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Informality and poverty in Africa: Which comes first?

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Abstract

Existing empirical work has investigated the relationship between informality and poverty. However, most of this work has neglected the feedback effect. This empirical paper explores the bi-directional causality between poverty and informality within the SGMM-PVAR framework among 40 selected high-income and low-income Sub-Saharan countries between 1991 and 2018. Our results support the heterogeneity argument, suggesting that sub-Saharan African informality is demand and supply-led. The income level of the country mediates the direction of effect. Bi-direction causality is observed for low-income countries. Causality in middle-income countries runs from poverty to informality. The results suggest that a certain level of informality may be desirable, especially in low-income countries.

KEYWORDS
Africa, development, informality, panel vector autoregression, poverty

1 | INTRODUCTION

The nexus between informality and poverty has recently attracted development Scholars, policymakers and governments alike (Bolarinwa et al., 2021; Ohnsorge & Yu, 2022). The interest in informality is driven by the large proportion of the global working force in the informal sector and its effects on economic performance. For instance, the ILO's recent report shows that 2 billion people representing over 61% of the global workforce, are in the informal sector (Brown, 2017; ILO, 2018). In addition, the informal sector houses a large proportion of the global poor. Because the informal sector has implications for poverty alleviation policies, empirical work is required to support the policy efforts by many governments.

The bulk of the extant literature focuses on one-direction relationships. Some studies focus on the effect of informality on poverty (Canelas, 2019; Devicienti et al., 2010), while others investigate the effect of poverty on informality (Dell'Anno & Solomon, 2008; Kanbur, 2016). The empirical literature has demonstrated the persistent nature of poverty in the informal sector and argues that the informal sector is characterised by low wages, low skills, low productivity, and underemployment (Dell'Anno & Solomon, 2008; Kanbur, 2016; Hong & Pham, 2022). The result undergirds the low standard of living and low exposure of poor households to formal sector employment opportunities in the informal sector. These economic situations force low-income families into perpetual poverty (Huang et al., 2020). Besides, the economic conditions associated with informality, such as low wage, low skills, residential separation, labour discrimination and spatial labour mismatch, reduces the prospects of individuals in the informal sector for securing employment opportunities in the formal sector (Devicienti et al., 2010).

However, both theoretical and a growing empirical literature suggests the possibility of the feedback effect of poverty on informality. Literature on the origins of informality suggests that informality could be both supply-side-led and demand-side-led, resulting in double causality between informality and poverty (Fields, 1975; Hart, 1973). The

Informative: The paper examines the effect of informality on poverty reduction in Africa. We use the causality test set up within the Panel Vector Autoregression and System Generalized Methods of Moments framework and a dataset of 40 countries selected from middle-income and low-income African countries. The empirical results show that causality is dependent on the country's income level.

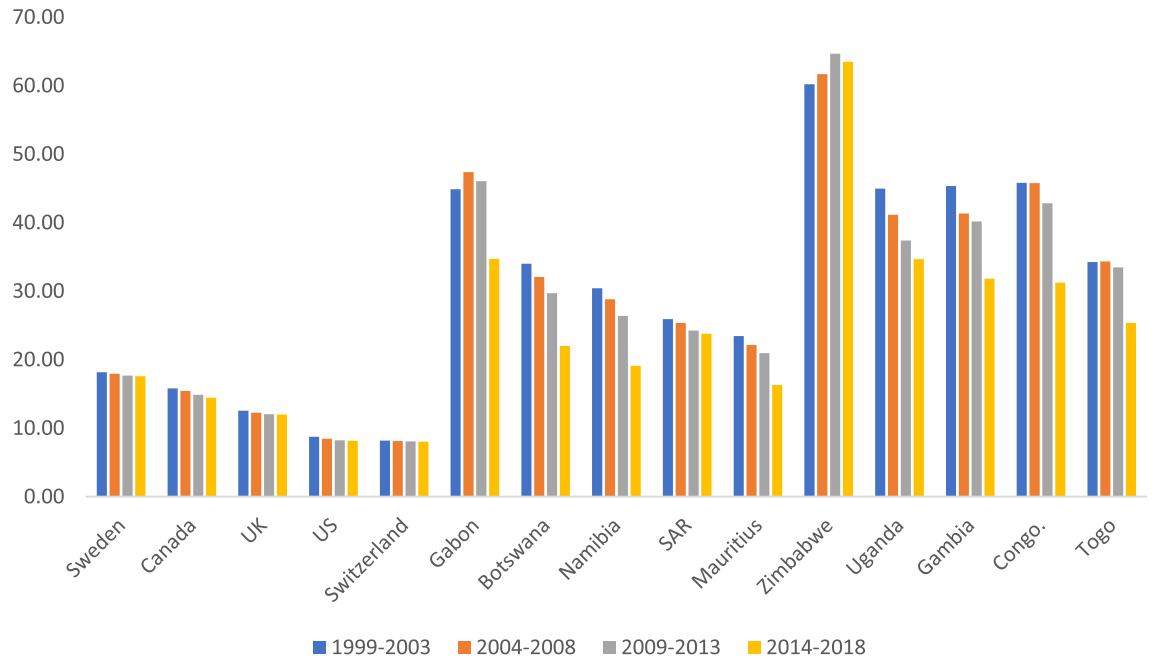

FIGURE 1 Informality in developed and developing economies. *Source*: World Bank Poverty Database (based on the 5-average of 2014–2018)

scarce empirical work supports this view (Canelas, 2019; Devicienti et al., 2010; Hong & Pham, 2022). The paper, therefore, tests the possibility of the bi-directional causal relationship between informality and poverty.

Investigating the effect of informality on poverty without incorporating the feedback effect in the nexus will lead to the problem of simultaneity bias and spurious estimates (Roodman, 2006; Wintoki et al., 2012). For this reason, we use a simultaneous and dynamic framework where both informality and poverty are treated as endogenous. The simultaneous and dynamic framework allows for investigating the nexus within a predictive framework. While the issue of reverse causation has recently attracted scholars, only a few studies have examined the issue empirically (Canelas, 2019; Devicienti et al., 2010; Hong & Pham, 2022; Nazier & Ramadan, 2015).

Anecdotal evidence suggests that economic development and growth affect the relationship between poverty and informality. Informality is a dominant feature of developing and emerging economies with weak institutional frameworks and macroeconomic imbalances. High-income developing economies with improving institutional framework development that tends to improve skills, quality management, education, and ease of doing business also exhibit lower levels of informality and poverty. These countries witness a considerate transfer of firms from informal to formal sectors, qualitative informal-formal interactions, and evolving institutional development. Similarly, high-income developing economies often report a reduction in informality (Elgin & Oztunali, 2012).

Figure 1 shows the trends of informality. Higher-income countries report lower levels of informality than lower-income countries. Upper-middle and lower-middle-income African countries also have lower informality levels relative to low-income African countries. Therefore, it is likely that economic growth accompanied by institutional and other social changes can largely explain the poverty-informality nexus. Studies on the poverty-informality nexus have largely neglected the role of growth process in the relationship. Of the studies investigating reverse causality, only Hong and Pham (2022) incorporate the role of income.

Following these premises, this paper uses data from 40 Sub-Saharan African countries to examine the possibility of a bi-directional causal relationship in the poverty-informality nexus. The paper adopts the United Nations Income grouping to segregate the sample into upper-middle, lower-middle-income and low-income groups. The paper contributes to the poverty-informality literature on three grounds. One, the paper examines the nexus within a bi-directional causality framework. The causality models are set up within the Panel Vector Autoregression (PVAR) of Abrigo and Love (2016) and System Generalised Methods of Moments (SGMM) framework, which allows both variables to be treated as endogenous, thus addressing inherent endogeneity in the nexus. Two, the paper provides evidence of the roles of income levels in the nexus. Here, we ask an important question, does income level offer a different explanation for the poverty-informality nexus? Three, the paper adopts macroeconomic data to examine the nexus. Extant studies have largely adopted survey data which limits their policy implications to particular jurisdictions. Following the introduction, the rest of the paper is structured as follows. Section 2 provides the literature review, while Section 3 addresses methodology. Section 4 discusses empirical results, and Section 5 concludes the study with policy recommendations.

2 | BRIEF LITERATURE REVIEW

2.1 | Theoretical issues

The rationale behind a bidirectional relationship between poverty and informality lies in the schools of thought that propose the origins of economic informality. On the one hand, the dualistic view of informality posits the existence of dual labour markets, which separate informal and formal sectors of the economy. Earlier forms of this view stem from the work of Lewis (1954) and Harris and Todaro (1970), which advance the simultaneous existence of a sector in the economy which is reliant on modern capitalist methods of production and the traditional agricultural sector, largely reliant on labour as a productive resource.[1] In this view, informality is a residue of development and therefore provides a secondary job market that houses labour that cannot be absorbed in the modern formal sector. Individuals who take up these jobs tend to have poor job market skills and are disproportionately drawn from poor populations (Loayza, 2018; World Bank, 2019). Therefore, poverty, as characterised by one's inability to get a well-paying job in the formal sector to meet basic needs, is a driver of the growth and persistence of informality (Devicienti et al., 2010; Nazier & Ramadan, 2015).

On the other hand, the neoliberal view argues that the informal sector exists because of a rational choice by economic agents to escape the burdensome regulations in the formal sector (de Soto, 1989, 2000; Portes & Benton, 1989). In addition, access to credit and lack of secure property rights also impose a significant barrier. However, firms in the informal sector lack access to critical infrastructure and credit markets to improve production (Gandelman & Rasteletti, 2017). Moreover, firms may voluntarily choose to operate in the informal sector in search of cheap labour and take advantage of those markets' unregulated nature (Farrell, 2004). Consequently, informality can lead to low productivity and stunted growth and development potential. In addition, the poor labour market potential of the workers and lack of social protection results in persistent low wages and poor working conditions, so the workers in the informal sector are likely to be stuck in a poverty trap.

Moreover, pervasive informality tends to erode the tax base limiting the extent to which governments can provide public services which relieve poverty (Besley & Persson, 2014; Ohnsorge & Yu, 2022). In addition to persistent informality, governments are likely to rely more on direct taxes, which are less progressive and likely disproportionately affect those on lower incomes, reinforcing poverty. In this view, therefore, informality can result in persistent poverty.

A third view implied in the work of Fields (1975) and Hart (1973) suggest that the informal sector is heterogenous, encompassing its role as a last resort employer, an employer of choice (or voluntary employment), and a labour dualism (Fields, 2004; Nazier & Ramadan, 2015). The proponents of this view argue that the informal sector is complex and exhibits demand-led and supply-led informality characteristics. With demand-led informality, workers enter informality involuntarily as a last resort in the absence of jobs in the formal sector. With supply-led informality, both employers and employees elect to operate in the informal sector, either because it is more cost-effective (for businesses) or because the workers' skills make it more viable to work in the informal sector (Canelas, 2019). If this is the case, informality can be viewed as a cause of poverty and its result.

2.2 | Brief empirical review

There is limited literature that directly investigates the relationship between poverty and informality. Most existing literature on the poverty-informality nexus focuses on the one-way relationship investigating whether informality affects poverty and vice versa. The extant results have shown positive effects on both sides.

A few but growing number of studies demonstrate the increasing recognition that positive results from both sides of the relationship suggest double causality between informality and poverty and support the view that informality is both demand and supply-led. An early study by Amuedo-Dorantes (2004) establishes double causality between informality and poverty. She shows that wage employment in the informal sector is positively linked to household poverty. She also shows that employment in the informal sector enhances household poverty relative to employment in the formal sector. These results are confirmed by other studies that use household data. For example, Devicienti et al. (2010) use a panel dataset to establish whether employment in the informal sector leads to future poverty at the household level and vice versa. They show that both poverty and informality are persistent in Argentina. They find significant spillovers from past poverty to current informality and past informality to current poverty, establishing double causality. Consequently, their results demonstrate that poor individuals are more likely to end up working in the informal sector and conversely, being employed in the informal sector predicts the likelihood of being poor.

Similarly, Canelas (2019)'s study uses Ecuadorian household data to find double causality. This study also shows that the likelihood of informal wage employment increases with poverty. Inversely, informality increases the likelihood of household poverty, although this effect is found to have a smaller effect than poverty on informality. The study by Nazier and Ramadan (2015) shows results that differ from these studies. Using household data for Egypt, they find that causality weakly runs only from informality to poverty. It is important to note that they only focus on wage employees in the informal sector in a country where self-employment is very high.

The paper by Hong and Pham (2022) most closely aligns with the current paper. They use a cross-country panel data set of 100 countries to investigate two-way causality between poverty and informality. The general result establishes double causality between informality and poverty. They find that the relationship between informality and poverty varies by the country's income level. Nevertheless, double causality is strongly established across income groups.

The review of the literature shows some observations. First, very few studies investigate this important phenomenon of simultaneous two-way causality between informality and poverty. This relationship has significant implications for policies that tackle poverty and

TABLE 1 Data, measurement and sources

Indicators	Measurement	Source
Informality 1	Based on Dynamic general equilibrium model-based (DGE) estimates of informal output (% of official GDP).	World Bank Informality Database, 2022.
Informality 2	Based on Multiple indicators, multiple causes model-based (MIMIC) estimates of informal output (% of official GDP).	World Bank Informality Database, 2022.
Poverty 1	The poverty gap at $1.90 a day (2011 PPP) is the mean shortfall in income or consumption from the poverty line of $1.90 a day, expressed as a percentage of the total population.	World Bank Poverty Database, 2022.
Poverty 2	The national poverty headcount ratio is the percentage of the population living below the national poverty line of $1.90 per day (2011 PPP).	World Bank Poverty Database, 2022.
Poverty 3	The poverty gap at $3.20 a day (2011 PPP) is the mean shortfall in income or consumption from the poverty line of $3.20 a day, expressed as a percentage of the total population.	World Bank Poverty Database, 2022.
Poverty 4	The national poverty headcount ratio is the percentage of the population living below the national poverty line of $3.20 per day (2011 PPP).	World Bank Poverty Database, 2022.
Economic growth	GDP per capita is gross domestic product divided by population, expressed in constant 2015 U.S. dollars.	World Bank Poverty Database, 2022.
Inequality	Measured using the GINI of household income.	Standardised World Income Inequality Database, 2022.
Education	The gross enrolment ratio is the ratio of total enrolment to the population of the age group of secondary education.	World Bank Database, 2022.
Urbanisation	The percentage of population in the urban areas as a proportion of total population in these countries.	World Bank Poverty Database, 2022.

TABLE 2 List of countries adopted in the study

Upper middle-income countries ($3896–$12,055)	Lower middle-income countries ($996–$3896)	Lower-income countries ($996 or lower)
Seychelles, Equatorial Guinea, Botswana, Gabon, Mauritius, Namibia and South Africa.	Angola, Cameroon, Cape Verde, Congo, Cote d'Ivoire, Ghana, Kenya, Lesotho, Mauritania, Nigeria, Sao Tome & Principe, Swaziland and Zambia.	Benin, Burkina Faso, Central African Republic, Chad, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Liberia, Malawi, Mali, Mozambique, Niger, Rwanda, Senegal, Tanzania, Togo, Sierra Leone, Uganda and Zimbabwe.

Source: Bolarinwa et al. (2021).

informality. Erroneously assuming that the relationship is unidirectional can result in distortionary policies, especially for countries where the informal sector is large relative to the formal sector. Second, most of the studies reviewed other than one adopted country-level data. We use a cross-country level macroeconomic dataset for the sub-Saharan region for comprehensive income level analysis, thus, providing macro evidence from the African perspective where the phenomenon has not been investigated. Finally, the literature shows only one study that accounts for the role played by national income in moderating the effects of informality and poverty. Our study takes this into account. The results show that this is a significant factor.

3 | METHODOLOGY

3.1 | Techniques of analysis and empirical models

Following the discussions in the introduction and literature review, this paper aims to examine the direction of the causal relationship between informality and poverty in Africa. The empirical models of the nexus are set up within the Panel Vector Autoregression (PVAR). The method simultaneously incorporates the attributes of Vector Autoregression (VAR) in time series, thereby treating all variables as endogenous and allowing the introduction of individual heterogeneity

TABLE 3 Descriptive statistics

Variables	Mean	SD	Min	Max
Poverty (income share by lowest 20%)	5.7604	1.52836	2.3	9.5
Poverty (poverty gap at $1.90)	15.9649	11.2705	0.10	63.6
Poverty (poverty gap at $3.20)	31.1808	15.66984	0.40	77.1
Poverty (poverty headcount at $1.90)	40.60809	21.7655	0.20	94.1
Poverty (poverty headcount at $3.20)	62.98726	24.13321	1.1	98.5
Informality 1	39.74513	8.60296	20.66142	64.47993
Informality 2	40.82137	8.340782	21.44893	62.05723
Economic growth	2247.493	3175.492	193.8673	18,654.16
School enrolment	41.0779	22.2174	5.21012	107.1769
Inequality	56.18188	121.8867	31.36616	2001

TABLE 4 Correlation matrix of the variables

	Poverty	Growth	Education	Inequality	Informality
Poverty	1.0000				
Growth	−0.3342***	1.0000			
Education	−0.5287***	0.5057***	1.0000		
Inequality	0.0179	−0.0078	0.0476	1.0000	
Informality	0.4085***	−0.3906***	−0.4379***	−0.0068	1.0000

Note: The poverty gap at $1.90 and DGE-based estimates of informality are used for measuring poverty and informality.
***, **, and * indicate 1%, 5%, and 10%, respectively.

TABLE 5 Baseline model on the relationship between informality and poverty in Africa: Middle-income countries

	Poverty gap $1.90	Poverty gap $3.20	Poverty head C $1.90	Poverty head C $3.20
Poverty models				
Poverty	0.8926*** (0.3239)	−0.5751*** (0.2218)	0.7149 (0.4642)	1.2836*** (0.4427)
Informal sector	0.1777 (0.5243)	−0.4348** (0.1718)	−1.3341** (0.3648)	−2.4848* (1.3605)
Inequality	0.8776*** (0.3409)	−0.6012** (0.2456)	3.3291*** (0.9321)	4.7589*** (1.2261)
Economic growth	−4.7376 (3.2373)	−4.5186** (2.0752)	−13.1519 (8.7332)	−7.8453 (8.8834)
School enrolment	0.1527 (0.1502)	−0.2796*** (0.0982)	0.5309 (0.4545)	0.9012* (0.5116)
Urbanisation	0.2323 (0.1712)	0.0063 (0.1186)	−0.3018 (0.5066)	−1.0144** (0.5296)
Informality models				
Poverty	1.1665*** (0.2452)	0.5294*** (0.1681)	0.2870*** (0.0896)	0.2774*** (0.0769)
Informal sector	−0.0927 (0.3612)	1.0032*** (0.2828)	−0.3822 (0.2945)	−0.2897 (0.2952)
Inequality	1.5420*** (0.5174)	−0.9473*** (0.2968)	1.1517*** (0.3736)	1.2627*** (0.3651)
Economic growth	−0.2974 (3.0368)	2.9686 (2.4204)	−0.9902 (2.7422)	0.4444 (2.1763)
School enrolment	0.1004 (0.1249)	−0.3959*** (0.1196)	−0.0017 (0.1150)	0.1164* (0.0695)
Urbanisation	−0.2767* (0.1596)	0.1143 (0.1141)	−0.3249*** (0.1242)	−0.4168*** (0.1046)
Hansen (prob.)	51.6024 (0.605)	56.4617 (0.246)	55.5395 (0.274)	48.3192 (0.634)
No. of countries	20	20	20	20

Note: Probability is shown in parenthesis.
***, **, and * indicate 1%, 5%, and 10%, respectively.

TABLE 6 Baseline model on the relationship between informality and poverty in Africa: Low-income countries

	Poverty gap $1.90	Poverty gap $3.20	Poverty head C $1.90	Poverty head C $3.20
Poverty models				
Poverty	0.0140 (0.0911)	0.0997 (0.0904)	0.2629*** (0.1007)	0.0997 (0.0904)
Informal sector	−1.7038*** (0.5180)	−2.3830*** (0.4424)	−3.8644*** (0.8172)	−2.3830*** (0.4424)
Inequality	−1.6445*** (0.6210)	−1.4784** (0.6438)	1.6078 (6.6352)	−1.4784** (0.6438)
Economic growth	−5.5778 (5.6157)	0.2370 (5.6291)	1.6078 (6.6352)	0.2370 (5.6291)
School enrolment	−0.1916* (0.1172)	0.2782** (0.1096)	−0.3653** (0.1470)	−2.2782** (0.1096)
Urbanisation	−1.5780*** (0.2714)	−2.0540*** (0.2791)	−2.8854*** (0.4109)	−2.0540*** (0.2791)
Informality models				
Poverty	−0.0533*** (0.0202)	−0.0454** (0.0188)	−0.0414*** (0.0134)	−0.0454** (0.0188)
Informal sector	0.8336*** (0.1497)	0.7314*** (0.1298)	0.7166*** (0.1257)	0.7314*** (0.1298)
Inequality	−0.5971*** (0.1616)	−0.4602*** (0.1264)	−0.4345*** (0.1186)	−0.4602*** (0.1264)
Economic growth	−4.5903*** (1.0575)	−5.1016*** (0.9285)	−5.4098*** (0.9790)	−5.1016*** (0.9708)
School enrolment	0.0635*** (0.0198)	0.0665*** (0.0157)	0.0692*** (0.0164)	0.0665*** (0.0157)
Urbanisation	−0.1461** (0.0604)	−0.1374*** (0.0514)	−0.1435*** (0.0463)	−0.1374*** (0.0514)
Hansen (prob.)	46.2536 (0.716)	48.7472 (0.524)	48.6727 (0.527)	49.4639 (0.6850)
No. of countries	20	20	20	20

Note: Probability is shown in parenthesis.
***, **, and * indicate 1%, 5%, and 10%, respectively.

effect by using fixed effects in its approach. The first-order PVAR is used to model the poverty-informality nexus and is specified as:

$$X_{it} = \beta_i + \varphi(L)X_{i,t-1} + \gamma(L)V_{i,t-1} + v_i + \theta_t + \varepsilon_{it}. \quad (1)$$

In Equation (1), i and t are countries and years, respectively. β_i is the vector of constant terms, and $\varphi(L)$ and $\gamma(L)$ are lag operators. X_{it} is the poverty level or informality rate, and $V_{i,t-1}$ is the set of control variables adopted in the models. Also, v_i is the country-specific effect. θ_t represents the time-fixed effect. Lastly, ε_{it} is the error term. One crucial attribute of the PVAR technique is that the v_i enters into all the values of X_{it}. Hence, the lagged dependent variable cannot be independent of the composite error process. One solution suggested in the literature is to adopt the first difference of Equation (1) (Hong & Pham, 2022). The first difference removes the constant term and country-specific effect. This yields:

$$\Delta X_{it} = \varphi\Delta(L)X_{i,t-1} + \gamma\Delta(L)V_{i,t-1} + \Delta\theta_t + \Delta\varepsilon_{it}. \quad (2)$$

In Equation (2), Δ is the difference indicator. Having differenced Equation (2), however, there is still a high correlation between the differenced lagged dependent variable and the error term. The literature suggests that using the difference GMM (Arellano & Bond, 1991) can address the correlation. However, differenced GMM suffer from finite sample bias, unbalanced panel issues, and small sample bias. To address these issues, Blundell and Bond (1998) developed System GMM. The estimator adopts both the equations in levels and first difference. The paper adopts the System GMM technique to estimate the PVAR model and test for the causality between poverty and informality in Africa. The work makes some assumptions. One, it is assumed that the potential causality is established through the income channel. Hence, economic growth, measured by per capita income, is included in the empirical model.

Similarly, studies have argued that the poverty-informality nexus is conditional on educational attainment; hence the paper includes educational level. Lastly, empirical work suggests that the level of inequality affects the nexus. Thus, inequality is another control variable adopted in the study. To avoid instrumental proliferation in the PVAR model, institutional quality, government expenditure, trade Openness, urbanisation, Corruption and inflation are adopted as instrumental and control variables.

3.2 | Data, measurement and sources

The paper relies on the World Bank Database for all variables used in the study between 1991 and 2018. The study adopts a 4-year non-overlapping average for all variables to control for business cycles and maximise country-level observations. The poverty indicators are sourced from the World Bank Poverty Database. Five poverty measures are adopted in the study covering the absolute and relative poverty measures and the severity of poverty levels. The measures are used alternately to check whether the nature of the nexus is dependent on the level or intensity of poverty. The paper adopts two well-known measures of informality. The first is based on the Dynamic general equilibrium model-based (DGE) estimates of informal output, while the second is built on the Multiple indicators multiple causes model-based (MIMIC) estimates of informal output. These measures are commonly adopted in empirical studies. See Table 1 for further details.

TABLE 7 Relationship between poverty and informality

Effect of informality on poverty			Effect of poverty on informality		
	MIC	LIC		MIC	LIC
Extreme poverty (poverty headcount at $1.90)	No	–	Extreme poverty (poverty headcount at $1.90)	+	–
Extreme poverty (poverty gap at $1.90)	–	–	Extreme poverty (poverty gap at $1.90)	+	–
Moderate poverty (poverty headcount at $3.20)	–	–	Moderate poverty (poverty headcount at $3.20)	+	–
Moderate poverty (poverty headcount at $3.20)	–	–	Moderate poverty (poverty headcount at $3.20)	+	–

Note: MIC and LIC are Middle-Income Countries and Low-Income Countries, respectively.

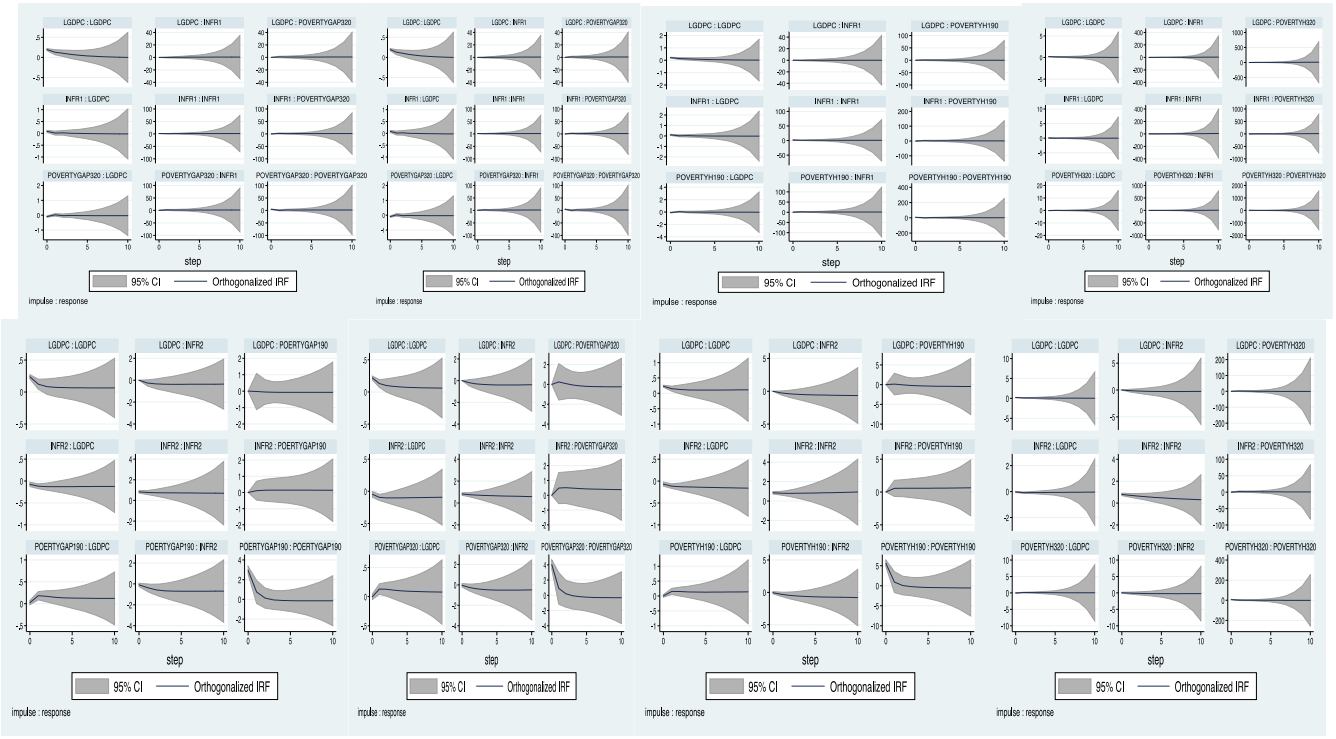

FIGURE 2 Impulse-response graphs for poverty, informality, and income

Similarly, 40 sub-Saharan African countries are used in the study due to data availability. These countries are segregated into upper-middle, lower-middle and lower-income countries following the United Nations income grouping. However, we adopt a more simplified approach by merging these into low-income and middle-income countries to address the data needs of using SGMM. The result is 20 countries in each group. Table 2 provides the list of these countries.

4 | EMPIRICAL RESULTS AND DISCUSSION

4.1 | Descriptive statistics and correlation analysis

The section discusses the empirical results. The discussion of the results starts with descriptive statistics in Table 3. Poverty indicators of the Poverty gap at $1.90 and $3.20, Poverty headcount at $1.90 and $3.20 show that the Democratic Republic of Congo reports the highest level of poverty rate during the analysis periods. Mali is another country that reports the highest poverty level when income shared by the poorest 20% of the population is adopted as a poverty measure. Similarly, using the poverty indicators of the Poverty gap at $1.90 and $3.20 and the Poverty headcount at $1.90, the descriptive statistics show that Mauritius is the highest middle-income economy among the 40 African countries selected during the period between 1991 and 2019.

Similarly, Gabon and Seychelles share the attribute of the highest middle-income economies with Mauritius when the poverty indicator of income shared by the poorest 20% and Poverty Headcount of $3.20 are adopted as poverty measures. Overall, it can be inferred that Mauritius, Syntheses and Gabon are the major middle-income economies in Sub-Saharan that can address poverty in the continent. On the other hand, the Democratic Republic of Congo and Mali are two economies mainly affected by poverty in the African continent.

As shown in Table 3, the African country with a severe poverty headcount of $1.90 has 94.1% of its population unable to meet the

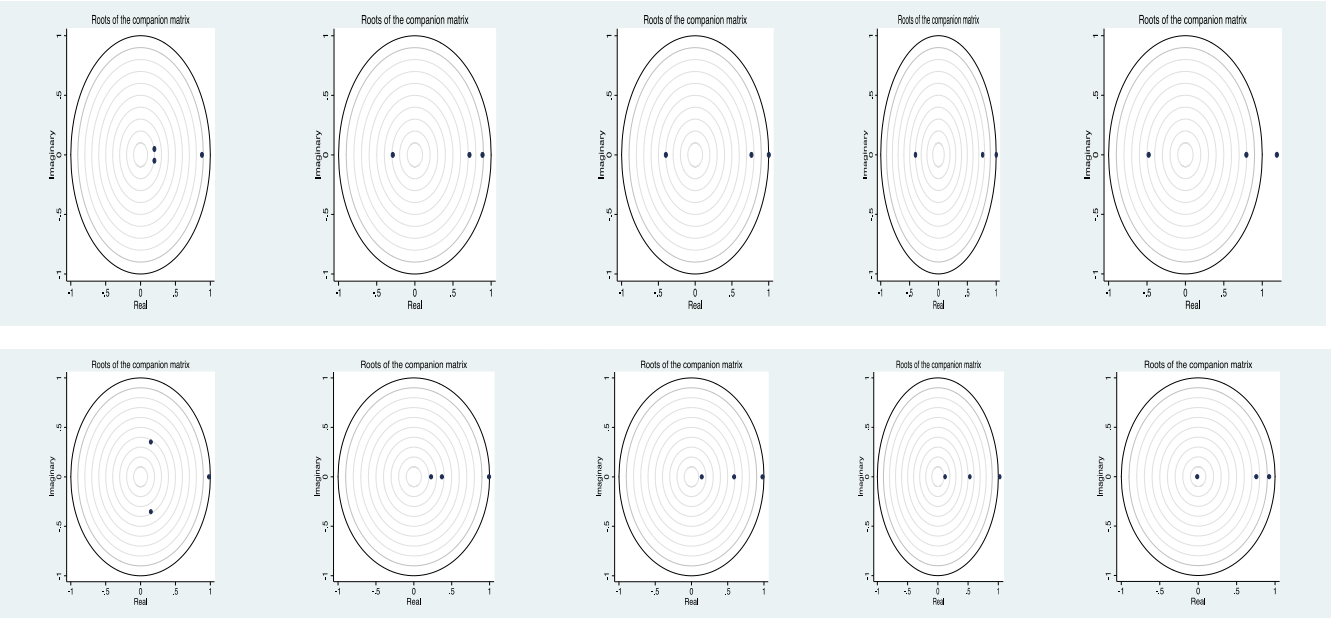

FIGURE 3 Stability tests of the models with three major variables

TABLE 8 Causality between informality and poverty in middle-income African countries

Hypotheses	Low-income	Middle-income
H0: Poverty (poverty gap $1.90) does not granger cause informality	6.962*** (0.008)	22.630*** (0.000)
H0: Informality does not granger cause poverty (poverty gap $1.90)	10.821*** (0.001)	0.115 (0.735)
H0: Poverty (poverty gap $3.20) does not granger cause informality	5.8190** (0.000)	9.915*** (0.002)
H0: Informality does not granger cause poverty (poverty gap $3.20)	29.020*** (0.000)	1.367 (0.242)
H0: Poverty (poverty head count $1.90) does not granger cause informality	9.501*** (0.002)	10.252*** (0.001)
H0: Informality does not granger cause poverty (poverty head count $1.90)	39.686*** (0.000)	0.955 (0.328)
H0: Poverty (poverty head count $3.20) does not granger cause informality	22.690*** (0.000)	13.027*** (0.000)
H0: Informality does not granger cause poverty (poverty head count $3.20)	37.311*** (0.000)	3.336* (0.068)

Note: Probability is shown in parenthesis.
***, **, and * indicate 1%, 5%, and 10%, respectively.

daily consumption and expenditure of $1.90 per day. 18% of this country's population cannot meet up with $3.20 per day. However, the wealthiest country has less than 1% of its population under less than $1.90 per day. The analysis shows a significant divergence in poverty situations among African economies. The large standard deviation values indicate significant poverty divergence among African countries in Sub-Saharan Africa.

Furthermore, Table 3 shows that the mean proportion of informality to total Gross Domestic Product (GDP) among African economies is approximately 40%. The descriptive statistics show that some African countries have high informality, such as 64%, while others have low informality, as low as the minimum of 20% of informal activities reported in the study. Table 3 presents further information on per capita income, educational enrolment and inequality in Africa.

Furthermore, correlation among the variables is used to check for multicollinearity and autocorrelation in the models. Table 4 shows the empirical results. The poverty headcount at $1.90 is adopted as the measure of poverty, while the Dynamic general equilibrium model-based (DGE) estimates of informal output are adopted as the measure of informality. Overall, the results show a positive and significant association between poverty and informality, implying that a higher level of information tends to increase poverty in African economies. Similarly, the correlation analysis shows a positive association between inequality and poverty and a significant negative association between educational attainment and economic growth and poverty. Overall, the correlation analysis does not show any presence of multicollinearity because none of the correlation pairs reports a pair higher than 50%.

4.2 | Baseline PVAR results

This section discusses the baseline regression results on the nexus. Tables 6 and 7 present the baseline results of the relationship between poverty and informality for low-income and middle-income

TABLE 9 Baseline Model on the relationship between informality and poverty in Africa: middle-income countries (robustness check)

	Poverty gap $1.90	Poverty gap $3.20	Poverty head C $1.90	Poverty head C $3.20
Poverty models				
Poverty	−0.3466** (0.1492)	−0.2135 (0.1719)	0.0755 (0.1880)	0.5494** (0.2899)
Informal sector	−1.2651*** (0.4451)	−2.1420*** (0.5421)	−2.6861*** (0.9863)	−2.0151* (1.2278)
Inequality	−0.1059 (0.1638)	−0.0481 (0.292)	0.1044 (0.2445)	0.6256 (0.5494)
Economic growth	−5.4246 (1.9576)	−7.8904*** (2.7218)	−11.1792** (4.8118)	−7.0419 (5.9562)
School enrolment	−0.0449 (0.0581)	−0.0581 (0.0673)	0.1820 (0.1328)	0.4709** (0.2026)
Urbanisation	0.4119*** (0.0814)	0.5796*** (0.1153)	0.6580*** (0.1882)	0.2090 (0.2593)
Informality models				
Poverty	0.0248** (0.0093)	0.0352 (0.0324)	0.1128** (0.0128)	0.0567* (0.0309)
Informal sector	0.8672*** (0.1061)	0.7016*** (1079)	0.8146*** (0.1055)	0.6806*** (0.1268)
Inequality	−0.1053** (0.0549)	−0.0888* (0.0492)	−0.0552 (0.0554)	−0.0507 (0.0533)
Economic growth	1.3815** (0.6579)	0.4598 (0.6852)	1.1322* (0.6423)	0.9831 (0.6293)
School enrolment	−0.0499*** (0.0138)	−0.0110 (0.0144)	−0.0345** (0.0160)	−0.0171 (0.0197)
Urbanisation	−0.0756*** (0.0232)	−0.0981*** (0.0265)	−0.0792*** (0.0160)	−0.0849*** (0.0253)
Hansen (prob.)	57.2596 (0.391)	49.6575 (0.642)	51.5673 (0.607)	39.78459 (0.849)
No. of countries	20	20	20	20

Note: Probability is shown in parenthesis.
***, **, and * indicate 1%, 5%, and 10%, respectively.

TABLE 10 Baseline model on the relationship between informality and poverty in Africa: Low-income countries

	Poverty gap $1.90	Poverty gap $3.20	Poverty head C $1.90	Poverty head C $3.20
Poverty models				
Poverty	0.0155 (0.0726)	0.0863 (0.0939)	0.1602 (0.1002)	0.5687*** (0.1144)
Informal sector	−1.1691*** (0.4220)	−1.5860*** (0.4139)	−2.7106*** (0.5662)	−2.1267*** (0.3363)
Inequality	−0.9596** (0.5079)	−1.0863** (0.5161)	−0.6851 (0.6238)	0.1551 (0.5427)
Economic growth	−2.0491 (3.8158)	6.2649 (4.0896)	12.3514** (6.2416)	8.8326* (4.7998)
School enrolment	−0.2103** (0.0872)	−0.3608*** (0.1004)	−0.4623*** (0.1443)	−0.3142*** (0.1076)
Urbanisation	−1.5932*** (0.2512)	−2.1237*** (0.3074)	−3.1557*** (0.3692)	−1.6413*** (0.2940)
Informality				
Poverty	−0.0297 (0.0257)	−0.0019 (0.0262)	−0.0006 (0.0030)	0.0165 (0.0314)
Informal sector	0.7403*** (0.1343)	0.6721*** (0.1330)	−0.0016 (0.0217)	0.8619*** (0.1118)
Inequality	−0.7669*** (0.2312)	−0.6254*** (0.1986)	−0.0656** (0.0281)	−0.5056** (0.2354)
Economic growth	−5.1743*** (1.4429)	−4.7255*** (0.1986)	0.0615 (0.02069)	−5.5292*** (1.2520)
School enrolment	0.0564* (0.0316)	0.0483** (0.0237)	0.0029 (0.0029)	0.0843*** (0.0235)
Urbanisation	−0.1144** (0.0586)	−0.0708 (0.0606)	0.0265*** (0.0095)	0.0842 (0.0842)
Hansen (prob.)	53.5671 (0.530)	55.2503 (0.465)	53.9475 (0.5649)	57.3771 (0.387)
No. of countries	20	20	20	20

countries, respectively. The first segment of the Tables reports results for the poverty models, while the lower segment reports evidence for the informality. In general, the results show a complex structure which seems to be dependent on the income level of the countries, especially with the effect of poverty on informality. Stability checks confirm the stability of the models as reported in Figures 2 and 3.

4.2.1 | Effect of informality on poverty

Results in Tables 5–7 show that the informality variable is negative and significant in three of the five models for middle-income countries. The variable is significant in all four models in low-income countries. In middle-income countries, the coefficients in four of the five models are negative and significant. An increase in the percentage

TABLE 11 Relationship between poverty and informality

Effect of informality on poverty			Effect of poverty on informality		
	MIC	LIC		MIC	LIC
Extreme poverty (poverty headcount at $1.90)	–	–	Extreme poverty (poverty headcount at $1.90)	+	No
Extreme poverty (poverty gap at $1.90)	–	–	Extreme poverty (poverty gap at $1.90)	No	No
Extreme poverty (income share by lowest 20%)	–	–	Extreme poverty (income share by lowest 20%)	+	No
Moderate poverty (poverty headcount at $3.20)	–	–	Moderate poverty (poverty headcount at $3.20)	+	No
Moderate poverty (poverty gap at $3.20)	No	+	Moderate poverty (poverty gap at $3.20)	+	No

Note: HIC and LIC are Middle-Income Countries and Low-Income Countries, respectively.

TABLE 12 Causality between informality and poverty in Africa

Hypotheses	Low-income	Middle-income
H0: Poverty (poverty gap $1.90) does not granger cause informality	1.335 (0.248)	0.254 (0.615)
H0: Informality does not granger cause poverty (poverty gap $1.90)	7.675*** (0.0006)	8.079*** (0.004)
H0: Poverty (poverty gap $3.20) does not granger cause informality	0.005 (0.943)	1.179 (0.278)
H0: Informality does not granger cause poverty (poverty gap $3.20)	14.679*** (0.000)	15.610*** (0.000)
H0: Poverty (poverty head count $1.90) does not granger cause informality	0.576 (0.448)	0.354 (0.552)
H0: Informality does not granger cause poverty (poverty head count $1.90)	22.198*** (0.000)	7.417*** (0.006)
H0: Poverty (poverty head count $3.20) does not granger cause informality	0.276 (0.599)	2.694* (0.100)
H0: Informality does not granger cause poverty (poverty head count $3.20)	40.007*** (0.000)	2.694* (0.100)

Note: Probability is shown in parenthesis.
***, **, and * indicate 1%, 5%, and 10%, respectively.

share of the informal sector in the economy leads to a reduction in poverty. These results are similar to those of (Hong & Pham, 2022). They are also supported by micro-level results such as those on South Africa by Cichello and Rogan (2017) and Amuedo-Dorantes (2004) for Ecuador.

These findings support the view that individuals who enter the informal sector do so voluntarily, suggesting that informality is supply-lead. For firms, this choice to operate in the informal sector could result from a desire to escape the burdensome regulations in the formal sector (de Soto, 2000; Farrell, 2004). For individuals, voluntary informal employment represents a rational choice to seek employment in the informal sector, not because they are poor but because their choices in the formal sector are not as attractive as those in the formal sector, given their preferences, skill sets and other characteristics. This result is confirmed in the literature. For instance, Morales and Agramont (2015) compare the characteristics of workers in the formal and informal sectors in Bolivia and find that there are workers with similar characteristics in both the formal and informal sectors; those in the informal sector with related characteristics choose to be in the informal sector. It is particularly true for small entrepreneurs whose earnings in the informal sector are similar to those in the formal sector. Huang et al. (2020) support the notion of voluntary informal employment and cite structural constraints, preferences and individual characteristics that influence the choice to work in the informal sector.

4.2.2 | The effect of poverty on informality

The effect of poverty on informality shows different results between low-income and middle-income countries. The effect of poverty on informality middle income countries is positive. This result is consistent for all four models where the variable is significant. This result is consistent with findings by Hong and Pham (2022). The results support the theoretical view advanced by dualists and those who propose or advocate for a demand-led informality. The poor can be drawn into the informal sector because of a lack of jobs in the formal sector. Often this is because they lack the requisite skills to get a job in the formal sector. This result obtains in middle-income countries where economic structures are expected to be advanced, and therefore more jobs are likely to be in the modern or industrialised sector, which requires minimum skills. Studies that use microeconomic data, such as Canelas (2019), provide some insights. Canelas finds that the poorer populations in Ecuador are less skilled and are likely to work in the informal sector.

In addition, some of the poor may have jobs in the formal sector, but the jobs are at a very low level that does not allow them to meet their basic needs. Therefore, employment in the formal sector can be driven by a need to supplement formal sector income, as proposed by Hart (1973) and Amuedo-Dorantes (2004). The effects of poverty on informality in low-income countries are unexpected. The coefficients on all the models are negative and significant in four of the five models. The robustness checks show that the relationship is still negative, although the variable is insignificant in those models. The results present a puzzle that we cannot explain. Robustness results are in Tables 9–12.

4.2.3 | Causality analysis

The causality results are extracted from the models after confirming the feedback relationship in the nexus from the SGMM-PVAR models. The empirical findings are reported in Tables 8 and 12. The findings indicate a clear reverse causality between informality and poverty in low-income countries. This result is valid for all models except the wealthiest 20% income share, where causality runs from informality to poverty. The reverse causality has also been observed by Hong and Pham (2022). However, unlike Pham, we find reverse causality for all poverty levels except for the 20% income share, which is not included in the Pham study.

Causality in middle-income countries shows a more dynamic structure. The results largely show that poverty granger causes informality. Only the mild headcount poverty model suggests reverse causality. The 20% income share model shows that poverty does not cause informality but rather that informality granger causes poverty. Overall, the causality results suggest that reverse causality is more prevalent in low-income countries than in middle-income countries.

5 | CONCLUSION AND RECOMMENDATIONS

The results of the paper indicate a somewhat complex relationship between informality and poverty. On the whole, this relationship seems to hinge on income and the level of poverty. We find that in most models, informality can explain the dynamics of poverty. Similarly, the dynamics in informality can be explained by poverty, notwithstanding the unexpected negative impact of poverty on informality which was observed. The complex structure supports the heterogeneity of informality suggested in the literature by Fields (1975), Hart (1973) and Maloney (2004).

A possible driver of this heterogeneity is the presence of various layers of informality. The first layer is self-employment. Self-employed workers in the informal sector are likely to constitute a more significant proportion of voluntary informal workers. Such workers are likely driven by an entrepreneurial drive but may lack the resources and skills to operate in the formal sector. In addition, they may be driven by a desire for higher earnings. Maloney (2004) finds that a significant proportion of self-employed in Latin America earned proportionately more after transitioning from formal work. Growth in non-tradable sectors such as construction tends to lend itself to increases in informality as earnings from self-employment in such sectors tend to be higher than wages in the formal sector.

The second layer of workers in the informal sector is wage or salary workers. These are likely to be the ones that are in the informal sector involuntarily, driving demand-led informality. Firms in the informal sector have very limited access to productive finance and infrastructure, especially in poorer countries. The result is low productivity and increased demand for low-skilled, cheaper labour. Low productivity can lead to a vicious cycle because it disincentivises investment in human and physical capital and the adoption of new technologies that promote growth. Consequently, wage workers in the informal sector get low wages relative to the formal sector and lack social protection. Despite this, they lack options outside the informal sector. Therefore, informality offers a way out of poverty for this group.

The causality results show that causality in middle-income countries flows from poverty to informality. We speculate that this is most likely driven by institutional factors which minimise the feedback loop from informality to poverty. In addition to relative economic industrialisation, these countries are more likely to have better institutions such as the rule of law, property rights protection and lower costs of doing business. These will likely promote the growth of informal businesses and their transition into the formal sector. Low-income economies exhibit strong feedback between informality and poverty. Therefore, poverty and informality reinforce each other. The lack of good institutions could explain why the loop between informality and poverty is reinforced. Constrained access to business resources such as business finance and relevant infrastructure can limit growth.

The policy options in the two country groupings, therefore, are different. Middle-income countries should focus on addressing poverty to limit the growth of informality to the extent that informality is undesirable. The PVAR results show that poverty increases informality in these countries. Low-income countries need to address informality and poverty simultaneously. Given that the negative effect of poverty on informality is an empirical representation of what is happening in low-income countries, informality may be desirable to some extent. As argued, if the lack of business resources is a binding constraint for the poor and they are unlikely to start their businesses, low-income countries should improve access to resources for the poor. Access to resources will allow the poor informal sector to start businesses resulting in access to at least some basic income and a poverty reduction.

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ENDNOTE

[1] The terms Formal and informal were coined by Hart (1973) to distinguish between self-employment and wage employment activities and have become the accepted terms to refer to the two sectors.

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