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The Proliferation of the Informal Sector in Sub-Saharan Africa: Is Inflation Also in the Dock?

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Abstract

The empirical literature on the economic consequences of inflation is abundant. However, the response of the informal sector in Sub-Saharan Africa (SSA) seems to have been ignored. The aim of this article is to analyze another neglected effect of inflation by assessing its impact on the informal economy in Sub-Saharan Africa (SSA). To achieve this, we use data from 27 countries over the period 2000-2018. Least squares estimation revealed that inflation amplifies the proliferation of the informal sector. This result is validated by the random effects method following the Hausman test. As a result, the monetary policies of central banks need to be adjusted to identify the source of inflation, with a view to providing a targeted solution. In addition, the government should continue to combat the black economy through effective programmes.

Keywords

Inflation, Informal Economy, SSA, Hausman Test

1. Introduction

The inflationary shock caused by Russia's war in Ukraine has caused interest rates to rise around the world, the effects of which have been clearly felt this year. As a result, sub-Saharan Africa is experiencing a slowdown in international demand, rising global interest rates, widening yield spreads observed on sovereign bonds and constant pressure on exchange rates; all of these factors have contributed to a serious shortage of funding, yet another shock for a region that is barely recovering from the COVID-19 pandemic. As a result, growth in 2023 is expected to fall for the second consecutive year, standing at 3.3%, compared to 4.0% last year (IMF, 2023).

Although often stigmatized, inflation is not always considered harmful. It is often observed in developing economies, where demand for goods grows faster than supply as a result of increased purchasing power. Moreover, reducing the cost of debt encourages borrowing, which can provide a lasting stimulus to the economy if borrowing is used for investment. But overall, inflation has negative effects on household purchasing power and growth potential: if prices rise faster than wages, the quantity of goods and services a household can buy falls. Inflation can also penalize an economy's competitiveness and foreign trade (in the face of domestic inflation, imported products become cheaper than domestic ones, and exported products find fewer buyers).

Inflation penalizes savings by reducing the value of sums saved and lowering the rate of return. All these effects are likely to lead to a fall in economic activity, a reduction in investment and, therefore, in growth potential. In addition to inflation, informality also poses a significant threat to developing economies in general and those of sub-Saharan Africa in particular.

According to Medina and Schneider (2019), informality is high and growing in both developing and developed economies. For example, in a sample of 157 economies studied, the underground economy was estimated to average 31% of gross domestic product (GDP). Among the economies studied, Latin America has the highest estimate, with Bolivia having the highest average of 62.9% of GDP, followed by Europe, where Georgia tops the list at around 62% of GDP. The trend is also upward in the African region, with Nigeria accounting for 56.8% of GDP and Tanzania 56% (Medina & Schneider, 2019). These data indicate that the underground economy is becoming a permanent feature of most of the world's economies and deserves the attention of researchers and policymakers worldwide.

Underground economies have been linked to crime (Schneider, 2004), drug trafficking (Ardizzi et al., 2014) and budget deficits (Dabla-Norris & Feltenstein, 2003) in developing countries. Naturally, high levels of the underground economy have negative consequences for society, as they result in an inefficient allocation of resources. This is why understanding the antecedents and effects of underground economies has been a major challenge. Social science research, particularly over the last decade (Schneider & Enste, 2000).

This article is one of the few studies that analyze the effect of inflation on the informal sector in SSA. Moreover, it uses data provided by Medina and Schneider (2019), whose particularity is to correct the imperfections of previous data. The simultaneous expansion of inflation and informality in sub-Saharan Africa leads to the assumption that there is an association between the two macroeconomic variables. The aim of this paper is, therefore, to analyze the incidence of inflation on informality in sub-Saharan Africa.

The remainder of this paper is structured as follows. Section two highlights the literature review. The methodology is presented in section three. Section four presents the results, while section five concludes.

2. Lessons from Literatures

Inflation is a complex economic phenomenon that affects all aspects of the economy, including the informal sector. This section aims to present a review of the literature on the determinants of the informal economy, both from a theoretical and an empirical point of view. The informal economy encompasses economic activities that take place outside the regulatory framework and official statistics. Often characterized by a low capacity to adapt to economic shocks, inflation can potentially have a significant impact on this part of the economy. By examining existing theoretical and empirical work, this literature review seeks to provide an overview of the mechanisms and consequences of inflation on the informal economy, as well as to identify gaps and opportunities for future research.

2.1. Theoretical Foundations

The theoretical literature on the determinants of the informal economy is vast and diverse, involving many authors and well-established economic theories. In this literature review, we will explore some of these key contributions to a better understanding of the mechanisms that drive individuals and firms to participate in the informal economy.

The legalist school, which emerged in the late 1980s and 1990s, views the informal sector as composed of informal entrepreneurs who choose to operate informally in order to avoid costs, the time and effort required for formal registration. According to this school, cumbersome government rules and procedures create obstacles to formalization and thus stifle the productive potential of informal entrepreneurs (De Soto, 1989, 2000). One author whose work has considerably influenced our understanding of the informal economy is De Soto (2000), with his theory of the mystery of capital. De Soto (2000) highlighted the lack of access to formal property rights as one of the main factors driving individuals into the informal economy. According to this author, access to formal property titles would enable informal entrepreneurs to benefit from loan guarantees and access to formal markets, thus reducing the incentives to operate outside the law.

Another well-known economic theory used to explain the informal economy is the shadow economy theory developed by Schneider (2003). According to Schneider (2003), the informal economy is fueled by high levels of regulation, taxation and bureaucracy in formal economies. The high costs associated with compliance and taxation encourage individuals and companies to operate informally, where they can avoid these burdens and benefit from greater flexibility. Similarly, according to the voluntarist school, informal entrepreneurs choose to operate illegally, or even criminally, in order to enjoy the benefits of avoiding taxes, business regulations, electricity and rental fees, and other formal operating costs (Maloney, 1999).

The theory of Galbraith (1997) emphasized the importance of economic and social inequalities in the development of the informal economy. According to this author, when formal economic opportunities are limited and inequalities are high,

individuals turn to the informal economy as a form of economic survival and bypassing barriers to access. Furthermore, Becker's irrational choice theory offered a behavioral explanation for participation in the informal economy. According to Becker (1976), individuals may choose to engage in the informal economy because of irrational behaviors such as risk aversion or a preference for flexibility. These decisions are based on individual considerations and may not be strictly linked to economic factors.

The Laffer curve can also be used to explain the informal economy. Indeed, according to Adair (1984), based on the hypothesis that increased tax pressure induces a trade-off in labor supply, favoring undeclared work to replace or supplement institutionalized employment. This includes taxes, social security contributions, the fight against corruption and institutional quality and regulation as explanatory variables for tax evasion.

Allingham and Sandmo's (1972) model is another reference for explaining the informal economy. According to these authors, maximization of the fraudster's expected utility function is based on a subjective assessment of the risks and rewards of tax evasion. With income, which can be expressed in terms of GDP or GDP per capita, or even growth rates.

The dualist school refers to the informal sector as being composed of distinct marginal and survivalist activities unrelated to the formal sector, which provide income to the poor and a safety net in times of crisis. According to this school, the persistence of informal activities, and therefore of a dualistic labor market, is largely due to the fact that there are not enough modern employment opportunities created to absorb the surplus of labor in developing countries, due to low rates of economic growth and/or faster rates of population growth (ILO, 1972).

2.2. Empirical Evidence

The theoretical interest in the informal economy outlined above has given rise to a wave of equally important empirical work attempting to explain the informal economy. We will therefore explore the research carried out by various authors on the determinants of the informal economy. The aim is to identify the key factors that have been emphasized by several authors, in order to provide an overview of the main determinants of the informal economy.

The empirical literature on the determinants of the informal economy points to a number of factors influencing the development of this sector, including fiscal pressure, the financial system, population, GDP per capita growth rates, and even monetary policy.

Indeed, in their analysis, Tanzi (1999), Hassan and Schneider (2016) and more recently Koffi (2022), show that one of the determinants of the informal economy is tax pressure. Hassan and Schneider (2016) and Koffi (2022) found that tax pressure is one of the main causes of the informal economy. Their argument is that rising taxes and high tax rates drive individuals to avoid paying taxes by hiding part of their activities. Also, the relationship between GDP per

capita and the informal sector is subject to debate, with some authors supporting a positive relationship (Tedds, 2005; Bajada & Schneider, 2005) and others a negative one (Dell'anno, 2003; Buehn & Schneider, 2008; Hassan & Schneider, 2016).

With regard to the financial system, some economists, such as Dabla-Norris et al. (2008); Bose et al. (2012) and Koffi (2022), argued that the development of the financial sector increases the opportunity costs of informal sector activity, lowering the barriers to obtaining capital. This encourages companies to move into the formal sector, where they can make productive investments.

In Haiti, the factors likely to influence the informal economy are wage regression (Lamaute-Brisson, 2005); falling GDP, rising taxes and public spending, as well as rising inflation, are the main factors affecting the growth of the informal economy, which in turn affects the unemployment rate (Aspilaire, 2014).

Building on this literature, it is interesting to note that the analysis of the determinants of the informal economy seems to sideline an indicator that appears to be very important in explaining the informal economy, namely inflation. Inflation, as a potential determinant of the informal economy, is not sufficiently explored in the existing empirical literature, despite its potential importance.

Several arguments can be highlighted in favor of inflation as a determinant of the informal economy. Firstly, inflation can reduce people's purchasing power, prompting them to seek unofficial means of increasing their income. This can lead to an increase in informal activities and a drop in tax compliance. In addition, higher inflation can also lead to greater economic uncertainty, which can lead individuals and businesses to turn to the informal economy in order to circumvent the constraints and costs associated with formality.

Few authors have explored the relationship between inflation and the informal economy. For example, Johnson et al. (1997) studied the impact of inflation on the informal economy and found that higher levels of inflation were associated with a larger size of the informal sector. In addition, economist Ergene (2015) has pointed out that inflation can be an important determinant of the informal economy, particularly in developing countries, where high rates of inflation can lead to a growing demand for informal goods and services.

3. Data and Econometric Specification

3.1. Data

This study uses a panel of 27 Sub-Saharan African countries and data over the period 2000-2018. These data come from the World Bank database and Medina and Schneider (2019). The periodicity and number of countries are chosen according to data availability.

The dependent variable in our study is informality. It is measured in this study by the size of the informal sector relative to GDP. It is provided by Medina and Schneider (2019). The independent variable is inflation. It is captured in this work by the consumer price index. To avoid omitted variables, we have introduced a

few control variables. These include trade liberalization (the sum of exports and imports over GDP), information and communication technologies (Internet users per 100 inhabitants), industrialization (the share of the industrial sector over GDP) and domestic credit to the private sector (credit allocated to the private sector by banks over GDP).

The relationship between the control variables and the dependent variable is well documented in the literature. Trade liberalization is negatively associated with the informal economy (Nkemgha, 2023). Regarding ICTs, Njagang et al. (2020) demonstrated that they are negatively correlated with informality. Moreover, Ajide and Dada (2022) also found a negative association between domestic credit and informality. As for industrialization, Enste (2018) highlighted that it is positively correlated with the informal economy.

The essential information on the variables is summarized in **Table 1** and **Table 2**. **Table 1** presents the descriptive statistics, while **Table 2** sets out the correlation matrix. **Table 2** shows that there is a positive correlation between inflation and the informal economy. Moreover, the correlation matrix establishes the absence of multicollinearity with regard to the values of the correlation coefficients, which are lower than 0.8 according to the rule of thumb (Young, 2018). This positive correlation between the two variables is confirmed by **Figure 1**.

Table 1. Summary statistics.

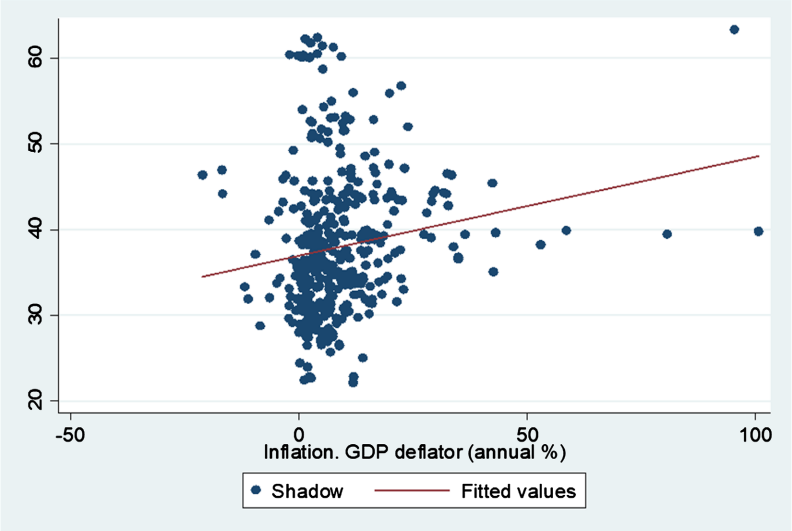
	N	Mean	Std. Dev.	Median	min	max
Shadow	405	37.93	8.083	36.757	22.1	63.296
PCI	405	8.575	11.735	6.255	−21.165	100.658
Open	405	67.714	25.571	65.078	1.295	148.587
Internet	405	12.595	15.003	6.21	0.19	64.804
Industry	405	4.561	12.484	4.225	−75.046	127.446
Domcred	405	26.564	31.016	14.949	1.095	160.125

Source: Authors.

Table 2. Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Shadow	1.000					
(2) PCI	0.167	1.000				
(3) Open	−0.082	−0.052	1.000			
(4) Internet	−0.262	−0.110	0.013	1.000		
(5) Industry	−0.038	0.039	0.072	−0.103	1.000	
(6) Domcred	−0.350	−0.135	0.153	0.558	−0.099	1.000

Source: Authors.



Source: Authors.

Figure 1. Relationship between inflation and the informal economy.

3.2. Econometric Specification

Relying on the work of Nkemgha (2023) on informality, we formulated the econometric model below.

$$\begin{aligned}\text{Shadow}_{it} &= \alpha_0 + \alpha_1 \text{PCI}_{it} + \alpha_2 \text{Open}_{it} + \alpha_3 \text{ICT}_{it} + \alpha_4 \text{Industry}_{it} \\ &+ \alpha_5 \text{Domcred}_{it} + U_i + V_t + \varepsilon_{it}\end{aligned} \quad (1)$$

where Shadow, PCI, Open, ICT, Industry and Domcred represent respectively, the informal economy, the consumer price index, trade liberalization, information and communication technologies, industrialization and domestic credit. U_i, V_t and ε_{it} represent the individual specific effect, the temporal specific effect and the error term.

As far as the estimation technique is concerned, we will use OLS. However, our analysis should not be limited to OLS, given that the data used are panel data. Indeed, it is common to encounter fixed or random effects with this type of data. The presence of fixed effects can be explained by the fact that "*entities* may *have individual characteristics that may or may not influence the outcome and/or the predictor variables*" (Torres-Reyna, 2007). Conversely, "*If you have reason to believe that differences between entities have some influence on your dependent variable, but are not correlated with the predictor variables, you should use random effects*" (Torres-Reyna, 2007). Therefore, to assess the potential presence of fixed or random effects, we performed a Hausman test. If the Chi-square probability is less than 0.05, the Hausman test suggests the presence of fixed effects. Otherwise, the model is a random-effects model.

4. Results

The results of our estimations are presented in Table 3 and Table 4. Table 3 presents the results obtained using the least squares method. These results show that

inflation (measured by the consumer price index) has a positive impact on the informal economy. Thus, an increase in inflation of one unit leads to an increase in the level of informality of 8.927% (Column 5). Overall, the other control variables (with the exception of trade liberalization) are all negative and significant. Moreover, the Fisher probability is less than 5%, which means that the model is globally significant.

Table 3. Effect of inflation on the informal economy using the OLS method

VARIABLES	1 shadow	2 shadow	3 shadow	4 shadow	5 shadow
PCI	0.115***	0.113***	0.0939***	0.0954***	0.0827**
	(0.0338)	(0.0338)	(0.0330)	(0.0330)	(0.0322)
Open		−0.0231	−0.0226	−0.0210	−0.00790
		(0.0155)	(0.0151)	(0.0151)	(0.0149)
Internet			−0.132***	−0.136***	−0.0532*
			(0.0258)	(0.0259)	(0.0302)
Industry				−0.0419	−0.0513*
				(0.0310)	(0.0302)
Domcred					−0.0736***
					(0.0148)
Constant	36.94***	38.53***	40.32***	40.44***	40.62***
	(0.491)	(1.174)	(1.191)	(1.193)	(1.159)
Obs	405	405	405	405	405
R-squared	0.028	0.033	0.093	0.097	0.150
F	11.58	6.914	13.68	10.74	14.04
Prob (F-stat)	0.00	0.00	0.00	0.00	0.00

Notes: Standard errors in parentheses ***p < 0.01, **p < 0.05, *p < 0.1.

However, the OLS method has its limitations, as this estimation technique does not take into account individual country characteristics that may influence the dependent variable. To this end, we will perform the Hausman test to determine whether the fixed-effect or random-effect model is appropriate. The results of the Hausman test are shown in **Figure 2**. This result establishes the existence of a random-effect model, as the Chi-square probability is greater than the 5% threshold.

Estimation of model (1) using the random-effects method yields the results recorded in **Table 4**. These results show that there is a positive and significant relationship between inflation and the informal economy. A one-unit increase in the consumer price index leads to a 2.93% increase in the informal sector. This result can be explained by the fact that an increase in the price level leads to a fall

	Coefficients			
	(b) fixed	(B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
PCI	.0285159	.0293257	-.0008099	.001834
open	-.0253093	-.0241223	-.001187	.0036628
internet	-.0880464	-.087234	-.0008124	.0019265
industry	-.0261195	-.0265472	.0004277	.0015137
Domcred	-.0572072	-.0597808	.0025736	.01798

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.44
Prob>chi2 = 0.9943

Source: Authors.

Figure 2. Hausman test result.

Table 4. Effect of inflation on the informal economy using the random effects method.

VARIABLES	1 shadow	2 shadow	3 shadow	4 shadow	5 shadow
PCI	0.0461***	0.0437***	0.0314**	0.0317**	0.0293*
	(0.0158)	(0.0158)	(0.0152)	(0.0152)	(0.0151)
open		−0.0235*	−0.0371***	−0.0325**	−0.0241*
		(0.0133)	(0.0129)	(0.0130)	(0.0135)
internet			−0.0938***	−0.0928***	−0.0872***
			(0.0151)	(0.0150)	(0.0151)
industry				−0.0265*	−0.0265**
				(0.0136)	(0.0135)
Domcred					−0.0598**
					(0.0269)
Constant	37.53***	39.14***	41.35***	41.15***	42.12***
	(1.434)	(1.719)	(1.720)	(1.729)	(1.781)
Obs	405	405	405	405	405
Number of i	27	27	27	27	27
prob	0.00	0.00	0	0.00	0.00
R^2	0.0720	0.0323	0.0766	0.0848	0.139

in household purchasing power. Low-income households will direct their consumption towards informal goods and services whose prices are more competitive

than those of formal goods and services, thus leading to the proliferation of the informal sector. This result is compatible with the work of Aspilaire (2014).

Trade liberalization is negatively associated with the informal economy. A one-unit increase in trade liberalization leads to a 2.4% drop in the informal economy. This result can be explained by the fact that liberalization increases opportunities, in particular access to a wider market, which may encourage those previously operating in the informal sector to migrate to the formal sector. This result is consistent with the work of Nkemgha (2023).

The number of Internet users is negatively associated with the informal economy. This result can be explained by the fact that digital technology is a window of opportunity that encourages individuals to migrate from the informal to the formal sector. This result is consistent with the work of Njagang et al. (2020).

Industrialization has a negative impact on the informal economy. A one-unit increase in the industrial sector leads to a 2.6% reduction in informal activity. This result can be explained by the fact that industrialization reduces the size of the informal sector through state protection, specifically the fight against counterfeiting. This result is similar to that of Enste (2018).

Finally, domestic credit reduces the size of the informal sector, as people wishing to access credit must first formalize their activity. This result is consistent with the work of Ajide and Dada (2022).

5. Conclusion

Sub-Saharan Africa is the second region in the world after Latin America, where the rate of informality is the highest. Africa is also facing a resurgence of inflation following the Russian-Ukrainian crisis. The objective of this paper is to analyze the relationship between the two macroeconomic quantities that coexist in sub-Saharan Africa. To achieve our objective, we used a panel of 27 countries over the period 200-2018. The use of the random effects method following the Hausman test made it possible to establish that inflation amplifies the proliferation of the informal sector. Consequently, monetary policies of central banks need to be adjusted to identify the source of inflation, the aim being to provide a targeted solution. In addition, the government should continue to combat the black economy through effective programs. For instance, an effective fiscal policy may fight against inflation and encourage firms that operate in the informal sector to migrate to the formal sector.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix. List of Sample Countries

Countries	Country
Algeria	Mauritania
Angola	Morocco
Botswana	Mozambique
Burkina Faso	Namibia
Cameroon	Niger
Chad	Nigeria
Central African Republic	Sierra Leone
Congo, Dem. Rep.	South Africa
Congo, Rep.	Sudan
Ivory Coast	Tanzania
Egypt, Arab Rep.	Tunisia
Ghana	Zambia
Guinea	Zimbabwe
Mali	

Source: Authors.