Unemployment and the Informal Economy

A Comparative Panel Data approach of Least Developed, Developing, and Developed Countries (1993-2020)

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Unemployment and the Informal Economy: A Comparative Analysis among Least Developed, Developing, and Developed Countries

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Introduction

A large informal sector is often associated with unfavorable macroeconomic and development outcomes, such as lower productivity, slower physical and human capital accumulation, less educated workforces, and smaller fiscal resources, eventually leading to a higher unemployment rate (Elgin et al., 2021). Our study aims to see how the relationship between unemployment and the informal economy varies across the least developed, developing, and developed countries. For this research, we worked on the data on the unemployment rate and the output of the informal economy for 150 countries across the world from 1993 to 2020, extracted from the World Bank and the International Labour Organization (ILO) database.

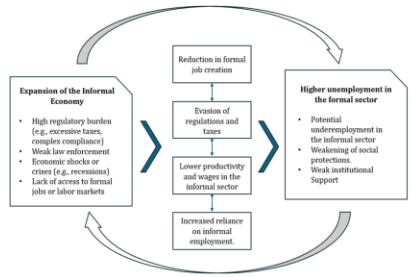
Informality is typically defined as the market-based and legal production of goods and services hidden from public authorities for monetary, regulatory, or institutional reasons (Schneider, Buehn, and Montenegro, 2010). Reflecting the difficulty of measuring informality, researchers have developed a wide range of estimation methods to capture its scale.

Data

In this study, we used two different estimation methods from the World Bank to measure the size of the informal economy. The first one is the Multiple Indicators Multiple Causes (MIMIC) model, a category of structural equation models utilized to assess the magnitude of informal economic activity. The MIMIC approach considers several potential causes of informal activity and encompasses multiple outcome indicators; simultaneously, it can be directly applied to estimate informal activity across different countries and temporal contexts. The second estimate we used for the output of the informal economy is the Dynamic General Equilibrium (DGE) model, which considers how optimizing households will allocate labor between formal and informal economies in each period and how the allocation changes over time. Compared to alternative estimation approaches, the DGE approach is distinguished by its extensive coverage of countries and years, robust theoretical foundation, and relevance to policy experiments and forecasts.

Understanding the Relationship between Unemployment rate and the Informal Economy

Figure 1: A conceptual framework of the relationship between the informal economy and unemployment



Adapted & modified from Mishra et al (2024)

Summary of Key Descriptive Statistics

The table 1 of summary statistics focused on the key variables: Unemployment Rate, DGE, and MIMIC estimations of informal economy. On average, unemployment is 7.68%, while informal economy estimates are 31.41% (DGE) and 33.17% (MIMIC), showing notable variation across countries. The dataset includes 4,200 observations, ensuring robustness for analysis. These statistics highlight the diverse economic environments across the dataset, with substantial variability in both unemployment rates and the size of the informal economy.

Table 1: Summary of key descriptive statistics

Variable	Mean	SD	Min	Max	N
Unemployment Rate	7.68	5.73	0.10	38.80	4200
DGE	31.41	12.28	7.91	69.79	4200
MIMIC	33.17	12.68	8.07	69.03	4200

How does the relationship vary across least developed, developing and developed countries?

Figure 2(a): **MIMIC estimated informal output over time (1993-2020)**

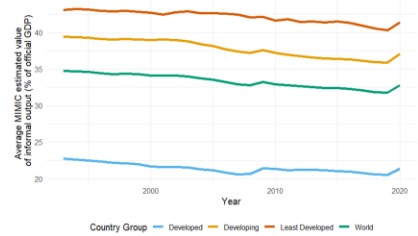


Figure 2(b): **DGE estimated informal output over time (1993-2020)**

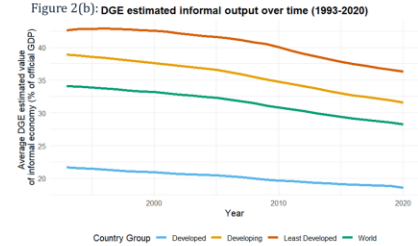
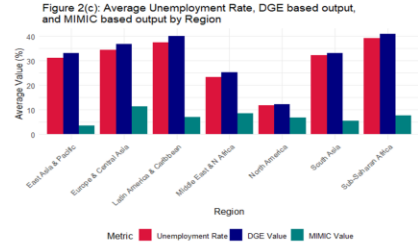


Figure 2(c): Average Unemployment Rate, DGE based output, and MIMIC based output by Region



Modeling the Informal Economy's Influence on Unemployment Rates

Using OLS:
Two OLS models were employed to explore the relationship between the informal economy and unemployment.

$$UNEMP_{it} = \beta_0 + \beta_1 DGE_{it} + \epsilon_{it} \dots \dots (1)$$
$$UNEMP_{it} = \beta_0 + \beta_1 MIMIC_{it} + \epsilon_{it} \dots \dots (2)$$

Table 2: Compiled coefficients of DGE and MIMIC estimated coefficients of Informal Economy

	DGE Model	MIMIC Model
Country Group	DGE Coefficient (S.E.)	MIMIC Coefficient (S.E.)
Least Developed	-0.09 *** (0.024)	-0.066 * (0.029)
Developing	-0.051 *** (0.011)	-0.04 *** (0.01)
Developed	0.197 *** (0.013)	0.186 *** (0.013)

The results from the OLS models reveal significant differences in the relationship between the informal economy and unemployment across country groups. For least developed and developing countries, both DGE and MIMIC coefficients are negative, suggesting that an increase in the informal economy reduces unemployment by absorbing surplus labor. In developed countries, however, the coefficients are positive, indicating that the informal economy increases unemployment, potentially due to competition with formal labor markets.

Using Fixed Effect Regression:
In this section, the fixed effect regression for the panel method is used for both estimations of the informal economy. With DGE estimated variable, econometric models are below:

$$UNEMP_{it} = \beta_0 + \beta_1 DGE_{it} + \alpha_i + \epsilon_{it} \dots \dots (3)$$
$$UNEMP_{it} = \beta_0 + \beta_1 DGE_{it} + \alpha_i + \lambda_t + \epsilon_{it} \dots \dots (4)$$

Table 3: Fixed Effects Regression Results: DGE Estimated of Informal Economy on Unemployment

	Least Developed (FE by Country)	Least Developed (FE by Country + Year)	Developing (FE by Country)	Developing (FE by Country + Year)	Developed (FE by Country)	Developed (FE by Country + Year)
DGE Coefficient	-0.034	-0.078+	0.035	-0.056	0.188	-0.124
	(0.028)	(0.044)	(0.031)	(0.040)	(0.170)	(0.190)
Num.Obs.	700	700	2212	2212	1344	1344

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

The fixed effect regression of the relationship between the DGE estimated informal economy and unemployment varies across development levels. In least-developed countries, the weak negative relationship suggests the informal sector plays a limited role in reducing unemployment, likely due to structural challenges such as underdeveloped labor markets and low productivity. In developing countries, the effects are mixed, indicating that while the informal economy may absorb surplus labor, it can also hinder formal job creation. In developed countries, the relationship is insignificant, reflecting the dominant role of formal labor markets and institutional factors that reduce reliance on informal employment. These findings highlight the diverse economic dynamics influencing unemployment and informality.

With MIMIC estimated variable, fixed effect regression-based econometric models are below:

$$UNEMP_{it} = \beta_0 + \beta_1 MIMIC_{it} + \alpha_i + \epsilon_{it} \dots \dots (5)$$
$$UNEMP_{it} = \beta_0 + \beta_1 MIMIC_{it} + \alpha_i + \lambda_t + \epsilon_{it} \dots \dots (6)$$

Table 4: Fixed Effects Regression Results: MIMIC Estimated of Informal Economy on Unemployment

	Least Developed (FE by Country)	Least Developed (FE by Country + Year)	Developing (FE by Country)	Developing (FE by Country + Year)	Developed (FE by Country)	Developed (FE by Country + Year)
MIMIC Coefficient	0.072	0.063	0.549***	0.758***	1.528***	1.800***
	(0.096)	(0.126)	(0.106)	(0.136)	(0.190)	(0.307)
Num.Obs.	700	700	2212	2212	1344	1344

The table displays fixed effects regression results using MIMIC estimated informal economy across least developed, developing, and developed countries. In least-developed countries, the relationship is positive but insignificant, suggesting that the informal economy has no clear impact on unemployment. In developing countries, the coefficients are positive and significant, indicating that an expansion of the informal economy increases unemployment, potentially reflecting its competition with formal labor markets. Similarly, in developed countries, the relationship is strongly positive and highly significant, implying that the informal economy disrupts formal employment and contributes to higher unemployment.

Conclusion

This study reveals the multifaceted relationship between the informal economy and unemployment, varying significantly across development levels and depending on the estimation method used. While the informal economy appears to mitigate unemployment in developing countries, its role is limited in least developed countries and disruptive in developed economies, reflecting differing labor market structures and institutional dynamics. The contrasting results from DGE and MIMIC estimators highlight the complexity of measuring informality, emphasizing the need for tailored policy interventions that consider country-specific economic contexts.

References

Elgin, C, M Kose, F Ohnsorge and S Yu (2021), 'DP16497 Understanding Informality', CEPR Discussion Paper No. 16497. *CEPR Press, Paris & London*. https://cepr.org/publications/dp16497

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). New Estimates for the Shadow Economies all over the World. International Economic Journal, 24(4), 443–461. https://doi.org/10.1080/10168737.2010.525974

World Bank. Informal Economy Database (2024). Dynamic General Equilibrium (DGE) model-based estimates of informal output & Multiple Indicators Multiple Causes (MIMIC) model-based estimates of informal output. https://www.worldbank.org/en/research/brief/informal-economy-database

International Labour Organization. (2020). ILO modeled estimates database, ILOSTAT [SDG indicator 8.5.2 - Unemployment rate (%) - Annual]. Available from https://ilostat.ilo.org/data/

DISCUSSION

FLOW

- Introduction and Research Motive
- Research Question
- Data
- Conceptual Framework
- Summary Statistics
- Econometric Analysis
- Conclusion
- Reference(s)

INTRODUCTION & RESEARCH MOTIVE

- What is an Informal Economy?

The informal economy refers to all economic activities by workers and economic units that are – in law or practice – not covered or insufficiently covered by formal arrangements.

- Why does it matter?

- According to the ILO (2021), about 2 billion workers, or 60 percent of the world's employed population ages 15 and older, spend at least part of their time in the informal sector.

- A survey from IMF (2019) found that, on average, the informal economy represents more than 37 percent of the GDP of Developing countries.

INTRODUCTION & RESEARCH MOTIVE

A large informal sector is often associated with unfavorable macroeconomic and development outcomes, such as -

- lower productivity
- slower physical and human capital accumulation
- less educated workforces,
- smaller fiscal resources

Eventually leading to a higher unemployment rate

RESEARCH
OBJECTIVE

This study aims to see –

- how the relationship between unemployment and the informal economy varies across the least developed, developing, and developed countries

THE DATASET

- For this research, I've worked on the data on the unemployment rate and the output of the informal economy for 148 countries across the world from 1993 to 2020

Variables	Labels	Sources	Data Range
Economy	Name		
Code	Country ISO code		
DGE_p	Dynamic general equilibrium model-based (DGE) estimates of informal output (% of official GDP)	World Bank	1993-2020
MIMIC_p	Multiple indicators multiple causes model-based (MIMIC) estimates of informal output (% of official GDP)	World Bank	1993-2020
UNEMP_p	Unemployment, total (% of total labor force) (modeled ILO estimate)	International Labor Organization	1993-2020

THE DATASET

- **The Multiple Indicators Multiple Causes (MIMIC)** model, a structural equation framework, assesses the magnitude of informal economic activity by analyzing multiple causes and outcome indicators, making it versatile for cross-country and temporal estimations.

- **The Dynamic General Equilibrium (DGE)** model estimates the informal economy by analysing how households allocate labor between formal and informal sectors over time, offering broad country coverage, a robust theoretical foundation, and relevance for policy applications and forecasts.

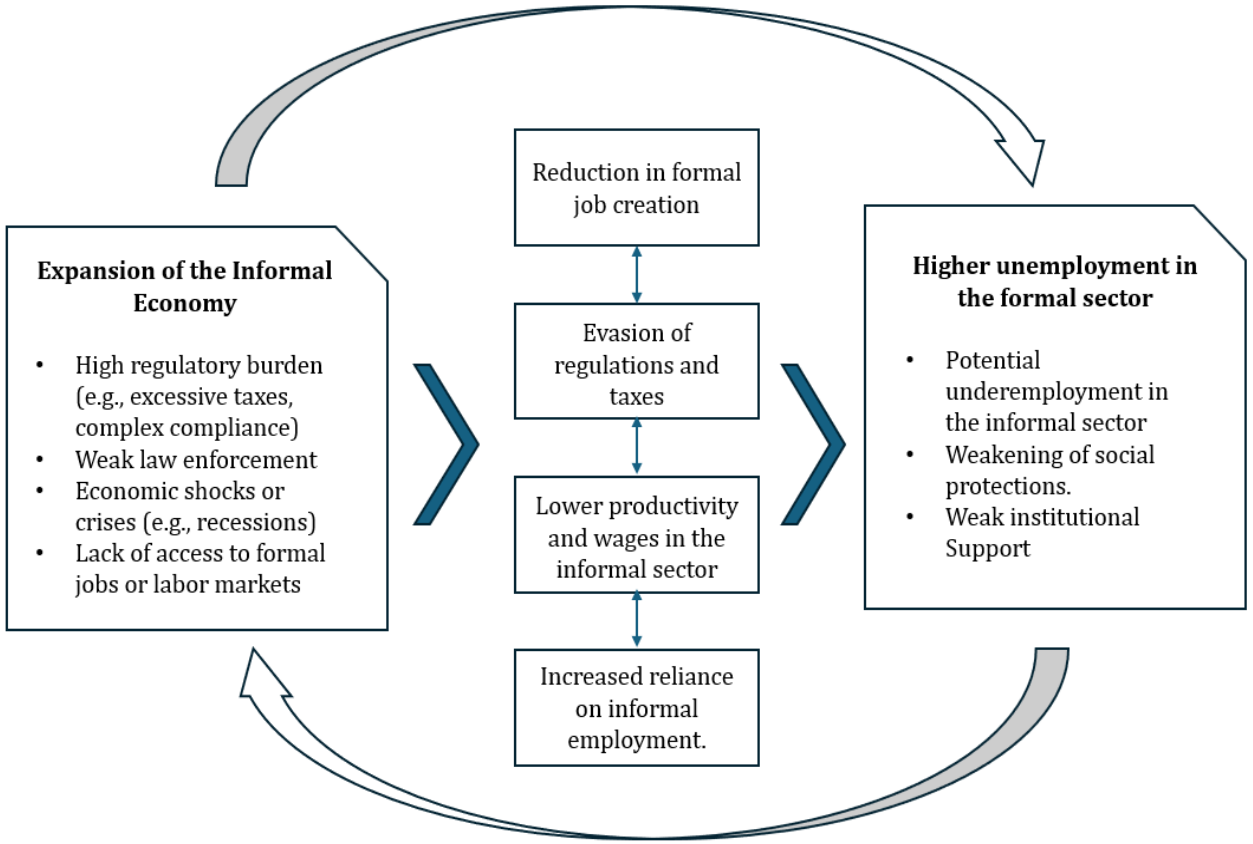
SNIPPET OF THE DATASET

Economy	Code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Albania	ALB	37.7	37.4	36.3	36.3	36.7	36.2	35.7	35.0	34.5	34.7	35.0	34.8	34.5	34.4	34.1	33.8	33.4	32.9
Algeria	DZA	31.1	30.9	30.8	30.7	30.6	30.8	30.9	30.8	30.8	30.7	30.9	30.9	30.8	30.5	31.2	31.4	31.7	31.2
Angola	AGO	43.3	42.5	42.5	42.9	42.4	41.4	42.2	40.9	41.5	40.3	40.9	41.5	41.7	41.8	42.0	42.2	42.2	42.1
Argentina	ARG	24.0	24.1	23.9	23.6	23.4	22.9	22.7	22.8	22.8	22.7	22.7	22.7	22.7	22.9	23.1	23.2	23.1	23.0
Armenia	ARM	43.8	42.9	42.8	43.7	46.0	46.0	46.3	47.0	47.0	47.1	46.9	46.8	45.5	45.0	44.2	43.5	42.3	41.1
Australia	AUS	14.7	14.5	14.5	14.4	14.3	14.3	14.3	14.2	14.1	14.0	14.0	13.9	13.8	13.8	13.7	13.6	13.6	13.5
Austria	AUT	10.5	10.4	10.3	10.2	10.2	10.1	10.0	9.9	9.9	9.8	9.8	9.7	9.6	9.6	9.6	9.5	9.5	9.5
Azerbaijan	AZE	45.1	46.5	46.3	48.7	52.7	55.7	56.0	56.2	56.8	57.1	57.3	57.2	56.5	55.3	54.4	54.0	53.0	52.0
Bahamas, The	BHS	33.2	32.4	31.9	31.9	31.4	31.1	30.7	30.1	29.6	29.1	28.6	28.2	27.9	27.5	27.3	26.9	26.5	26.2
Bahrain	BHR	17.1	16.9	16.8	16.6	16.5	16.5	16.3	16.3	16.1	16.4	16.6	16.7	16.7	16.7	16.9	17.1	17.1	17.0
Bangladesh	BGD	42.3	41.9	41.7	41.3	41.0	40.6	40.2	40.0	39.5	38.9	38.4	37.9	37.3	36.6	36.0	35.3	34.7	34.1
Barbados	BRB	25.9	25.7	25.4	25.0	25.5	25.8	25.8	25.7	25.5	25.4	25.3	25.3	24.9	24.7	24.8	24.8	24.6	24.5
Belarus	BLR	44.0	43.6	43.6	43.8	42.8	42.3	42.7	43.3	43.5	43.7	44.0	44.0	44.2	44.1	44.1	44.1	43.8	43.3
Belgium	BEL	22.8	22.7	22.5	22.4	22.3	22.2	22.1	22.0	21.9	21.8	21.8	21.7	21.6	21.5	21.5	21.5	21.4	21.3
Belize	BLZ	44.4	43.7	42.3	41.8	41.5	41.4	41.1	41.6	41.8	42.0	41.8	41.4	40.9	41.1	41.4	41.5	41.6	42.0
Benin	BEN	49.2	49.7	49.9	50.2	50.3	50.2	50.4	50.3	50.2	50.1	50.1	49.8	49.8	49.5	49.4	49.3	49.3	49.1
Bhutan	BTN	39.5	39.4	38.7	37.5	36.8	35.7	34.9	34.4	34.2	33.8	32.5	31.4	30.6	29.7	29.0	28.3	27.8	27.7
Bolivia	BOL	66.4	66.4	66.1	65.6	65.7	65.3	64.9	64.4	63.6	63.2	63.1	63.3	63.2	62.9	63.6	63.6	63.8	63.5
Bosnia and Herzegovina	BIH	43.0	39.9	37.0	33.5	33.4	34.3	41.1	43.0	41.3	39.9	38.7	37.8	36.8	35.7	34.8	33.9	33.3	32.8
Botswana	BWA	40.7	40.2	39.3	38.7	38.2	37.9	37.7	37.0	36.7	36.3	35.8	35.2	34.6	33.9	33.1	32.5	32.1	31.9
Brazil	BRA	38.8	38.4	38.0	37.6	37.1	36.5	35.5	35.6	35.4	35.7	35.9	35.8	35.9	35.9	36.2	36.3	36.2	36.0
Brunei Darussalam	BRN	32.9	32.6	32.8	32.2	31.8	31.4	30.9	30.4	30.1	30.4	30.7	30.6	30.7	31.0	31.2	31.4	31.5	31.2
Bulgaria	BGR	39.4	39.1	39.1	38.9	39.3	38.7	39.7	39.7	38.8	38.3	37.5	36.5	35.9	35.3	34.8	34.1	33.4	32.7
Burkina Faso	BFA	48.7	48.0	47.4	47.0	46.5	46.0	45.4	44.7	44.0	43.7	43.2	42.8	42.4	42.0	41.4	40.8	40.2	39.6
Burundi	BDI	40.0	40.1	40.0	39.9	40.2	40.3	40.3	40.5	40.5	40.1	39.9	39.8	40.0	39.9	39.5	39.3	39.5	39.6
Cabo Verde	CPV	39.6	39.4	39.1	38.7	38.4	37.9	37.8	37.3	37.2	36.8	36.6	36.5	36.0	35.6	35.0	34.6	34.2	33.4
Cambodia	KHM	53.7	53.9	54.0	53.9	53.8	53.7	53.3	53.0	52.9	52.4	51.5	51.6	50.2	49.3	48.4	47.6	46.9	46.0
Cameroon	CMR	32.4	32.4	32.6	32.6	32.6	32.6	32.6	32.5	32.4	32.3	32.2	31.9	31.7	31.7	31.6	31.2	31.0	31.4
Canada	CAN	16.8	16.6	16.5	16.4	16.3	16.3	16.2	16.2	16.1	16.0	16.0	15.9	15.8	15.7	15.6	15.5	15.4	15.3
Central African Republic	CAF	41.7	41.6	41.6	42.1	42.2	42.3	43.1	43.5	43.8	43.3	43.4	43.8	43.9	44.5	44.8	44.8	44.9	45.1
Chad	TCD	49.5	49.6	49.6	50.1	50.4	50.5	50.6	50.8	50.9	51.0	51.0	49.9	47.4	46.0	45.2	44.4	43.2	42.2
Chile	CHL	22.1	22.0	21.9	21.5	21.2	20.9	20.7	20.4	20.1	19.9	19.8	19.6	19.4	19.3	19.2	19.0	18.8	18.5
China	CHN	19.5	19.2	18.7	18.1	17.6	17.1	16.6	16.1	15.6	15.1	14.7	14.3	13.9	13.5	13.1	12.6	12.2	11.9
Colombia	COL	34.8	35.0	34.8	34.7	34.4	34.2	33.9	33.6	33.3	33.2	33.6	33.6	33.7	33.7	33.8	33.8	33.6	
Comoros	COM	35.9	36.0	36.4	36.5	36.5	36.7	37.0	37.2	37.3	37.5	37.7	37.8	38.0	38.3	38.6	38.9	39.2	

Read me | DGE_p | MIMIC_p | UNEMP_p | COMPILED DATA | Least Developed Country | Develping Country | Dev ...

CONCEPTUAL FRAMEWORK

Figure 1: A conceptual framework of the relationship between the informal economy and unemployment



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SUMMARY
STATISTICS

Table 1: Summary of key descriptive statistics

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How Does The Relationship Vary Across Least Developed, Developing And Developed Countries?

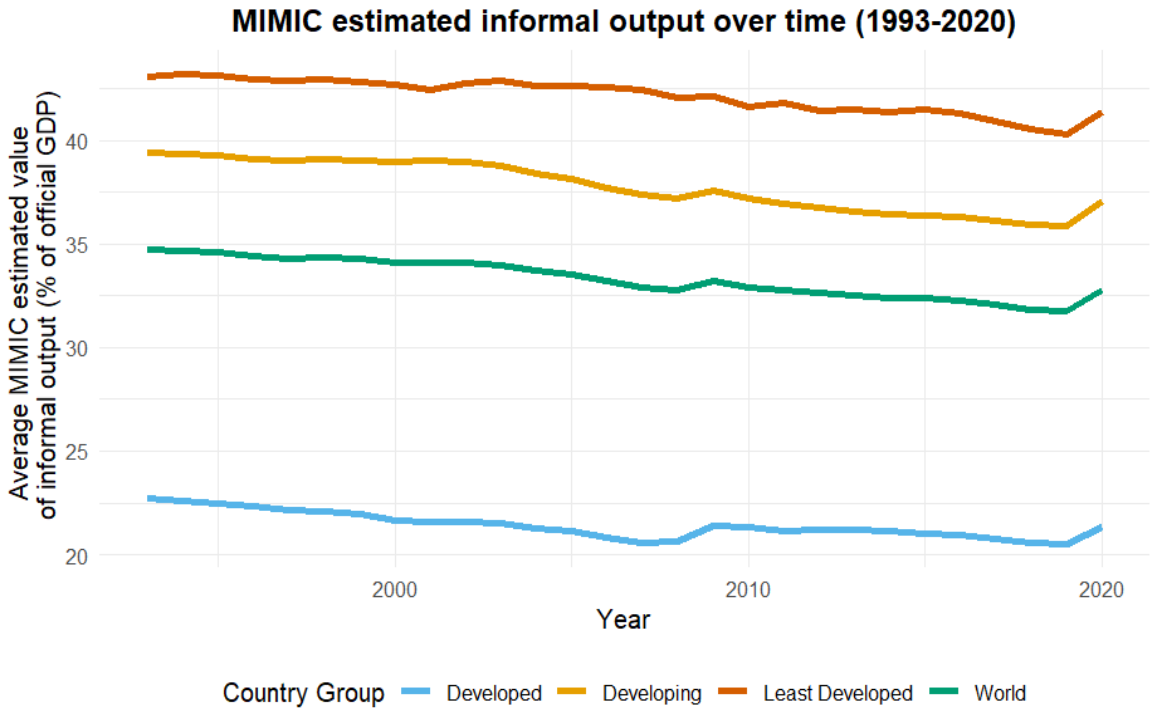


Figure 2(a)

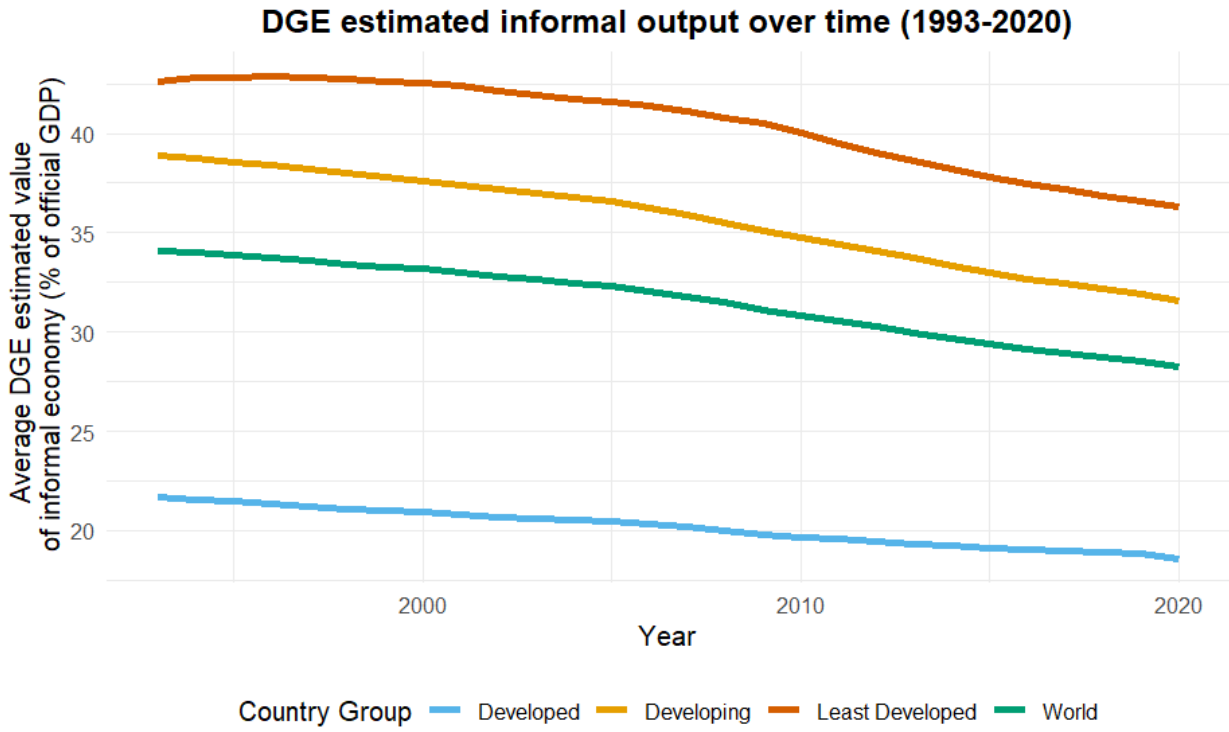
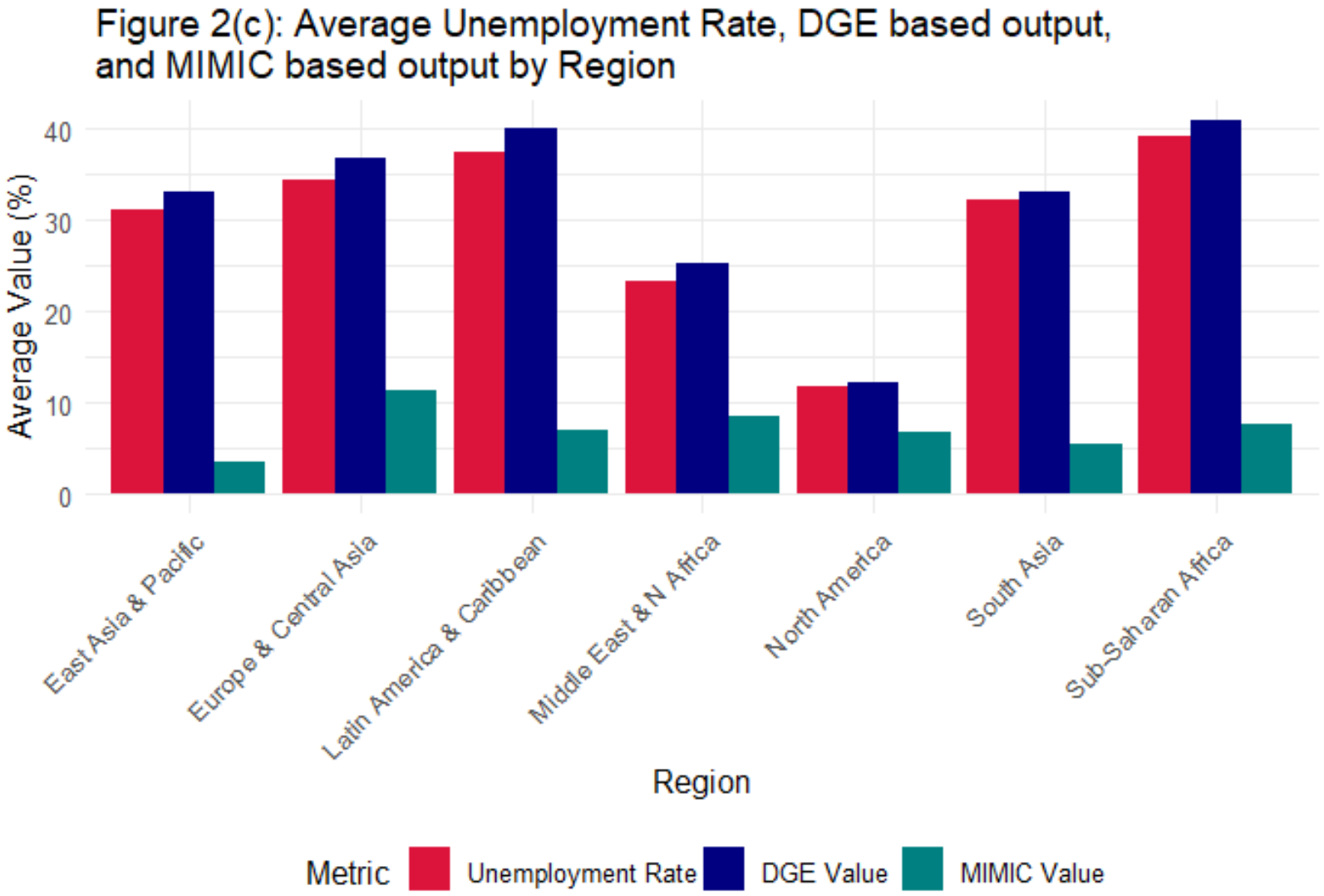


Figure 2(b)

How Does The Relationship Vary Across Least Developed, Developing And Developed Countries?



MODELING THE INFORMAL ECONOMY'S INFLUENCE ON UNEMPLOYMENT RATES

Using OLS:
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$$UNEMP_{it} = \beta_0 + \beta_1 DGE_{it} + \epsilon_{it} \dots \dots (1)$$
$$UNEMP_{it} = \beta_0 + \beta_1 MIMIC_{it} + \epsilon_{it} \dots \dots (2)$$

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Country Group	**DGE Coefficient (S.E.)**	**MIMIC Coefficient (S.E.)**
Least Developed	-0.09 *** (0.024)	-0.066 * (0.029)
Developing	-0.051 *** (0.011)	-0.04 *** (0.01)
Developed	0.197 *** (0.013)	0.186 *** (0.013)

$UNEMP_{it}$: Unemployment rate for country i at time t

DGE_{it} : Informal economy (% of GDP) measured using DGE

$MIMIC_{it}$: Informal economy (% of GDP) measured using MIMIC

ϵit: Error term.

- For least developed and developing countries, both DGE and MIMIC coefficients are negative, suggesting that an increase in the informal economy reduces unemployment by absorbing surplus labor.
- In developed countries, however, the coefficients are positive, indicating that the informal economy increases unemployment, potentially due to competition with formal labor markets.

MODELING THE INFORMAL ECONOMY'S INFLUENCE ON UNEMPLOYMENT RATES

Using Fixed Effect Regression:

In this section, the fixed effect regression for the panel method is used for both estimations of the informal economy. With DGE & MIMIC estimated variable, econometric models are below:

$$UNEMP_{it}=\beta_0+\beta_1 DGE_{it}+\alpha_i+\epsilon_{it} \dots \dots (3)$$

$$UNEMP_{it}=\beta_0+\beta_1 DGE_{it}+\alpha_i+\lambda_t+\epsilon_{it} \dots \dots (4)$$

$$UNEMP_{it}=\beta_0+\beta_1 MIMIC_{it}+\alpha_i+\epsilon_{it} \dots \dots (5)$$

$$UNEMP_{it}=\beta_0+\beta_1 MIMIC_{it}+\alpha_i+\lambda t+\epsilon_{it} \dots \dots (6)$$

$UNEMP_{it}$ *: Unemployment rate for country* i *at time* t

DGE_{it} : Informal economy (% of GDP) measured using DGE

$MIMIC_{it}$: Informal economy (% of GDP) measured using MIMIC

α_i: Country-specific fixed effects

λ_t: Year-specific fixed effects

ϵ_{it}: Error term.

MODELING THE INFORMAL ECONOMY'S INFLUENCE ON UNEMPLOYMENT RATES

Table 3: Fixed Effects Regression Results: DGE Estimated of Informal Economy on Unemployment

	Least Developed (FE by Country)	Least Developed (FE by Country + Year)	Developing (FE by Country)	Developing (FE by Country + Year)	Developed (FE by Country)	Developed (FE by Country + Year)
DGE Coefficient	-0.034	-0.078+	0.035	-0.056	0.188	-0.124
	(0.028)	(0.044)	(0.031)	(0.040)	(0.170)	(0.190)
Num.Obs.	700	700	2212	2212	1344	1344

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

- **Least-Developed Countries:** The weak negative relationship indicates that the informal sector plays a minimal role in reducing unemployment, constrained by underdeveloped labour markets and low productivity.
- **Developing Countries**: Mixed effects suggest that the informal economy absorbs surplus labour but may also hinder formal job creation, reflecting its dual role in labour markets.
- **Developed Countries:** The insignificant relationship highlights the dominance of formal labour markets and institutional frameworks that minimise reliance on informal employment.

Table 4: Fixed Effects Regression Results: MIMIC Estimated of Informal Economy on Unemployment

	Least Developed (FE by Country)	Least Developed (FE by Country + Year)	Developing (FE by Country)	Developing (FE by Country + Year)	Developed (FE by Country)	Developed (FE by Country + Year)
MIMIC Coefficient	0.072	0.063	0.549***	0.758***	1.528***	1.800***
	(0.096)	(0.126)	(0.106)	(0.136)	(0.190)	(0.307)
Num.Obs.	700	700	2212	2212	1344	1344

- **Least-developed countries:** the relationship is positive but insignificant, suggesting that the informal economy has no clear impact on unemployment.
- **Developing countries:** the coefficients are positive and significant, indicating that an expansion of the informal economy increases unemployment, potentially reflecting its competition with formal labour markets.
- **Developed countries:** the relationship is strongly positive and highly significant, implying that the informal economy disrupts formal employment and contributes to higher unemployment.

CONCLUSION

- The divergence in results underscores the importance of recognising the strengths and limitations of each estimator.
- DGE captures long-term structural dynamics, while MIMIC reflects broader statistical relationships.
- Combining insights from both models can provide a more comprehensive understanding of the informal economy's impact on unemployment across different contexts.
- The relationship between the informal economy and unemployment varies significantly across development levels, reflecting differences in labor market structures and institutional dynamics.
- In developing countries, the informal economy mitigates unemployment, while in least developed countries, its impact is minimal, and in developed economies, it disrupts formal labor markets.
- Contrasting results from DGE and MIMIC estimators highlight the complexity of measuring informality, emphasizing the need for tailored policy interventions based on country-specific economic contexts.

REFERENCE(S)

Elgin, C, M Kose, F Ohnsorge and S Yu (2021), 'DP16497 Understanding Informality', CEPR Discussion Paper No. 16497. *CEPR Press, Paris & London*. https://cepr.org/publications/dp16497

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). New Estimates for the Shadow Economies all over the World. International Economic Journal, 24(4), 443–461. https://doi.org/10.1080/10168737.2010.525974

World Bank. Informal Economy Database (2024). Dynamic General Equilibrium (DGE) model-based estimates of informal output &
Multiple Indicators Multiple Causes (MIMIC) model-based estimates of informal output.
https://www.worldbank.org/en/research/brief/informal-economy-database

International Labour Organization. (2020). ILO modeled estimates database, ILOSTAT [SDG indicator 8.5.2 - Unemployment rate (%) - Annual]. Available from https://ilostat.ilo.org/data/

THANK YOU