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Factors affecting the probability of formalizing informal sector activities in Sub Saharan Africa: evidence from World Bank enterprise surveys

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Abstract

Purpose – This study aims to investigate the factors that affect the likelihood of formalizing informal sector activities in 13 Sub-Saharan African countries, using World Bank enterprise survey data collected between the periods 2009 and 2018. Notwithstanding the great contribution of the informal economy in Africa, developing countries may stand to gain more if they make inroads in formalizing the informal sector.

Design/methodology/approach – Since the dependent variable is binary taking the value of one if the firm is willing to formalize and zero otherwise, the study will employ a discrete choice probit model.

Findings – Results *inter alia* show that firms that are more likely to formalize are young, owned by individuals with high levels of education and, have registered before. Governments should therefore target firms that are young and provide them with information about the benefits of registration, and if these firms are owned by experienced and educated individuals, the likelihood for them to register would be high.

Research limitations/implications – The study uses cross sectional data and therefore cannot capture time variant factors affecting the probability to register and also cannot correct effectively for endogeneity.

Practical implications – Governments should therefore target firms that are young and provide them with as much information as possible about the benefits of registration, and if these firms are owned by experienced and educated individuals, the likelihood to convince them to register would be high. They should also reduce the cost of registration so as to improve net benefits in line with the rational exit view.

Social implications – Formalizing informal activities will help improve the performance of these firms, reduce vulnerable employment as well as crime, poverty and inequality. Providing decent operating and working conditions to informal players will reduce social and political unrest.

Originality/value – The African continent is home to many informal firms accounting for roughly 55% of economic activity with 90% of workers eking out a living in a sector that does not respect worker rights, provide decent working conditions and where changes in growth have done little to reduce its size. Regulatory reforms have also been implemented resulting in the number of start-up registration procedures falling from 11 in 2003 to seven in 2019. The uniqueness of Sub Saharan Africa in terms of entrepreneurial culture, political, institutional and economic conditions as well as lack of consensus in the extant empirical literature make this study pertinent.

Keywords Informal, Formalization, World Bank and Africa

Paper type Research paper

1. Introduction

Private sector development is crucial for growth, employment creation and industrialization, but in many developing countries private sector activity lies outside the formal economy (La Porta and Shleifer, 2014; Aryeetey, 2009; Ulyssea, 2018). Several enterprises both in the developing and developed world operate partially or wholly outside the purview of government

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regulations. They avoid paying taxes, ignore product quality and safety regulations, infringe on copyrights as well as fail to register as legal entities (Farrell, 2004). Thus, the informal sector usually includes all economic activities that contribute to the Gross Domestic Product (GDP) but are not officially reported (International Labour Organisation, 2013; Feige, 1997; Schneider, 1994, Fourie, 2019). It also includes economic activities, jobs and workers that are not regulated and protected by the state and is far much bigger than the formal sector in many developing countries. It is heterogeneous, with different dimensions which maybe legal (whether the business is registered or not), fiscal (whether the businesses pay taxes and maintain bookkeeping) and labour (whether it offers contracts and benefits to employees). These dimensions are not mutually exclusive because a firm that operates without registering is unlikely to abide by fiscal requirements (Qiang and Ghossein, 2020). Ulyssea (2020) referred to the legal and labour dimensions as extensive and intensive margins of informality.

Poor levels of economic growth, resultant weak employment conditions and increasing levels of poverty have contributed largely to the proliferation of the informal sector in many countries. The African Development Bank (2013), states that the informal sector contributes about 55% of Africa's GDP and 80% of the labour force, and this makes the sector the main driver of growth in the continent. The ILO 2018 report states that two billion of the world's population above 15 years representing 61.2% of global employment eke out a living informally.

Generally, the size of the informal sector is a direct measure of the failure of socio-economic policies, mismanagement of economic resources, increase in population, rural and urban migration as well as the youth bulge. The ILO (2018) statistics show that the part of the labour force that dominates the informal sector is the youths between the ages of 15–24 years, and this is partly a reflection of deteriorating economic conditions in these respective regions. There is also a negative relationship between informal employment and level of education, with workers with no education or with primary education accounting for more than 70% of people employed in the informal sector in all the developing regions. Self-employment (own account workers) constitutes a greater share of informal employment with about 50% recorded in Sub Saharan Africa (SSA) compared to 46% in Asia and the Pacific and 41% in the Americas (ILO, 2018).

The World Bank (2011) views the informal sector as a social safety net for the poor and a training ground for budding entrepreneurs and hence a trampoline to formality. This view is supported by Aryeetey (2009) who argues that the sector is supposed to be a temporary alternative to unemployment and a coping mechanism against poverty, which will disappear as the economy matures and becomes more developed. The sector is like a built in economic stabilizer growing when the economy is in a downturn and shrinking when there is an upswing, and this kind of flexibility helps in promoting inclusive growth (Cassim *et al.*, 2015). However, this transitional view of the informal sector, vanishing after growth has taken off, has proven to be untrue. Growth has increased in several countries without significantly affecting the size of the informal sector (Aryeetey, 2009; Ishengoma, 2018). This view is supported by Medina *et al.* (2017) who also state that although in SSA, informality seems to fall with the level of income, recent evidence also indicate that the informal economy is becoming a long-term feature of developing economies. Aryeteey (2009) goes on to argue that despite the great contribution of the informal economy in many countries, some literature suggest that Sub Saharan African economies stand to gain more if they make inroads into formalizing the informal sector. Formalization will *inter alia* help informal firms escape pressurization into exploitative relationships with the formal (Gallin, 2001) and enjoy legal protection, intellectual property rights and will also be able to overcome impediments to growth like lack of access to capital, credit and government support. Zylfijaj *et al.* (2020) also argues that formalization is a means of breaking the vicious circle of low productivity and precarious working conditions that prevail in the informal economy. Consumers will also benefit from legal recourse if a poor job is done, have access to insurance cover and guarantees in relation to the work done including certainty that health and safety regulations

have been followed (Williams and Martinez, 2014). In the case of government, formalization may improve tax revenue (Kundt, 2017) and lead to a greater control over the quality of jobs provided in the economy. Taxing the informal economy leads the African Development Bank's tax priorities, and reducing informality is seen as its central objective of tax reform and revenue mobilization. Statistics from the African Development Bank (2013) show that about 50% of non-agricultural gross value added comes from the informal sector, and therefore, formalizing it will go a long way in solving revenue and other infrastructure and service delivery challenges facing the African continent.

In 2015, the International Labour Council adopted ILO Recommendation 204 on transition from the informal to the formal economy. It is the first ever ILO instrument to tackle the informal economy and stresses the need to facilitate transition whilst respecting workers' fundamental rights, income security and livelihoods as well as prevent the informalization of formal jobs. Formalization of informal activities is important for achieving inclusive development and the realization of the 2030 Sustainable Development Goals (SDG 8 and Target 8.3) which promotes productive activities and decent jobs [1]. These views suggest that La Porta and Shleifer's (2008) "romantic view" of informality where activities are "pure and efficient" (no taxes and compliance with regulations etc.) is not necessarily good for sustainable development.

There are two opposing schools of thought concerning the role of the informal economy in economic growth. There are those who believe that the informal economy needs to be formalized and those who view it as a permanent feature that can never be completely eradicated. The social costs of informality in terms of forgone taxes, lower productivity and lack of social security outweigh the benefits and therefore encouraging the formalization of informal activities should enhance social welfare (World Bank, 2011). A large informal sector may lead to a higher tax burden on registered labour and firms because of a narrow tax base. The co-existence of formal and informal firms means that firms competing in the same industry face different marginal costs in form of labour costs and taxes, leading to inefficient allocation of resources (Levy, 2008; Amin *et al.*, 2019). The parasite view considers informal firms as unfair competition to formal firms, because they evade taxes and regulations and is supported by the work done by Amin *et al.* (2019) who found that on average, competition from informal firms reduces formal firm productivity by 25%. However, the dual view argues that these two groups of firms have different customer bases, qualities of products and because the scale of operations of informal firms is relatively smaller, they pose less threat to operations of formal firms (Distinguin *et al.*, 2016). Fallah (2014) also argues that a large informal sector might render monetary policy less effective as informal firms are less connected to the banking system. On the fiscal side, decreasing the tax rate might have a less stimulatory effect whilst increasing the tax rate might have a less restraining effect on growth or inflation, due to excessive tax evasion (Eilat and Zinnes, 2002).

However, proponents of the rational choice view like Maloney (2004) argue that the firms that would benefit from formalizing already do formalize, whereas smaller and less productive firms rationally opt out of the formal sector because they perceive little benefit to being formal. This view is supported by Ulyssea (2020) who argues that informality is a survival strategy for low-skill individuals, who are too unproductive to ever become formal. Since such firms are also constrained by their lower levels of human capital, being in the informal sector is often the optimal decision given their preferences. The "survival view", also argues that informality is a survival strategy for low-skilled individuals in economies that do not generate enough opportunities for wage employment (Ulyssea, 2020). These individuals would prefer wage employment but are screened out as a result of their lower productivity, and so are unable to find formal jobs (Field and Larsen, 2009). Therefore, these survival firms should only be formalized if there is a compelling public rationale for doing so. De Soto (1989) in his "handcuffs view" of informality argues that informal firms are potentially very

productive, but are constrained by costly government regulations, corruption, bureaucracy and inability to secure property rights and to access finance. Therefore, if the barriers to official status were lowered and capital provided, informal firms would formally register and enjoy the benefits of formalization.

Existing work on informality has focussed mostly on its causes, characteristics and consequences, while research devoted to empirically investigate the costs and the benefits of formalization is scarcer (Rand and Torm, 2012). Most of the studies in this area are theoretical, simply discussing the pull and push factors of formalization (See United States Agency for International Development, 2005; Cassim *et al.*, 2015; Aryeteey, 2009; Farrell, 2004; Fourie, 2019; Charman *et al.*, 2013; Rand and Torm, 2012; Williams and Shahid, 2014). The aim of this study is to take this discussion a bit further and use informal firms' survey data from the World Bank to quantitatively investigate the factors that affect the probability of SSA informal firms to formalize their activities. We investigate the likelihood to formalize because the African continent is home to so many informal firms accounting for roughly 55% of economic activity (African Development Bank, 2013), and changes in growth in the continent have done little to reduce the size of the sector. Understanding the reasons for the persistence of the informal economy is important in formulating effective policies to facilitate transition to formality. Regulatory reforms have also been implemented in the continent resulting in the number of start-up procedures to register a business falling from 11 in 2003 to seven in 2019 (Doing Business, 2021). Although doing business rankings of most countries in this study are above 100 except for Mauritius, Botswana, Kenya and Rwanda, procedures for registering a business have been dropping since 2003 and were as low as three in Burkina Faso and four in the Democratic Republic of Congo and Mauritius. Some of the countries in this study (Burkina Faso, Cameroon and Mali) are members of the Organisation for the Harmonisation of Business Law in Africa (OHADA) and recently introduced a new registration system called entreprenant in 2011, designed for micro and small businesses, and makes registering easy, free and possibly done in one business day (Doing Business, 2021). This study therefore attempts to investigate how these changes have affected the formalization of informal firms in the study countries.

There is also so much literature on formalization of informal firms, but most of these empirical studies have been concentrated on other developing countries except Africa (Zylfijaj *et al.*, 2020 for Kosovo; Díaz *et al.*, 2018 in Peru; Rocha *et al.*, 2018 for Brazil; Rand and Tom, 2012 and Boly, 2020 on Vietnam; Fallah, 2014 for Palestines, etc.). Studies that have been done in Africa in this area were mostly qualitative (Elmi and Roblei, 2019 on Djibouti, Chekenya, 2016 on Zimbabwe, Fourie, 2019 on South Africa and Cassim *et al.*, 2015 on SSA). Few (if not none) studies have used the publicly available enterprise survey data on informal firms to interrogate the issue of informality in Africa. Gajigo and Hallward-Driemeier (2012) carried out an econometric study analysing why some firms in Nigeria, Kenya, Senegal and Ivory Coast abandon formality for informality something different from what this study seeks to investigate. An experimental study by Benhassine *et al.* (2017) in Benin and Ishengoma (2018) on Tanzania are closely related to what we want to achieve but differs in terms of the data set and coverage of countries and scope. The study by Ishengoma only looked at entreprenuer attributes that drive formalization in Tanzania whilst our study goes further to look at firm and country level characteristics. The study by Benhassine *et al.* (2017) was an experiment that only looked at the impact of providing information on the new registration system "entreprenant", providing business training and assistance with opening a bank account as well as tax mediation to informal firms in Benin. Our study not only covers many SSA countries but interrogates many firm and non-firm factors that may affect formalization. The problem that has affected the paucity of African studies in this area has been the availability of reliable public data on the informal sector. The World Bank has been collecting data on informal firms in Africa since 2009 and has so far covered 17 countries, and this is the data set that we want to exploit.

Since the African continent is unique in terms of culture, institutions, economic and political environment, it is essential to understand which of the many factors mentioned in the extant informal sector literature are important in enhancing formalization. Studies by North (1994), Rodrik (2008) and Acemoglu and Robinson (2010), amongst others, emphasized the significance of institutions in shaping business activities and improving inclusive growth. Rodrik (2008) stressed that without sound and efficient institutional setting such as legal and regulatory bodies, property rights and political stability, markets and businesses would be characterized by anti-competitive situations, inefficiency and lawlessness, which can bring about poor functioning of businesses and low productivity. Institutions play an important role in the prosperity of an economy in general, and in investment decision and business performance of firms in particular. The neo-liberal school believes that informality is a sign of popular resistance and a rational economic tactic voluntarily pursued by entrepreneurs stifled by poor quality institutions. Zylfijaj *et al.* (2020) using firm-level data for 243 informal firms in Kosovo found that institutional environment variables like corruption, inefficient tax administration and judiciary systems have a significant negative effect on formalization, and this was confirmed in studies done *inter alia* by Farrell (2004), Webb *et al.* (2014), Saunoris and Sajny (2017) and Sweidan (2017). World Bank (2021) firms' survey data show that about 18 and 39% of firms identify the court system and corruption respectively as major constraints to doing business whilst 28% are expected to give gifts to public officials to get things done. It is also part of the objectives of this study to investigate how the quality of institutions in SSA has impacted on informality. Thus, does the institutional framework play a crucial role in understanding the decision of registering a business?

Although it could be true that informality cannot be completely eradicated, high levels of informality in Africa where close to 90% of workers eke out a living in a sector that does not respect worker rights or provide decent working conditions is not good for sustainable and inclusive development (ILO, 2018). Africa's youth bulge where youths end up finding jobs in the informal sector requires policy intervention. Lack of structural long-term prospects for these youths may lead to frustration, increased levels of crime, social and political instability and inter-regional and international migration. Migration has resulted in xenophobic attacks in South Africa and serious challenges in Europe, so understanding ways of breaking the persistency and growth of informality is very important.

The other objective of this study is to test the applicability of the exclusion and rational exit view to informality in the context of SSA. Thus, is the cost of registering prohibitively high and excluding or that the net benefits from formalizing are unattractively low to warrant exit from informal activities? Table 2 shows that the number of firms identifying time fees and paperwork as reasons for not registering is higher than that of those who identify better access to finance as motivation to register. The same is true for firms identifying taxes to be paid *vis-a-vis* less bribes to pay and more infrastructure services to enjoy when registered. According to Maloney (2004) and Benhassine *et al.* (2017) burdensome regulations is not the main reason firms in Benin are informal, but instead they are rationally choosing to be informal because the benefits of formalizing are low for them compared to the tax and other costs. Florid *et al.* (2020) in their meta-analysis study therefore recommend that policy makers should focus on interventions that increase the benefits of formalization. The uniqueness of SSA in terms of entrepreneurial culture, political, institutional and economic conditions as well as lack of consensus in the extant empirical literature about factors that help drive formalization is another motivation for this study.

Our results show that *inter alia*, firms that are more likely to formalize are young, male owned and owned by individuals with high levels of education and experience. Although the prospect of accessing finance appears to encourage firms to formalize, it also seems that those firms whose loan applications were rejected because of being unregistered are unlikely to register their activities. The possibility of accessing infrastructure and government services has a negative impact on registration. So is the growth in income or GDP per capita.

This study is organized as follows: the next section is a review of the theoretical and empirical literature, followed by Section 3 which covers the methodology. Sections 4 and 5 are for results' analysis and conclusions, respectively.

2. Literature review

There is so much that has been written in this area. There are so many theoretical models to explain formalization and empirical studies to explain factors that can drive the process and the effects of being formalized on various factors such as investment, profits and productivity. The early discussion of informality by Hart (1970) was based on the development paradigm which was grounded on the dualistic view of development proposed by Lewis (1954) in his seminal work. The two-sector model assumed that a worker could earn different wages depending on the sector they were hired and that formal jobs are better than informal jobs. In this case, informal workers queue for better jobs, and thus, subsistence labour was a symptom of underdevelopment and as industrialization takes off, workers move into the formal sector. The dual economy model casts the informal sector as a unique segment of the economy, characterized by low levels of skills, poor technology, low productivity, low incomes and therefore inability to comply with the standards of the "modern" economy. The poor and low skilled people find the informal sector the only option for securing their livelihoods. This view implies that informality is a transitional development phase and that informal and formal firms are fundamentally different (Harris and Todaro, 1970) and that informal firms are considered not to be responsive to formalization policies (La Porta and Shleifer, 2014). This argument is akin to what the proponents of the modernization theory believe. They argue that the informal sector is a minor remnant and a product of underdevelopment, backwardness and traditionalism of societies and thus disappears when growth improves. From this perspective, therefore, informality is portrayed as greater in less developed and less modernized economies. However, recent evidence has shown that informality is extensive, enduring and expanding in many global regions, a refutation of the modernization and dualistic theories.

The structuralist explanation of the causes of informality asserts that this sector is an unregulated, insecure and low paid survival-driven endeavour conducted out of necessity and as a last resort by populations excluded from the formal labour market (Zylfijaj *et al.*, 2020; Ulyssea, 2020; Floridi *et al.*, 2020; Gallin, 2001; Slavnic, 2010; Taiwo, 2013). Given this view, the informal sector is thus a result of the under-regulation of work and the lack of social protection and thus the direct product of poverty. This explanation is akin to the neo-liberal view which portrays informal firms as a necessity-driven endeavour conducted by marginalized populations. Neo-liberal scholars contend that the growth of informal firms signals how many are choosing to voluntarily exit the formal economy in order to avoid high taxes, public sector corruption and an over-burdensome state (Williams and Shahid, 2014). Thus, informal entrepreneurs are heroes rejecting the bureaucratic shackles of an over-regulated state, and informality is a rational economic tactic pursued by entrepreneurs stifled by state-imposed constraints (Maloney, 2004; Williams and Yousseff, 2013; Packard *et al.*, 2012). This view is supported by a study done by Gajigo and Hallward-Driemeier (2012) on four African countries of Kenya, Nigeria, Senegal and Ivory Coast. They found that productivity and corruption (informal payments to public officials) significantly led to firms going back into the informal sector even after initially registering at the start-up. This was partly confirmed by Chuc *et al.* (2014) who found that in Vietnam switching from formal to informal is done by businesses who want to escape government regulations.

There are also two more prevailing views of informality referred to in the literature as the exclusion and rational exit models (McKenzie, 2011). The exclusion view focusses on the costs of registering whilst the exit view focuses on the balance between the benefits and costs of informality. In the exclusion view, the argument is burdensome entry regulations prevent

small firms from becoming formal, resulting in these firms experiencing low levels of productivity (Floridi *et al.*, 2020; Perry *et al.*, 2007; Maloney, 2004). Government regulations exclude a potential pool of entrepreneurs through *inter alia* lack of access to formal financial markets and government contracts and removing these burdensome regulations by cutting red tape, improving legal environment and reducing entry costs can reduce informality. The exclusion model had great impact on policy makers including the World Bank. The World Bank through its Doing Business projects promoted regulatory reforms aimed at decreasing direct costs and the time of formally starting up a business and even introducing one stop shops (Campos *et al.*, 2018; De Andrade *et al.*, 2018; La Porta and Shleifer, 2014; Bruhn and McKenzie, 2013). These World Bank policies succeeded in reducing the costs of formalization and increasing registrations even though new registrations were attributable to new formal enterprises rather than to previous informal firms switching to formality (Floridi *et al.*, 2020). The exit view on the other hand argues that the decision to become formal is synonymous with any other investment decision. Each firm compares the perceived costs of formalizing (registration, tax payments costs, compliance costs, etc.) with perceived benefits of being formal in the form of *inter alia* access to banks, courts, law and order, infrastructure and government contracts, zero informal payments or bribes as well as access to skilled labour. In this case, as the informal firm grows, becoming more efficient, benefits tend to outweigh the costs of formalizing, but this may not be true for less productive small firms. The appropriate policy response in the exit model is to increase the benefits of formality, making existing benefits more salient (Floridi *et al.*, 2020; Rothenberg *et al.*, 2015).

Charlot *et al.* (2013), using a multi-sector theoretical model for a developing economy found that lessening regulation and taxes decreases informality and that increasing informality detection is the least preferable policy because of negative side effects. Rocha *et al.* (2018) also found that in Brazil, reducing taxes after having already cut costs further induces informal firms to formalize. In order to test the rational exit view, De Mel *et al.* (2013) conducted an experiment in Sri Lanka offering monetary incentives for registration and found a large positive impact, but Fandl and Bustamante (2016) found no significant effects in their emerging markets countries. Another group of studies (De Giorgi *et al.*, 2018; Galiani *et al.*, 2017) investigated the parasite model by conducting field experiments with enforcement activities. De Giorgi *et al.* (2018) carried out an experiment in Bangladesh, where firms received a visit by a tax officer, and found a small increase in registration whilst De Andrade *et al.* (2018) found that in Brazil randomly assigning municipal inspectors to firms increases registration rates. The effectiveness of enforcement suggests that informal firms are parasite firms, which are productive enough to survive in the formal sector but choose to remain informal so as to benefit from not complying with regulations. Maloney (2004) also added that remaining unofficial is often a conscious choice based on the degree of attractiveness of informality versus formality and in line with this, DePaula and Scheinkman (2011) use an informal sector general equilibrium model for Brazil where individuals choose to become entrepreneurs in the formal or informal sector. The trade-off is that informal firms pay no taxes but face higher costs of capital, and they minimize the probability of being caught by tax authorities by limiting their scale of operations. They find that higher ability entrepreneurs are less attracted to the informal sector, and that formalization is associated with larger capital labour ratios and profits per worker [2]. This is also in line with Ulyssea's (2020) argument that informality is the outcome of firms self-selecting into the formal and informal sectors based on their productivity and relative pay-offs. Thus, informality does not cause low productivity, but rather lower-quality firms self-select into informality. However, McKenzie and Sakho (2010) find that in Bolivia, owners of firms who choose to remain informal have a higher ability than owners of formal firms, a result that differs from the mainstream view that formalization is positively correlated with the quality of the entrepreneurial input or productivity.

Other empirical studies have examined the influence of tax burden on the size of the informal sector. Zylfijaj *et al.* (2020) in Kosovo and Loayza (1996), using data for 14 Latin American countries, find that tax burden is positively associated with a larger informal sector. Similarly, Cebula (1997) provides evidence of a similarly positive tax effect using United States of America *data*, finding that increasing the income tax rate by one per cent, expands the size of the informal sector by 1.4%. Rocha *et al.* (2018) using data from Brazil estimated the effects of reducing the costs of formality on firm formalization and found that reducing taxes once registration costs have already been eliminated reduces firm informality. Similar results on Brazil are confirmed by Tumen (2016) who found that a 5% reduction in taxes leads to a 6.5% decline in the size of the informal sector when the stepping stone role of the informal sector is strong and by 14% if the stepping stone [3] motive is weak. This effect comes from the formalization of existing informal firms, and not from the creation of new formal businesses. Ulysssea (2020) also found that reducing the tax burden can induce some formalization, albeit the elasticity seems to be low.

Empirical evidence shows that the size of the informal sector is negatively related to the expected risk of detection. Feld and Larsen (2009), using German data for 2004–2007, find that an increase in the probability of detection and the severity of the penalty reduces the likelihood of working in the informal sector, but Ulyssea (2020) warns that enforcement might have negative effects on welfare if informal firms are survivalist and thus will prefer to exit than to register. De Andrade *et al.* (2018) using field experiments in one Brazilian city to test which government action induces informal firms to register, report that the likelihood of registering increases by 21–27% points if the firm receives an actual inspection. Prado (2011) applying a general equilibrium model on Organisation of Economic Cooperation and Development (OECD) countries found that enforcement is negatively correlated with the size of the informal sector, but De Giorgi *et al.* (2018) in Bangladesh and Galiani *et al.* (2017) in Colombia found small increases in registrations. Entrepreneurs in Tanzania, however, stated that they would formalize, if their business growth were dependent on it, suggesting that growth leads to formalization. United States Agency for International Development (2005) also found that there is a high statistically significant correlation between a country's overall performance on the Doing Business indicators and the size of its informal economy. A worse environment for doing business is associated with a larger informal economy. Zylfijaj *et al.* (2020) using firm-level data for 243 informal firms in Kosovo, found that business-environment variables like limited access to financing, the cost of financing, the unavailability of subsidies, tax rates and corruption have a significant negative impact on the formalization of informal firms.

La Porta and Schleifer (2014) found that although avoidance of taxes and regulations is an important reason for informality, the productivity of informal firms is too low for them to thrive in the formal sector. Lowering registration costs neither brings many informal firms into the formal sector, nor unleashes economic growth. They conclude that informal firms will stay permanently informal because they hire informal workers for cash, buy their inputs for cash, sell their products for cash, are extremely unproductive and are unlikely to benefit much from becoming formal. De Mel *et al.* (2013) in Sri Lanka carried out a field experiment and found that information about the registration process and even actual reimbursement of direct costs of registration had no effect on formality. This effect is confirmed by Benhassine *et al.* (2017) in Benin who found that few firms register when just given information about the new registration process (entreprenant), but a full package of supplementary efforts consisting of tax participation support, provision of business services, training, assistance in opening a bank account as well as assistance in registering boosts formalization by 16.3% points. They recommend that policy makers should target firms that look more formal if they want to increase formalization rates. These studies suggest just like La Porta and Schleifer (2014) that, informal firms are difficult to lure into the formal sector.

A comprehensive review of the literature on formalization done by Ulyssea (2020) found that lowering the costs of formality is not an effective policy to reduce informality but may generate positive aggregate effects, such as higher output and total factor productivity. The most effective formalization policy is to increase enforcement on the extensive margin but not on the intensive margin of informality [4] Floridi *et al.* (2020) used meta-analysis to systematically assess the literature on the impact of formalization policies and came up with 842 estimates from 27 studies conducted by 49 researchers and published until June 2019. They found that there is no evidence for increased formalization associated with cost, and enforcement policy interventions but policies increasing the benefits after formalization result in increased formalization rates though the evidence base is thin.

One message coming from the literature reviewed in this section is that factors affecting formalization of informal firms are heterogeneous, vary from one country to another and that there is no one size fits all.

3. Methodology

McKenzie and Sakho (2010) and Benhassine *et al.* (2017) in line with the rational exit view, hypothesized that a profit maximizing firm becomes formal if and only if the expected present discounted value of the net benefits from doing so outweighs the upfront costs. Thus,

$$\sum_{t=1}^{T} \delta^t E(\pi_{F,t} - \pi_{I,t}) + \theta_{law\ abbiding} > C_{money} + C_{time} + C_{information} \tag{1}$$

where $\pi_{F,t}$ is firm profits if it is formally registered at time t, and $\pi_{I,t}$ is profits if it is not formally registered at time t. $\theta_{law\ abbiding}$ is the utility to firm owners from obeying the law and feeling they are contributing to national welfare by paying taxes. C_{money} , C_{time}, $C_{information}$ denote the monetary, time and information costs of registering, respectively. Firm and owner level characteristics like age, sex, etc. are assumed to affect firm profitability.

In line with the above methodological framework, an informal firm will formalize if the discounted profits and other benefits from formalizing exceed formalization costs. We capture these benefits and costs that can enhance formalizing using the firm, the owner and country level characteristics as shown in Equation (2) below. There are many factors that influence a business's decision to formalize, and these range from internal factors [5] to external factors.

$$IR_{ij} = \beta_0 + \beta_1 \sum Z_{ij} + \beta_2 \sum C_j + \mu_{ij} \tag{2}$$

where IR_{ij} is intention to register by firm i in country j, Z_{ij} are firm and owner level characteristics, and C_j represents country level indicators. This intention to register takes the value of one if the informal firms would want to register the business and zero otherwise. This is because the only question that was asked about informal firms' registration status is as follows: "Would you like for your business to be registered with your country's company registration office?" A firm that says "yes" wants to register and is assigned a binary value of one whilst the one that says "no", a value of zero.

When the dependent variable is binary, there are three alternative models that can be used for estimation such as the linear probability model, the logit and the probit models. The linear probability model (LPM) is simple to estimate and use but has some drawbacks. The two most common drawbacks in addition to assuming linearity is that the fitted probabilities can be less than zero or greater than one and the partial effect of any explanatory variable is constant (Wooldridge, 2019). However, the limitations of the LPM can be overcome by using sophisticated binary response non-linear models such as probit and logit, estimated using

maximum likelihood as opposed to the ordinary least squares in the case of the LPM. These two maximum likelihood techniques basically produce identical results, but the difference between them lies in the functional form [6]. Unlike in the case of the LPM, marginal effects have to be calculated to enable the interpretation of coefficients, and both models produce more or less the same effects. Therefore, the choice between the probit and logit is immaterial since estimated probabilities are approximately the same.

We regress our binary dependent variable against various firm level variables including those that look at the cost and benefits of registration like the time it takes to register, time, fees and paperwork involved, taxes to be paid, access to finance, availability of infrastructure and government services. Country level variables include GDP per capita to capture the impact of an improvement in economic activity and also test the applicability of the dualistic view by Lewis (1954), institutional indicators like corruption, the rule of law, to capture trust that the state is not serving interest of the elite and few private individuals. Our hypothesis is that an improvement in the institutional environment should encourage firms to formalize. The definition and measurement of all the variables used in this study is provided in the appendix section (Table A2).

3.1 Data and stylized facts

Firm level informal sector data are from the World Bank informal sector enterprise surveys. These surveys currently cover about 22 countries all from the developing world, and 15 of these countries are in Africa and the rest are from North and South America as well as Asia. We use comparable standardized data from 13 countries from Sub Saharan Africa, surveyed between 2009 and 2018. Although the sampling techniques and the questionnaire used to collect data in these countries are standard, the pooling of country data collected at different points in time may create problems. Thus, if firm's responses are driven by economic, cultural and institutional environment in the country then this might result in omitted variable bias and hence endogeneity. It is possible that if a specific year was used for all the firms across these countries, the responses to the questionnaire questions would have been different in some countries. This is because of the dynamic nature of the economic and institutional environment, and it is possible to minimize this problem if we had longitudinal data.

However, time series data on these informal firms are not available, as the surveys were only conducted once in each African country, and this means that our data vary only across firms and countries, and there are no dynamic changes captured. Our data are pooled cross section and composed of 4,019 firms, and the coverage of firms in each country varies widely with Botswana contributing the least about 99 firms compared to 729 in Ghana (see Table 1 below). These countries are also heterogeneous in that they are a mix of upper middle income, lower middle income and lower income countries [7]. We use this data set to collect firm-specific indicators on firm registration and firm owner characteristics. We also use cross tabulation to infer more about the characteristics of these firms and the formalization related issues.

The descriptive statistics on Table 1 below show that about 47% of firms in the sample expressed interest in registering their businesses, and the number of firms intending to register is higher in Angola at 88%, Mali at 79% and Burkina Faso at 60%. This number is surprisingly low in the island nations of Madagascar and Mauritius at zero [8] and two per cent, respectively followed by Mozambique with only 11%. Only about 4% of these firms once registered their businesses, and this number is very high again in Angola with 18% having registered sometime in the past, followed by Burkina Faso and Cameroon at 5%, respectively. Botswana is the only country with firms that never registered their businesses in the past. There also appears to be no relationship between the proportion of firms intending to register and the time it takes to register. It takes more than 130 days to register a business

Table 1.
General firm level descriptive statistics

	No. of firms	Intent to register (%)	Firm age	Firm size 000s	Owned by male (%)	% in manufacturing	Experience in sector (in years)	Time to register (days)	Business once registered (%)	Main reason for not being registered
Angola (2010)	119	88.6	6.0	147	68.9	45.4	7.8	133.8	18.0	Time, fees and paperwork
Botswana (2010)	99	58.6	5.9	8.5	56.7	44.4	7.6	40.5	0.0	Time, fees and paperwork
Burkina Faso (2009)	120	60.3	8.9	16.1	78.3	–	10.8	32.6	5.0	Time, fees and paperwork
Cabo Verde (2009)	129	57.7	9.8	66.9	37.2	–	11.9	45.1	0.8	Time, fees and paperwork
Cameroon (2009)	122	50.8	7.3	10.3	66.4	–	9.5	121.0	4.9	Time, fees and paperwork
The DRC (2013)	480	48.9	7.9	0.18	77.1	47.9	9.5	6.2	3.3	No benefit
Ghana (2013)	729	50.9	8.6	6.1	37.2	44.2	9.5	31.7	2.5	No benefit
Kenya (2013)	533	53.0	6.5	3.7	61.1	48.4	8.1	17.9	1.3	No benefit
Madagascar (2009)	127	0.0	7.3	2.4	50.8	39.2	7.3	–	1.3	–
Mali (2010)	120	79.3	9.4	12.6	80.8	50.8	11.7	89.2	1.7	Time, fees and paperwork
Mauritius (2009)	132	2.3	15.3	8.7	69.5	50.8	18.3	–	–	–
Rwanda (2011)	240	56.1	5.7	1.9	65.4	68.3	7.4	53.9	0.4	Taxes to be paid
Mozambique (2018)	554	10.8	5.2	3.3	46.3	40.0	6.5	–	–	No benefit
Zimbabwe (2016)	515	42.7	6.9	4.8	56.6	19.2	7.7	–	–	Taxes to be paid
Total	*4,019*	*47.1*	*7.9*	*20.9*	*60.9*	*35.6*	*9.5*	*40.9*	*3.5*	*Time, fees and paperwork*

Source(s): Author's calculation based on World Bank enterprise data. The size variable is in US dollars and calculated by average monthly sales of each firm multiplied by 12 (to get annual sales) and then converting the local currency amount into US dollars using the applicable year exchange rate. It is important to note that this approach ignores the effect of seasonality

	Registration costs			Registration benefits	
	Firms identifying time, fees and paperwork	Firms identifying taxes to be paid	Firms identifying less bribes to be paid	Firms identifying better access to finance reason to register	Firms identifying *inter alia*, infrastructure and government services
Angola (2010)	72.2	–	57.0	87.6	36.2
Botswana (2010)	38.9	–	5.5	75.5	25.0
Burkina Faso (2009)	73.3	–	50.0	89.8	37.1
Cabo Verde (2009)	92.7	–	11.2	71.7	34.9
Cameroon (2009)	47.6	–	43.5	69.6	32.7
The DRC (2013)	56.4	58.1	13.4	66.1	33.3
Ghana (2013)	58.6	45.6	23.3	61.9	45.8
Kenya (2013)	56.2	56.9	40.1	76.8	60.8
Madagascar (2009)	–	–	44.4	46.0	51.7
Mali (2010)	91.7	–	11.7	79.6	29.0
Mauritius (2009)	–	–	50.0	73.2	60.6
Rwanda (2011)	58.2	61.1	8.8	90.4	49.6
Mozambique (2018)	38.2	31.3	24.3	37.3	16.6
Zimbabwe (2016)	78.3	80.6	29.8	59.3	48.6
Average	76.2	55.6	29.5	70.3	40.1

Source(s): Author's calculation based on World Bank enterprise data

Table 2.
Firm level benefits and costs to being registered (% of firms)

in Angola and only six days in the Democratic Republic of Congo (DRC), but the number willing to register is more in the former than that in the latter. The time it takes to register a business is relatively high in this sample, and this is probably why time, fees and paperwork appear as one of the main reasons why some firms in these countries are not registered (see Table 2). The most important factor that seems to drive these firms to register appears to be better access to finance. About 64% of firms in total pinpointed this as a motivation, and the number is higher in both Rwanda and Burkina Faso at 90% followed by Angola at 88%.

4. Results presentation and analysis

Since our dependent variable is binary, and the choice between logit and probit immaterial, we use the probit model to do our main estimations and marginal effects to calculate the probabilities thereafter. Our models are cross sectional, and thus make it difficult to effectively control for endogeneity and capture time variant factors affecting the probability to register. The decision to register is a choice variable and may result in endogeneity especially due to omitted variable bias. Thus, it is possible that informal firms who are more productive and expect large benefits from becoming formal will more likely formalize, and this kind of self-selection conflates the causal effect with the selection effect, biasing results (McKenzie and Sakho, 2010). In this case lower-quality firms also self-select into informality.

However, correcting for endogeneity is generally difficult particularly using cross sectional data. One approach that we have used here to minimize omitted variable bias is to include as many indicators that affect this chosen variable as possible, and this is the same technique used by Amin *et al.* (2019). To correct for self-selection, we decided to estimate a production function where we proxy productivity using residuals. We then calculate average productivity of informal firms in each sector and country and use this as an instrument in the endogenous probit model. This technique was also used by Amin *et al.* (2019), De Rosa *et al.* (2010) and Dollar *et al.* (2006). Therefore, Model 5 in Table 4 includes many variables that are possible, given the data set and that may influence the decision to register whilst Model 6 is an endogenous probit model. We use 13 countries with comparable informal firms' data excluding Madagascar since there are no firms that intend to register their businesses in the country (Table 1). It is also worth mentioning that our results are based on cross sectional data, and despite endogeneity checks, our findings cannot be treated as truly causal. A richer longitudinal data set with time dimension is needed to confirm or reject causality (Amin *et al.*, 2019).

Baseline results on Table 3 below capture general firm specific characteristics, and we use different forms of binary choice techniques from the linear probability model, the logit and then the probit model. Most of the variables appear to have expected signs with firm age showing that an older firm's likelihood to register is small, probably because these are firms that have been operating informally for a long time and so have become comfortably operating in the sector. Zylfijaj *et al.* (2020), Ishengoma (2018) and Floridi *et al.* (2020) found same results whilst Jaramilo (2013) found positive relationship between firm age and formalization in Lima. The level of education of the main owner is a significant predictor of the probability to register most likely because they understand the benefits and costs of doing so. Similar results were found by Benhassine *et al.* (2017), Ulyssea (2019), Galliani and Weinschellbaum (2012), Cling *et al.* (2012) and Gasparini and Tornarolli (2009). The firm size and experience of the owner variables indicate a positive and significant relationship with the probability to register. This suggests that being large in size makes you more visible especially to inspectors whilst more experience working in the sector, makes you more knowledgeable of the pros and cons of being unregistered and how they affect business growth. Larger firms might also have greater need of accessing formal credit markets or issuing tax receipts to buyers. Ishengoma (2018) argues that educated and experienced firm owners are more enlightened and confident and also understand the business registration

Variable	Model 1 (the LPM)	Model 2 (Logit)	Model 3 (Probit)
Manufacturing	0.041 (0.025)	0.034 (0.026)	0.034 (0.026)
Firm size	0.012* (0.006)	0.013* (0.007)	0.012* (0.007)
Experience of the owner	0.007* (0.003)	0.007* (0.004)	0.006* (0.004)
Firm age	−0.001 (0.004)	−0.001 (0.004)	−0.001 (0.004)
Education	0.056*** (0.015)	0.056*** (0.016)	0.054*** (0.004)
Gender of owner	0.023 (0.032)	0.027 (0.033)	0.056** (0.027)
Maximum time of registration	−0.001 (0.002)	−0.001 (0.002)	−0.001 (0.002)
Constant	0.527*** (0.058)	−0.375 (0.256)	−0.229 (0.157)
Observations	*1,467*	*1,467*	*1,467*
No of countries	*13*	*13*	*13*

Note(s): The corresponding robust standard errors are in parentheses. ***$p < 0.01$; **$p < 0.05$, and *$p < 0.1$. The access to the finance variable is a dummy taking the value of one when the firm states that it has a loan and zero otherwise. Sector dummy takes the value of one if it is manufacturing and zero if it is services. We use marginal effects to estimate impact

Table 3.
Baseline results

Table 4. Detailed full sample results estimated using a probit model

Variable(s)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6 (endogenous probit)
Manufacturing	0.009 (0.035)	0.0006 (0.028)	0.016 (0.037)	0.028 (0.022)	0.010 (0.035)	0.017* (0.009)
Firm size	0.015* (0.007)	−0.009 (0.006)	0.004 (0.008)	−0.004 (0.007)	−0.014 (0.013)	0.016 (0.012)
Experience the of owner	0.004 (0.004)	0.014*** (0.003)	0.006 (0.004)	0.006*** (0.002)	0.007 (0.004)	0.008*** (0.003)
Firm age	0.0002 (0.004)	−0.009** (0.003)	0.002 (0.005)	−0.005** (0.002)	−0.002 (0.005)	−0.006** (0.0.002)
Education	0.055** (0.018)	0.048*** (0.014)	0.055*** (0.019)	0.069*** (0.011)	0.051*** (0.019)	0.062*** (0.020)
Gender of the owner	0.028 (0.036)	0.052* (0.029)	−0.002 (0.038)	0.081*** (0.022)	0.037 (0.038)	0.048 (0.036)
Registration time	−0.001*** (0.0003)		−0.0003 (0.0002)		−0.0005** (0.0002)	−0.0007** (0.0003)
Time fees and paperwork	−0.002*** (0.0004)		−0.004 (0.020)		−0.024 (0.016)	−0.036** (0.012)
Productivity						0.045** (0.013)
Future taxes	−0.039*** (0.014)		−0.053*** (0.021)		−0.023 (0.015)	0.031 (0.017)
Bribes to remain unregistered	−0.020*** (0.006)		−0.007 (0.007)		−0.019*** (0.006)	−0.018 (0.010)
Access to finance		0.308*** (0.027)	0.034*** (0.012)		0.021* (0.011)	0.045*** (0.011)
Inspections					−0.012 (0.011)	0.013*** (0.002)
Access to infrastructure etc.		−0.004 (0.008)	−0.017 (0.011)		0.015 (0.010)	0.018* (0.010)
Less bribes		−0.003 (0.006)	−0.003 (0.009)		−0.006 (0.008)	−0.007 (0.005)
No benefit		0.355*** (0.026)	−0.436*** (0.033)		−0.032** (0.013)	−0.046 (0.024)
Biggest obstacle – land				0.053 (0.035)	−0.005 (0.057)	
Biggest obstacle – corruption				0.021 (0.049)	0.128** (0.061)	
Biggest obstacle – crime				−0.098** (0.049)	−0.069 (0.083)	
Biggest obstacle – power				−0.035 (0.029)	−0.058 (0.121)	
LnGDP					−0.278** (0.110)	−0.243** (0.091)
The rule of law				−0.173*** (0.035)	0.270** (0.107)	0.189* (0.090)
Past registration				0.198*** (0.038)	0.299*** (0.054)	0.183*** (0.045)
Age of the owner					0.001 (0.002)	0.006*** (0.001)
Owner has a job					−0.157** (0.078)	−0.132*** (0.055)
Age business × past registration					0.044** (0.018)	
Age owner × education					0.0003 (0.0006)	
Sex × education					−0.018 (0.039)	
Observations	*2,456*	*2,456*	*2,456*	*2,456*	*2,456*	*2,450*
No. of countries	*13*	*13*	*13*	*13*	*13*	*13*

Note(s): The corresponding robust standard errors are in parentheses; ***$p < 0.01$; **$p < 0.05$, and *$p < 0.1$. The coefficients are equal to marginal effects

processes and requirements, and this helps them reduce the transactions costs of registering. Results on experience are confirmed by what Williams and Shahid (2014) found in Pakistan whilst results on size are in line with what Cling *et al.* (2012) found in Vietnam. In the case of experience, Cling found no significant effect, concluding that household businesses are stuck in the informality trap.

Williams and Shahid (2014) also found that, being in manufacturing or services etc. has no effect on the likelihood to register as is the case in these baseline models. According to Ishengoma (2018), it is not the sector that matters but whether an entrepreneur is selling their products to or outsourcing their inputs from relatively large firms. Thus, firms transacting in large businesses are more likely to formalize than those not doing so.

The gender variable shows that male owned businesses are more likely to register compared to female owned ones. Cling *et al.* (2012) found similar results arguing that women were less willing to register because they treat their ventures as an "auxiliary" activity. However, Williams and Shahid (2014) found no relationship between the gender of the entrepreneur and the level of formalization. Registration costs as captured by maximum time to register have a negative effect on probability to register something contrary to the no effect result found by Zylfijaj *et al.* (2020) in Kosovo. De Mel *et al.* (2013) however found that in Sri Lanka, more formalization occurs from interventions that reduces costs and increases benefits.

After running the baseline models, we introduced several other firm specific variables identified in the literature and that relates to the costs and benefits of registering and captured in the survey questionnaire. Institutional indicators are meant to capture whether lack of the rule of law, levels of corruption etc. are important considerations in the firms' decisions to operate formally or informally. We measure corruption at firm level using perception indicators. Firms were asked whether corruption is the biggest obstacle to doing business or not and responded using a five-point rating scale where 1 is not an obstacle and 5, a very severe obstacle. GDP per capita is used to capture the general level of purchasing power or demand. If demand is high, survivalist firms will not want to register but prefer to exit the informal sector and this variable can be used to test the transitional view of informality.

By using sector level controls to capture whether the firm is in manufacturing or services, the idea is to ascertain whether the nature of the product produced in the informal sector plays a role in changing the probability to formalize. Manufacturing firms generally require a physical production site at all times, and this makes their operations easily detectable by inspectors, and these products bring in relatively large sums of money thus attracting tax authorities. In all our results, the manufacturing sector variable continues to be insignificant although positive. These results are partly confirmed by Williams and Shahid (2014) in Pakistan and Ishengoma (2018) in Tanzania. Ishengoma (2018) provided a good reason above about why the sector does not matter but the value of goods being traded. The firm size [9] variable captures whether the scale of the firm's operations matters in enhancing the likelihood to formalize. Our results on Table 4 below show that this variable is now negative and generally insignificant contrary to what was found by Cling *et al.* (2012) and Zylfijaj *et al.* (2020). Ulyssea (2020) views that the extensive margin of informality declines with firm size, or that the share of informal firms decreases as firms growing larger are contradicted by our findings. Amin and Islam (2015) found that small informal firms have higher labour productivity than large informal firms, and this result may partly explain why big firms are reluctant to register their activities. Another variable related to size that we looked at was firm age. In all the models, it is generally negative and significant suggesting that being old reduces the probability of formally registering a business, and this negative effect does not change even at country level (Table 5). When you have been operating in an environment for a long time, it becomes difficult to change because you have somehow mastered the art of

surviving in the sector and probably also sceptical of the benefits of formalizing. Similar results were found by Zylfijaj *et al.* (2020) and Floridi *et al.* (2020) whilst Williams and Shahid (2014) found a positive and significant effect in Pakistan with Jaramilo (2013) finding a positive but insignificant effect in Lima. The level of pairwise correlation between firm size and firm age is low (0.06) suggesting that old firms are not necessarily big in size, and thus there is no problem of multi-collinearity caused by including these two variables simultaneously in the same model. Our results also show that the age of the owner has a positive and significant effect on formalization contrary to what Gajigo and Hallward-Driemeier (2012) in their study that covered four African countries as well as Jaramilo (2013) in Lima found. Ishengoma (2018) found that in Tanzania, owners between the age of 31 and 50 years are more likely to formalize than those between the age of 16 and 30 years. Gennari (2004) argued that the probability of young and very elderly entrepreneurs formalizing their businesses is less than that of the middle-aged entrepreneurs, primarily due to fragile social security systems and inadequate retirement benefits as well as the fact that young entrepreneurs engage in the informal sector out of necessity especially when unemployment is high.

We went further and interacted firm age with past registration, and found the impact to be positive and significant (see Table 4) suggesting that an old firm that once registered will most likely register again. This effect should probably be driven by past registration because it has a positive and significant effect on the probability to re-register. The net effect of the age variable after taking the interaction effect into account is 0.001 obtained as follows: [−0.0002+ (0.041 × 0.028)]. In this case 0.0002 is the unconditional probability effect of age whilst 0.041 is the conditional effect on the interaction between age and past registration, and 0.028 is the mean value of past registrations [10]. Having registered in the past enables firms to compare business life when registered with one when operating informally and realizing that the former was significantly better than the latter thus neutralizing the negative effect of the age variable.

The experience of the owner captures the number of years the main decision maker or owner has been working in the sector. These are formal years of experience working in a sector closely

Variable(s)	Ghana	Kenya	The DRC
Manufacturing	0.077 (0.090)	0.075 (0.162)	0.028 (0.070)
Experience of the owner	0.025* (0.015)	0.001 (0.020)	−0.005 (0.007)
Firm age	−0.006 (0.015)	−0.011 (0.021)	−0.011 (0.008)
Education	0.121** (0.055)	0.092 (0.101)	0.016 (0.034)
Gender of the owner	0.033 (0.098)	−0.001 (0.179)	0.095 (0.078)
Registration time	−0.0001 (0.0008)	0.0004 (0.0013)	0.0002 (0.0002)
Time fees and paperwork	−0.014 (0.095)	−0.201 (0.164)	−0.007 (0.037)
Future taxes	−0.209** (0.095)	−0.044 (0.067)	−0.064* (0.039)
Bribes to remain unregistered	0.007 (0.025)	−0.0140 (0.030)	−0.014 (0.011)
Access to finance	0.085* (0.049)	0.151*** (0.057)	−0.012 (0.021)
Past registration	0.237** (0.116)		0.310*** (0.061)
Access to infrastructure etc.	0.063* (0.035)	0.039 (0.053)	−0.017 (0.019)
No benefit	−0.267*** (0.096)	−0.875*** (0.177)	0.545*** (0.055)
Inspection	−0.008 (0.025)	−0.065 (0.069)	−0.029 (0.029)
Age of owner	−0.003 (0.004)	0.011 (0.010)	0.004 (0.004)
Owner has a job	−0.244 (0.356)	−0.625 (0.396)	0.018 (0.106)
Education × experience	0.098** (0.025)	0.076* (0.029)	0.120* (0.058)
Observations	*547*	*381*	*350*

Note(s): The corresponding robust standard errors are in parentheses; ***$p < 0.01$; **$p < 0.05$, and *$p < 0.1$. The coefficients are equal to marginal effects

Table 5. Country level results estimated using a probit model

related to what the informal firm is doing. This variable is generally positive and significant in most models estimated but negative at country level in the DRC. This finding supports results found by Williams and Shahid (2014) and Ishengoma (2018) who proxied the variable using business age but contradicts what Cling *et al.* (2012) found in Vietnam. Our results also suggest that entrepreneurs start their business informally to test their business ideas and acceptance in the market before beginning to formalize the activities after gaining confidence (Williams and Martinez, 2014; Williams and Nadin, 2013; Williams and Shahid, 2014). We also controlled for the owner's level of education, and the pattern of results is also like experience. Perry *et al.* (2007), Ishengoma (2018), Cling *et al.* (2012), Jaramilo (2013), Williams and Shahid (2014), Benhassine *et al.* (2017) and La Porte and Shleifer (2014) also found similar results using a data set from a broad set of countries whilst Zylfijaj *et al.* (2020) found the variable to be negative and insignificant in Kosovo. In this study, the variable has a positive and significant effect on the likelihood to register except in Kenya where the effect is negative though insignificant. Being educated enables the owners to appreciate the benefit of registering and to be aware of the consequences of operating informally. The question is why is being experienced and educated reducing the likelihood to register in Kenya and the DRC? We interacted these two variables at country level (Table 5) and found that they are positive and significant, suggesting that a highly educated and experienced owner is more likely to formalize. Education in both Kenya and the DRC needs to be complemented with experience for formalization to take place. According to Sinclair-Desgagné (2013) and Nelson and De Bruijn (2005) an entrepreneur's personal traits (namely, education, self-confidence and attitude towards risk) play an important role in the formalization decision-making models. Thus, more educated and experienced entrepreneurs are likely to understand ways of handling formalization procedures and requirements than the less-educated and experienced ones. These country level results suggest that education alone without experience in Kenya and the DRC is not sufficient to make owners of these informal firms formalize. Education helps with being literate, but experience is good for institutional memory.

The gender variable also provides consistent results showing that a firm owned by a male has a higher chance of becoming registered than the one owned by a female. Ishengoma (2018), Gajigo and Hallward-Driemeier (2012), Cling *et al.* (2012), Benhassine *et al.* (2017) and Zylfijaj *et al.* (2020) found similar results with Cling *et al.* (2012) arguing that women were less willing to register their businesses as they treat these ventures as an "auxiliary" activity. However, Williams and Shahid (2014) found no relationship between the gender of the entrepreneur and the level of formalization in Pakistan. Ishengoma (2018) and van Rooyen *et al.* (2012) add that females tend to be risk averse and invest more in attaining their families' social needs and development whereas males invest more in productive assets and, thus, business expansion which is positively associated with formalization.

After controlling for these firm specific features, we went further and included variables that capture the cost and benefits of registering an informal business. These covered costs in the form of the time it takes to register a business, administration procedures in the form of time, fees and paperwork, potential inspections and meeting with government officials that take place when registered, bribes paid by registered businesses and the future taxes that will be paid after registration. The benefits are in the form of access to formal finance, access to infrastructure, raw material and other government services, as well as less bribes to pay. Results on these controls are presented on Tables 4 and 5 below. The maximum time it takes to register a business as well as time, fees and paperwork appear to have a negative and significant effect on the probability to register in line with what De Soto (2001) and Zylfijaj *et al.* (2020) found supporting the exclusion view of informality. Díaz *et al.* (2018) also confirm these results finding that the distance from the tax office systematically increases the likelihood of enterprises to de-register, but other researchers like Goldszmidt *et al.* (2018), Rocha *et al.* (2018), Rothenberg *et al.* (2015), Aparicio (2014) and Bruhn and McKenzie (2013) found a fairly small positive impact of reducing registration time or costs on firm registration. Thus, only in a few

cases did the reduction in costs led to a significant increase in the number of businesses formalizing. Providing information and removing the upfront cost of registration had no effect on tax registration in randomized experiments in Sri Lanka (De Mel *et al.*, 2013), Bangladesh (De Giorgi and Rahman, 2013), Brazil (De Andrade *et al.*, 2018), Malawi (Campos *et al.*, 2018) or Colombia (Galiani *et al.*, 2017). Ulyssea (2020) concludes that lowering the costs of formality is not an effective policy to reduce informality but may generate positive aggregate effects, such as higher output and total factor productivity. If this is true, it supports the parasite view where firms remain informal just to escape paying taxes. Even though the time it takes to register is negative and significant, at country level, this variable is insignificant. This is probably explained by the fact that the three countries used in Table 5 have the lowest registration time compared to all the other countries.

The variable that captures the possibility of paying taxes is also negative and significant even at country level, showing that the prospect of paying taxes in future discourages firms from registering their businesses. This result confirms the finding obtained by Charlot *et al.* (2013) in their theoretical model as well as Cebula (1997), Farrell (2004) and Rocha *et al.* (2016). The latter found that the tax burden is the cause of informality. Fajnzylber *et al.* (2011) focussed on a tax reduction and simplification programme in Brazil, also finding a positive impact on registration. Rocha *et al.* (2018) found that in Brazil, reducing the tax burden increased formalization by 11% whilst reducing entry costs had no effect. Explaining how the tax system works and which profit thresholds attract taxation will be very informative to informal firms.

On the benefits side, the access to finance dummy captures the fact that registered firms have easier access to loan from formal financial institutions than unregistered enterprises. The results support this hypothesis, and the variable is positive and significant except at country level in the DRC where it carries a negative but insignificant effect. This variable is positive and generally significant suggesting that firms that face financial challenges will more likely register in line with findings by Demirgüç-Kunt *et al.* (2008), Gelb *et al.* (2009), and Nichter and Goldmark (2009). Ishengoma (2018) and Zylfijaj *et al.* (2020) also found similar results in Tanzania and Kosovo, respectively. Thus, firms with access to financial and banking services were between 8 and 14% more likely to formalize their businesses than those without access to these services in Tanzania. Ulyssea (2020) also adds that the more developed the financial sector and credit markets are in a given country, the greater is the opportunity cost of being informal, and this credit channel effect was confirmed by D'Erasmo (2016), and Lopez-Martin (2019) using general equilibrium models. On average about 70% of firms in this study identified access to finance as the reason why they would want to register.

Another benefit variable, access to infrastructure, is generally positive but insignificant maybe because the term is broad, and impact depends on the type of infrastructure under consideration. Ishengoma (2018) disaggregated infrastructure into water, electricity and telecommunication finding that those with access to water and telecommunication were on average 3% more likely to formalize whilst those with access to electricity were on average 13% more likely. This shows that being accessible to electricity will incentivise firms to formalize more than being accessible to water and telecommunication. The fact that cost of registering variables (time fees and paperwork as well as future taxes) have a negative and significant effect on registering and that benefits' variables (access to finance and infrastructure) are positive and significant partly suggesting that net benefits matter when it comes to formalization as per the rational exit view. This is also supported by the significance of the no benefit variable which shows that firms that believe that there is no benefit from registering will not formalize.

If indirect measures of formalizing such as reducing entry costs and increasing benefits are not yielding expected results, policy makers have the option of using direct tools of enforcements through inspections. On the inspection variable, our results are in line with findings by De Andrade *et al.* (2018). They randomly assigned municipal inspectors to firms in

order to assess whether higher enforcement can induce firms to formalize in Brazil and found that enforcement increases registration rates. De LaPara (2016) also found inspections increase the transition probability from informal to formal jobs within the same establishment from 14% to 20% within the first three months after the inspection occurs. De Andrade *et al.* (2018) also found that enforcement efforts to get targeted firms to become formal was effective in Brazil whilst Ulyssea (2020) argues that the most effective formalization policy is to increase enforcement on the extensive margin but not on the intensive margins of informality. The significance of enforcement supports the view that sees informal firms as parasites, which are productive enough to survive in the formal sector but choose to remain informal to earn higher profits from the cost advantages of not complying with taxes and regulations and thus require increased enforcement (Ulyssea, 2018; Levy, 2008). The problem with this view is that if these informal firms are instead survivalist, improving enforcement and inspections will not be effective but may result in them exiting as their productivity levels are very low.

Although inspections may improve registrations, this strategy may lead to corruption where firms resort to paying bribes to remain unregistered. We interrogated this issue and found that the bribes to remain unregistered variable have a negative and significant effect. Zylfijaj *et al.* (2020), Farrell (2004) as well as Gajigo and Hallward-Driemeier (2012) found similar results using the corruption variable. Gajigo and Hallward-Driemeier (2012) found that firms that have paid a large percentage of their sales on gifts and informal payments to government officials are unlikely to register. Williams and Shahid (2014), also found that an entrepreneur citing corruption as the main reason for operating informally is 3.8 times more likely to operate at a lower level of formality.

Another firm level variable that we interrogated is that of past registrations. About 4% of firms in this sample once registered their operations, and our aim was to find out whether these firms will be interested in registering again. A firm's past registration appears to be a significant predictor of its probability to register. This variable is consistently positive even at country level. This explains why after interacting it with firm age, even old informal businesses that once registered are more likely to register. The net effect of past registration after interacting with age is 0.65 suggesting that policy makers should also target old informal businesses that once registered. This is closely related to a finding by Gajigo and Hallward-Driemeier (2012) that the number of years served by an employee of a formal enterprise has a positive and significant effect on the likelihood to formalize.

In the case of country level indicators like GDP per capita and the rule of law, results show that GDP per capita has a negative and significant effect. The negative effect suggests that increasing incomes reduces the likelihood to register contrary to the dualistic or transitional view but supportive of the fact that informality is pervasive and persistent. This finding suggests that increases in income will boost business and reduce informal firms' need for loans, government provided land space and even assistance with protection from crime. Firms will probably be able to provide these services for them, and the zeal to register will diminish. This supports the findings by Pratap and Quintin (2006) but is against those of Chen (2007). This finding is also contrary to the well-established stylized fact that informal-to-formal transitions are pro-cyclical (Ulyssea, 2020; Bosch and Esteban-Pretel, 2015).In the case of country level institutional indicators [11] like the rule of law, an improvement in the quality of this variable is associated with an increase in the likelihood to register. The variable has a positive and significant effect. Pratap and Quintin (2006) find that the weak rule of law, government corruption, heavy bureaucracy, weak security of property rights and the quality of the legal system are central explanations for large variations in size of the informal sector in countries with similar levels of economic development. Zylfijaj *et al.* (2020), however, found that an inefficient judiciary system has a positive but insignificant effect on formalization in Kosovo.

5. Conclusions

The debate on how to formalize the informal sector has been on for a long time, and this study is a further attempt to contribute to this discourse. Our study is a first in terms of using SSA enterprise surveys data collected by the World Bank to interrogate the formalization of informal sector activities in 13 SSA countries. The main message from this study is that firms that are more likely to formalize are young, owned by individuals with high levels of education and experience as well as those who are not formally employed. Male owned firms and those that also formerly registered in the past are likely to register. These are some of the characteristics of the informal firms that regulators should use when encouraging formalization. Government should target firms that are young and provide them as much information as possible about the benefits of registration, and if these firms are owned by experienced and educated individuals, the likelihood to convince them to register will be high. More information should be provided about the nature of benefits that informal firms will stand to enjoy once registered including easy access to finance.

Improving the effectiveness of the police force or officials involved in inspections as well as ensuring that courts are efficient should be one of the priorities of SSA governments if they want informal firms to formalize. In the case of future taxes, explaining how the tax systems works and when and how firms must pay taxes may allay the fears and negative perceptions that informal firms have about paying taxes when registered. Transparent use of tax resources should also be encouraged by governments, and abuse of state resources through corruption should be intolerable, and effective administration of law and order be promoted. The applicability of the exclusion and rational exit views suggest that registration costs as well as benefits are important to informal firms. Ensuring that the net benefits from formalization are higher by reducing registration related costs can also improve the level of formalization. Thus, streamlining and publicizing registration procedures, and assistance or opportunities provided to registered firms by government and other organizations should be promoted to improve formalization levels. The fact that increases in income do not appear to lead to reduction in informality suggests that this sector is not a trampoline to formality; effective direct and indirect measures should instead be used to encourage formalization.

Notes

1. The monitoring system of SDGs include an indicator (Indicator 8.3.1) which measures the share of informal employment in non-agricultural employment, by sex and thus monitors progress towards achieving SDG Target 8.3.
2. Rand and Torm (2012) argue that the shortcoming of these studies is their failure to account for the potential endogeneity of legal status, which in turn could affect the results. For example, if selection into formality is based partly on unobserved characteristics such as owner ability this could lead to an overestimation of the impact of formalization on profits. On the other hand, if informality is a voluntary decision of firms based on their preferences (Maloney, 2004) then lower productivity is not necessarily a consequence of informality. They went on to argue that taking into account the voluntary aspect of informality may help explain why reforms aimed at simplifying business procedures have in some cases, had no impact on firm registration (Kaplan *et al.*, 2006; Bruhn, 2006).
3. In Latin America, young unskilled workers tend to work in the informal sector right after school as a stepping stone to acquiring skills that will transition them to the better jobs in the formal sector (Tumen, 2016).
4. The extensive margin is based on whether firms register and pay entry fees to achieve a formal status whilst the intensive margin, based on whether firms that are formal in the first sense hire workers without a formal contract.
5. Internal factors cover business characteristics like the number of employees, productivity, capital and owner characteristics like age, gender, skilled educated with subsistence and growth being part of the business purpose. External characteristics include market conditions (access to credit,

infrastructure and market linkages), cost of doing business and institutional conditions (transaction costs, corruption, trust and quality of public service) and business culture or tradition (tax morale and discriminatory practices) as well as labour (skills availability).

6. The function form of the LPM is $F(x'\beta) = x'\beta$ whilst that of the logit model is given as $F(x'\beta) = \frac{\exp(x'\beta)}{1+\exp(x'\beta)}$. In the case of probit the function form is $F(x'\beta) = \varnothing(x'\beta) = \int_{-\infty}^{x'\beta} \varnothing(z)dz$.
7. We use the 2018 United Nations income classification categories.
8. Madagascar is dropped from the data set because of having zero firms willing to register
9. It is important to note that the measurement of this variable ignores the effect of seasonality since we calculated it by multiplying monthly sales of the firm by 12 to get annual sales.
10. $Y = a + bX + cXZ$, where X and Z are independent variables, b and c coefficients. To find the marginal net impact of X on Y, we find the derivative of the estimated equation with respect to X; $\frac{dy}{dx} = b + cZ$, and we evaluate Z at the mean.
11. The rule of law is the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence (World Bank, 2018). An increase in the value of this indicator implies an improvement in institutional quality, and its values range from −2.5 (weak) and +2.5 (strong).

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Table A1.
Results for all countries with interactions

Variable(s)	Model 1	Model 2	Model 3	Model 4	Model 5 (endogenous probit)
Manufacturing	0.014 (0.028)	0.015 (0.029)	0.027 (0.030)	0.018 (0.029)	0.022* (0.01)
Firm size	0.019*** (0.004)	0.019*** (0.004)	0.015** (0.006)	0.019*** (0.006)	0.020 (0.013)
Experience of the owner	0.006** (0.003)	0.005* (0.003)	0.005* (0.003)	0.004 (0.003)	0.008** (0.003)
Firm age	−0.007* (0.003)	−0.006* (0.003)	−0.007 (0.004)	−0.005 (0.003)	−0.006 (0.004)
Education	0.063*** (0.015)	0.069*** (0.015)	0.065*** (0.015)	0.069*** (0.015)	0.071*** (0.020)
Gender of the owner	0.047 (0.029)	0.048 (0.030)	0.055* (0.031)	0.055* (0.030)	0.061** (0.020)
Registration time	−0.0002 (0.0002)	0.0003 (0.0002)	0.0002 (0.0003)	0.0003 (0.0002)	0.0002 (0.00015)
Productivity					0.039** (0.018)
Future taxes	−0.054*** (0.014)	−0.053*** (0.014)	−0.071*** (0.014)	−0.225*** (0.079)	0.098 (0.057)
Time, fees and paperwork	−0.027* (0.013)	−0.024* (0.013)	−0.029* (0.015)	−0.015 (0.015)	0.022** (0.010)
Access to finance	0.365*** (0.028)	0.346*** (0.028)	0.333*** (0.029)	0.342*** (0.043)	0.249*** (0.056)
Infrastructure and governmentt services	0.016 (0.010)	0.016 (0.010)	0.021** (0.011)		0.018** (0.008)
Past registration	0.245*** (0.059)	0.235*** (0.061)	0.218*** (0.062)	0.218*** (0.063)	0.179 (0.101)
No loan × unregistered		−0.079 (0.069)	−0.078 (0.070)	−0.072 (0.071)	−0.086 (0.054)
Age × size			0.002 (0.003)		0.003 (0.002)
Age × taxes				−0.001 (0.008)	0.002 (0.003)
Access finance × taxes				0.019 (0.064)	0.022** (0.010)
Observations	*2,240*	*2,240*	*2,240*	*2,240*	*2,215*
No. of countries	*13*	*13*	*13*	*13*	*13*

Note(s): The corresponding robust standard errors are in parentheses; ***$p < 0.01$; **$p < 0.05$, *$p < 0.1$. The intention to register variable is a dummy taking the value of one when the firm states that it intends to register and zero otherwise. Sector dummy takes the value of one if it is manufacturing and zero if it is services. Gender is a dummy taking the value of one if the main decision maker is male and zero otherwise. Other variables are as defined in Table A2 in Appendix

Variable(s)	Definition
Intention to register (a dependent variable)	Dummy taking the value of one if the firm intends to register and zero otherwise
Manufacturing sector dummy	Dummy taking a value of one if firm is in manufacturing and zero otherwise
Firm size	Measured using annual total output of the firm. This variable was created by using sales of a firm in a regular month and multiplying this by 12 to obtain annual sales. The annual sales for each country and firm were standardized by converting them into common currency the US dollar using the exchange rate applicable, the year the survey was done
Firm age	Measured by taking the difference between the year the survey was done and the year the firm started operating
Experience of the owner	The owner's number of years of experience working in the sector
Gender of the owner	Dummy taking the value of one if the owner is male and zero otherwise
Registration time	The number of days it takes for a firm to register the business
Future taxes	Dummy taking value of one if the firm identifies future taxes as a reason for not registering the business and zero otherwise
Time, fees and paperwork	Dummy taking value of one if the firm identifies time, fees and paperwork as a reason for not registering the business and zero otherwise
Access to finance	Dummy taking value of one if the firm identifies access to finance as the main reason for wanting to register the business and zero otherwise
Infrastructure and government services	Dummy taking value of one if the firm identifies infrastructure and government services as a benefit to be realised once the firm is registered and zero otherwise
Past registration	Dummy taking a value of one if the firm was once registered before
No loan × unregistered	Interaction of two dummies, not applying for a loan and citing being unregistered as reason
Age × size	Interaction of firms age and firm size
Age × taxes	Interaction of firm age and future taxes dummy
Access_finance × taxes	Interaction of access to finance dummy and future taxes dummy
Education	A categorical variable taking the value of one if the owner has no education, two if they have primary education, three if they have secondary education, four for vocational education and five for university education
Owner has a job	Dummy taking the value of one if the owner is formally employed and zero otherwise

Table A2.
Definitions of variables

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