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Institutionalized democracy and the shadow economy in the short- and long-run: empirical analysis from Uganda

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This paper investigates the relationship between institutionalized democracy and the shadow economy in both the long- and short-run. Using time series data from Uganda that cover the period from 1991 to 2015, this paper applies autoregressive distributed lag method to investigate this relationship. How democracy affects the shadow economy in less developed countries like Uganda is not well understood. This paper aims to fill the above knowledge gap. The findings show that the shadow economy and institutionalized democracy are negatively correlated in both the short- and long-run. This implies that improvement in institutionalized democracy significantly hinders the rise of shadow activities. This indicates that institutions regulate the conduct of economic agents and determine how entrepreneurs engage in economic activities. Moreover, institutions are crucial in resource allocation which in turn leads to welfare improvement. Improvement in welfare of citizens reduces their incentive to engage in informal sector activities since the formal sector provides the necessary support needed to operate legally. These findings are robust to alternative econometric methods. Two practical implications of these findings stand out. First, these findings indicate that reforming the governance system to facilitate efficient resource allocation could be one way of addressing widespread informality in developing economies. Second, these results also indicate that minimizing informality in the economy should gradually move away from emphasis on tackling proximate causes of informality to democratic reforms that change the authority patterns. In this case institutionalized democracy is another important channel of mitigating the rise of the shadow economy.

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Introduction

The literature on the rise of the shadow economy continues to attract attention of researchers and policy makers in both the developing and developed world (Goel et al., 2019). The attention of researchers and policy makers has largely been centered on the determinants of the shadow economy, and its interactions with variables such as economic growth, financial development, income inequality, corruption, and trade liberalization among others (see Buehn and Schneider, 2012a, 2012b; Elbahnasawy et al., 2016; Elgin and Oztunali, 2014; Esaku, 2021c, 2021e, 2021f, 2021g). Although the shadow economy plays an important role in the growth of economies through provision of jobs to the unemployed, critics argue that its expansion is detrimental to economic growth and development. This is because an increase in the size of the shadow economy worsens income inequality (Esaku, 2021a), is a barrier to economic growth (Esaku, 2021b), and aggravates tax evasion (Buehn and Schneider, 2012b). To define the shadow economy we follow the definition of Medina and Schneider (2019), who define it as "all economic activities which are concealed from the regulatory authority for monetary, regulatory and institutional reasons" (see Medina and Schneider, 2019, p. 4). This implies that all these economic activities could be hidden by businesses to avoid taxes and social security contributions (monetary reasons), burdensome regulatory framework (regulatory reasons), and corrupt tendencies among regulatory bodies (institutional reasons). Similarly, by institutionalized democracy, we mean "the process by which a democratic practice or organization becomes well established and widely known, if not, universally accepted" (Mainwaring, 1998, p. 68).

The purpose of this paper is to investigate the long- and short-run relationship between institutionalized democracy and the shadow economy[1]. Using time series data from Uganda covering the period from 1991 to 2015, we apply the autoregressive distributed lag (ARDL) bounds testing approach to cointegration to investigate this relationship. This study follows the line of literature that examines the effect of institutions on the shadow economy. The study of the impact of institutions on the various aspects of economics is well documented in the literature (see Acemoglu et al., 2001; North, 1991). The literature summarizes the study of institutions along two important directions; the nature of institutions, and the outcomes of institutions; on the economic aspects of life. For instance, Persson and Tabellini (2003) focus their study on the impact of specific forms of institutions, such as forms of government and electoral rules, on the fiscal policies of a given country. Along this line, Teobaldelli and Schneider (2013) have extended the study of forms of government to explore the impact of direct democracy on the size of the shadow economy. This paper follows along the lines of Teobaldelli and Schneider (2013) to examine the short- and long-run effect of institutionalized democracy on the size of the shadow economy in Uganda. The specific research question we seek to answer is whether an improvement in institutionalized democracy reduces the size of the shadow economy in Uganda. This study is in line with recent studies that have uncovered evidence of widespread informality in Uganda (Esaku, 2021a; Mugoda et al., 2020) and across the world (Medina and Schneider, 2019). A large informal sector has been shown to create a number of challenges to the growth of the formal sector and the economy as a whole (Esaku, 2021b) on account that this sector (informal) undermines governments' fiscal policy targets (Alm and Embaye, 2013; Esaku, 2021i).

We situate this study in Uganda for a number of reasons. First, Uganda is one of the African countries with a turbulent political history since the 1970s when the then democratically elected government of Obote was overthrown by the military junta led by Idi Amin Dada (Esaku, 2021c). The dictatorship of the Amin regime dismantled democratic achievements of the country which led to wide spread informality. Consequently, the proliferation of informal sector activities created a number of distortions to the economy which undermined economic growth during that period. Second, Uganda offers interesting testing ground for our ideas given that this country has taken important strides to improve the state of governance in the last 20 years when the political space was opened up for political competition. Like most developing countries where political upheavals have occurred, the process of democratization is quite slow and painstaking. Once democratization is achieved, there is likelihood that the welfare of citizens will improve and the expansion of shadow activities can be curtailed (Esaku, 2021e; Teobaldelli and Schneider, 2013). Given the above discourse, we investigate whether institutionalization of democracy dampens citizen's incentive to operate in the shadow economy. Third, the study of the relationship between the shadow economy and institutionalized democracy has not been investigated in the African context (to the best of the author's knowledge). This might be the first attempt to examine this relationship in this context. Investigating this relationship in the above context is important because most countries in Africa still face issues of democracy resulting into violent crackdown of dissenting voices. This paper investigates whether institutionalized democracy mitigates wide spread informality in a less developed country like Uganda.

This study contributes to the literature in four important ways: first, we extend the study of the relationship of direct democracy and the shadow economy (see Teobaldelli and Schneider, 2013) to institutionalized democracy and the informal economy which will enrich our understanding of factors that can impede wide spread informality. Second, this paper examines an important relationship between the size of the shadow economy and institutionalized democracy, which has many implications for policy. For instance, how can the political system be harnessed to tackle wide spread informality in the developing and developed economies? Third, investigating the relationship between institutionalized democracy and the shadow economy in the African context will unearth important findings and policy implications which can provide new insights on how to address informality in developing countries. Fourth, recent studies have studied the various aspects of the shadow economy, especially the size (Elgin and Oztunali, 2014; Medina and Schneider, 2019), the determinants (Buehn and Schneider, 2012a), the causes and consequences (Schneider, 2005), the interrelationship with other economic variables such as: corruption (Buehn and Schneider, 2012b; Esaku, 2021e); trade openness (Esaku, 2021f), inequality (Esaku, 2021g), the level of economic development (Esaku, 2021b), and political instability (Elbahnasawy et al., 2016; Esaku, 2021c), among others. However, the bulk of these studies have largely focused on the financial and economic dimension, with little attention on the political and governance system. This study fills this gap by focusing on how the political system (democracy) affects the size of the shadow economy in Uganda.

While this study follows in the footsteps of Teobaldelli and Schneider (2013), it differs with the above study in three important ways. First, we use a different measure of democracy (institutionalized democracy) while the above authors use an index of direct democracy drawn from a number of sources. Second, while the above authors focus on developed economies, this paper situates its investigation of the above relationship in a different context, Uganda. An interesting point is whether an evolving democracy can hinder the rise and expansion of shadow activities as is claimed in Teobaldelli and Schneider (2013). Third, whereas the above authors develop a structural model to examine

the effect of direct democracy on shadow economy, this paper relies on the relatively new cointegration approach—the ARDL bounds testing method of Pesaran and Shin (1999) and its extension by Pesaran et al. (2001), to study this relationship. This method is considered more robust than the traditional cointegration methods because of its ability to provide unbiased estimates and valid *t*-statistics, regardless of the endogeneity of some of the regressors (Jalil and Ma, 2008). Moreover, this approach can be used irrespective of the sample size (Tang, 2004). Furthermore, the ARDL model allows for the correction of outliers and it distinguishes between the outcome and explanatory variables (Marques et al., 2017).

In conclusion, the rest of the paper is structured as follows: Section "Introduction" presents the introduction—which lays out the general setting, and discusses the objective, rationale and contribution of this paper to the literature. Section "Review of related literature on the shadow economy and institutionalized democracy" presents the review of the literature related to this paper which is important for understanding the connection between this paper and previous research in the literature. Section "Data and descriptive statistics" presents the data, where the main variables are discussed and summary statistics presented. Section "Methodology" reports the methodology, where we present the theoretical framework and estimation methods that have been used in the econometric exercises.

Section "Results and discussion" reports the findings and presents detailed discussion of the results. Finally, section "Conclusion" concludes this paper, by presenting summary of the main findings, main policy implications and recommendations for future research.

Review of related literature on the shadow economy and institutionalized democracy

Recent developments in the production and distribution of goods and services reveal interesting pattern across the world. The pattern shows that a substantial level of production of goods and services occurs in both the formal and informal sectors of the economy across the world (Medina and Schneider, 2019). In both the developed and developing economies, the size of the shadow economy is relatively large and in many cases its activities go unnoticed because they are quite hidden and difficult to trace (Alm and Embaye, 2013; Buehn and Schneider, 2012a; Esaku, 2021i). Recent estimates of the size of the shadow economy by Medina and Schneider (2019) show that in many countries across the world, informality is still a substantial part of the economy which drives the production and distribution of goods and services. Across the 157 economies surveyed the shadow economy as a percent of gross domestic product (GDP), on average, account for 31% of GDP globally.

Disaggregating these estimates into regions indicates that informality is highest in Latin American countries, with Bolivia leading with 62.9%. The second region with the highest level of informality is Europe, where Georgia leads with 62%; then African countries come third, where Nigeria leads with 56.8% (see Medina and Schneider, 2019). For the case of Uganda, informality is still a challenge with about 31.23% of GDP being produced in the shadow economy (Esaku, 2021f; Mugoda et al., 2020). As can be observed from the above estimates, informal sector activities are quite substantial and persistent across many countries. This evidence seems to contradict earlier suggestions that informal sector activities are a consequence of underdevelopment and would disappear once a country attains substantial levels of economic development (Harris and Todaro, 1970). Furthermore, informal sector was considered a 'refuge' sector for the rural population who migrate to cities in search of better livelihood opportunities. Once in cities, these 'migrants' often find difficulty in getting employment causing them to seek 'refuge' in the informal sector. If this suggestion is correct then countries with substantial levels of economic development should be expected to have low levels of informality. But this seems to contradict recent empirical evidence (see Medina and Schneider, 2019).

Empirical evidence shows that this sector (informal) should not be regarded as transitory economy since there is evidence of its persistence in both the developed and developing economies. This indicates that previous levels of informality, that is, estimates of informality in period $t-1$ are highly correlated with current estimates, that is, estimates in period t (see Gutiérrez-Romero, 2021). The key reason for this observed increase and persistence in shadow activities seems to be associated with the fact that the formal economy has not been able to generate enough jobs that can sufficiently absorb the increasing number of the labor force (Esaku, 2019). Additionally, the literature also suggests that increased taxation and burdensome regulatory framework impose 'additional costs' to businesses that intend to start-up 'shop'. These additional costs associated with formalization of businesses seem to dissuade entrepreneurs from formalizing their operations (Dell'Anno, 2018; Goel et al., 2019). From the above empirical evidence, we can argue that informal sector seems to play a substantial role in the production and distribution of goods and services, as has been shown in previous studies (see Esaku, 2021h; ILO, 2018). More specifically, informal sector provides employment opportunities to the most vulnerable members of society, like women and youth, who find it difficult to be absorbed by the formal sector (ILO, 2002, 2018). Consequently, the incomes generated from informal sector activities end up in the formal sector which has a positive impact on the level of economic growth and development (La Porta and Shleifer, 2014). Given this, informal sector production of goods and services could be viewed as complementing the formal economy activities by providing a source of livelihoods for a majority of the population who cannot be absorbed by the formal sector (ILO, 2002). This implies that this sector cannot be considered as illegal or perpetuating illegality in the production of goods and services since it has helped generate incomes for the poor, which incomes also end up in the formal economy thereby raising the demand of goods and services produced in the formal sector (Blanchflower and Oswald, 1998).

While some analysts argue that a large size of the shadow economy complements the formal sector and drives overall economic growth and development, others seem to suggest that this sector (informal) is harmful to economic growth and overall welfare of the population. For example, Esaku (2021a) investigates whether the large size of the shadow economy undermines governments' efforts to reduce income inequality. Using data from Uganda, the above author finds evidence that a large informal sector increases income inequality and undermines government's effort to redistribute income from the rich to the poor. Additionally, the literature has recently indicated that a large size of the shadow economy is detrimental to economic growth and the welfare of the citizens. For example Esaku (2021b) investigates whether a large size of the shadow economy undermines economic growth and finds evidence that informality undermines economic growth in both the short- and long-run. This is because a large shadow economy indicates that a substantial number of entrepreneurs do not pay their tax liability which affects tax revenue collection (Goel et al., 2019). Failure by government to raise adequate tax revenues affects its (government) ability to provide essential public goods and services, such as infrastructure, security, healthcare and education, among others. Additionally, a large size of the shadow economy is the outcome of government inefficiencies in enforcing tax collection which in turn undermines its (government) fiscal policy.

Table 1 Descriptive statistics and correlation matrix of main variables.

	Se15	Demo	Frac	Gw	Gov/gdp	Dob	Dur
(a) *Summary statistics*							
Mean	38.743	0.440	0.393	3.344	11.775	7.985	5.280
Median	40.720	0.000	0.550	3.080	11.757	7.702	5.000
Maximum	43.250	1.000	0.687	8.140	16.792	13.786	11.000
Minimum	31.880	0.000	0.000	0.030	6.636	3.529	0.000
Std. dev.	4.008	0.507	0.304	2.245	3.005	3.191	3.260
Skewness	−0.521	0.242	−0.517	0.360	−0.178	0.276	0.003
Kurtosis	1.679	1.058	1.358	2.280	1.878	1.770	1.956
# Obs.	25	25	25	25	25	25	25
(b) *Correlation matrix*							
Se15	1.000						
Demo	−0.905	1.000					
Frac	−0.496	0.354	1.000				
Gw	−0.143	−0.007	−0.009	1.000			
Gov/gdp	0.584	−0.411	−0.273	0.374	1.000		
Dob	−0.894	0.866	0.369	−0.028	−0.234	1.000	
Dur	−0.202	−0.078	0.056	−0.458	0.012	0.289	1.000

Source: Author's calculations.

Similarly, the literature has also focused on the distortionary nature of shadow activities on the growth of the formal sector. For example, Alm and Ebaye (2013) argue that a large informal sector changes income distribution, creates distortions to resource allocation, and undermines governments' ability to collect tax revenue. Additionally, a large size of the shadow economy encourages small-scale and inferior methods of production and distribution of goods and services, distorts investment and worsens income inequality (Elbahnasawy et al., 2016). Additionally, wide spread informality introduces biases in the official macroeconomic measures of the economy, like employment, national income, consumption expenditures and labor force, which can falsify the actual state of the economy. This misrepresentation of the economy creates problems for the planners since the actual state of the economy cannot fairly be estimated. As a result, policies crafted to guide the country's fiscal and monetary stance might become less effective since policy makers have no accurate picture of the state of the economy (Capasso and Jappelli, 2013).

Taken together, while the above literature provides insights into the effect of the shadow economy on various dimensions of economic life, a few studies have focused on how governance affects the size of the shadow economy. This study intends to fill this gap by investigating whether institutionalized democracy mitigates the rise of informal sector activities in Uganda.

Data and descriptive statistics

Data and data sources. In this section, the data and data sources are reported. The data used in this paper are annual time series from Uganda collected from various data sources, and cover the period from 1991 to 2015. The data for the dependent variable, the size of the shadow economy-measured as a percent of gross domestic product (GDP), which is denoted by (se15), is from Medina and Schneider (2018). The above authors use mixed approaches to calculate the size of the shadow economy for 158 economies globally. The main explanatory variable, institutionalized democracy index[2] (demo) is from the Center for Systemic Peace and measures the existence of institutions and procedures where citizens express effective choices about alternative policies and leadership. It further measures the presence of institutionalized controls on the executives' exercise of power and guarantee of civil liberties for all citizens. The index ranges between −10 (strongly autocratic) and +10 (strongly democratic). Apart from the above main variables, we also include a number of control variables to control for political, economic, financial and fiscal state of the economy. Specifically, variables included are; the level of political fractionalization (frac), annual growth rate of GDP or simply growth (gw), the share of government spending to GDP (gov/gdp), and financial development, measured using domestic credit to private sector provided by banks as a share of GDP (dob), and regime durability index (dur). The data for political fractionalization (frac) and regime durability (dur) are from the World Bank's Database for political institutions and Center for Systemic Peace, respectively. The rest of the control variables come from the World development indicators of the World Bank (version 2020). The details of variable description and data sources are provided in the appendix, Table A.1.

Summary of the main variables. The descriptive statistics and correlation matrix for the main variables are presented in Table 1. Table 1, panels (a) and (b), reports summary statistics and correlation matrix, respectively. The mean values of the key variables are; shadow economy (Se15), 38.743, institutionalized democracy (demo), 0.440, political fractionalization (frac), 0.393, growth (gw), 3.344, government expenditure (Gov/gdp), 11.775, domestic credit (dob), 7.985, and regime durability (dur), 5.280. In Panel (b) the variables of interest (the size of the shadow economy and institutionalized democracy) are negatively correlated. One implication of this could be that an improvement in institutionalized democracy impacts negatively on the size of the shadow economy. However, negative correlation should not be taken to infer that an improvement in the level of a country's democracy discourages entrepreneurs from operating underground. To understand this relationship, a formal estimation is required to unearth the empirical relationship between these two variables.

Methodology

Theoretical framework. We assume that the primary driver of the shadow economy is government's inefficient tax enforcement leading to tax revenue shortfall. This implies that inefficiency in government's ability to collect taxes creates incentives for the entrepreneurs to evade their tax liability by concealing their operations from tax authorities leading to loss in tax revenue and rise in the shadow economy. Government collects from an entrepreneur an amount τ of total tax revenue. However, not all of the total tax τ is collected because of the inefficiency of the tax collection. A fraction, ρ of the total tax revenue is lost due to

administration costs. The output Y is produced by the shadow economy, which is increasing in lost tax revenue as a result of inefficiency in the tax administration. Thus

$$Y = Y(\rho) \tag{1}$$

where $Y'(\rho) > 0$. As shown in Elbahnasawy et al. (2016), the extent of tax collection inefficiency is determined by the governance and political system in place.

As in Cukierman et al. (1992), to investigate the relationship between the government's choice of inefficiency in taxation and the political environment, we make the following assumptions: first we assume that government is responsible for provision of total public goods, G, with two varieties of public goods, g and f. Second, there are two policy makers, D and R, who randomly occupy office at a given period. These two policy makers have similar preferences in the provision of total public goods G, but vary in the composition of g and f. One policy maker favors a fraction λ of the total public goods for type g, and $1-\lambda$ for type f of the public good. The other policy maker favors a contrasting composition of total public goods. Their disagreement stems from parameter λ, which defines the extent of political system polarization. If we assume $\lambda = \frac{1}{2}$, then the preference for total public goods provision for the two policy makers is similar and there is absence of political polarization in the political system. But if λ is far away from $\frac{1}{2}$ then the political system will be characterized by high level of political instability and polarization. Similarly, if we assume $\lambda > \frac{1}{2}$, this implies that a rise in λ results in more political instability and polarization and vice versa.

In the above case, the political system is described as a Markov process with transition probabilities γ and $1 - \gamma$ implying that the incumbent government has a fixed probability γ of being voted out next period and probability $1 - \gamma$ of being re-elected. For concreteness, probability γ denotes the instability or polarization of the political system. Again if we assume that, then the political system is stable and a high possibility that the incumbent government will remain in power in the next period, and the reverse is true. This implies that instability of the political system increases with γ.

Furthermore, the consumption of public goods, G, and private goods, C, are all a function of ρ. Where inefficiency in tax administration reduces the provision of public goods, that is, $G'(\rho) < 0$, but increases private consumption so that $C'(\rho) < 0$. We assume that policy choices affect tax efficiency with a lag of one period, and then the decision by incumbent government is to choose the level of investment that ensures efficient tax collection. Given the likelihood of the incumbent government getting voted out each period, it follows that the incumbent government can constrain the future opposition government by choosing inefficient tax collection approach for the next period. Thus, the optimization problem of the incumbent government can be expressed as

$$\max_{\rho} U\big(C(\rho)\big) + \beta(\lambda, \gamma) G(\rho) \tag{2}$$

where $U(C(\rho))$ denotes private sector consumption while $\beta(\lambda,\gamma)$ is the weight attached to provision of total public goods which correlates with the stability and polarization of the political system. As shown by Elbahnasawy et al. (2016), the weight attached to public goods is unity when the political system has no polarization, and zero in the limit where the political system has maximum instability and polarization. Thus, $\beta(0, \lambda) = \big(\gamma, \frac{1}{2}\big) = 1$ and $\lim_{\substack{\gamma \to 1 \\ \lambda \to 1}} (\gamma, \lambda) = 0$

The implication of the above is that the more polarized or unstable the political system, the higher the chances of the incumbent government being voted out resulting into lower weight being given to provision of public goods hence a less efficient taxation system, so that β_γ, $\beta_\lambda < 0$. Given this, the first-order equilibrium of the inefficient tax system becomes:

$$U\prime\big(C(\rho)\big)C\prime(\rho) + \beta(\gamma, \lambda) G\prime(\rho) \le 0 \tag{3}$$

This implies that inefficiency in tax collection caters for the marginal cost of public goods provision and marginal benefit of increased private sector consumption. Equation (3) indicates that the equilibrium tax collection inefficiency is a function of the political system, $\rho(\gamma, \lambda)$ so that ρ_γ, $\rho_\lambda > 0$ (see Cukierman et al., 1992). This implies that more instability in the political system reduces the marginal cost of inefficiency in tax administration or collection so that inefficiency in tax collection increases with political instability and polarization.

Thus, Eqs. (1) and (3) indicate that for $\rho > 0$ the shadow economy is a function of political polarization and instability:

$$Y = Y\big(\rho(\gamma, \lambda)\big) \tag{4}$$

where Y_γ, $Y_\lambda > 0$. In this case more political polarization and instability is predicted to increase the size of the shadow economy. Given that all the two political parties are faced with similar optimization problem, the structure of tax inefficiency selected by the one party will resemble what the other party would have selected, so that there is persistence in polarization and political instability. Therefore, the political or governance system that is marked by polarization and political instability creates persistent tax collection inefficiencies hence providing incentives for businesses to operate in the shadow economy.

The main underlying assumption of the model is that democratic institutions continue to function and political parties are responsive to the needs of their supporters when it comes to public goods and services, such as infrastructure, security, law enforcement, and healthcare among others. This makes it possible to connect our model to democracy, where the influence of institutionalized democracy on the size of the shadow economy depends on the political system in place. It has been shown that in highly stable and low polarized political systems, high levels of democracy dampens entrepreneurs' incentive to operate informally which leads to more taxes and small size of the shadow economy, while in unstable and highly polarized political systems increased democracy provides incentives for businesses to operate underground hence increasing the size of the shadow economy (Elbahnasawy et al., 2016). The above model assumes that increased institutional democracy in the presence of a stable political system dampens the incentive of businesses to operate underground hence reducing the size of the shadow economy.

Estimation strategy. This section reports model specification and econometric methodology used to implement the empirical exercises that test the relationship between shadow economy and institutionalized democracy. This paper opts for a quantitative rather than qualitative strategy because the objective is to examine the relationship between the two main variables. The relationship between the size of the shadow economy and institutionalized democracy is formally expressed in Eq. (5), while econometric model for the estimation of the relationship is expressed formally in Eq. (6). The above are described in detail in the next sub-sections.

Model specification. This section details the empirical model for testing the long- and short-run relationship between the main variables. This paper posits that the shadow economy is a function of variables that can be expressed as follows:

$$\text{se15} = F\big(demo, \text{frac}, gw, Gov/gdp, dob, dur\big) \tag{5}$$

where se15 is the size of the shadow economy as a percent of

GDP, demo is institutionalized democracy index, frac is fractionalization index, gw is growth rate of GDP, Gov/gdp denotes government expenditure as a share of GDP, dob is domestic credit to the private sector by banks as a share of GDP, and dur denotes regime durability. The above control variables are chosen in line with the previous studies and the literature review in the previous section. The literature shows that the level of fractionalization and regime durability is important in shaping the nature of the shadow economy (Esaku, 2021c). For example, Elbahnasawy et al. (2016) provide evidence that political processes influence policies that come into place, or enacted, which in turn determine resource allocation. In this regard, political processes could either create instability and conflict or generate consensus which also results into weak (strong) political and democratic institutions. Thus, the political system can therefore affect the welfare of citizens through its impact on the size of the shadow economy. These two variables (frac and dur) are included in the main estimation equation. Furthermore, the level of the country's development influences the shadow economy. For example, Esaku (2021b) indicates that an improvement in the level of economic growth negatively affects the size of the shadow economy. Correspondingly, recent studies show that government spending is a proximate cause of the shadow economy (see Buehn and Schneider, 2012a). Accordingly, we include this variable in the main estimation equation. Finally, financial structure of the country has also been shown to be an indicator or determinant of the size of the shadow economy (see Berdiev and Saunoris, 2016). In what follows, we present the econometric methodology in the next section.

Econometric methodology. This section reports the econometric methodology followed in the estimation process. To proceed with the estimation, first, stationarity tests are carried out, and then the ARDL bounds test for the presence of long-run relationship between the variables is implemented in the second step. In the third step, estimation of the ARDL model aimed at unearthing the short- and long-run relationship among variables is implemented. Thus, this paper follows the ARDL bounds testing approach to cointegration pioneered by Pesaran and Shin (1999) and its extension by Pesaran et al. (2001), which has a number of advantages, compared with traditional cointegration techniques. This approach is a robust econometric method for investigating time series data and can be applied regardless of the sample size (Tang, 2004). Even in situations where the variables are integrated either of order zero, $I(0)$s and or one, $I(1)$s, this method remains robust in estimating level relationships (Pesaran and Shin, 1999). Furthermore, the ARDL method can also correct for any possible endogeneity among the independent variables.

The ARDL model for the empirical estimation of Eq. (1) can formally be expressed as follows:

$$\begin{aligned}\Delta se15 = {} & \beta_0 + \sum_{i=1}^{p}\beta_{1i}\Delta se15_{t-i} + \sum_{i=0}^{p}\beta_{2i}\mathrm{demo}_{t-i} + \sum_{i=0}^{p}\beta_{3i}\Delta\mathrm{frac}_{t-i} + \sum_{i=0}^{p}\beta_{4i}\Delta\mathrm{gw}_{t-i} \\ & + \sum_{i=0}^{p}\beta_{5i}\Delta\mathrm{gov/gdp}_{t-i} + \sum_{i=0}^{p}\beta_{6i}\Delta\mathrm{dob}_{t-i} + \sum_{i=0}^{p}\beta_{7i}\Delta\mathrm{dur}_{t-i} + \gamma_1 se15_{t-1} \\ & + \gamma_2\mathrm{demo}_{t-1} + \gamma_3\mathrm{frac}_{t-1} + \gamma_4\mathrm{gw}_{t-1} + \gamma_5\mathrm{gov/gdp}_{t-1} + \gamma_6\mathrm{dob}_{t-1} \\ & + \gamma_7\mathrm{dur}_{t-1} + \mu_t\end{aligned} \tag{6}$$

where β_0 denotes the constant term while $\beta_1,\ldots,\beta_7$ and $\gamma_1,\ldots,\gamma_7$ denote the short-run and long-run coefficients, respectively, and μ_t denotes the error term.

This paper first tests for cointegration relationship among variables to ascertain the existence of a long-run relationship among the variables using the *F*-statistic. The null hypothesis of no cointegration, expressed as (H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$) is evaluated against the alternative hypothesis of the presence of cointegration among variables, expressed as (H_a: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$). Once this test is conducted, the result of the *F*-statistic is evaluated against the critical values specified in Pesaran et al. (2001). The decision rule is as follows: if the calculated values of *F*-statistic are above the upper critical bound values, then the H_0 (the null hypothesis) is rejected and vice versa. But, if the *F*-statistic values fall within the bounds, then the test result is inconclusive.

Before conducting ARDL bounds testing procedure, this paper first determines the optimal lag length for the ARDL model. The optimal lag length is determined based on the appropriate lag length selection criteria using the Schwartz–Bayesian criterion (SBC). The optimal lag length chosen by the criteria is shown in the appendix, Table A.2.

Based on results of the cointegration test in Eq. (2), this paper expressed the error correction model (ECM) for a long-run relationship, as follows:

$$\begin{aligned}\Delta se15_t = {} & \beta_0 + \sum_{i=1}^{n}\beta_{1i}\Delta se15_{t-i} + \sum_{i=0}^{n}\beta_{2i}\Delta\mathrm{demo}_{t-i} + \sum_{i=0}^{n}\beta_{3i}\Delta\mathrm{frac}_{t-i} + \sum_{i=0}^{n}\beta_{4i}\Delta\mathrm{gw}_{t-i} \\ & + \sum_{i=0}^{n}\beta_{5i}\mathrm{gov/gdp}_{t-i} + \sum_{i=0}^{n}\beta_{6i}\Delta\mathrm{dob}_{t-i} + \sum_{i=0}^{n}\beta_{7i}\Delta\mathrm{dur}_{t-i} + \pi\mathrm{ECT}_{t-1} + \mu_t\end{aligned} \tag{7}$$

where π denotes the coefficient of the error correction term (ECT) which captures the long-run adjustment to the equilibrium after deviations. Additionally, μ_t denotes the residual error term. The importance of the ECT coefficient lies in its size and sign, which denotes the speed of adjustment and validity of the results. As shown by Enders (2004), the coefficient of the error correction term (π) should be negative, less than, or equal to 1 and statistically significant.

Results and discussion

Stationarity tests. This paper first tested the variables to determine their order of integration, whether they are integrated of order zero, $I(0)$, and or order one, $I(1)$. We relied on two different stationarity tests, Augmented–Dickey–Fuller test (ADF) and Phillip–Perron (PP), implemented with intercept and with trend and intercept. The results of these tests are presented in the appendix, Table A.2. In Table A.2, we can observe that the main variables are all stationary after first differencing, and vary according to the type of stationarity test used.

Once the unit root tests were conducted, this paper proceeded to carry out the ARDL bounds testing approach. In Table 2 panel (a), this paper formally expressed the equation to be tested, while panel (b) reports the results of the ARDL bounds test for cointegration. As can be seen from panel (b), the calculated *F*-statistic is higher than the asymptotic critical value bounds given in Pesaran et al. (2001). Given that the results of the *F*-statistic indicate cointegration, we can reject the null hypothesis of no cointegration and conclude that the variables are cointegrated. Additionally, residual diagnostic tests of the bounds testing are also implemented. Specifically, implemented residual diagnostic tests include Breusch–Godfrey Serial Correlation LM Test, Heteroskedasticity Test (Breusch–Pagan–Godfrey), and Normality test. The residual diagnostic tests show no evidence of biased estimation giving credence to the view that the calculated *F*-statistic should be taken as reliable. After the above tests, this study proceeded to estimate the long- and short-run coefficients for the model. The optimal lag length selected according to the Schwartz information criterion (SIC), is ARDL (1,0,0,0,0,0,0,0) model.

The size of shadow economy and institutionalized democracy in the long-run. In this section, the long-run relationship between the size of the shadow economy and institutionalized

Table 2 Results of the ARDL bounds test.

Panel (a): The equation to be tested

Equation	Dependent variable	Function
Eq. (1)	Se15	*F*(se15 | demo, frac, gw, gov/gdp, dob, dur)

Panel (b): Results of ARDL bounds test

	ARDL model	*F*-Stat.	Diagnostics		
			X^2 (Normality)	X^2 (Heteroscedasticity)	X^2 (Correlation)
Eq. (1)	(1,0,0,0,0,0,0)	7.848	0.646	0.959	0.641
	Actual sample size ($T = 24$)				
	Critical values				
	Lower bound *I*(0)			**Upper bound *I*(1)**	
10%	2.12			3.23	
5%	2.45			3.61	
2.5	2.75			3.99	
1%	3.15			4.43	

Source: Author's calculation.

Table 3 Long run relationship between shadow economy and institutionalized democracy.

Explanatory	Dependent variable: Shadow economy								
	ARDL model			Fully modified OLS			Dynamic OLS		
	Coeff.	*t*-stat.	Prob.	Coeff	*t*-stat	Prob.	Coeff.	*t*-stat.	Prob.
Demo	−3.399***	−4.357	0.000	−3.122***	−3.618	0.003	−3.399***	−4.357	0.000
Frac	−1.418***	−3.594	0.002	−1.198**	−2.814	0.013	−1.418***	−3.594	0.002
Gw	−0.121*	−2.002	0.063	−0.128*	−2.065	0.057	−0.121*	−2.002	0.063
Gov/gdp	0.379***	3.678	0.002	0.405***	6.532	0.000	0.379***	3.678	0.002
Dob	−0.384***	−6.618	0.000	−0.390***	−3.383	0.004	−0.384***	−6.618	0.000
Dur	−0.194***	−3.967	0.001	−0.188**	−2.866	0.012	−0.194***	−3.967	0.001
Constant	37.516***	5.475	0.000	35.104***	4.204	0.000	37.516***	6.852	0.000
R-sq.	0.979			0.977			0.979		
R-bar-sq.	0.966			0.966			0.970		
Durb. W.	2.104								
Residual diagnostics									
X^2 (Correlation- BGS LM Test)	0.641								
X^2 (Heteroskedasticity-BPG)	0.959								
X^2 (Normality)	0.646								

Source: Author's calculation.
*,**,***, indicate statistical significance at 10%, 5% and 1% levels, respectively. HAC (Newey-West) standard errors and covariance used.

democracy is evaluated and results reported in Table 3. This relationship is tested using three econometric methods, that is, ARDL, Fully-modified ordinary least squares (FMOLS) and the Dynamic least squares (DOLS). First, the ARDL results are reported in Table 3, column 2. Then we use FMOLS and DOLS approaches as a robustness check on the ADRL model results. The FMOLS and DOLS results are presented in columns 5 and 8. In Table 3, column 2, the results indicate that institutionalized democracy is directly correlated with the size of the shadow economy, in the long-run, all else equal. We can observe that the coefficient on the institutionalized democracy is negative and statistically significant at 1% level. This finding implies that institutionalized democracy has a negative effect on the size of the shadow economy in the long-run, all else equal. Specifically, these results confirm that an improvement in institutionalized democracy significantly reduces the size of the shadow economy by 3.399 units, statistically significant at 1% level.

The result of the long-run relationship between the shadow economy and institutionalized democracy has important implications. First, these results seem to suggest that improvement in the state of democracy is important for extending social and economic services to the citizens leading to improvement in their welfare (Teobaldelli and Schneider, 2013). Improvement in welfare reduces the incentive of individuals to operate in the informal economy since the formal sector provides the necessary support needed to operate legally (Alm and Embaye, 2013). This then reduces the size of the shadow economy. Second, the long-run relationship between the shadow economy and institutionalized democracy could imply that as democracy matures in the country, state power may be rested in institutions instead of individuals. This implies that political processes cannot be dictated but rather negotiated as the citizenry become more aware of their rights and obligations to demand accountability from the politicians. Those found culpable are punished through the 'power of the vote.' State patronage in this case cannot stand since institutions facilitate political processes and decisions, such as allocation of economic and productive resources. Thus, developed democracy is reflected in the functioning of the country's institutions and how political processes evolve (see Elbahnasawy et al., 2016; Esaku, 2021c). This can be seen in the development of institutional capability to regulate, tax, and mobilize the citizenry to engage in national service. Furthermore, political structures are transformed towards political participation and legitimization so as to achieve effective provision of public

goods like infrastructure, health care and education among others. This provides an explanation on the possible negative relationship between the size of the shadow economy and institutionalized democracy in the long-run.

In other results, column 2 also shows that the level of the country's development is important in shaping the size of the shadow economy. Specifically, the coefficient on economic growth is negative and statistically significant at 10% level. This implies that an increase in economic growth reduces the size of the shadow economy by 0.121 units statistically significant at 10% level. This is consistent with previous studies that show the importance of economic growth in shaping the size of the shadow economy in every country (see Buehn and Schneider, 2012a; Elgin, 2020; Esaku, 2021i). Correspondingly, there is evidence that the fiscal burden (denoted by government expenditure as percent of GDP) increases the likelihood of businesses operating underground. We can observe that the coefficient on government expenditure is positive and statistically significant at 1% level. This implies that an increase in the fiscal burden on businesses drives them underground and to conceal their operations in order to evade tax or reduce their tax liability (see Buehn and Schneider, 2012b; Esaku, 2021f). Specifically, these results indicate that an increase in taxation leads to an increase in the size of the informal sector in the long-run.

Additionally, improvement in financial development (denoted by domestic credit to the private sector by banks as a share of GDP) leads to a reduction in the size of the shadow economy. In column 2, we can observe that an improvement in domestic credit offered to private sector by banks reduces the size of the shadow economy by 0.384 units statistically significant at 1% level consistent with previous studies (see Berdiev and Saunoris, 2016). Bayar and Ozturk (2016) find similar results and conclude that financial development is crucial in reducing the size of the shadow economy. The literature also shows that regime durability plays a critical role in shaping the evolution of the shadow economy (see Elbahnasawy et al., 2016; Esaku, 2021c). We find evidence of a direct relationship between the shadow economy and regime durability. We can observe that the coefficient on (dur) is negative and statistically significant at 1% level. These results indicate that an improvement in the durability of the incumbent regime reduces the size of the shadow economy by 0.194 units statistically significant at 1% level. These findings seem to bode well with the suggestion that political processes seem to shape the landscape where businesses operate (see Esaku, 2021j). Given that political processes are important, regimes that last long periods seem to guarantee political stability and economic prosperity hence reducing uncertainty in the process (see Elbahnasawy et al., 2016). This implies that political processes that reinforce regime durability provide enabling environment for businesses to operate and produce goods that improve the welfare of the general population (Esaku, 2020c). Citizens with better livelihood opportunities will be less inclined to operate in the shadow economy since there are better chances of success in the formal economy as shown in Teobaldelli and Schneider (2013). Finally, we observe that fractionalization is negatively correlated with the size of the shadow economy, and this finding is supported by the literature (see Esaku, 2021c).

As a robustness check, this paper follows the suggestion of Menegaki (2019), who proposes to use DOLS and or FMOLS to validate the robustness of the results. This is on account that the above econometric methods generate asymptotically efficient coefficients and can address the issue of endogeneity and serial autocorrelation (Menegaki, 2019). We report these results in Table 3 columns 5 and 8. It can be seen that the results are qualitatively and quantitatively similar to the ARDL model results. This indicates that an improvement in institutionalized democracy significantly reduces the size of the shadow economy in the long-run, in the case of Uganda, all else equal. To ascertain the reliability of these results, residual diagnostic are carried out. Specifically, this paper conducted Breusch-Godfrey Serial Correlation LM Test, Heteroskedasticity Test (Breusch–Pagan–Godfrey), and Normality test. The results of these tests are shown on the lower panel of Table 3. These tests confirm that the ARDL model results are reliable and mirror a stable relationship between the size of the shadow economy and institutionalized democracy.

In sum, it can be concluded that an improvement in institutionalized democracy, political institutions, economic growth, financial development and regime durability could be viable policy directions that would partially contribute to the reduction of informality in Uganda.

Table 4 Short-run relationship between the shadow economy and institutionalized democracy.

Explanatory variable	Outcome variable: Shadow economy		
	Eq. (1)		
	Coefficient	*t*-statistic	Probability
ΔDemo	−3.663***	−7.268	0.000
ΔFrac	−1.938***	−4.215	0.000
ΔGw	−0.096	−1.741	0.104
ΔGov/gdp	0.342***	5.962	0.000
ΔDob	−0.374***	−10.444	0.000
ΔDur	−0.181***	−5.483	0.000
ECM(−1)	−0.941***	−4.615	0.000
Constant	−0.034	−0.329	0.747
R-squared	0.799		
R-bar-squared	0.685		
Durbin Watson	2.193		
Residual diagnostics			
X^2 (Correlation- BGS LM Test)	0.203		
X^2 (Heteroskedasticity-BPG)			0.250
X^2 (Normality)			0.603

Source: Author's calculation.
*,**,***, indicate statistical significance at 10%, 5% and 1% levels, respectively. HAC (Newey-West) standard errors and covariance used.

The short-run relationship between the shadow economy and institutionalized democracy. Next, we investigate the short-run relationship between the size of the shadow economy and institutionalized democracy. The findings of this short-run relationship are shown in Table 4, column 2. We can observe that the coefficient on institutionalized democracy is negative and highly significant. This implies that the size of the shadow economy and institutionalized democracy are negatively correlated in the short-run, all else equal. This is in line with previous studies that have demonstrated the importance of democracy in shaping the size and the scope of the shadow economy (see Teobaldelli and Schneider, 2013). In the short-run, an improvement in institutionalized democracy significantly reduces the size of the shadow economy by 3.663 units, statistically significant at 1% level, all else equal. The implication of these results is that democracy could be crucial for improving allocation of economic and productive resources that in turn improve the welfare of citizens and hence reduce their incentive to operate in the shadow economy since the formal sector can now provide the necessary support. This suggestion is probable given that institutionalized democracy helps in facilitating political processes and building consensus, a process, if done well could create policies that reinforce efficient allocation of productive resources and provision of public goods that improve the welfare of the citizens.

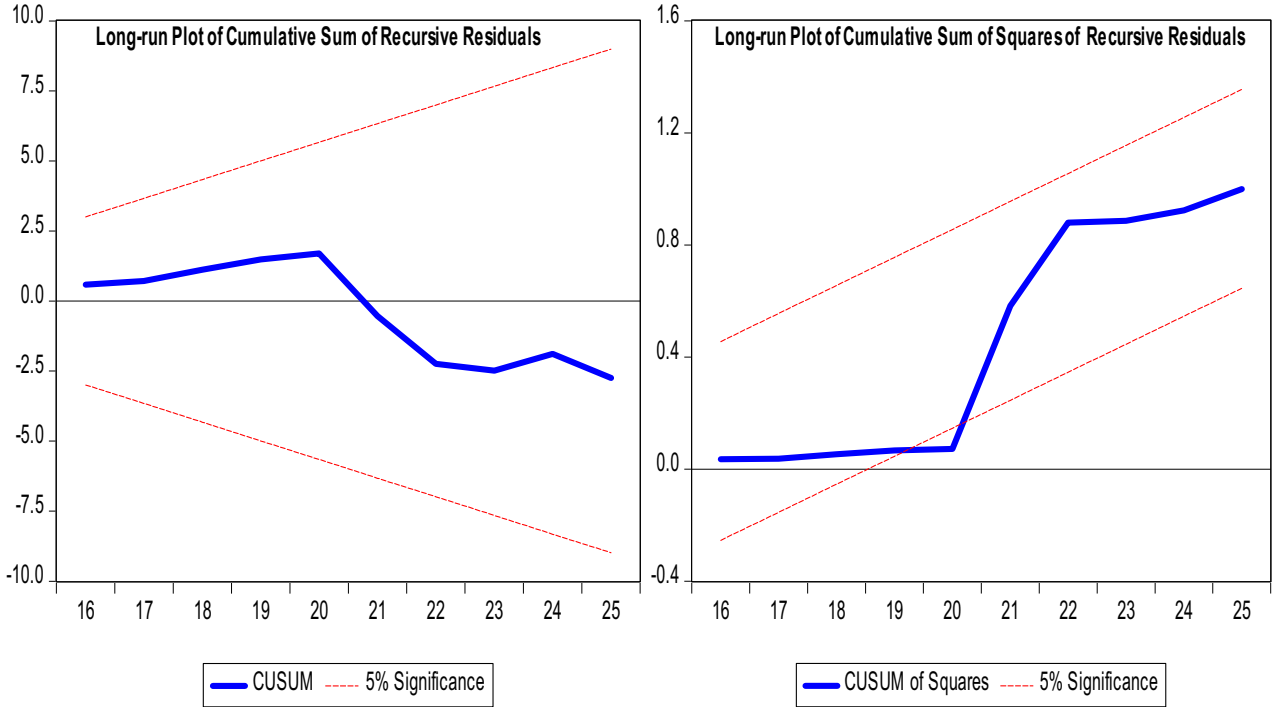

Fig. 1 Plot of Cummulative sum of Recursive Residuals (CUSM) for ARDL model.

In other results, we find evidence that the level of economic growth is negatively correlated with the size of the shadow economy in the short-run but this relationship is not statistically significant. Similarly, financial development and the shadow economy are highly correlated in both the short- and long-run. In the short-run, an improvement in financial development reduces the size of the shadow economy by 0.374 units statistically significant at 1% level. This is consistent with the findings in Berdiev and Saunoris (2016), who also find that improvements in financial development of the country significantly reduce the size of the shadow economy. Capasso and Japelli (2013) show the importance of financial development in dampening the expansion of the shadow economy. Bayar and Ozturk (2016) provide support for the negative relationship between financial development and the size of the shadow economy.

Correspondingly, this paper also indicates that the shadow economy and regime durability are highly correlated. The coefficient on (dur) is negative and statistically significant at 1% level. This would imply that the durability of the government in power is important for addressing the rise of informality (Esaku, 2021c). Regime durability could provide certainty needed to provide sustainable investments that in turn improve the livelihoods of the citizens (see Elbahnasawy et al., 2016). Also significant is the level of fractionalization. The coefficient on (frac) is negative and statistically significant at 1% level. The results show that an improvement in fractionalization reduces the size of the shadow economy by 1.938 units, statistically significant at 1% level. Correspondingly, government expenditure is another proximate cause of the shadow economy. The coefficient of (Gov/gdp) is positive and statistically significant at 1% level. Specifically, in the short-run, an increase in government expenditure significantly increases the size of the shadow economy by 0.342 units. This bodes well with the literature (see Dell'Anno et al., 2018).

Finally, we examine how the shadow economy corrects for any changes from long-run equilibrium. We do this by analyzing the sign, size and significance level of the error correction term (ECT). These results indicate that the lagged coefficient of the ECT is negative and statistically significant at 1% level. Specifically, the coefficient on ECM is negative and statistically significant at 1% level. This implies that the shadow economy adjusts to any deviations from long-run equilibrium at a speed of adjustment which is 94.07%, statistically significant at 1% level.

As a robustness check, we implemented residual diagnostic to ascertain the robustness of these findings. Specifically, this paper implemented Breusch-Godfrey Serial Correlation LM, Hetero-skedasticity (Breusch–Pagan–Godfrey), and Normality tests as robustness checks for the above findings. The results are reported on the lower panel of Table 4. From these tests, there is evidence that the ARDL model results are reliable and not biased.

To sum, this paper shows that the shadow economy and institutionalized democracy are negatively correlated in both the short- and long-run. This implies that an improvement in institutionalized democracy significantly mitigates the expansion of the shadow economy. This is probable given that democratic institutions play important role in efficient allocation of productive resources and social cohesion (Teobaldelli and Schneider, 2013). Democratic institutions do affect the way political processes shape decision making, which is critical in resource allocation. The practical implication of these findings is that reforming the governance system to facilitate efficient resource allocation could be one way of addressing widespread informality in developing economies. Furthermore, these results also indicate that attempts to minimize wide spread shadow activities in the economy should gradually move away from emphasis on tackling proximate causes of informality to democratic reforms that change the authority patterns, from dictatorship or autocracy to democracy.

Diagnostic tests. This paper carried out stability test to analyze the stability of the long- and short-run coefficients of the ADRL model. The result of this test is reported in the plots of the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMQ) in Fig. (1) and Fig. (2). As shown in these figures, the residual plots are tightly bound within the boundaries at a significance level of 5% and provide additional evidence of the stability of the estimated

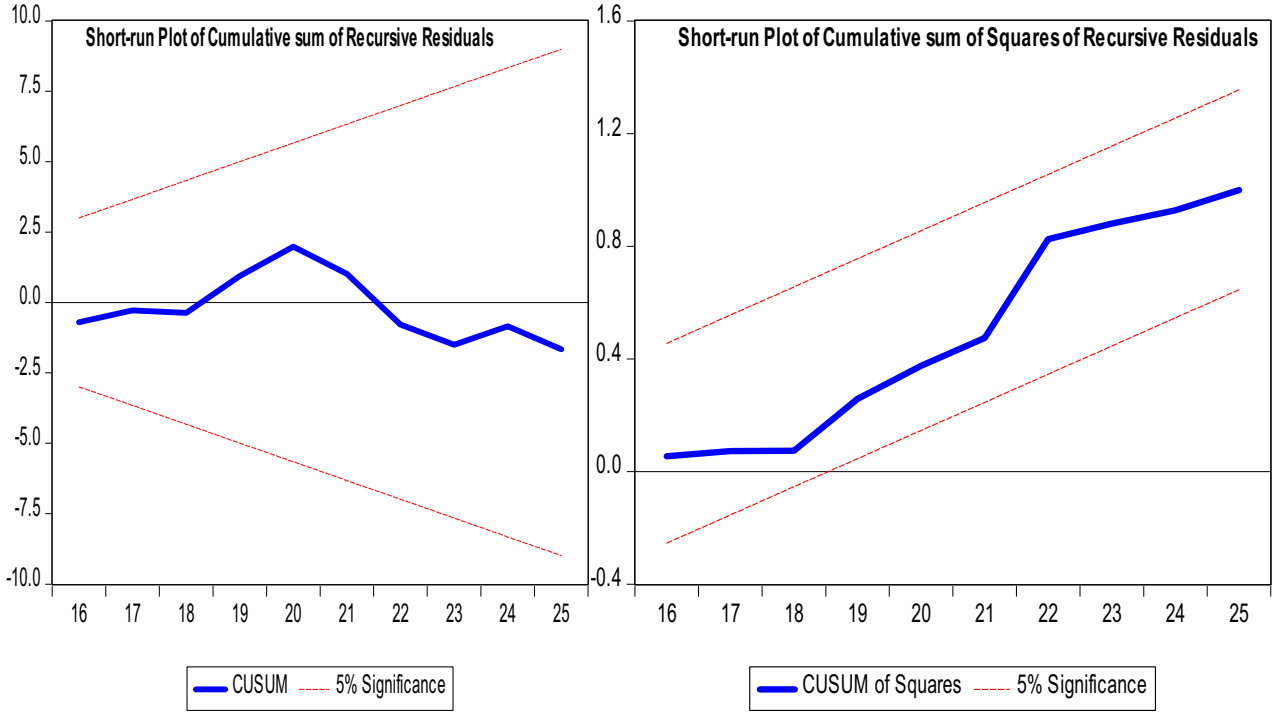

Fig. 2 Plot of Cumulative sum of squares of Recursive Residuals (CUSUMQ) for ARDL model.

model. Thus, we sum up by arguing that these results show evidence of a negative and statistically significant relationship between shadow economy and institutionalized democracy in both the long-run and short-run, for the case of Uganda.

Conclusion

This paper investigates the relationship between institutionalized democracy and the size of the shadow economy in both the long- and short-run. Using time series data from Uganda that cover the period from 1991 to 2015, this paper applies autoregressive distributed lag method to investigate the above relationship. The findings are quite remarkable. This paper finds that the shadow economy and institutionalized democracy are negatively correlated in both the long- and short-run. In both of these cases (the long- and short-run), an improvement in institutionalized democracy significantly reduces the size of the shadow economy by a substantial level, all else equal. These results have important implications. Firstly, these results suggest that improvement in democracy increases political processes that are important for extending social and economic services to the citizens leading to improvement in their welfare. Improvement in welfare of citizens reduces their incentive to engage in informal activities since the formal sector provides the necessary support needed to operate legally. This then reduces the size of the shadow economy. Secondly, the relationship between the shadow economy and institutionalized democracy could also mean that as democracy matures in the country, state power may be rested in institutions instead of individuals implying that political processes cannot be dictated but rather negotiated as the citizenry become more aware of their rights and obligations to demand accountability from the government. State patronage in this case cannot stand since institutions facilitate political processes and decisions, such as allocation of economic and productive resources.

The practical implication of these findings is that reforming political or governance system to facilitate efficient resource allocation could be one way of addressing widespread informality in developing countries. Furthermore, these results also indicate that attempts to minimize wide spread shadow activities in the economy should gradually move away from emphasis on tackling proximate causes of informality to democratic reforms that change the authority patterns, from dictatorship or autocracy to democracy.

Future research could focus on how other variables interact with the size of the shadow economy. Additionally, exploring other causes and consequences of the shadow economy in African context would also be helpful for policy formulation. Furthermore, exploring theoretical linkages between the shadow economy and its various determinants could also provide greater insight into the study of the shadow economy. Lastly, if data can be available, exploring the operation of the shadow economy in key sectors like agriculture, manufacturing and services in a disaggregated manner could address some of the gaps in the literature.

Data availability

All data generated during and/or analyzed during the current study are included in this published article and its supplementary information files.

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Notes

1 In this paper, we use shadow economy to also mean informal economy, underground economy, unobserved economy, informal sector, shadow/informal activities. We use these words interchangeably to mean same thing.
2 Full description of this index is provided by Center for Systemic Peace.

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Competing interests

The author declares no competing interests.

Ethical approval

This research was not required to receive any ethical approval because it did not involve human research participants and no primary data were collected. It uses data collected by International Organizations such as the World Bank and International Monetary Fund among others.

Informed consent

This article does not contain any studies with human participants performed by any of the author(s).

Additional information

Supplementary information The online version contains supplementary material available at https://doi.org/10.1057/s41599-022-01128-1.

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