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Abstract

The main objective of this paper is to contribute to in-depth literature on the relationship between growth and the informal sector in the presence of corruption. The impact of the interaction between growth and corruption on economic performance (increase or decrease of the informal sector) will be discussed. To the best of our knowledge, our paper is unique in the empirical literature because it studies the effect of the interaction between growth and corruption in the informal sector using a sample of developing countries. Our results based on the FE, system GMM, MG, AMG, and IV-2SLS for 112 countries between the 1991-2015 periods, show that growth reduces informality in the direct effect regression. Moreover, economic growth interacts with corruption and produces negative net effects up to a corruption threshold of 4.79745 when this effect is nullified. This negative net effect was found to be robust across different regional groupings and income groups except in the Middle East and North Africa (positive net effect) and high income and upper-middle-income countries (only direct effects) producing different thresholds per sample. The study recommends that policymakers should intensify their fight against corruption in their quest to reduce the size of the informal economy.

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

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

1. Introduction

The world economy has evolved over the years, moving from State-led ascendency of the 1970s to market-led supremacy in the 1990s and now to an increasingly integrated and globalised world economic growth, with the share of informal economy dominating in several regions of the world (Yusuff, 2011; Njoya et al., 2022). The constant increase in macroeconomic growth has failed to reduce the size of informal economies where the underlying causes of poverty, such as lack of access to education, health, and credit, have remained unchanged (Chambwera et al. 2011). For example, India's gross domestic product (GDP) has grown by about 6.5% each year over the past decade, which has had some impact on poverty reduction, but the informal economy remains large, accounting for nearly 90% of the labour force (Government of India, 2012). In Cameroon, the informal sector dominates the formal sectors with youths at the forefront; in fact, young people aged 10-24account for more than 26% of the informal employment in that country (Ngohouo and Nchofoung, 2021). Even with the narrower definitions of informal markets, there is ample evidence of their contribution to national economies. For example, in sub-Saharan Africa, the informal sector accounts for about 55% of GDP and 80% of the labour force (AfDB, 2013). Opportunities offered by informal markets are not limited to the least developed countries. In a recent study of 44 low- and middle-income countries, the International Labour Organisation (ILO) found that in 11 countries, informal employment accounts for at least two-thirds of non-agricultural employment. Moreover, in more than 22 countries, more women than men are in informal employment (ILO, 2011; Benson, 2014).

At the same time, the effect of economic growth has been experienced in diverse economic sectors in developing countries. This moves from its ability to boom the financial sector though undermined by corruption (Song et al., 2021). Economic growth could further shape the budget deficit and productivity of the economy (Arjomand et al., 2016), or reduce income inequality and poverty (Perera and Lee, 2013). Besides, growth could influence the tax structure (Koch et al., 2013). High taxes, poverty and inequality could push a chunk of the labour force to the informal sector. High taxes could equally spurbig firms to engage in the informal sectors in order to avoid fixed charges associated with the formal sector (Mishra and Ray, 2013). However, for economies characterized by high inequality and poverty, a useful tool for government to appease social unrest, could be to choose a lower level of governance allowing substantial corruption in the system, leading to high levels of employment in informal activities (Dutta et al., 2013).

Historically, analysis of the relationship between the informal sector and economic growth has remained controversial. While it is clearly established that in developing countries, there is a positive relationship between these variables (Schneider, 2011; Schneider and Enste,2000; Axel Dreher and al., 2008;Dell'anno, 2015), some studies rather find that a very high informal sector weakens the performance of the economy (De Soto 1989;Loayza1997; Cooper Drury 2006; Era and Gabriela, 2008). In addition, a negative correlation between growth and the size of the informal sector has also been shown by many researchers (Chen, 2006; Heintz and Pollin, 2008; Elgin and Birinci, 2016). Thus, the definition of the informal sector firstly confronts researchers with the problem of lack of a single definition. The definitions often used in empirical research lack consistency from one study to another (Guha-Khasnobis, Kanbur, and Ostrom, 2006). For example, Smith (1994, p. 18) defines it as "*a market-based production of goods and services, legal or illegal, that escapes detection in official GDP estimates*". Schneider et al. (2010) on their part define the informal sector as a set of market-based economic activities that are consciously hidden from the government in order to avoid regulation and taxation. Although difficult to define and measure, the informal sector is undoubtedly a widespread phenomenon in developing countries. The common denominator deriving from these definitions is gross domestic product. In other words, there is a certain level of growth that is always hidden in the shadow because of the undergrown economy.

However, an in-depth analysis shows that an increase in growth is not always synonymous with a reduction in the volume of informality in developing countries that are characterized by very poor institutional performance, particularly their high level of corruption, with Sub-Saharan economies in the lead (Ngouhouo et al., 2021). Other factors[1] besides economic growth have been shown to be effective in reducing the size of the informal economy in Africa (Ngouhouo and Njoya, 2020). Again, this sector contributes only to one-third of the economy (Schneider and Enste, 2002) and is subject to tax losses (Mazhar and Melon, 2016). It also has a negative impact on economic and social development (Ulyssea, 2020) and could be a barrier to sustainable development (Özgür et al., 2021). Thus, the main question raised by this paper is why, despite rapid growth rates in many developing countries, the size of the informal sector continues to grow? Empirical evidence shows that economic growth reduces the size of the informal sector and that high levels of corruption jeopardize this relationship.

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[1] For example: women's parliamentary representation (Ngouhouo and Njoya, 2020)

The main contribution of this paper lies in the fact that it shows new evidence on the relationship between growth and the informal sector given the controversies in previous studies. The study further integrates the mechanisms through which corruption impacts this relationship. Besides, regional groupings and income groups are further separately studied for more oriented policies. In order to achieve our objectives, the remaining of the study is presented as follows: Section 2 engages a brief literature review; Section 3 explains the methodology and presents the data and Section 4 discloses various results. Section 5 concludes with policy implications and directions for future research.

2.   Theoretical and Empirical Literature Review

Despite multiple reforms and endless debates, the question on the development of the informal sector has remained embarrassing. In fact, it has been clearly established in the literature that the informal sector is rising despite high and rapid growth rates in developing countries. The main objective of this section is to present the theoretical and empirical evidence of the relation between the growth rate of GDP and the informal sector in the presence of corruption in developing countries.

2.1.   Theoretical approach

Theoretical analyses of the informal economy argued that informality is a temporary phenomenon that disappears as economies develop. However, contrary to expectations, informality has not disappeared, but rather has become permanent. It has become increasingly clear that there is a complex relationship between economic growth and informality.

Three dominant schools of thought in the literature present the origins and the causes of the informal sector in the world economy and particularly in developing countries. These three schools are: the Dualistic, the Structuralism and the Judicial or Liberal School.

The Dualistic approach follows Lewis (1954) and Harris-Todaro (1970).This approach views the informal sector as a subsistence economy resulting from the fact that the modern sector cannot absorb all the labour force. Perceived in this way, the informal sector is: (i) bound to disappear with economic growth; (ii) a regulator; and (iii) a palliative to the collapse in the modern sector.

The Structuralist approach focuses on existing relationships between formal and informal sectors. This approach insists on the link of subordination between the two sectors within the

framework of a capitalist system. The modern takes advantage of the existence of the informal sector because of low labour costs in order to be more competitive of social relations corresponding to different stages of development.

The Legalistic or Liberal approach is an approach that emphasizes the importance of the costs of formalization. It considers that the informal economy is an economy of micro-entrepreneurs who seek by all means to voluntarily escape state regulations. De Soto (1989) believed that the urban informal sector is where pure and perfect competition develops, prevented from developing in the formal sector by multiple legal barriers. Thus, none of these schools or authors took into consideration in their development the relation between the growth rate of GDP and the informal sector in the presence of corruption.

2.2. Empirical literature

Many authors discussed the effect of growth rate on the informal sector (Loayza, 1997; Ihrig and Moe, 2000; Dangler, 2000; Heintz and Pollin, 2005; Heintz, and Pollin, 2008; Chen, 2012; Baklouti and Boujelbene, 2020). Others put emphasis on corruption and informality (Shleifer, 1997; Hindriks et al., 1999; Johnson, Friedman et al., 2000; Hibbs and Piculescu, 2005; Andreas et al., 2011; Choi and Thum, 2005; Dreher et al., 2009).

For the first group of authors, existing literature clearly establishes a negative correlation between growth and the informal sector (Baklouti and Boujelbene, 2020). In the same vein and in line with classical theory, more recent studies on the informal economy suggest that the informal economy will decline with growth (Loayza, 1997; Ihrig and Moe, 2000; Dangler, 2000; Heintz et al., 2005; Heintz and Pollin, 2008; Chen, 2012; Baklouti and 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 (Castells and Portes,1989; Benería 1989).

This paradox in the literature suggests that other external factors (level of corruption, financial development, *inter alia*) significantly influence the relationship between growth and the informal sector.

The second group of authors found a positive relation between corruption and the informal sector (Shleifer 1997; Kaufmann and Zoido-Lobatón, 1998b; Johnson, Friedman et al., 2000; Hibbs and Piculescu 2005), while Choi and Thum (2005), Dreher et al. (2009) found a negative correlation.

We can therefore observe that, neither those who relate growth rate and the informal sector, nor those who put emphasis on corruption and the informal sector in their analysis, took into

consideration the behaviour of growth and informality in the presence of corruption, one of the main plagues of developing countries and emergent economies.

This paper attempts to correct the main obstacle, which is: the hypothesis of a universal negative relationship between economic growth and the informal sector. This may only be true if the level of corruption remains modest because to the best of our knowledge, the dimension of corruption is related to economic growth in order to reduce the size of the informal sector. The hypothesis of a universal negative relationship between economic growth and informal sector may only be true if the level of corruption remains modest.

Table1: Most important findings in the existing literature

Authors, years and dependent variables in bold	Title of the article	Independent variables of interest and signs obtained
NedraBaklouti& YounesBoujelbene (2020). /**Informal sector**	The Economic Growth–Inflation–Shadow Economy Trilogy: Developed Versus Developing Countries	Economic Growth / (-)
Nedra Baklouti[1] · Younes Boujelbene(2018)./ **Informality**	A simultaneous equation model of economic growth and shadow economy: Is there a difference between the developed and developing countries?	GDPpercapita / (-)
Loayza and al, (2006) ./ **Informal employment**	Informality Trends and Cycles	Growth / (-)
Jane Ihri and Karine S. Moe(2004)./**Informal sector**	Tax Policies and Informal Employment: The Asian Experience	GDPgrowth / (-)
James Heintz AndRobertPollin(2003)./ **Informalization**	Informalization, Economic Growth and the Challenge of Creating Viable Labor Standards in Developing Countries	Growth / (-)
ILO(wcms_210444.pdf) informality	Growth Strategies and Quality Employment Generation.	Growth / (-)

*Douglas A. Hibbs, Jr. and VioletaPiculescu (2005)./**Informality***	*Institutions, Corruption and Tax Evasion in the Unofficial Economy*	*Corruption / (+)*
*Johnson, S.,& Kaufmann, D. Zoido-Lobaton. (1998)./**Informality***	*"Regulatory discretion and the unofficial economy". American Economic Review, 88(2), 387-392.*	*Corruption / (+)*
*Andreas Buehn· Friedrich Schneider(2011)./ **Informality***	*Corruption and the shadow economy: like oil and vinegar, like water and fire?*	*Corruption / (+)*
*Axel Dreher, Christos Kotsogiannis and Steve McCorriston(2009)./ **Informality***	*How do institutions affect corruption and the shadow economy?*	*Corruption / (-)*
*Choi, J., &Thum, M. (2005)./**Informality***	*Corruption and the shadow economy. International Economic Review,46(3),817–836*	*Corruption / (-)*
This study: ***Informal sector***	***Effects of growth on informal sector in presence of corruption.***	*GDPgrowth/ (+ **or** -) the sign here varies depending on the level of corruption in the economy*

Source: Authors

3.   Empirical specification and data

The main research question of this paper concerns the economics of development. More interestingly, this study collects empirical evidence of the impact of interactions between growth and corruption on the informal sector.

3.1.   Empirical hypothesis

As our results indicate, the negative relationship between growth and informality weakens or contradicts higher levels of corruption. To what extent this overview is relevant to real economies is an empirical question. This discussion can be presented in hypothesis (H3).

H1- The higher the growth rate in an economy, the more the informal sector declines.

H2- The higher the level of corruption in a country, the more the informal sector, ceteris

paribus, develops.

H3- Higher levels of corruption undermine the effect of growth on the informal sector:the effect of growth is indirectly related to the informal sector if the corruption rate is low and vice versa when it is high.

The different hypotheses are tested using simple regression models in panel data. In simple terms, linear models can be presented as specifications 1 and 2.

$$IS_{i,t} = \beta0 + \boldsymbol{\beta1Growth_{i,t}} + \sum_{i=5}^{n} \beta_k X_{i,t} + \theta_i + \gamma_t + \varepsilon \qquad (1)$$

$$IS_{i,t} = \beta0 + \boldsymbol{\beta1Corrup_{i,t}} + \sum_{i=5}^{n} \beta_k X_{i,t} + \theta_i + \gamma_t + \varepsilon_{i,t} \qquad (2)$$

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 in the informal sector (+) and β_k is the effect of controls variables.

However, the main purpose of this study is to analyse the effect of growth in the black economy in the presence of corruption. To this end, we estimate specification 3:

$$IS_{i,t} = \alpha_0 + IS_{i,t\text{-}1} + \alpha_1 Growth_{i,t} + \alpha_2 Corrup_{i,t} + \alpha_3 Corrup_{i,t} \times Growth_{i,t} + \sum_{i=5}^{n} \beta_k X_{i,t} + \theta_i + \gamma_t + \varepsilon_{i,t} \qquad (3)$$

The interpretation of the interaction term requires the calculation of marginal effects. By taking a partial derivative of equation (3) with regard to corruption, we obtain the effect of economic growth on informality as a function of corruption. The coefficient α3 of specification (3) makes it possible to grasp the supposed influence of economic growth on the underground economy evaluated to the level of corruption. In the dynamic panel data estimations, p-values corresponding to two standard tests are also provided in Tables 4 and 5. One of these tests is the Hansen J-test for over-identification and restrictions and the other one is the AR (2) test for autocorrelation. The tests provide support for the exogeneity of the instruments and absence of autocorrelation.

3.2.   Data

A large data set from 112 countries within the period 1991-2015 from the CPI (Corruption Perception Index), WDI (World development Indicator) 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 2 provides descriptive statistics for all variables. The choice of these variables has been guided by existing literature.

Table 2: Summary statistics

| Variables	Description	Obs	Mean	Std. Dev.	Min	Max
Shadow	Shadow Economy	2775	36.539	10.939	12.02	71.95
Gdpgrowth	Gdpgrowthannual	2721	4.112	7.174	-50.248	149.973
Corruption	Corruption	1887	2.973	.624	.908	4.273
Domestic	Domesticcredittoprivatesector	2621	27.135	22.751	.001	166.504
Mobile_money	mobile_money	2775	.155	.362	0	1
Propertyrigths	Propertyrights	2148	39.267	17.353	0	90
Trade	TradeofGDP	2663	78.502	40.536	13.753	531.737
Fragment	Fragmentationethnic	1,803	.16583	.6067578	0	3

Obs.: Observations. Std. Dev.: Standard Deviation. Min.: Minimum. Max. : Maximum.

Source: authors' computation

Among these variables, we predict a negative correlation between growth in GDP, mobile money, the domestic credit to private sector, Trade and the black economy. With regards to the estimated coefficients of corruption and fragment, our expectations are positive. We obtained the data sets on growth, mobile money, fragment, Trade, domestic credit to private sector and property rights from the World Development Indicators (WDI). These are the most widely used variables in the empirical literature on the underground economy.

Figure 1 provides information on the importance of our key independent variables. Thus, Figure 1 gives information on the impact of the variation of the GDP rate on the size of the informal sector, then on the impact of the level of corruption on the evolution of the underground economy, and finally the impact of the variation of the level of corruption on the economic growth rate. Looking at the slopes of the three figures and considering the impact of the interaction between corruption and growth on informality, it appears that corruption (+) has a devastating influence on the size of the informal sector than economic growth (-).

Figure 1. Illustration of the of the effects through fitted plots
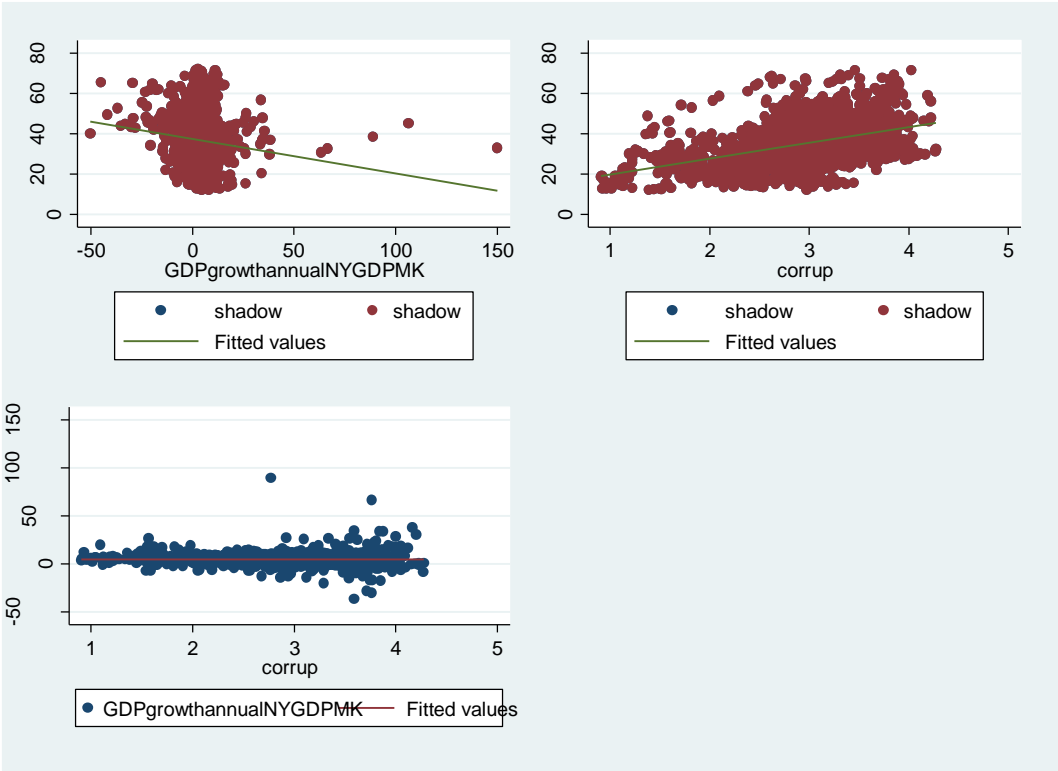
Source: Authors based on data from CPI (Corruption Perception Index) and WDI (World Development Indicator)

4.   Results and discussion

Coming to the nature of the correlation between growth and the informal sector, the negative impact of corruption on economic performance will be highlighted, unlike some other studies (Huntington 1968, Lui 1985).

4.1.   Baseline estimation

After the Hausman test, the fixed effect model was adopted in preference of the random effect. Table 3 presents these results.

Table 3: Growth and informality (FE estimator)

VARIABLES	(1)	(2)	(3)	(4)
	Dependent variable: shadow economy			
Gdpgrowth	-0.0789***		-0.0446**	-0.0931***
	(0.0123)		(0.0183)	(0.0195)
Corrupt		1.969***	2.118***	3.085***
		(0.462)	(0.474)	(0.452)
Domestic				-0.108***
				(0.00921)
Mobile_money				-2.496***
				(0.213)
Fragment				1.642***
				(0.332)
Propertyrights				0.116***
				(0.0118)
Trade				-0.0242***
				(0.00525)
Constant	36.92***	29.35***	29.14***	27.39***
	(0.0969)	(1.376)	(1.416)	(1.558)
Observations	2,721	1,887	1,875	1,505
R-squared	0.115	0.10	0.315	0.669
Number of countries	111	111	111	109
Fisher	41.02***	18.18***	13.31***	116.1***

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

Source: authors' calculations.

We can observe a relationship between the explained and explanatory variables in Table 3. The sample size varies according to the number of observations, followed by the addition and removal of certain variables in the regression. Growth has a negative and significant effect on the size of the informal sector in all columns. These results support those of previous studies such as Baklouti & Boujelbene (2020). Similarly, corruption has a positive and significant effect on the informal sector. This may indicate that in the presence of corruption, other variables have a significant independent impact on the informal sector.

The linear specifications in Table 3 establish the importance of growth as a key determinant of the informal sector, taking into account the influence of other possible factors, including corruption. However, it does not take into account the interactive effects that can be captured by the use of an interactive term combining corruption and economic growth. Corruption being one of the two constituent elements of the interactive term, its impact is given by Equation (3).

Table4 : Corruption interaction with Growth and informality (GMM estimator)

VARIABLES	(1)	(2)	(3)
	Dependent variable: shadow economy		
L.shadow	0.992***	0.860***	0.873***
	(0.0135)	(0.00571)	(0.00905)
Gdpgrowth	-0.0808***	-0.234***	-0.758***
	(0.0248)	(0.00532)	(0.0371)
Corrupt		0.809***	-0.378*
		(0.0773)	(0.195)
Domestic		-0.0316***	-0.0378***
		(0.00210)	(0.00418)
Mobile_money		-0.309***	-0.792***
		(0.0389)	(0.0730)
Fragment		0.0649	0.900***
		(0.0988)	(0.0999)
Propertyrights		0.0211***	-0.0353***
		(0.00344)	(0.00448)
Trade		0.00529***	-0.0159***
		(0.00111)	(0.00189)
Gdpgrowth×Corrupt			0.158***
			(0.0116)
Constant	0.315	2.892***	10.20***
	(0.536)	(0.416)	(0.525)
Net effect			-0.288266
Threshold			4.79745
Observations	2,620	1,505	1,505
Number of countries	111	109	109
Prop>AR1	1.08e-09	9.33e-09	5.93e-09
Prop>AR2	0.309	0.340	0.282
Instruments	4	104	101
Prop>sargan	0.0483	0.000	0.000
Prop>Hansen	0.165	0.418	0.322
Fisher	3063***	186256***	2.840e+06***
Difference in Hansen test			
Hansen test excluding group	------	0.355	0.228
Difference (null H = exogenous)	0.165	0.677	0.818

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
NB: in the above regression, -0.288266= [2.973*0.158] + [-0.758],
2.973 is the average of the modulating variable (corruption),
0.158 is the direct effect coefficient and -0.758 is the direct effect coefficient

Source: authors' calculations

The results with interaction effects are presented in Table 4 using the same set of control variables as in Table 3. As in Table 3, the control variables are significant. The interpretation of the coefficients of the interaction between growth and corruption is not simple. This becomes clearer due to the partial differential of the informal sector with regard to corruption. For example, in column (1) of Table 4, we get:

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$$\frac{\partial(\text{Shadow})}{\partial(\text{Gdpgrowth})} = \text{-0.758+0.158 (\textbf{Corruption})} \qquad\qquad (3)$$

Learning from attendant literature (Tchamyou, 2019; Tchamyou et al., 2019; Asongu and Nchofoung, 2021; Nchofoung et al., 2021), the net effects of economic growth on the shadow economy are computed on the basis of average values of the policy or moderating variables, notably: the average value of corruption.

From Table 4, economic growth interacts with corruption producing a negative direct effect and positive indirect effect. The negative direct effect outpaced the positive indirect effect producing a negative net effect. This negative net effect is nullified at a corruption threshold of 4.79745. The negative effect of growth on informality implies that an increase in economic growth reduces the size of the informal sector. Economic growth increases the revenue within the economy which can be used for investments in sectors that create formal employments. In the presence of corruption however, several companies in order to avoid formal taxes will prefer to operate in the informal sectors while buying their ways out from officials.

4.2. Robustness test

Our results are robust against alternative specifications as well as variations in estimation techniques. We use the instrumental variable method: Mean group (MG), Augmented mean group (AMG) and Double least squares(IV-2SLS) to take into account the endogeneity problem in our different regressions.

Table 5 allows us to verify the robustness of the results using different estimation techniques, highlighting the important link between the regression variables and the informal sector. The robustness analysis allows us to conclude that our results are probably not weakened by problems of endogeneity or bias of omitted variables. In addition, the results remain unchanged in the face of the alternative specification at the level of the regions for example (Tables 6 and 7).

Table 5: Corruption, growth and informality: different estimators

VARIABLES	(1) MG shadow	(2) AMG shadow	(3) IV-2SLS Shadow
Gdpgrowth	-0.344	-0.642	-0.0479
	(1.031)	(0.819)	(0.257)
Corrupt	1.342	1.174	7.624***
	(1.849)	(1.506)	(0.821)
Domestic	-0.206***	0.00939	-0.124***
	(0.0408)	(0.0404)	(0.0140)
Mobile_money	-0.600***	-0.403*	0.135
	(0.223)	(0.210)	(0.555)
Fragment	0.258	0.258*	2.921***
	(0.186)	(0.132)	(0.524)
Propertyrights	0.0120	0.00527	0.0991***
	(0.0368)	(0.0303)	(0.0252)
Trade	-0.0976***	-0.0856***	-0.00272
	(0.0178)	(0.0157)	(0.00741)
Gdpgrowth×Corrupt	0.103	0.175	0.0527*
	(0.342)	(0.268)	(0.0819)
Constant	42.29***	39.23***	12.38***
	(6.340)	(5.274)	(3.392)
Observations	1,429	1,419	1,282
R-squared			0.294
Number of countries	97	96	
chi2	88.04***	57.55***	
Fisher			85.25***

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

Source: authors' calculations.

Table 6: Effect of Corruption interaction with Growth on informality: different country groups (IV-2SLS)

VARIABLES	(1) East Asia and Pacific	(2) Europe and Central Asia	(3) Latin America and Caribbean	(4) MENA	(5) South Asia	(6) SSA
	Dependent variable: shadow economy					
Gdpgrowth	-9.225***	0.091	0.0376*	-0.200**	-0.363**	-0.120*
	(2.022)	(0.883)	(0.872)	(0.342)	(2.570)	(0.323)
Corrupt	1.876	11.82***	8.154***	9.453***	1.224	4.560***
	(4.652)	(2.059)	(1.916)	(1.820)	(4.906)	(1.033)
Domestic	-0.0111	-0.0724*	0.0876	0.0685***	-0.0883	-0.221***
	(0.0354)	(0.0375)	(0.0534)	(0.0200)	(0.0643)	(0.0219)
Mobile_money	2.750**	-4.140**	-1.848	1.640	-5.305***	-1.910***
	(1.401)	(2.063)	(1.567)	(1.412)	(1.399)	(0.665)
Propertyrights	0.635***	0.00170	-0.0722	0.236***	-0.0461	0.138***
	(0.0617)	(0.0426)	(0.0522)	(0.0569)	(0.0893)	(0.0284)
Trade	0.0613**	0.000568	-0.0507***	-0.119***	-0.0631***	-0.0401***
	(0.0243)	(0.0186)	(0.0152)	(0.0253)	(0.0221)	(0.00974)
Gdpgrowth×Corrupt	2.612***	-0.253	-0.0853**	0.186*	0.0192**	-0.0425**
	(0.669)	(0.262)	(0.283)	(0.171)	(0.801)	(0.105)
Constant	2.517	-0.0882	17.04**	-6.621	40.03**	28.09***
	(14.38)	(8.111)	(7.367)	(6.630)	(16.84)	(3.885)
Net effect	-1.459524	-----	-0.2159969	0.352978	-0.3059184	----
Threshold	3.53177	----	0.440797	1.0752688	nsa	-----
Observations	117	217	319	154	85	519
R-squared	0.458	0.188	0.297	0.389	0.220	0.379
Fisher	28.50***	33.58***	18.72***	28.76***	6.265***	89.03***

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$. nsa: not specifically applicable because threshold is not within range.

Source: authors' calculations

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Table7: Effect of Corruption interaction with Growth on informality: different income groups (IV-2SLS)

VARIABLES	(1) Upper-middle-income	(2) High income	(3) Lower middle	(4) Low income
		Dependent variable: shadow economy		
Gdpgrowth	-0.332*	-0.399*	-1.083**	-1.181*
	(0.396)	(0.217)	(0.798)	(0.694)
Corrupt	8.266***	5.107***	2.210*	0.965*
	(1.259)	(1.217)	(1.914)	(1.831)
Domestic	-0.0818***	-0.0805***	-0.134***	-0.0590
	(0.0211)	(0.0275)	(0.0226)	(0.0305)
Mobile_money	0.00648	3.748**	-4.279***	-2.871***
	(0.972)	(1.824)	(0.996)	(0.882)
Propertyrights	0.198***	0.115***	0.0544	-0.0957**
	(0.0380)	(0.0402)	(0.0525)	(0.0442)
Trade	0.0304**	-0.0244*	-0.0265**	0.00506
	(0.0129)	(0.0140)	(0.0128)	(0.0133)
Gdpgrowth×corrupt	0.103	0.0818	0.226*	0.205*
	(0.131)	(0.0635)	(0.263)	(0.196)
Constant	1.024	10.87**	37.83***	43.68***
	(5.081)	(4.788)	(7.598)	(6.975)
Net effect	-----	-----	-0.411102	-0.571535
Threshold			4.792035	5.7609756
Observations	424	163	422	273
R-squared	0.638	0.779	0.529	0.510
Fisher	24.05***	30.08***	15.35***	11.30***

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1. not specifically applicable because threshold is not within range.

Source: authors' calculations

Tables 6 and 7 show that our negative net effect result is robust across regional groupings and income groups except in the MENA region in which, a positive net effect is apparent. The corresponding positive net effect is nullified at a corruption threshold of 1.0752688. The effect is non-significant in Europe and South Asia. Corruption is not a transmission channel in high-income and upper-middle-income countries, but indirectly undermines growth in low-income and lower-middle-income countries. The fight against corruption is a determining factor for growth in the sense that the least corrupt economies also have reduced informal activities (Dreher and Schneider 2010; Mishra and Ray 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.

5.   Conclusion and policy implications

This study aimed to analyse the relationship between growth and the informal economy in developing 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 analyse 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). Using the FE, system GMM, MG, AMG, and IV-2SLS on a sample of 112 countries between 1991-2015, results show that growth reduces informality in the direct effect regression. Moreover, economic growth interacts with corruption producing negative net effects up to a corruption threshold of 4.79745 when this effect is nullified. This negative net effect was found to be robust across different regional groupings and income groups except in the MENA (positive net effect) and high income and upper-middle-income countries (only direct effects) producing different thresholds per sample. The new contribution of this study is to have shown explicitly the indirect effect of corruption in the informal sector.

The policy implications of this study suggest that policymakers should focus on policies that improve their quest for reducing the size of the informal sector. To actually benefit from the fruits of high growth in reducing the informal sector, the following should be applied by countries: (i) countries are encouraged to multiply their efforts in the fight against corruption;(ii) a corruption threshold of 4.79745 should not be exceeded in developing economies and (iii) each country should not neglect itsregional grouping and income group in order for the most relevant threshold to be maintained to avoid the undesired effect on growth which has unfavourable externalities on the informal sector.

Future studies could focus on countries specific cases for more oriented policies. Moreover, other possible transmission channels could be used for more completed and oriented complementary policies in reducing the size of the informal sector.

Appendix

East Asia & Pacific: Cambodia ; Fiji ;Indonesia ;Laos ; Malaysia; Mongolia; Papua New Guinea; Philippines; Solomon Islands; Thailand; Vietnam.

Europe and Central Asia: Albania; Armenia; Azerbaijan; Belarus; Bosnia and

Herzegovina; Bulgaria; Croatia; Georgia; Hungary; Kazakhstan; Kyrgyz Republic; Moldova; Poland; Romania; Russia; Tajikistan; Turkey; Ukraine

Latin America and the Caribbean: Argentina; Bolivia; Brazil; Chile; Colombia; Costa

Rica; Dominican Republic; Ecuador; El Salvador; Guatemala; Guyana; Haiti; Honduras;

Jamaica; Mexico; Nicaragua ; Paraguay ; Peru Suriname; Trinidad and Tobago; Uruguay; Venezuela

Middle East and North Africa: Algeria; Egypt; Iran; Jordan; Kuwait ;Lebanon Morocco; Oman ; Qatar; Saudi Arabia; Tunisia

Sub-Saharan Africa: Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Cape

Verde; Central African Republic; Chad; Comoros; Congo, Dem, Rep; Congo, Rep; Cote d'Ivoire; Equatorial Guinea Eritrea; Ethiopia; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Lesotho; Liberia Madagascar; Malawi ; Mali ; Mauritania; Mauritius ; Mozambique ;

Namibia ; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; South Africa; Swaziland; Tanzania; Togo; Uganda; Zambia; Zimbabwe.

References

Ackerman, S. R. (1978). Corruption: A study in political economy. *Nova Iorque: Academic Press.*

Arjomand, M., Emami, K., &Salimi, F. (2016). Growth and Productivity; the role of budget deficit in the MENA selected countries. *Procedia Economics and Finance*, *36*, 345-352.

Asongu, S., &Nchofoung, T. (2021). The terrorism-finance nexus contingent on globalisation and governance dynamics in Africa. *European Xtramile Centre of African Studies WP/21/016.*

Baklouti, N., &Boujelbene, Y. (2020). The Economic Growth–Inflation–Shadow Economy Trilogy: Developed Versus Developing Countries. *International Economic Journal*, *33*(4), 679695.

Benería, L. (1989). Subcontracting and employment dynamics in Mexico City. *The informal economy: Studies in advanced and less developed countries*, 173-188.

Castells, M., &Portes, A. (1989). World underneath: The origins, dynamics, and effects of the informal economy. *The informal economy: Studies in advanced and less developed countries*, *12*.

Chen, X. (2012).*Social protest and contentious authoritarianism in China*. Cambridge University Press.

Choi, J. P., &Thum, M. (2005). Corruption and the shadow economy. *International Economic Review*, *46*(3), 817-836.

Dabla-Norris, E., Gradstein, M., &Inchauste, G. (2008). What causes firms to hide output? The determinants of informality. *Journal of development economics*, *85*(1-2), 1-27.

Dabla-Norris, E., Gradstein, M., &Inchauste, G. (2008). What causes firms to hide output? The determinants of informality. *Journal of development economics*, *85*(1-2), 1-27.

Dangler, J. F. (2000). The periodic resurgence of non-factory-based production: the case of waged homework. *Informalization: Process and Structure*, 47-68.

De Soto, Hernando. (1989). *The Other Path: The Invisible Revolution in the Third World. New York:* Harper and Row.

Dell'Anno, R., &Teobaldelli, D. (2015). Keeping both corruption and the shadow economy in check: the role of decentralization. *International Tax and Public Finance*, *22*(1), 1-40.

Dreher, A., & Schneider, F. (2010). Corruption and the shadow economy: an empirical analysis. *Public Choice*, *144*(1-2), 215-238.

Dreher, A., Kotsogiannis, C., &McCorriston, S. (2009). How do institutions affect corruption and the shadow economy?.*International Tax and Public Finance*, *16*(6), 773.

Dreher, A., Marchesi, S., & Vreeland, J. R. (2008). The political economy of IMF forecasts. *Public Choice*, *137*(1-2), 145-171.

Drury, A. C., Krieckhaus, J., &Lusztig, M. (2006). Corruption, democracy, and economic growth. *International political science review*, *27*(2), 121-136.

Dutta, N., Kar, S., & Roy, S. (2013). Corruption and persistent informality: An empirical investigation for India. *International Review of Economics & Finance*, *27*, 357-373.

Elgin, C., &Birinci, S. (2016). Growth and informality: A comprehensive panel data analysis. Evidence from Bangladesh, *Journal of Applied Economics*, 16(2), 271-292.

Guha-Khasnobis, B., Kanbur, R., &Ostrom, E. (2006). Beyond formality and informality. *Linking the formal and informal economy: Concepts and policies*, *4*, 75-92.

Harris, J.R., Todaro, M.P., (1970). Migration, unemployment and development: A two-sector analysis.*American Economic Review*, 60, 126–142.

Heintz, J., &Pollin, R. (2008). Targeting Employment Expansion, Economic Growth and Development in Sub-Saharan Africa: Outlines of an Alternative Economic. The United Nations Economic Commission for Africa (UNECA) https://peri.umass.edu/fileadmin/pdf/other_publication_types/Targeting_Employment_Expansion_-_Pollin_and_Heintz_-_final.pdf (Accessed: 24/11/2021).

Heintz, J., Wicks-Lim, J., &Pollin, R. (2005).*Decent Work in America: The State-by-state Work Environment Index, 2005* (No. rr9).

Hibbs Jr, D. A., &Piculescu, V. (2005). Institutions, corruption and tax evasion in the unofficial economy. *Institutions*, *2005*(08), 02c3.

Huntington, S. P. (1968). Political Order in Changing Societies, New Haven: Yale University Press.Joh

Ihrig, J., & Moe, K. S. (2000). The influence of government policies on informal labor: implications for long-run growth. *De Economist*, *148*(3), 331-343.

Johnson, S., Boone, P., Breach, A., & Friedman, E. (2000). Corporate governance in the Asian financial crisis. *Journal of financial Economics*, *58*(1-2), 141-186.

Johnson, S., Kaufmann, D., &Zoido-Lobaton, P. (1998). Regulatory discretion and the unofficial economy. *The American economic review*, *88*(2), 387-392.

Johnson, S., Kaufmann, D., Shleifer, A., Goldman, M. I., & Weitzman, M. L. (1997). The unofficial economy in transition. *Brookings papers on economic activity*, *1997*(2), 159-239.

Koch, S. F., Schoeman, N. J., & Van Tonder, J. J. (2005). Economic growth and the structure of taxes in South Africa: 1960–2002. *South African Journal of Economics*, *73*(2), 190-210.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The manchester school*, *22*(2), 139-191.

Li, J., & Chen, J. (2006). Development of Chinese small and medium-sized enterprises. *Journal of small business and enterprise development*,13(2), 140-147.

Loayza, N. (1997). The economics of the informal sector. A Simple Model and Empirical Evidence from Latin America. *Policy Research*, 1-52.

Lui, F. T. (1985). An equilibrium queuing model of bribery. *Journal of political economy*, *93*(4), 760-781.

Lui, F. T. (1986). A dynamic model of corruption deterrence. *Journal of public Economics*, *31*(2), 215-236.

Mazhar, U., & Jafri, J. (2017). Can the shadow economy undermine the effect of political stability on inflation? empirical evidence. *Journal of applied economics*, *20*(2), 395-420.

Medina, L., & Schneider, F. (2018). Shadow economies around the world: what did we learn over the last 20 years?.

Mishra, A. K., & Ray, R. (2013). Corruption and informality. *University of Bath Centre for Development Studies Working Paper*, (21).

Mishra, A., & Ray, R. (2013).*Informality and corruption* (No. 21). Bath Papers in International Development and Wellbeing.

Nchofoung, T., Achuo, E., &Asongu, S. (2021). Resource rents and inclusive human development in developing countries. *European Xtramile Centre of AfricanStudies WP/21/025*.

Ngouhouo, I. and Njoya, L. (2020). Can the women'sparliamentaryrepresentationreduces corruption andinformalsector in Africa ? empiricalanalysis. Economics Bulletin, 40(1) :612_623.

Ngouhouo, I., &Nchofoung, T. N. (2021). Does Trade Openness Affects Employment in Cameroon?.*Foreign Trade Review*, *56*(1), 105-116.

Ngouhouo, I., Nchofoung, T., &NjamenKengdo, A. A. (2021). Determinants of Trade Openness in Sub-Saharan Africa: Do Institutions Matter?. International Economic Journal, 35(1), 96-119.

Njoya, L., Ngouhouo, I., Asongu, S., &Schneider, F., (2022). The role of economic prosperity on informality in Africa: evidence of corruption thresholds from PSTR. *African Governance and Development Institute Working Paper*, Yaoundé.

Özgür, G., Elgin, C., &Elveren, A. Y. (2021). Is informality a barrier to sustainable development?. Sustainable Development, 29(1), 45-65.

Perera, L. D. H., & Lee, G. H. (2013). Have economic growth and institutional quality contributed to poverty and inequality reduction in Asia?.*Journal of Asian Economics*, *27*, 71-86.

Sarte, P-D G. (2000). Informality and rent-seeking bureaucracies in a model of longrun growth. Journal of Monetary Economics 46, 173-197.

Schneider, F. (2011). The shadow economy and shadow economy labor force: what do we (not) know?.https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1867038SSRN Paper

Schneider, F., &Enste, D. H. (2000). Shadow economies: size, causes, and consequences. *Journal of economic literature*, *38*(1), 77-114.

Schneider, F., &Enste, D. H. (2002). The Shadow Economy: Theoretical Approaches, Empirical Studies, and Policy Implications.

Schneider, F., Buehn, A., & Montenegro, C. E. (2010). Shadow economies all over the world: New estimates for 162 countries from 1999 to 2007. *World Bank policy research working paper*, (5356).

Smith, P. (1994). Assessing the Size of the Underground Economy: The Canadian Statistical Pespectives. Canadian Economic Observer, Catalogue No. 11-010, 3.16-33,

Song, C. Q., Chang, C. P., & Gong, Q. (2021). Economic growth, corruption, and financial development: Global evidence. *Economic Modelling*, *94*, 822-830.

Tchamyou, V. S. (2019). The role of information sharing in modulating the effect of financial access on inequality. *Journal of African Business*, *20*(3), 317-338.

Tchamyou, V. S., Erreygers, G., &Cassimon, D. (2019). Inequality, ICT and financial access in Africa. *Technological Forecasting and Social Change*, 139, 169-184.

Ulyssea, G. (2020). Informality: Causes and consequences for development. *Annual Review of Economics*, 12, 525-546.

Yusuff, O. S. (2011). A theoretical analysis of the concept of informal economy and informality in developing countries. *European Journal of Social Sciences*, *20*(4), 624-636.