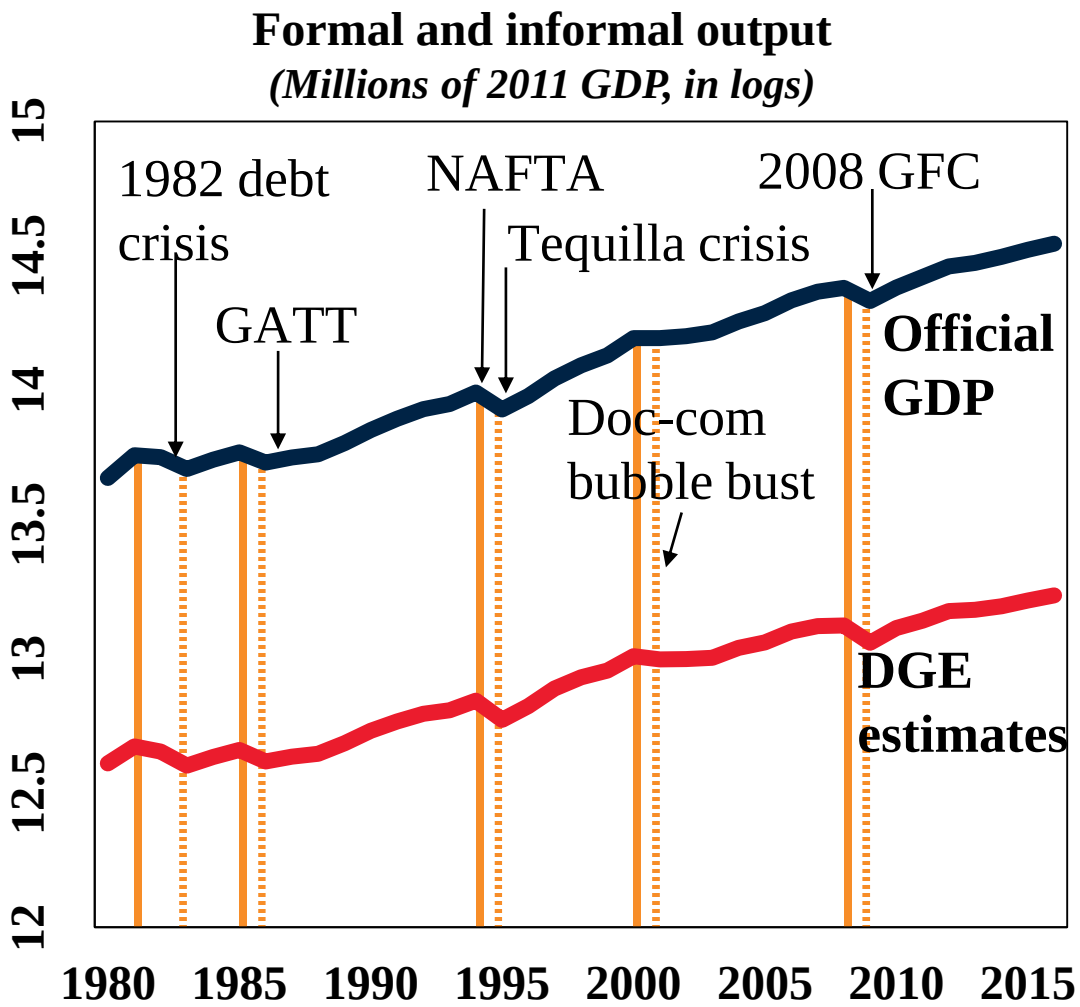


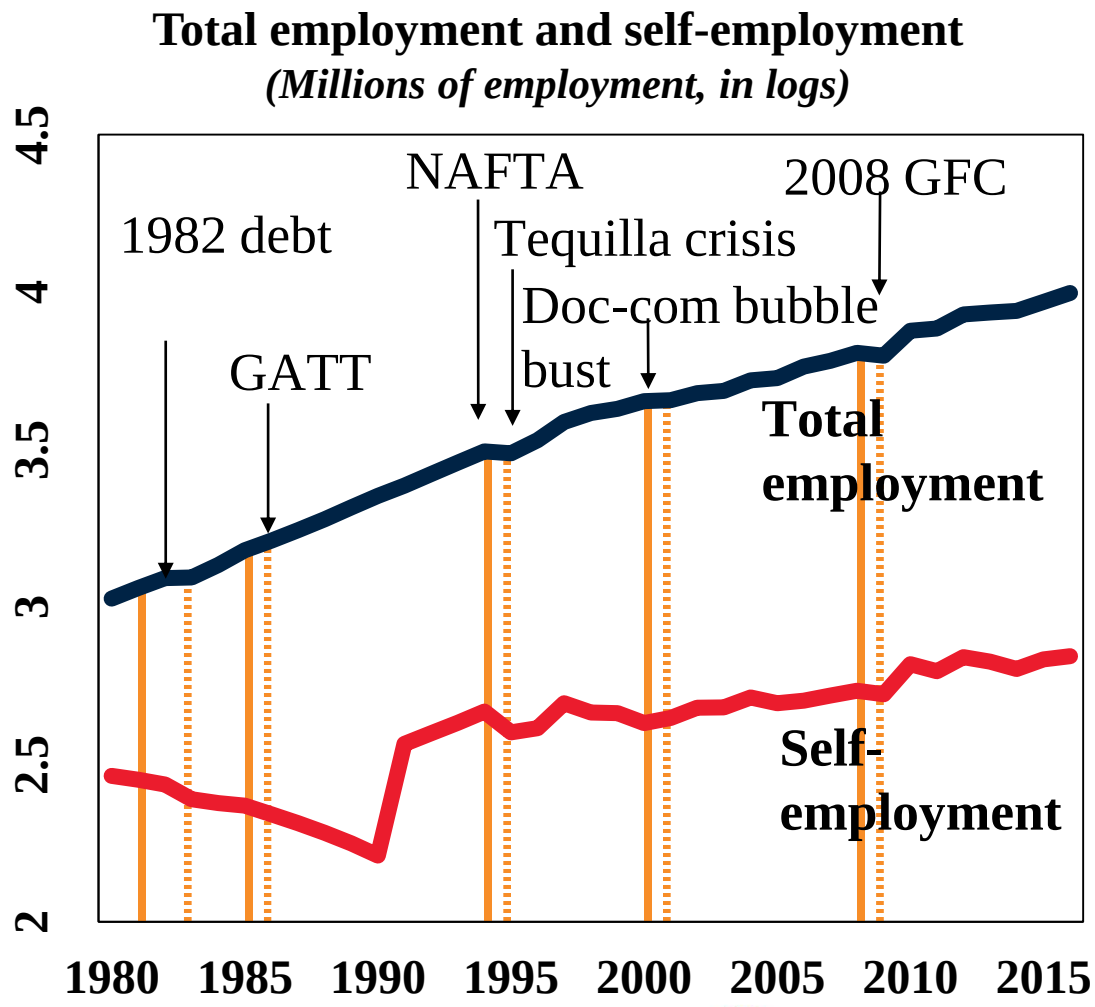
Sources: Elgin et al. (forthcoming a and b), World Bank.
Left Panel. Unweighted group averages for advanced economies and EMDEs. Right Panel. Unweighted group averages of self-employment for advanced economies and EMDEs.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Country Example

Formal and Informal Business Cycles in Mexico



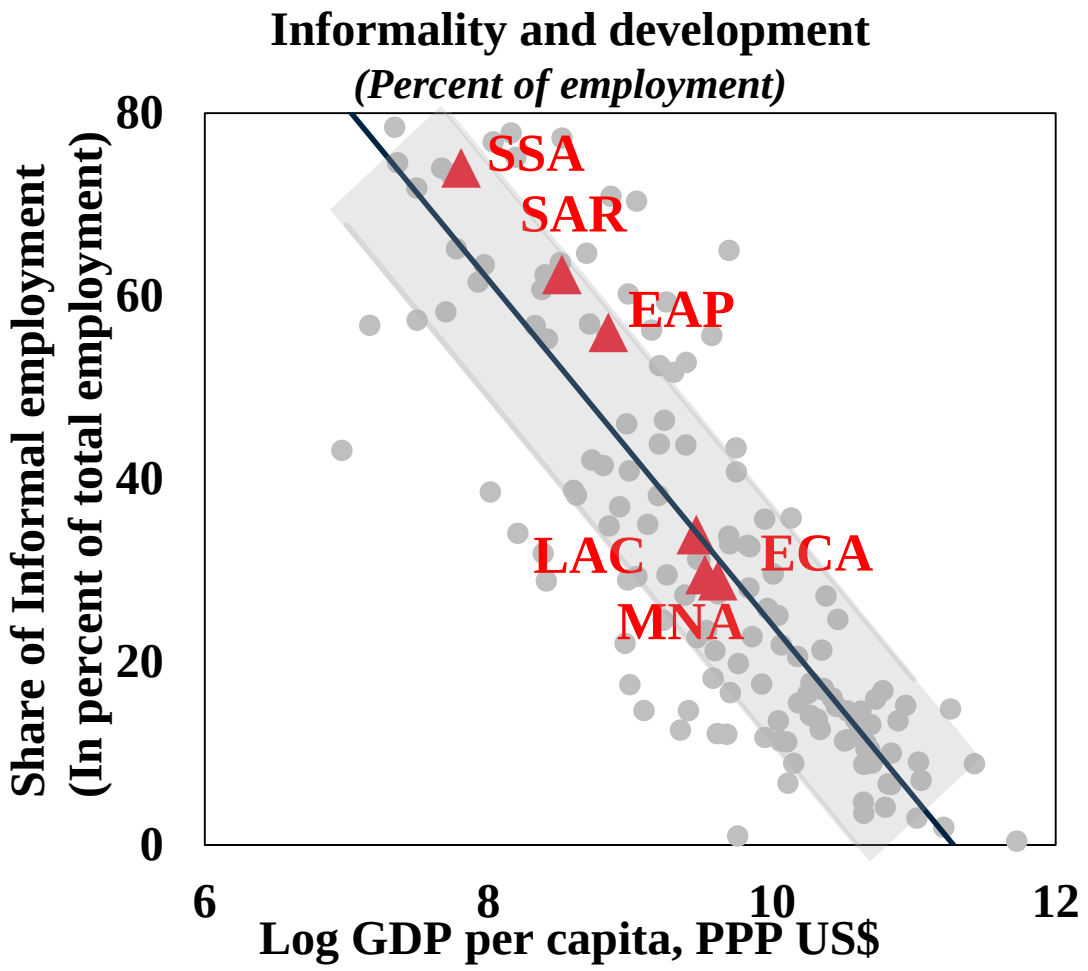


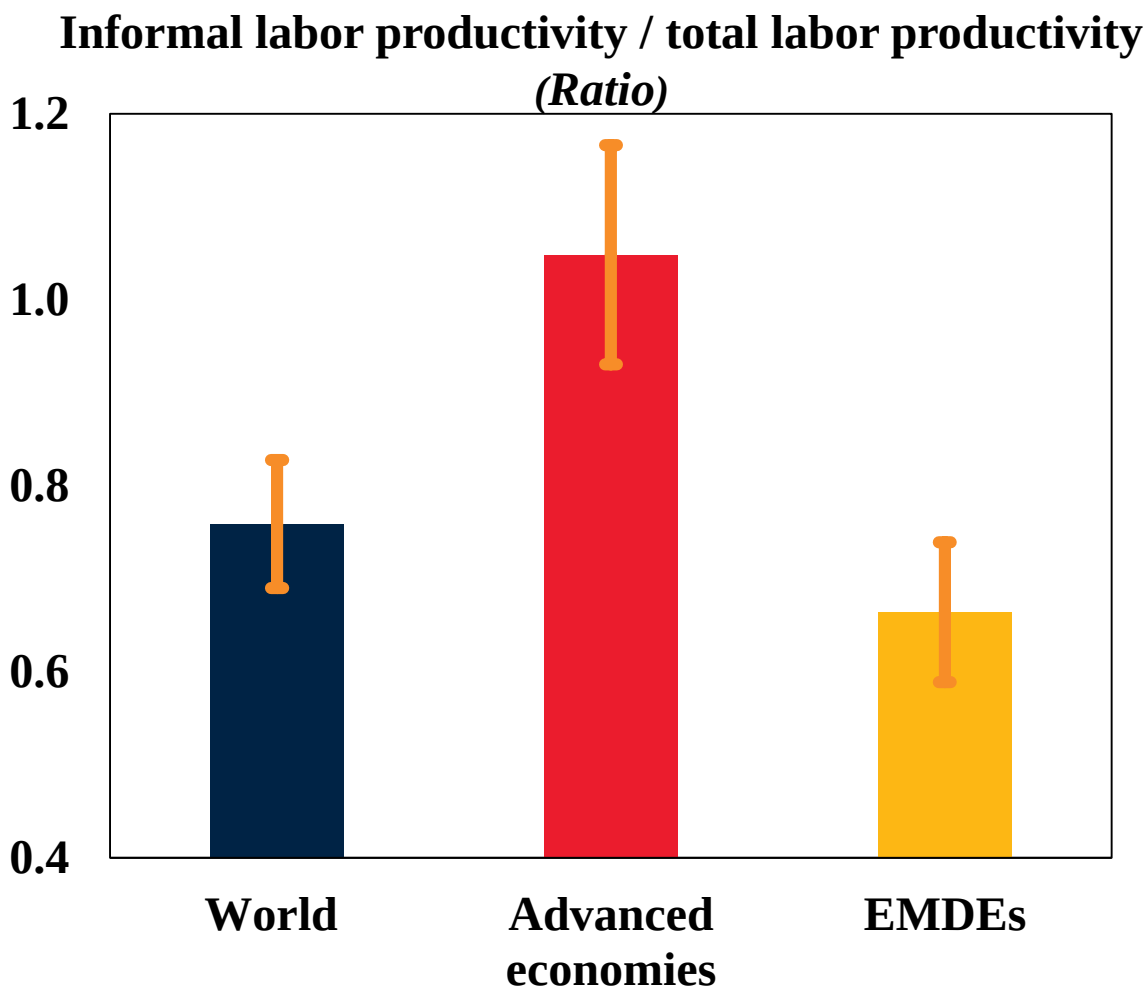
Sources: Elgin et al. (forthcoming a and b), World Bank.
Note: Peaks of official GDP are labelled in solid orange lines while troughs are labelled in orange dash lines. BBQ dating method is applied here.
Left Panel. The blue line depicts official GDP while the red line shows DGE estimates. Right Panel. The blue line depicts total employment while the red line depicts self-employment.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Correlates of Informality

Associated with Underdevelopment





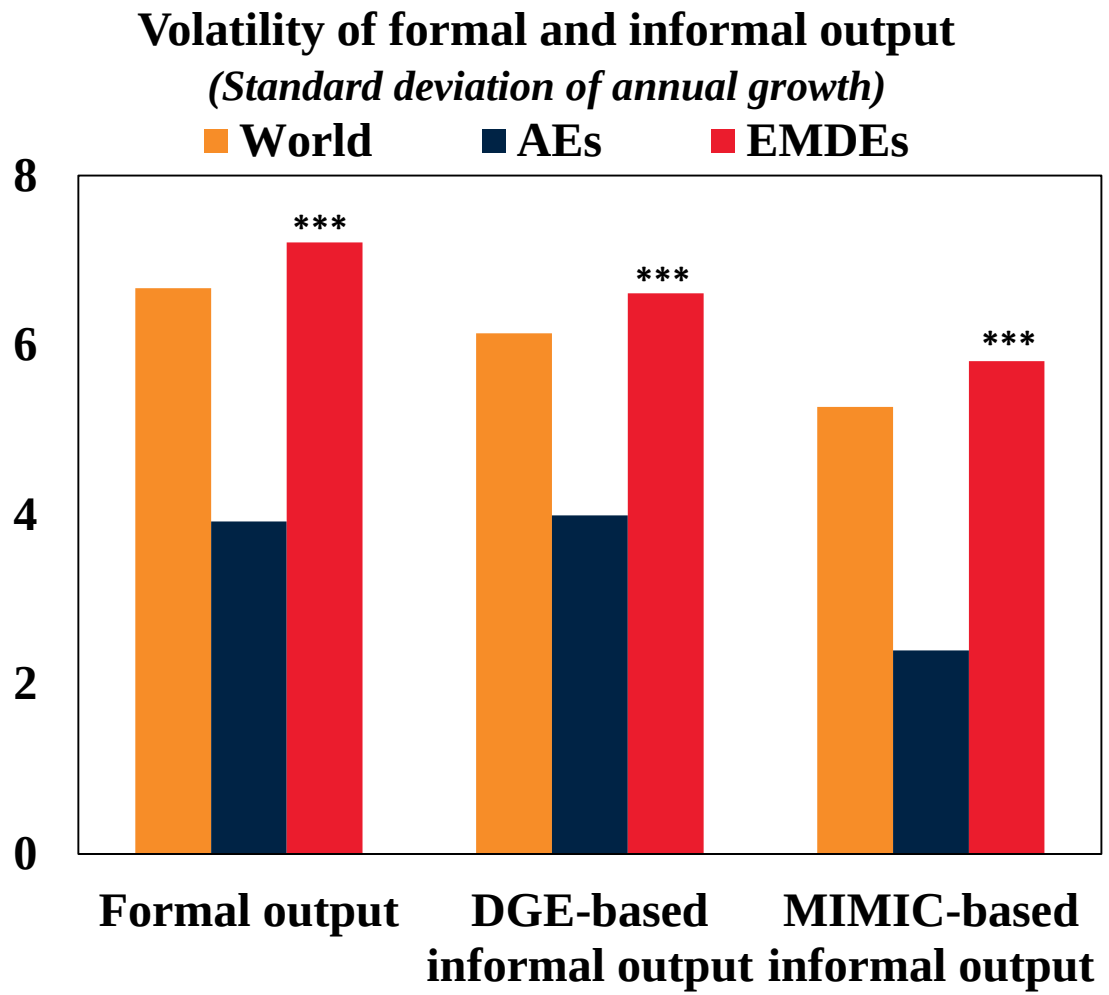
Source: World Bank.

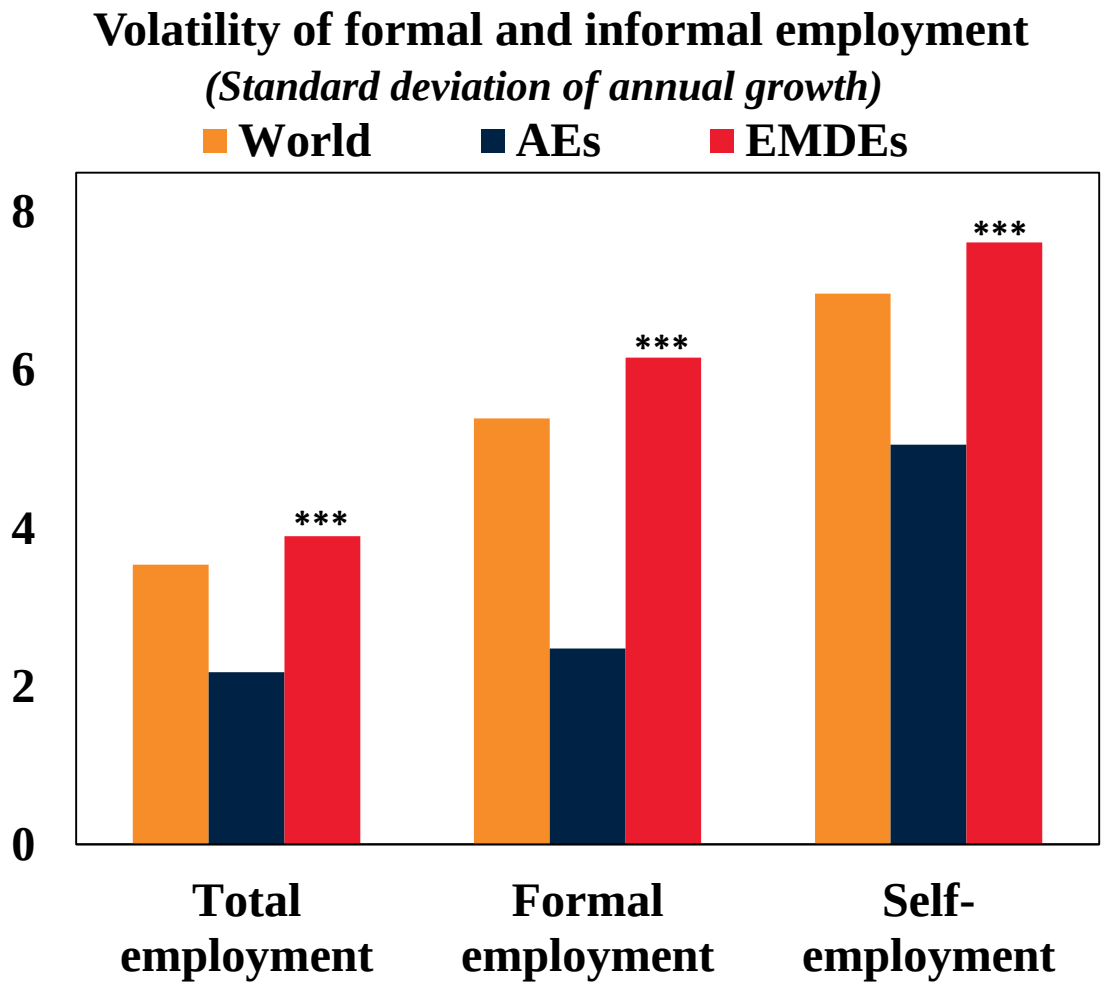
Left Panel: Grey markers show average log GDP (2011 PPP $ - averaged 2010-16) relative to the share of self-employment for 145 economies, with the fitted lines shown in blue and the corresponding +1 and -1 standard errors shown in shaded gray areas. Regional markers show median GDP per capita and median shares of self-employment in EMDE regions. Right Panel. The average relative ratio of informal labor productivity over total labor productivity in 2016 are shown in bars for advanced economies, EMDEs, and world, with corresponding 95 percent confidence interval shown in orange vertical bars. The relative ratio is calculated using DGE-based estimates and the share of self-employment following the method in Loayza (2018).

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Features of Informal Economy Business Cycles:

More Volatile Formal and Informal Output and Employment in EMDEs





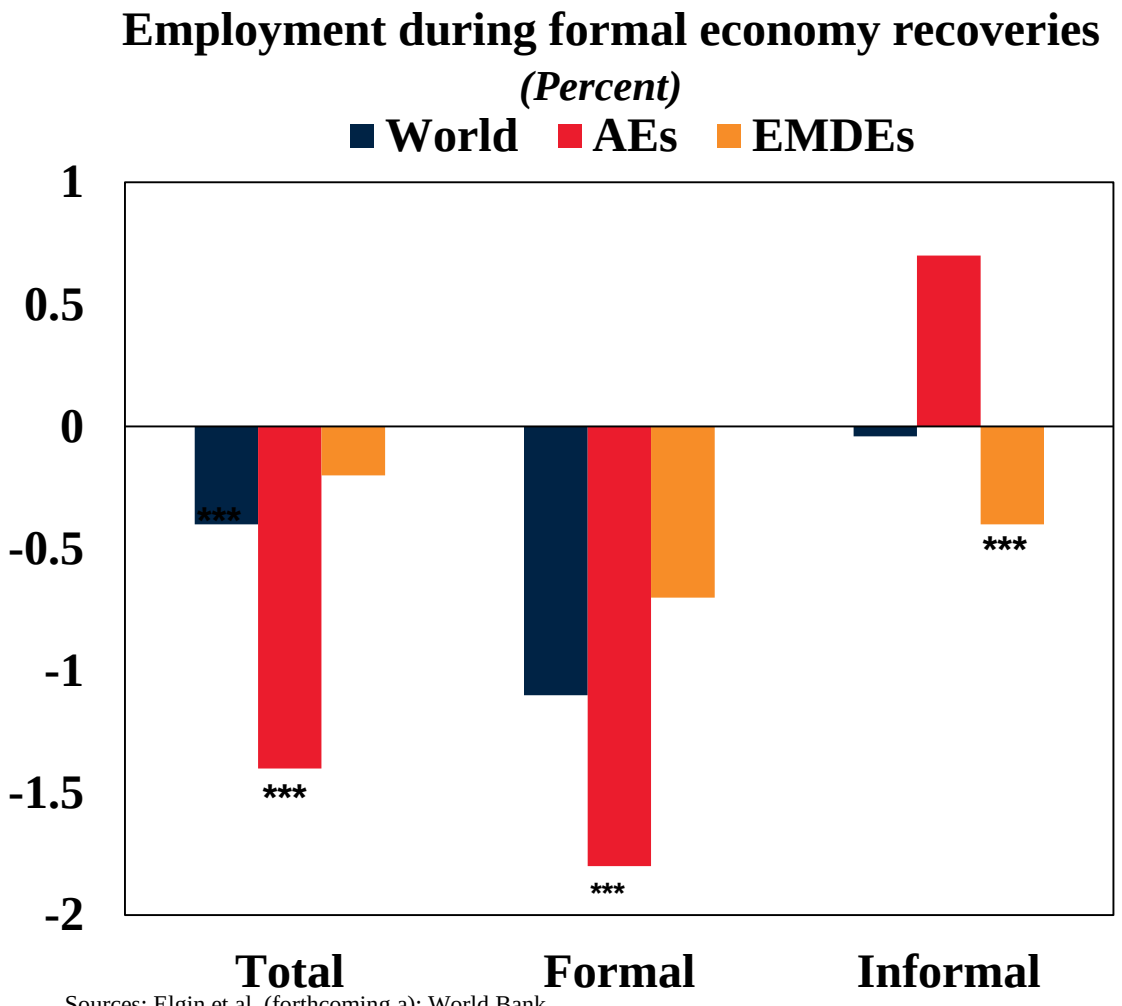
Sources: Elgin et al. (forthcoming a); World Bank.

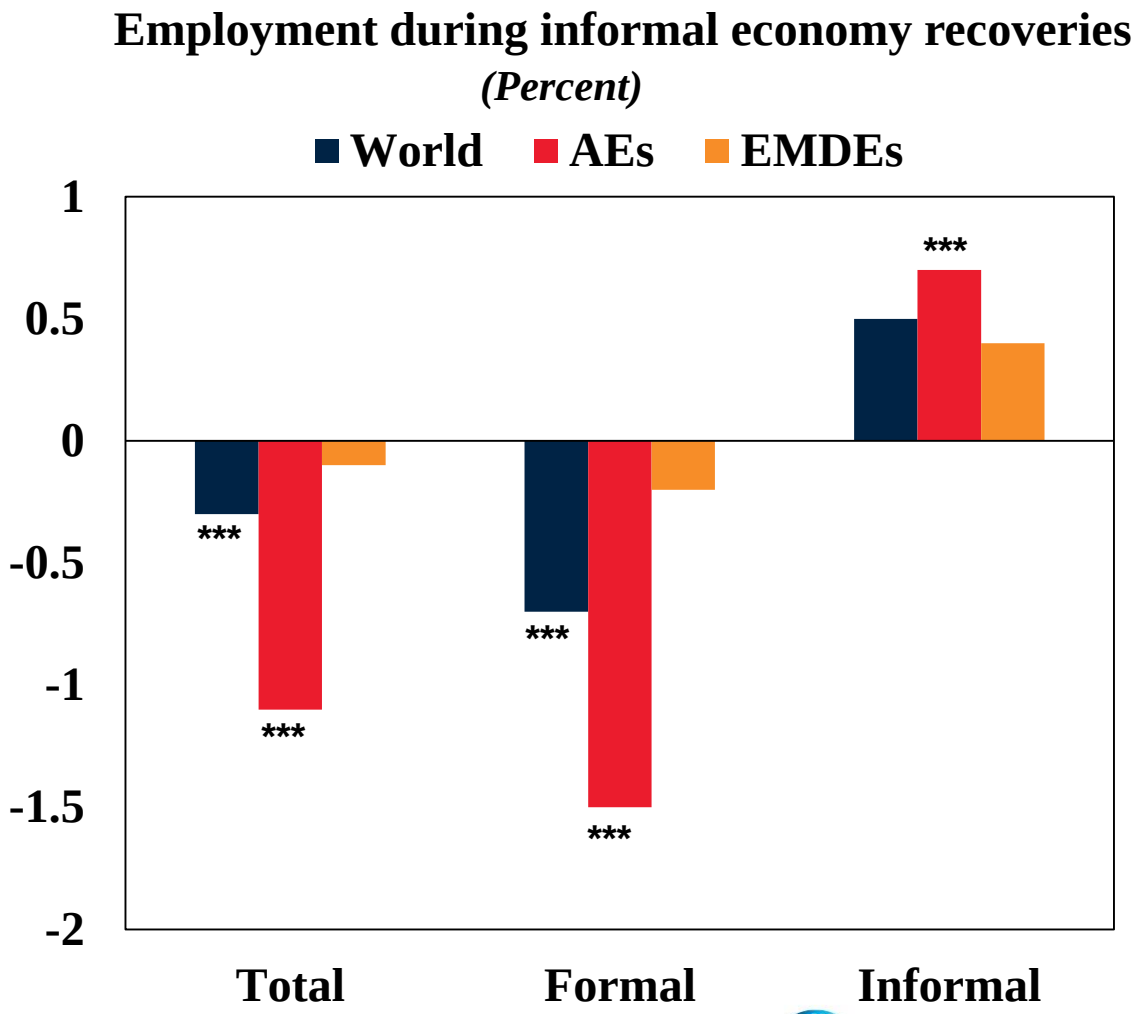
Note. Data are for the period 1990-2016. Volatility in both panels shows the standard deviations (SDs) of the concerning variables' annual growth rates. "***" implies significant differences at 5 percent level between advanced economies (AEs) and emerging markets and developing economies (EMDEs). Left Panel. Formal output is captured by official GDP, while informal output uses DGE-based or MIMIC-based estimates. Right Panel. Total employment is the sum of formal employment and self-employment.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group

Characteristics of Informal Employment through Recoveries:

Stable Employment during Recoveries





Sources: Elgin et al. (forthcoming a); World Bank.

Note. Data for the period 1990-2016. Business cycle turning points determined based on formal and informal GDP using the algorithm of Harding and Pagan (2002). Recovery is defined as the time it takes for output to rebound from the trough to the peak level before the recession (Claessens et al. 2012). All statistics correspond to the sample medians of demeaned, first differenced, and logged employment. "***" implies that employment growth is significantly different from 0 at 10 percent level. "+++" implies significant differences at 10 percent level between advanced economies and EMDEs. Left Panel. Employment during formal economy recoveries. Right Panel. Employment during informal economy recoveries.

WORLD BANK GROUP
Equitable Growth, Finance & Institutions
Prospects Group