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Abstract

This paper is interested in explaining the causes of the simultaneous evolution between economic growth and informality. Using a large annual panel of African countries with a time series of 25 years, ours results show that when the corruption rate is above (below) a threshold of 1.3577, economic growth reduces (increases) informal economic sector. The corruption proxy is measured as a decreasing function of corruption such that higher levels of the corruption proxy translate lower levels of corruption. It is therefore desirable for policymakers to improve the transparency of interactions between firms, public and private agents to fight corruption, in view of decreasing the informal economic sector through economic growth.

Keywords: Informal sector, Growth, Corruption, African countries.

JEL Classification: D73, F47, J46, O1, O17, O47

1. Introduction

Since the beginning of the 2000s, African economies have experienced remarkable growth (Nesma, 2017). Africa experienced sustained economic growth averaging nearly 5 percent per year between 2001 and 2014, with a quarter of countries posting growth rates of 7 percent or more (ECA, 2017). The African continent has experienced a cycle of strong economic growth, to the point that it has become the second fastest growing region in the world after South Asia (Berrou & Eekhout, 2019). At the same time, the informal sector has continued to grow, but according to classical development theories (Onwe, 2013), the informal economic sector (hence, the informal sector or informality) should decline with the level of economic growth. However, the informal economy represents a phenomenon that is significant and permanent. Moreover, as a consequence of the global pandemic, it is evolving in most regions of the world. In terms of national income, the World Bank estimates for 162 low-, middle-, and high-income nations during the period 1997- 2009 revealed that on average, the share of the informal economy relative to gross domestic product (GDP) was 3.5 % in high-income, 36.5% in Central Asia and Europe and 38.4 % in sub-Saharan African countries, respectively (Schneider et al., 2010).

According to the latest figures, the International Labor Office (2018) estimates revealed that 85.8 % of employment is hosted by the informal sector in Africa. In Asia and the Pacific, this proportion is 68.2 %, while in the Arab States it is 68.6%. The corresponding rate is 25.1% in Europe and Central Asia while it is 40% in the Americas. The report also shows that 93% of the informal sector employment in the world is in developing and emerging economies. The largest include: Bolivia (62.3 %) and Zimbabwe (60.6 %) while the smallest are Switzerland (7.2 %) and Austria (8.9 %). Evidence is apparent that firms in the informal sector are generally smaller and are characterized by lower productivity, and that variations in the informal sector's size can elicit a significant proportion of output per capita variations between poor and rich nations (La Porta & Shleifer, 2014).

Moreover, the average share of employment in the informal sector in relation to total nonfarm employment is growing rapidly on a continuous basis, especially in countries in Africa that are characterized by growing employment in the informal sector. The informal sector's size in some cases entails formal sector's size, especially in low-income nations such as Zimbabwe and Tanzania. These low-income nations are also characterized by substantially high informal employment shares, which could exceed 70 percent in some cases (as apparent

in Mali, Madagascar, the Democratic Republic of Congo and Uganda). Nonetheless, the informal sector's growth has failed to prevent the underlying countries from witnessing higher levels of economic prosperity. It is worthwhile to note that a steady trajectory is followed by informal employment: a tendency that continues to progress irrespective of the economic growth level that is achieved. Hence, economic prosperity does not necessarily engender a decline in the progression of informality. Both high GDP growth and a substantial proportion of informal employment and the informal economy are reported by some countries (such as Ethiopia, Rwanda and Tanzania).

There is a consensus in the literature that the informal economy should decline with economic growth (Wu & Schneider, 2019). As such, this article aims to explain the persistence of the informal sector in Africa, despite the strong growths recorded. In other words, it seeks to explain the cause of the simultaneous increase of the economic growth rate and the size of the informal economic sector in African countries. Thus, the main question raised by this study is, why despite rapid and high growth rates in African countries, the size of the informal sector continues to grow? To answer this question, we look at the role that the quality of institutions can play, particularly corruption (an endemic phenomenon in Africa). Although informality is a well-documented topic, with contributions from different perspectives, to our knowledge there is no comprehensive study assessing the effect of economic growth on the informal sector in the presence of corruption. Moreover, almost no study has explained the simultaneous increase in growth and informality in developing countries and particularly in Africa. Our paper contributes to the existing literature by filling this gap. For the first time, it is shown in this paper that the relationship between economic growth and the informal sector is not linear or blanket but contingent on the rate of corruption, such that economic growth only decreases the informal economic sector when the level of corruption is below a given threshold. The rest of the paper is structured around the following points: Section 2 presents a brief review of the literature, Section 3 covers the methodology and dataset. The empirical results are disclosed in Section 4 while Section 5 concludes with implications and future research directions.

2. Literature Review

This section has two sub-sections; the first deals with the theoretical (2.1) and the second with empirical (2.2) literature.

2.1- Theoretical literature

The informality literature is diverse and entrenched. The attendant strand of literature became popular in the late 1980s when the Other Path was published; a publication in which de Soto and co-authors illustrate the informal sector as the response of the private sector to an economy that is in a state of inefficiency and over regulation. This approach steers clear of the approach that was prevailing at the time, in which informality was not the consequence of misguided policies, but seen as a mere underdevelopment symptom (Loayza, 2016).

Early theoretical analyses of the informal economy argued that informality is a temporary phenomenon that disappears with the development of economies. In the theoretical literature, the informal economy debate has crystallized into four main strands of thought (the structuralist, dualist, voluntarist, and legalistic schools). According to the dualist school, an economy's informal sector is comprised of distinct marginal activities, parallel to the formal sector, which provides the poor with a safety net and income in period of crisis (Sethuraman, 1976; Hart, 1973; Tokman , 1978).

According to the structuralist school, the informal economic sector is perceived as a subordinate economic unit (e.g. a micro-enterprise) and workers play the role of reducing labor and input costs and thus boost the competitiveness of large capitalist corporations (Moser, 1978; Castells & Portes, 1989).

From the perspective of the legalist, the informal sector consists of "courageous" micro-entrepreneurs who: (i) decide to operate on an informal basis in order to limit time, costs, and effort of formal registration and (ii) are in need of property rights in order to make their assets recognized assets legally (de Soto 1989, 2000). The voluntarist school also puts emphasis on entrepreneurs in the informal sector who deliberately aim to avoid taxation and regulation. However, but, as opposed to the legalistic school, the blame does not rest on the stringent registration procedures. Accordingly, a different casualty theory supporting the origin of the informal sector is consistent with each school of thought.

According to the Dualists, it is argued that operators of the informal sector are not involved in economic opportunities owing to imbalances that are apparent between on the one hand, modern industrial employment and population growth rates, and on the other, a mismatch between the structure of modern economic opportunities and people's skills.

It is assumed by Structuralists that the nature of economic prosperity in the capitalism/capitalist world is the force driving informality. Accordingly, it is about formal firms' attempts to mitigate the cost of labor and boost competitiveness and how formal firms respond to the force behind organized labor, economic state regulation (involving social legislisation and taxes), competition at the global level, and the industrialization process (involving offshore industries, flexible specialization and subcontracting chains). According to lawyers, a legal system that is hostile pushes the self-employed to informally operate with their standards that are extra-legal standards. According to proponents of this approach informal operators decide to informally operate upon weighing the benefits and costs of informality compared to formalism (Chen, 2012).

Several theoretical approaches have clashed since the concept first appeared, in an attempt to understand "why" the informal sector exists, or even persists. From these different confrontations, we can retain some major approaches to the informal sector, ranging from its perception as an economy of survival to the conception of a refusal of development, passing through an acceptance in terms of excess of State or submission to capitalism. For some analysts, inspired by modernization theories, the informal sector responds above all to a logic of survival for those who are not (yet) registered in the formal or modern circuits of the economy. This perspective, defended in particular by the International Labour Organisation (ILO) and developed from the very beginning of the concept, notes the existence of a sector whose production logic differs from that of the rest of the economy. It is then analyzed in terms of poverty and the search for survival. In the absence of a welfare state, the poor of the Third World formulate survival strategies, recover and transform waste, take advantage of the slightest opportunity (Lautier, 1994).

According to this approach, as things stand at present, the informal sector provides income and survival jobs, but nothing more is to be expected from it. Ideally, therefore, it should be formalized in the long term. It should also be noted that this approach in terms of survival was also that of the liberals until the mid-1980s, when they developed their approach to the sector.

From a theoretical perspective, Perry et al. (2007) postulate that there is an efficiency risk of losses owing to the absence of economies of scale within the informal sector. Further, given that informal activities are not compliant with any laws and regulations, there is an associated cost advantage that enables such activities to be in competition with the formal sector. Unfair competition is a consequence and such could lead to a decline in destructive

and creative processes that do away with inefficiencies (Stuart et al., 2009). Nonetheless, the self-selection of firms in industries characterised by low-production is not necessarily unproductive given that some industries principally leverage on labor-intensive technologies and by extension, increasing returns to scale are not indispensable. Hence, even if a negative impact on overall growth has been generalized by informality, growing informality could engender positive macroeconomic outcomes by positively influencing standard determinants of growth such as financial capital, human capital, and GDP per capita.

From a theoretical perspective, Sarte (2000) has argued that economic growth is not negatively affected by the informal sector. Conversely, economic growth is reduced by behavior that is rent-seeking in the presence of substantial extra-legal costs. Furthermore, by employing an endogenous model, it has been shown by Nabi and Drine (2009) that when certain conditions are met, economic growth can be positively linked to the informal sector.

More recent studies on the informal economy, consistent with conventional theory, suggest that the informal economy will decline with growth (Loayza, 1996; Ihrig & Moe, 2000; Heintz & Pollin, 2005; Rigolini et al., 2006; Chen, 2006; Heintz & Pollin, 2008; Nordling, 2017; Goutam, 2017; Baklouti & Boujelbene, 2020). While economic growth is an essential element in reducing informality, there is evidence that, in some cases, informality may persist despite strong economic growth (Stansell, 1983; Castells & Portes, 1989; Benería, 1989). Contrary to expectations, however, informality has not disappeared but rather has become permanent. It has become increasingly evident that there is a complex relationship between economic growth and informality.

2.2- Empirical literature

A substantial number of economic studies have been oriented towards the informal economy, with a special focus on the corresponding causes and estimated magnitude of effects. Moreover, most studies on the productivity of informal firms show that informality is associated with lower growth and productivity (Loayza, 1997; Gonzales & Lamanna, 2007; Friesen & Wacker, 2013; Abid & Salha, 2013; Chatterjee & Turnovsky 2018). However, other studies (Ali & Najman, 2014; Arona & Thiam, 2018) rather prove that in specific cases, the presence of the informal sector can be beneficial to formal firms and economic growth.

According to Berrou and Eekhout (2019), responding to the challenges of promoting and formalizing the informal economy helps to strengthen the link between the State and the

population and such is accompanied by benefits in terms of growth, income, equity, and governance capable of generating inclusive development (Berrou & Eekhout, 2019). According to Ruzek (2015), the sustainable use of goods can be encouraged by the informal economy. The author demonstrates that when the informal sector is supported by means of non-market activities, street vendors and the market of farmers, there is a drift from a singular economy and a car-dominated society trajectory. Accordingly, social capital can be provided by the informal sector, which can also create jobs, provide the basis for sustainable development and promote local economies. Arona and Thiam (2018) also analyzed the influence of the informal sector on the Senegalese economy using a two-sector Dynamic Stochastic General Equilibrium (DSGE) model for the simulations. Their results showed that after a 5% annual increase in the productivity of the informal sector over 10 years, overall production should increase by 2% on average, that of the informal sector would increase by 4.9% while that of the formal sector would be virtually unaffected. The impact on the economy's productivity would be positive given the predominant weight of the informal sector. This would lead to an increase in household final consumption and a decrease in the general price level. Ali and Najman (2014) prove that in specific cases, the presence of the informal sector can be beneficial for some formal firms. However, the informal sector, previously considered as a transitory "accident" in the process of building a modern economy in developing (Baliamoune-Lutz et al., 2008; Fiorino et al., 2012).

From an empirical standpoint Porta and Shleifer (2008) provide a clear conclusion on how the informal economy contributes towards economic development in Latin American, African and Asian countries. On the contrary, the authors have articulated that growth productivity is accompanied by large firms in the formal economic sector. Furthermore, employing a transnational dimension, it is suggested by Loayza and Rigolini (2006) that in the long term, informality has a counter-cyclical impact on GDP per capita. In the short run, this impact is attenuated in countries in which informal employment is higher as well as where better policies and regulations are apparent. However, Bigsten et al. (2004) establish no significant gap in productivity between formal firms that are small and their informal counterparts in Kenya, although better export and investment avenues are associated with formal firms. When a large panel data set from 161 countries during the period 1950-2010 is employed by Elgin and Birinci (2016), an inverted U-shaped nexus is established between economic growth and the size of the informal sector. It is also shown by Schneider (2006) that the informal economic sector engenders a negative and significant incidence on economic

growth in developing nations. However, a positive effect was apparent in transitioning and developed OECD countries. Moreover, some main findings from the attendant literature are provided in Table 1.

We can therefore see that neither those who link the growth rate to the informal sector, nor those who focus on corruption and the informal sector, have taken into account in their analyses the behavior of growth and informality in the presence of corruption, which is one of the main characteristics of developing countries and emerging economies. This main limitation (the hypothesis of a universal negative relationship between economic growth and the informal sector can only be true if the level of corruption remains low) is assessed by this paper for the first time to our knowledge and constitutes a major contribution to the literature in this field. We will therefore test the following hypothesis in our regressions:

Hypothesis 1: If corruption is high, the informal economy increases, ceteris paribus.

Table I Some findings in the existing literature.

Authors, years and dependent variables in bold	***Title of the article***	***Independent variables and signs obtained***
Baklouti and Boujelbene(2020)	*The Economic Growth–Inflation–Shadow Economy Trilogy: Developed Versus Developing Countries*	*Economic Growth /(-)*
Baklouti1 and Boujelbene(2018)	*A simultaneous equation model of economic growth and shadow economy: Is there a difference between the developed and developing countries?*	GDPpercapita / (-)
Nordling (2017).	*Growth and the Informal Economy: A study on the effect of growth on the relative size of the informal economy in the developing world.*	*Economic Growth(-)*
Loayza and al. ***(2006)***	*Informality Trends and Cycles*	*Growth / (-)*
Goutam, Gutierrez, Kumar and Nataraj (2017).	*Growth and Informality: Evidence from Bangladesh.*	*GDPgrowth / (-)*
Ihri and Moe (2004)	*Tax Policies and Informal Employment: The Asian Experience*	*GDPgrowth / (-)*

Heintz and Pollin(2003).	*Informalization, Economic Growth and the Challenge of Creating Viable Labor Standards in Developing Countries*	*Growth / (-)*
ILO(2012)	*Growth Strategies and Quality Employment Generation.*	*Growth / (-)*
Hibbs, Jr. and Piculescu (2005).	*Institutions, Corruption and Tax Evasion in the Unofficial Economy*	Corruption/ (+)
Johnson, Kaufmann, and Zoido- Lobaton. (1998).	*Regulatory discretion and the unofficial economy*	*Corruption / (+)*
Buehn and Schneider(2011)	*Corruption and the shadow economy: like oil and vinegar, like water and fire?*	Corruption/ (+)
Dreher, Kotsogiannis and McCorriston(2009).	*How do institutions affect corruption and the shadow economy?*	*Corruption / (-)*
Choi and Thum (2005)./ ***informality***	*Corruption and the shadow economy.*	*Corruption / (-)*
Our paper work's looking for: Informal sector	***The role of economic prosperity on informality in Africa: evidence of corruption thresholds from PSTR***	*GDPgrowth/ (+* ***or*** *-) the sign here varies depending on the level of corruption in the economy*
Source: Authors		

3. Methodology

3.1 Data and sources

A large data set from south Saharan African countries[1] within the period 1991-2015 from the Corruption Perception Index (CPI), World Development Indicators (WDI), and Medina and Schneider (2018) were used. In addition to economic growth and the informal sector, several control variables were employed in this analysis. Table 1 provides descriptive statistics for all the used variables. The existing literature provides insights into the choice of variables.

4.1- Descriptive statistics

Table II Summary statistics (1991-2015)

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
GDP growth	GDPgrowthannual	1,169	4.375917	8.451599	-50.24807	149.973
Domes	DomesticcredittopS	1,124	18.27799	17.36414	.4103563	106.2603
TradeofGDP	TradeofGDPNET	1,113	74.69485	44.06886	20.43712	531.7374
Corrup	Corruption	799	3.10567	.5886707	1.283263	4.272761
Property-R	Property rights	884	37.20588	15.67466	5	75

Among these variables, we predict a negative correlation between growth in GDP, credit to the private sector, trade, and the informal economy. Concerning the estimated coefficient of corruption our expectations is positive. We obtained the data sets on growth, trade, domestic credit to the private sector, and property rights from the World Development Indicators (WDI). These are the most widely used variables in the empirical literature on informality.

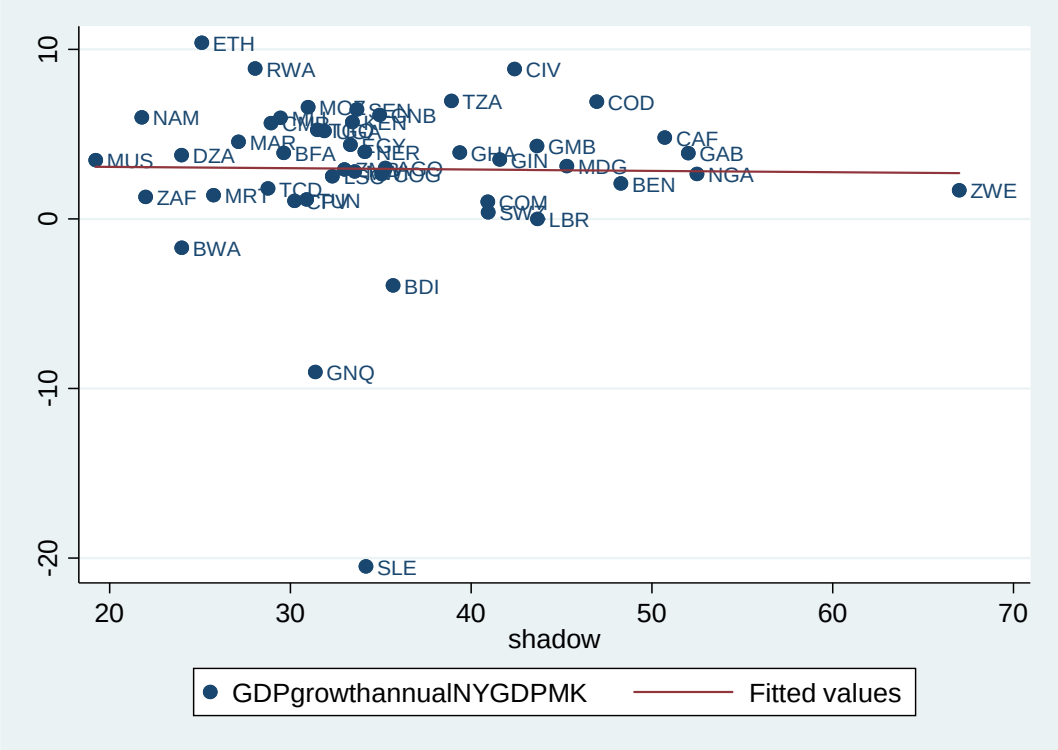
Figure I shows the influence of growth on the size of the informal sector. We see that increased growth negatively affects the informal sector.

Figure II highlights the impact of corruption on the size of informality. We find that the increase in corruption positively affects the size of the informal sector.

[1]The sampled countries are : Algeria; Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Cape Verde; Central African Republic; Chad; Comoros; Congo, Dem, Rep; Congo, Rep; Cote d'Ivoire; Egypt; Equatorial Guinea; Eritrea; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mauritius; Morocco; Mozambique; Namibia; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; South Africa; Swaziland; Tanzania; Togo; Tunisia; Uganda; Zambia; and Zimbabwe.

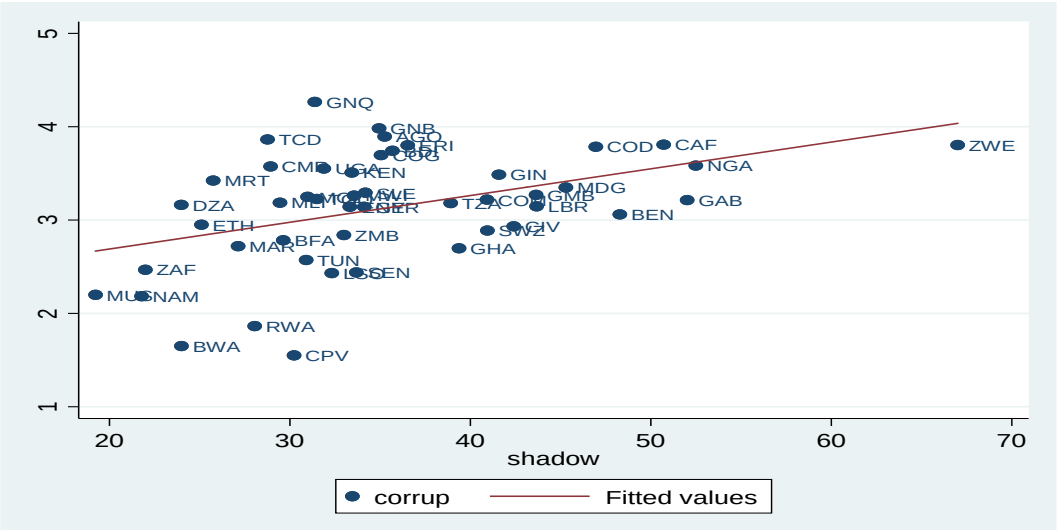
Figure III highlights the influence of corruption on growth. We find that the increase in corruption negatively influences the level of growth.

Fig I Growth and Informality



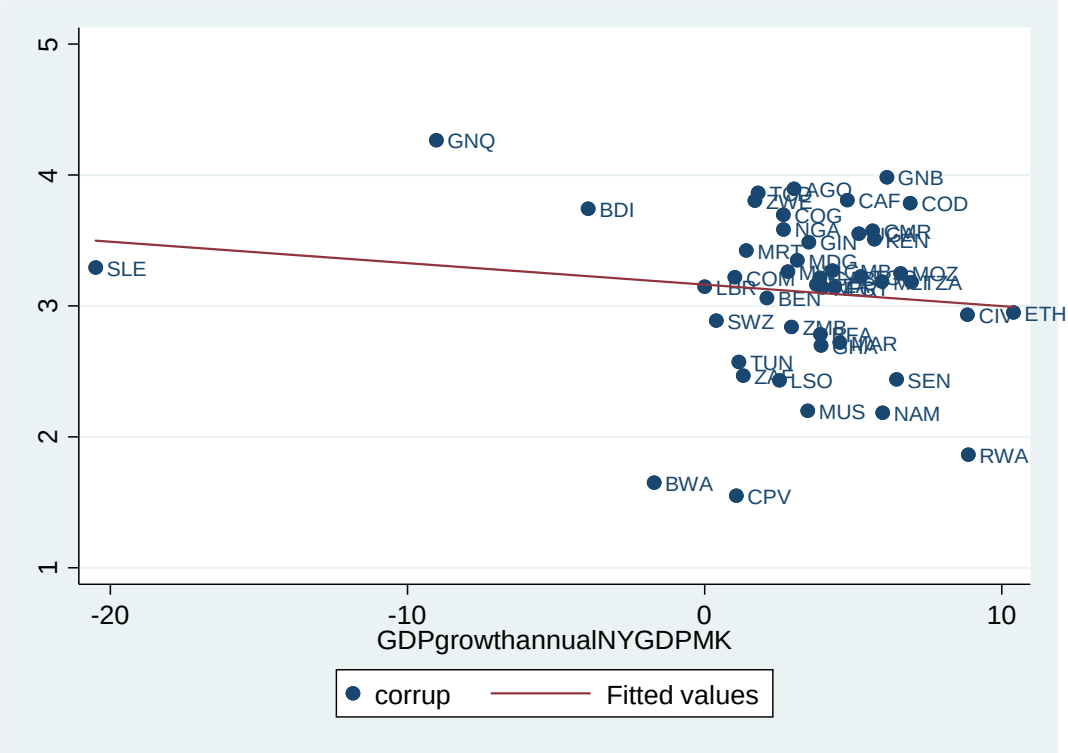
Source: Authors based on data from Medina and Schneider (2018) and WDI

Fig II Corruption and Informality



Source: Authors based on data from Medina and Schneider (2018) and CPI

Fig III Corruption and GDPgrowth



Source: Authors based on data from CPI and WDI

3.2 Model

Our hypothesis is tested using the Panel Smooth Transition Regression (PSTR)model controlling both the economic and institutional determinants of the informal economy. In simple terms, the linear model can be presented as Equation (1).

$$IS_{i,t} = \beta 0 + \beta 1 Growth_{i,t} + \beta 2 Corrup_{i,t} + \sum_{i=5}^{n} \beta_k X_{i,t} + \theta_i + \gamma_t + \varepsilon_{i,t} \qquad (1)$$

Where $IS_{i,t}$ is informal sector size as % of GDP in country i, in year t, $X_{i,t}$ denotes other explanatory(control) variables. θ_i , γ_t are the country and period fixed effects, and $\varepsilon_{i,t}$ denotes the error term. β_1 is the effect of growth on the informal economy (-) and β_2 is the effect of corruption on the informal sector (+) and β_k represents the effects of the control variables. However, the main purpose of this study is to analyze the effect of growth on the informal economy in the presence of corruption. To this end, we estimate Equation (1):

$$IS_{i,t} = \alpha_0 + IS_{i,t-1} + \alpha_1 Growth_{i,t} + \alpha_2 Corrup_{i,t} + \alpha_3 Corrup_{i,t} * Growth_{i,t} + \sum_{i=5}^{n} \beta_k X_{i,t} + \theta_i + \gamma_t + \varepsilon_{i,t} \quad (2)$$

The interpretation of the interaction term requires the calculation of marginal effects. By taking a partial derivative of Equation (2) about corruption, we obtain the effect of economic growth on informality as a function of corruption. The coefficient α_3 of Equation (2) makes it possible to grasp the supposed influence of economic growth on the informal economy evaluated to values of corruption.

4.1- Stationarity tests

Verification of stationarity in regression analyses with data that involves time series properties is now a standard. The purpose of such is to assess if variables are stationary or non-stationary. In an event where variables are non-stationary, if the standard OLS is be employed for the regression, the results of the estimation will be erroneous (Enders, 2010). Moreover, it is very probable that in the presence of non-stationary variables, especially when a linear combination of the variables exhibits stationarity, a long-term equilibrium is apparent among the variables (Engel & Granger, 1987). In order to assess for non-stationarity, the following panel data tests are employed: the LLC (Levin, Lin & Chu) and IPS (Im, Pesaran and Shin W-stat) tests.

In a number of scholarly contributions, Andrew Levin and Chien-Fu Lin proposed the first panel unit root test to the scientific community (Levin & Lin, 1992, 1993; Levin, Lin & Chu, 2002). Their suggested approach builds on the time-series unit root tests of Dickey and Fuller (1979). A principal drawback in the test proposed by Levin and Lin is that under the alternative hypothesis it is situated in the homogeneous side of the autoregressive root. Accordingly, it is not very likely that in the event that a unit root hypothesis is not accepted, the autoregressive root hypothesis is not rejected. The proposed tests by Im, Pesaran and Shin in a number of studies (1997, 2002 and 2003) respond to the underlying criticism. Accordingly, unit root tests are performed to make sure that the variables are either stationary I(0) or integrated of order one I(1). Consistent with the literature (Pesaran et al., 2001; Ouattara, 2004), when I(2) variables are apparent, the F-statistics computed in the limit approach are not valid owing to the fact that the test statistics in the limit tests are computed under the I(0) or I(1) assumptions.

Table III Unit root test of the different variables

	LLC	IPS	Decisions
GDP growth	-20.2830	-25.4400	I(1)
	(0.0000)	(0.0000)	
Domes	-7.9366	-12.233	I(1)
	(0.0000)	(0.0000)	
Property-R	-3.28061	-1.45796	I(0)
	(0.0005)	(0.0724)	
TradeofGDP	-2.15747	-1.40452	I(0)
	(0.0155)	(0.0801)	
Corrupt	-7.61406	-6.90398	I(1)
	(0.0005)	(0.0000)	

Source: Authors', from Stata-15 software. NB: If the P-Values (the values in brackets) are less than 0.01; 0.05; 0.10, it means that the variables are stationary at the threshold of 1%; 5%; 10%, respectively.

In general, classical statistical methods of econometrics have been designed for series that are stationary and for which statistical properties do not vary across time. Among these unit root tests, the most widely employed are those of Im, Pesaran and Shin (IPS) and Levin-Lin-Chu (LLC). According to Hurlin and Mignon (2004), the employment of first generation tests such as that proposed by Levin and Chu has draw backs. Accordingly, the test supposes interindividual independence of the residuals. The alternative second generation tests such as that proposed by Im, Pesaran and Shin addresses the identified deficiency. Hence, it is this test that is employed because it is stable as well as effective. The null hypothesis of the test is based on the fact that, against the alternative hypothesis supporting the perspective that only a fraction of the series is stationary, all the series are non-stationary. Through the Im-Pesaran-Shin stationarity test, we can see that most of the variables (GDP growth, Domes) are stationary in first difference, at the 1% level of significance. Property-R and TradeofGDP are also stationary at the 1% level of significance.

4.2 Empirical results

The PSTR analysis allows us to conclude that our results are probably not weakened by endogeneity problems or omitted variable bias.

Table IV Corruption, growth, and informality (PSTR estimator)

	Informality		**Informality**
	Corruption		**Corruption**
	Lower regime		**Upper Regime**
GDPgrowth	0.0526**		-0.2339***
	(0.0653)		(0.0670)
TradeofGDP	-0.01540531*		-0.0168*
	(0.0093)		(0.0105)
Property-R	0.0904***		0.0240
	(0.0182)		(0.0170)
Domes	-0.2116***		-0.0103
	(0.0337)		(0.0192)
Threshold	**1.3577**		**1.3577**
Gamma	61.7644		61.7644
LMF	10.775		10.775
	[0.000]		[0.000]
Observations	44		44

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

Source: *authors' calculations based on Matlab 14a.*

In Table (IV), we use the Panel Smooth Transition Regression (PSTR) to determine the threshold of informality at which a regime change occurs. This threshold corresponds to 1.3577 and reflects the rate of corruption that affects the relationship between growth and the informal economy. The perception of corruption is the indicator provided by the CPI and is between 0 and 100. A score closer to 0 corresponds to more corruption while a score closer to 100, to less corruption.

In the first regime where corruption is below 1.3577, i.e. a value that tends toward zero, the high level of corruption undermines the effect of growth on the size of informality.

The universally recognized negative relationship between growth and informality becomes positive. On the other hand, in the second regime corresponding to values above 1.3577, growth continues to play its role in reducing the size of informality. It is important to note that, the corruption proxy is measured as a decreasing function of corruption such that higher levels of the corruption proxy translate to lower levels of corruption.

Table V Sensitivity *coefficients*

Group of countries in relation to the size of informality			
Size of informality <50		size of informality >50	
Algeria	-0.11966534	Benin	-0.12185749
Burundi	-0.11966534	Gabon	-0.11966534
Cameroon	-0.1092751	Nigeria	-0.11966534
Mean β	-0.11620193	Mean β	-0.12039606

Source: *authors' calculations based on Matlab 14a.*

The sensitivity analysis in Table (V) indicates that countries with low levels of informality and low levels of corruption have a better sensitivity coefficient than countries with high levels of informality and higher levels of corruption. These results support those of previous works (Goutam, 2017; Baklouti & Boujelbene, 2020). In their analysis, Baklouti and Boujelbene, (2020) found that higher GDP per capita is associated with a smaller informal economy in countries with good institutional quality. However, in countries with low institutional quality, higher GDP per capita does not influence the size of informality. This may indicate that in the presence of corruption, other variables have a significant independent impact on the informal sector.

The results of this study imply that increased informality and political failures are likely to occur in an economy where more corruption reduces the effects of growth. The fight against corruption is a determining factor for growth in the sense that the least corrupt economies also have reduced informal activities (Dreher & Schneider 2010; Mishra & Ray 2013).

5. Concluding implication and future research directions

This study aimed to broaden the analysis of the relationship between growth and the informal economy in African countries while explicitly highlighting the negative impact of a significant presence of corruption on economic performance. As growth contributes to the reduction of parallel activities through better reallocation of its resources, it is, therefore, essential to analyze the role played by corruption in this process of resource allocation, particularly in developing economies where the allocation of talent is dependent on rent-seeking (Rose-Ackerman, 1978; Murphy et al., 1991). Our results have shown that growth contributes to the reduction of informal activities at a modest level of corruption. This effect

becomes contrary to the most significant levels of corruption. The fight against corruption is a determining factor for growth in the sense that the least corrupted economies also have reduced informal activities (Dreher & Schneider, 2010; Ajit & Ranjan, 2013). The results of this study imply that increased informality and political failures are likely to occur in an economy where more corruption reduces the effects of growth. These forecasts are based on empirical evidence from the use of econometric models and a panel data set comprising African countries over the period 1991-2015.

The new contribution of this study is to show explicitly the indirect effect of corruption on the informal sector. When there is poor reallocation of resources or in situations where the redistribution of the fruits of growth are exacerbated by corruption, most economic agents are forced to engage in survival activities, which is the reason growth rates do not contribute significantly to reduce informal activities. It is therefore desirable for policy makers to improve the transparency of interactions between businesses and public and private agents in order to better combat corruption and significantly reduce the size of the informal sector. It follows that economic growth is a necessary but not a sufficient condition for the reduction of the informal economic sector, not least, because such economic prosperity should be complemented with appropriate institutional governance policies, notably: corruption-control such that both the State and citizens fully respect institutions that govern interactions between them.

The findings in this study can obviously be extended by considering other mechanisms and policy variables by which the informal economic sector can be curbed in Africa and by extension, how such interactions can improve the tax base and consolidate fiscal income. These future directions should also be considered along the lines of the global development agenda of sustainable development goals (SDGs).

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