

**STRUCTURAL REFORMS, DEBT FINANCING AND THE FORMAL AND
INFORMAL SECTORS IN SUB-SAHARAN AFRICA—AN EMPIRICAL
ANALYSIS**

By

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1 An Introduction

The thesis is about enterprises in the formal and informal sector in sub-Saharan Africa. It consists of three separate but connected essays. It is related to the literature on entrepreneurship and economic growth. The importance of enterprises in the formal and informal sectors for job creation and economic growth in developing countries is not in doubt. Ayyagari, Demirgüç-Kunt, & Maksimovic (2011), report that over 95% of enterprises across the world are Small and Medium Scale Enterprises (SMEs). By the same report, SMEs account for 60% of all private sector jobs. According to Abor & Quartey (2010), in developing countries, over 90% of all non-agricultural enterprises are SMEs. These SMEs contribute to the GDP in the various countries. Abor & Quartey report that in South Africa, SMEs contribute 91% of the enterprises in the formal sector and contribute approximately 55% to GDP. In Ghana, SMEs constitute 92% of private businesses and add about 70% to Ghana's GDP.

Several previous studies, including Kuntchev et al. (2014), Beck, Demirgüç-Kunt, & Maksimovic (2008), and Ayyagari, Demirgüç-Kunt, & Maksimovic (2008), have highlighted access to finance as an obstacle to the growth of SMEs in developing countries. The World Bank, (2013) observes that the perceptions of the regulatory environment in various economies affect start-up rates of enterprises, thereby affecting job creation. Consequently, in recent years, the World Bank has highlighted the importance of creating an enabling environment for businesses to thrive. However, there has been limited research on the effectiveness of policies in the credit market. Therefore, the first essay examines whether or not structural reforms in the business regulatory environment, trade sector and the financial sector as promoted by the World

Bank, can influence access to debt financing for investment in sub-Saharan Africa. The data consist of longitudinally observed enterprises from twelve countries. The data is from the World Bank Enterprise Surveys and the Country Policy and Institutional Assessment reports. The analyses involve panel data models. The first essay demonstrates that improvements in the structural policy environment increase the probability of access to debt financing. Specifically, reforms in the business regulatory environment and the financial sector increase the likelihood of access to debt financing. However, trade sector reforms initially increase the chances of debt financing by 20% until a policy score of 3.5, beyond which trade sector reforms reduce the probability by as much as 13%. These results have implications for the type of reforms pursued in various countries.

Williams (2014), defines the informal sector as consisting of "private firms that are unincorporated as separate legal entities, do not keep a complete set of accounts for tax and social security purposes, and are also either unregistered or small." The absence of incorporation implies that these enterprises are not separate legal entities and are not separate from their owners. The lack of registration suggests that the enterprises are not recognised as legal entities as prescribed by national laws and regulations for social security and tax purposes. Schneider, (2013) report that in sub-Saharan Africa, the informal sector contributes 41% to GDP; 39% of GDP in Europe and Central Asia and 38.8% of GDP in Latin America and the Caribbean. The implication is that the informal sector exists in both developing and developed countries, as reported by Thai & Turkina (2014). Thus, the size of the informal sector in the global economy makes it an imperative to understand why entrepreneurs choose to be there. However, research on entrepreneur level factors that encourage informality remains unknown.

Consequently, the second essay examines how entrepreneur level factors, such as social and human capital, and liquidity constraints influence the decision to operate either in the formal or informal sector. The analysis involves data from both the formal and informal sectors, providing a unique opportunity to investigate the research question from entrepreneurs and enterprises in both sectors in one framework. The second essay demonstrates that human and social capital, in addition to financing constraints influence the choice of the sector.

The third essay is about the relationship between enterprises in the formal and informal sector. The literature on the informal sector acknowledges the existence of linkages between enterprises in the formal and those in the informal sector. An ILO report (2014) argues that there is evidence that the informal sector can sustainably coexist parallel with growth and expansion in the formal sector in developing countries. Böhme & Thiele (2014) find evidence of backward linkages between enterprises in the formal and informal sector in West Africa. Williams (2013) reports the results of a study on the informal sector in Europe. According to Williams (2013), when participants were asked to rank the main reasons for participating in the informal sector, 46.7% of them picked "both parties benefited from it." If participants in the two sectors take advantage of the linkages, understanding and facilitating those linkages will be essential for job creation. Concerning what drives the linkages, Moreno-Monroy, Pieters, & Erumban (2014) identify the type of technology used in the informal sector as important. Arimah (2001) identifies the level of investment, income of the entrepreneur, firm size, experience of the entrepreneur and the level of education of workers in the informal sector as the determining factors. However, the role of social capital in the formation of the linkages remains unclear.

The third essay aims to uncover, at least in part, whether or not social and human capitals are important in facilitating the linkages between enterprises in the formal, and the informal

sector. If one starts with the premise that linkages between the formal and informal sectors contribute to job creation, which serves as a source of livelihood for those participating in the informal sector, then identifying the determinants of the linkages beyond technological and productive capacities is essential for the design of entrepreneurial policy. As a novelty, having linkages with the formal sector is treated as a rare event. Consequently, the analysis involves flexible binary generalized extreme value models. The results are indicative that for both male and female entrepreneurs, social and human capitals have significant positive real effects on the likelihood of linkages. From a policy point of view, if one sees the informal sector as a source of jobs and as a stepping-stone to the formal sector, there is a case for skill training programs and recognition of the role of informal institutions and networks in the design of entrepreneurial policy.

As a contribution to the literature, the thesis demonstrates amongst others that the current trade sector reforms within the context of structural policy reforms supported by the World Bank are not making the anticipated impact, at least in the credit market. There is a need to rethink this aspect of the reforms. Also, the study identifies financing constraints, the incidence of taxes, and the perception that there are no benefits for operating in the formal sector as factors driving entrepreneurs into the informal sector. The perception of no benefits from formalisation highlights structural and institutional weaknesses in the various countries. Further, there is a recognition of the interconnectivity of the formal and informal sector in sub-Saharan Africa. The implication is that policy that promotes entrepreneurship in the formal sector have rippling effects on those in the informal sector. Social and human capitals enhance the interconnectivity.

The rest of the thesis follows the following order. Chapter two presents essay one while Chapters three and four present essays two and three. The last chapter presents conclusions.

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2 Can Structural Reforms Relax Credit Constraints on Enterprises? Evidence from Sub-Saharan Africa

Abstract

The chapter examines whether structural reforms can influence the credit climate for enterprises in sub-Saharan Africa, within the context of the dual and common agency problems in the credit market. Previous research focused on the effects of debt financing constraints on enterprise investment and growth. The data consist of longitudinally observed enterprises from twelve countries. The analyses involve three-way error component models. The results are indicative that although nonlinear, a one-unit improvement in the structural policy environment increases the probability of access to debt financing by 10%. A one-unit improvement in the business regulatory environment increases the likelihood of access to debt financing by 16%. Trade sector reforms initially increase the likelihood of debt financing by 20% until a policy score of 3.5, beyond which trade sector reforms reduce the likelihood by as much as 13%. These results have implications for the type of reforms pursued in various countries.

JEL Classification: L11; O1; O4

Keywords: Dual and common agency problem; financing constraint; policy environment; random effects generalised ordered Probit

2.1 Introduction

Enterprises and entrepreneurs in the economies of developing countries play an important role in job creation and economic growth. Figure 1.1 presents what enterprises in sub-Saharan Africa consider constraints on their operations, constructed from data from the World Bank Enterprise Survey (WBES) over the period 2009 to 2013. From the figure, over 22% of the enterprises interviewed selected access to finance as a constraint. The average for all countries is 16%. Figure 2.2 presents the results when the survey question asks whether access to finance is a major obstacle. Twenty-eight percent (28%) of all enterprises in the sample responded yes. Across the countries in sub-Saharan Africa, the average is 42%, ranging from a low of 15% in Kenya to a high of 75% in Burkina Faso. Several previous studies, including Kuntchev et al. (2014), Beck, Demirgüç-Kunt, & Maksimovic, (2008), and Ayyagari, Demirgüç-Kunt, & Maksimovic, (2008) have highlighted access to finance as an obstacle to the growth of Small and Medium Scale Enterprises (SMEs) in developing countries. Therefore, addressing financing constraints facing enterprises is of the first order. However, there has been limited research on the effectiveness of policies in the credit market. This essay examines whether structural reforms can influence the credit climate for enterprises in sub-Saharan Africa.

The World Bank, (2013) observes that the perceptions of the regulatory environment in various economies affect start-up rates of enterprises, thereby affecting job creation. Consequently, in recent years, the World Bank has highlighted the importance of creating an enabling environment for businesses to thrive. Ayyagari, Demirgüç-Kunt, & Maksimovic (2008) observe that financial constraint and instability in the policy environment negatively affect business growth. Earlier research on enterprise financing constraints, for instance, Kuntchev et al. (2014), Ayyagari, Demirgüç-Kunt, & Maksimovic (2008), Beck and Demirguc-Kunt (2006)

and Kaplan and Zingales (1997), have tended to focus on the effects of financing constraints on enterprise growth. However, there is limited research on the effectiveness of policies in the credit market. This study examines whether or not, structural reforms (defined below) can influence the credit climate for particular enterprises in sub-Saharan Africa.

Small and Medium Scale Enterprises (SMEs) contribute to job creation and economic growth. Ayyagari, Demirguc-Kunt, & Maksimovic (2011) write that 95% of enterprises in the world are SMEs and account for about 60% of jobs created in the private sector. In South Africa, Abor & Quartey, (2010) reports that 91% of the formal sector enterprises are SMEs and account for 61% of total employment. In the case of Ghana, Abor and Quartey (2010) report that SMEs contribute 92% of local businesses and 70% on average, to Ghana's GDP, while accounting for 80% of total jobs in the Ghanaian economy. These make the role of SMEs imperative.

The analysis involves data from the World Bank Enterprise Surveys and the World Bank's Country Policy and Institutional Assessment Reports. There are three indicators of the financial status of the enterprise namely, *state_1* and *state_2* both ordered outcome variables and *credit*; a binary outcome variable. *State_1* follows Kuntchev et al. (2014), using enterprise level data from the World Bank Enterprise Surveys (WBES). Kuntchev et al. classify enterprises into "not credit constrained (NCC)", "may be credit constrained (MCC)", "partially credit constrained (PCC)" and "fully credit constrained (FCC)". Figure 2.3 presents a schematic representation of their classification scheme. A *fully credit constrained* enterprise must have applied for credit in the past fiscal year, and the application rejected. Also, the enterprise should not have outstanding loans from the formal credit market at the time of data collection. A *fully credit constrained* enterprise also includes enterprises that did not apply for credit in the past fiscal year, because of reasons other than having enough capital. A *partially credit constrained*

enterprise is one that applied for loans or lines of credit but does not have bank financing. Enterprises in this category may have informal financing. An enterprise *may be constrained* if it applied for loans and has bank financing. Enterprises that do not have debt finance and did not request a loan in the earlier fiscal year and the reason they did not apply is because they had enough capital are *not credit constrained*.

Unlike *State_1*, *State_2* comes from responses to the question “to what degree is access to finance an obstacle to the current operations of this establishment?” The answers range from one to four. One is access to finance is a “minor obstacle.” Two is access to finance is a “moderate obstacle.” Three is access to finance is a “major obstacle.” Four is access to finance is a “very severe obstacle.” This variable would be measuring the effect of access to finance on working capital. The third is *credit*. It is a binary variable based on whether enterprises had access to a line of credit or loan or not. This variable comes from responses to the question “at this time, does this establishment have a line of credit or a loan from a financial institution?” Establishments with loans or lines of credit get a value of one and zero otherwise.

Structural policy index (*reform*), as defined by the World Bank, constitute the primary explanatory variable. The analyses involve three-way error component panel data models. For each indicator, the estimation proceeds in two stages. In the first stage (base model), there is an estimation of each model using the composite form of the primary explanatory variable, *reform*, (for structural policy reforms index) and the control variables. The structural policy variable is an index consisting of trade, financial sector reforms, and the business regulatory environment. In the second stage (full model), the analysis involves all the three disaggregated variables as explanatory variables.

The results are indicative that although nonlinear, a one-unit improvement in the structural policy environment increases the probability of access to debt financing by 10%. On further analysis, the results are indicative that a one-unit improvement in the business regulatory environment increases the likelihood of access to debt financing by 16%; while trade sector reforms reduce the likelihood by 13%. Trade sector reforms initially increase the probability of debt financing by 20% until a policy score of 3.5. Beyond a score of 3.5, successive reforms in the trade sector reduce the likelihood by as much as 13% below the initial rate. The results are indicative that, reducing the average most favored nation (MFN) tariff in addition to all other import taxes below 15% could negatively affect local enterprises due to the potential competition from imports. The competition makes the balance sheets of the local businesses worse, thereby making it harder to attract debt financing.

This chapter contributes to different strands of the literature. It relates to the literature on financing entrepreneurship and SMEs. It represents an empirical adaptation of the theoretical model on the dual and common agency problems in the credit market by Tirole (2006). This chapter is one of the few studies to examine empirically, the impact of financial sector reforms in the credit market. It also builds on and extends an earlier study by Kuntchev et al. (2014). It builds on that study in the sense that it uses their approach to identify credit-constrained enterprises but differs in method and policy variables analysed. Kuntchev et al. (2014) use cross-sectional data while the current study uses panel data. The rest of the chapter consists of four sections. Section 2.2 presents a review of the literature. Section 2.3 provides the theoretical framework motivating the research question. Section 2.4 presents the methodology, which includes a description of variables and data sources, the econometric model specification and

estimation strategy. Section 2.5 shows the results, followed by a summary and a discussion in section 2.6.

2.2 Literature review

2.2.1 Credit rationing

There are different perspectives on the role of financial institutions, and public policy in a country on the ability of firms to access debt finance. Related to this is the role of public policy, if any, in financial markets—to the extent that public policies affect firms' investment decisions. Before the seminal work by Schumpeter (1934), economic theory treated the financial sector as playing a minor role in the process of economic growth. The insight of Schumpeter led to changes. In their seminal paper, Gurley & Shaw (1955) argue that at low levels of economic development, firms self-finance their investments and switch to debt finance as the economy grows. Financial markets and institutions, acting as intermediaries, become principal actors in investment financing, which in turn, influences long-term economic growth. Goldsmith (1969) find that as economies grow, banks and nonbank financial institutions grow in importance in the economy, highlighting the role of financial markets and institutions for economic growth.

Modigliani & Miller (1958) present a different view of the role of financial factors in the investment decision of enterprises. They argue, in essence that, under certain conditions, an enterprise's financial structure does not affect its investment decisions. The conditions required for this result is the Arrow-Debreu environment of frictionless markets, assumed competitive and complete, and free from taxes, transaction costs, and asymmetric information. The perspectives by Modigliani and Miller formed the basis of the neoclassical theory of investment formalized by Jorgenson & Siebert (1968). In the Schumpeter context, the argument by Modigliani and Miller (1958) represents a particular case, not a general one.

Stiglitz & Weiss (1981) demonstrate that the presence of imperfect information in capital markets reduces the number of credit contracts, leading to credit rationing—a situation where some identical borrowers with a given net worth are denied loans in the credit market. However, there are two issues with Stiglitz & Weiss (1981). First, their argument applies if enterprises choose to use debt financing and can borrow only from the domestic credit market. If enterprises can raise capital from the international capital market, or use equity financing, their argument may not hold. In the case of borrowing from the international capital market, the broader macroeconomic policy environment of a country will be critical. The policy environment may affect the cost of doing business, the exchange rate, and the risk premium on loans. Secondly, as Bester (1985) argues, no credit rationing occurs in equilibrium if creditors use interest rate discrimination and differential net worth requirements for different enterprises.

McKinnon (1973) and Shaw (1973) present a perspective similar in spirit to Modigliani and Miller. They observe that financial markets characterized by administered interest rates, capital controls, high reserve requirements, and concessional credit practices discourage saving. Discouraged savings constrain investment and lower the rate of economic growth. They argue that high real interest rate may induce savers to save more, making more loanable funds available for investment. Implicitly, a policy prescription from the McKinnon-Shaw thesis is the idea that a liberalized financial market is good for developing countries—higher interest rates promote greater savings that promote growth by increasing investments. The focus then was on interest rate deregulation as a monetary policy instrument with no role for government. The McKinnon-Shaw thesis has had its critics. The empirical evidence is not conclusive in supporting or rejecting the proposition that financial liberalization promotes economic growth.

Following the seminal paper by Fazzari, Hubbard, Petersen, Blinder, & James (1988), there has been a growing body of empirical literature on financing constraints of enterprises. Fazzari, Hubbard, Petersen, Blinder, & James argue that due to asymmetric information, internal and external sources of financing are not perfect substitutes; debt finance is more costly than internal finance. Du & Girma (2012) support this view, arguing that because the fixed cost of raising external funds is non-trivial for small enterprises, size is important in determining access to finance. As such, given the chance, enterprises will rely on internal sources of funds first, before using debt finance. Calomiris and Hubbard (1990) examine the role of internal net worth in credit markets in the presence of asymmetric information. They provide a link between internal finance and investment spending by firms. They highlight the idea that not all enterprises face the same costs of debt finance: enterprises with relatively small net worth face higher costs of debt finance. Different enterprises will face a different level of constraint in imperfect capital markets.

2.2.2 Financing constraints

In the empirical literature, Beck & Demirguc-Kunt (2006) find that size, age, and ownership structure of an enterprise are determinants of access to finance—older, larger, and foreign-owned enterprises are less likely to be credit constrained. Cassar (2004) argues that creditors might perceive incorporation as a sign of credibility and formality of operations, as such; incorporated enterprises are likely to have more access to debt finance. Using firm-level data, Ayyagari, Demirgüç-Kunt, & Maksimovic (2008) investigate the impact of the business environment on enterprise growth. They find that financial constraint and instability in the policy environment negatively affect enterprise growth.

Another issue relevant to the financing constraint literature is the use of trade credit by enterprises. Burkart & Ellingsen (2004) explain that the relative illiquidity of inputs makes it

difficult for businesses to divert for personal gain, unlike loans, providing an opportunity for suppliers of trade credit to reduce the moral hazard and adverse selection problems associated with loans. They explain that because inputs are relatively difficult to misappropriate, providers of trade credit have lower monitoring costs than banks, providing an opportunity for financially constrained enterprises to access credit. Petersen & Rajan (1997) argue that because suppliers interact with businesses and observe them frequently, they have relatively low costs of monitoring. The low cost of monitoring facilitates enforcement of credit contracts, and hence, suppliers can provide trade credit to enterprises constrained in the capital market.

On the demand side, it is not too obvious why enterprises require or use trade credit, despite it being a very expensive source of credit. Tirole (2006) reports that the terms of a trade credit contract are typically not favorable to enterprises. In the U.S., Tirole states that in some cases, the overall cost of the trade credit is as much as 37.24% per annum. Smith (1987) argues that to creditors in the capital market, possession of a trade credit contract is a signal of borrower type. The implication is that in certain situations, trade credit functions as a screening device. Trade credits play different roles in the various countries, and potentially, play different roles in different enterprises, depending on the economic structure, and history of countries.

2.2.3 Characterising credit constrained enterprises

Any empirical study on ‘credit constrained enterprises’ has to contend with the characterisation of a credit-constrained enterprise—how does one objectively identify one, and from whose perspective? Kaplan & Zingales (2000) classified enterprises based on qualitative and quantitative information contained in their annual financial reports. They identify enterprises without access to more resources than needed to fund their investment as credit constrained, and those with access as unconstrained. This approach is problematic. Fazzari, Hubbard, & Petersen, (2000) observe that the data used by Kaplan & Zingales (2000) coincided with years in which

the enterprises were financially distressed and, therefore, presents a distorted view of their financial positions. Bigsten, Collier, & Dercon (2003) give another classification scheme using survey data. Based on why enterprises did not apply for loans, they grouped them into three. The first group consist of “financially unconstrained enterprises without credit demand”; this group consists of enterprises that did not apply for loans because they did not need one. The second group consist of “financially constrained enterprises;” this group consists of those that applied for loans, but the application rejected, enterprises that did not have enough collateral, enterprises that considered the application process too complicated, and enterprises who anticipated rejection even if they were willing to pay the current interest rates. The third group consist of “financially unconstrained enterprises with credit demand”; this group consists of those that obtained loans.

Kuntchev et al. (2014) present a variant of the scheme by Bigsten, Collier, & Dercon (2003) using enterprise level data from the World Bank Enterprise Surveys (WBES). They classify enterprises into “not credit constrained,” “may be credit constrained,” “partially credit constrained,” and “fully credit constrained.” Figure 2.3 presents a schematic representation of their classification scheme. This study adopts the classification system by Kuntchev et al. (2014) in measuring one of the three indicators of the credit constraint status of enterprises.

2.2.4 Summary of the literature review

The financial structure of the enterprise influences its investment decisions. Internal and debt finance are not perfect substitutes because of cost differentials—the cost differences are attributable to problems associated with asymmetric information between lenders and borrowers. In the presence of asymmetric information, not everyone who wants to borrow will have access to credit in the capital market. Previous studies focused on the enterprise specific characteristics without much attention to whether or not; structural policy reforms can be effective in reducing

debt-financing constraints on enterprises. This gap in the literature is a significant omission since businesses, and financial institutions do not exist and operate in isolation; they operate within a particular institutional and regulatory framework.

2.3 The dual and common agency problem in financing contracts

The model presented in this section is directly from Tirole (2006, p. 546-549). Tirole (2006) provides a useful framework for thinking about how policy can influence credit contracts, and hence, credit constraints in the credit market. Tirole observes that for a private financing agreement between a lender and a borrower, lender returns depends on the behaviour of the borrower, and the policy choices of the borrower's government. Financial arrangements between creditors and borrowers influence each other through their impact on the incentives of the government of the borrower. The government is the common agent of all participants in the financing contract. A profit-enhancing policy action by the government that signals the protection for the rights of lenders and borrowers alike induces more financing deals.

Assume a small developing country with a large number of enterprises owned and managed by a continuum of entrepreneurs with mass one. The representative entrepreneur, under the protection of limited liability, is risk neutral. There is a single tradable good. The entrepreneur has initial wealth W and needs to invest I , where $W < I$. To be able to invest, the entrepreneur has to borrow $I - W > 0$. There are risk neutral creditors who demand a rate of return of zero. There is some chance that the project yields profit RI with probability $\rho + \vartheta$ and fails with probability $1 - (\rho + \vartheta)$. The entrepreneur chooses ρ . The entrepreneur has two choices; behave with probability $\rho = \rho_H$ and receive zero private benefits, or misbehave with probability $\rho = \rho_L = \rho_H - \Delta\rho$ and receive private benefit BI . The probabilities lie within the $[0, 1]$ interval.

The government chooses $\vartheta \geq 0$, a variable taken to be profit friendly. The policy action by the government involves a cost $c(\vartheta)I$, proportional to the level of investment, I , with $\hat{c}(0) = \hat{c}'(0) = 0$, $\hat{c}' > 0$, and $\hat{c}'' > 0$. Borrowers and creditors incur the cost, with borrowers paying a share of θ_b and creditors, θ_c . Assume that $\theta_b + \theta_c = 1$. The parties incur the cost only when they enter into a financing agreement. There are five dates, $t = 0, 1, 2, 3, 4$, corresponding to five stages. In the first stage, the government sets the policy $\vartheta = \vartheta_0$. In the second stage, the representative entrepreneur borrows $I - W$, and invests I . In the third stage, the government has two options: The government could choose not to commit to its initial choice of ϑ_0 , or commit to ϑ_0 . In the case of no commitment, the government chooses the preferred policy $\vartheta = \vartheta^*$. This choice is irrespective of the initial choice at stage one. In the case of commitment, the government abides by its initial choice: $\vartheta = \vartheta_0$. The entrepreneur chooses whether to behave or misbehave in stage four. If the entrepreneur behaves, there is no private benefit, while misbehaviour results in some private benefit. Stage 5 involves the realisation of outcomes.

The typical entrepreneur behaves if the gain from doing so outweighs the private benefit:

$$[(\rho_H + \vartheta) - (\rho_L + \vartheta)]R_b \geq BI; \quad (1)$$

where R_b is the entrepreneur's return in case of success. Creditors will invest if and only if they expect to claim returns on their investment. Assuming that the market rate of interest is zero, the creditors' break-even constraint is:

$$(\rho_H + \vartheta) \left(R - \frac{B}{\Delta\rho} \right) I - \theta_c \hat{c}(\vartheta)I = I - W \quad (2)$$

Implicit in equation (2) is the assumption that the incidence of the cost of the policy falls on creditors in proportion to borrower's investment. The pledgeable income per unit of investment is smaller than 1, that is,

$$(\rho_H + \vartheta) \left(R - \frac{B}{\Delta\rho} \right) I - \theta_c \hat{c}(\vartheta) < 1 \quad (3)$$

If this condition does not hold, there will be no credit rationing. The net present value (NPV) is positive. The positive NPV implies that entrepreneurs want to invest:

$$(\rho_H + \vartheta)R - I - \hat{c}(\vartheta) > 0 \quad (4)$$

Let $\delta \equiv \frac{\vartheta}{\rho_H}$ and $c(\delta) \equiv \hat{c}(\rho_H \delta)$; $\rho_0 \equiv \rho_H \left(R - \frac{B}{\Delta\rho} \right)$; $\rho_1 \equiv \rho_H R$.

The borrowing constraint (Equation 2) becomes

$$I = I(\delta) = \frac{W}{1 + \theta_c c(\delta) - (1 + \delta)\rho_0} \quad (5)$$

where $\rho_0 \equiv \rho_H \left(R - \frac{B}{\Delta\rho} \right) > \theta_c c'(\delta)$. If this condition holds, investment would increase with δ , the profit friendly policy variable.

The econometric model follows from the investment function in the form of equation (5). The empirical analysis proceeds with the assumption that the government chooses and commits to its policy actions, placing equal weights on the borrowers and creditors. Enterprises that can raise funds can finance their investments, hence are not financially constrained. Those unable to sign financing contracts will not be able to fund their investments, hence, will be credit constrained.

2.4 Methodology

2.4.1 Data sources

The analysis involves three data sources; the Country Policy and Institutional Assessment (CPIA) data, Economic Freedom Index (EFI) from the Fraser Institute, as reported by Gwartney, Lawson, & Hall (2013), and the World Bank Enterprise Survey (WBES). There are twelve (12) countries from sub-Saharan Africa in the sample. The sample size is up to 9,366 enterprises with 8,002 longitudinally observed enterprises. For each enterprise in each country, there are two non-consecutive data points. Table 2.0 presents a breakdown of the enterprises across countries in the sample and the years of data collection for each country. Table 2.1 presents a distribution of the outcome variables across countries in the sample.

2.4.2 Indicators of credit status

The analyses involve three indicators of the credit status of the enterprises, each measuring the ease or otherwise of accessing debt-financing. The first is *State_1*, an ordinal variable following Kuntchev et al. (2014), using enterprise level data from the World Bank Enterprise Surveys (WBES). Kuntchev et al. classify enterprises into “not credit constrained (NCC)”, “may be credit constrained (MCC)”, “partially credit constrained (PCC)” and “fully credit constrained (FCC)”. Figure 2.3 presents a schematic representation of their classification scheme. A *fully credit constrained* enterprise must have applied for credit in the past fiscal year, and the application rejected. Also, the enterprise should not have outstanding loans from the formal credit market at the time of data collection. A *fully credit constrained* enterprise also includes enterprises that did not apply for credit in the past fiscal year, because of reasons other than having enough capital. A *partially credit constrained* enterprise is one that applied for loans or lines of credit but does not have bank financing. Enterprises in this category may have informal financing. Business *may be constrained* if it applied for loans and has bank financing. Those that do not have debt

finance and did not request a loan in the earlier fiscal year and the reason they did not apply is because they had enough capital are *not credit constrained*. The ordinal variable *State_1* comes from the four categories, where NCC takes a value of one, MCC as two, PCC as three, and FCC as four. From Table 2.1, 24.41% (2,286) of the enterprises are NCC; 13.31% (1,247) are MCC; 24.25% (2,271) are PCC; and 20.84% are FCC.

The second indicator is *State_2*, also an ordinal variable. However, unlike '*State_1*' it comes from responses to the question "to what degree is access to finance an obstacle to the current operations of this establishment?" The answers range from one to four. One is access to finance is a "minor obstacle." Two is access to finance is a "moderate obstacle." Three is access to finance is a "major obstacle." Four is access to finance is a "very severe obstacle." This variable would be measuring the effect of access to finance on working capital. The third is *credit*. It is a binary variable based on whether enterprises had access to a line of credit or loan or not. This variable comes from responses to the question "at this time, does this establishment have a line of credit or a loan from a financial institution?" Establishments with loans or lines of credit get a value of one and zero otherwise. Again, from Table 2.1, 22.84% (2,139) of the enterprises did not have access to loans or lines of credit.

2.4.3 Explanatory variables

The primary explanatory variable is *reform*. It represents the World Bank's Country Policy and Institutional Assessment (CPIA, 2015) index on structural policy reforms. The structural policy reforms cover trade, financial sector reforms, and the business regulatory environment. The trade component attempts to assess how the policy framework fosters regional and global integration in goods and services, focusing on the trade policy regime and trade facilitation. Assessment of the trade regime covers tariffs, non-tariff barriers, and obstacles to trade in services. On the

financial sector, the CPIA measures policies and regulations that affect financial stability, efficiency, and access. The business regulatory environment component attempts to assess the degree to which the quality of the policy, legal, and regulatory framework for enterprises is profit-friendly to attract private investment. The regulatory framework includes enforcement of contracts, collateral registry, regulations on entry, exit, and competition, regulations on businesses in operations and regulations concerning land and labour.

The CPIA attempts to measure the conduciveness of a country's institutional and policy environment for economic growth. The CPIA measures represent the World Bank's perspective on what are the most necessary requirements for "growth-inducing environment." Although macro in nature, these indicators are likely to be significant at the micro level regarding their effect on access to debt finance. The index on structural reforms is on a six-point scale—with a 1-point rating corresponding to the lowest recorded performance while a 6-point rating corresponds to highest recorded performance.

There is control for time varying country level variables, specifically, credit to the private sector as a percent of GDP. There is also control for the income group a country belongs, namely, low-income countries, lower middle-income countries, upper-middle-income countries, and high-income. There is further control for age, size, type of industry (manufacturing or services), the ownership structure of the enterprise— foreign-owned, sole proprietorship. There is also control of product market— whether the operation produces for the export or the local market, and the legal status of the company. The number of full-time employees determines the size of the enterprise. Enterprises with at least five but less than twenty full-time workers are small; those with a full-time staff of between twenty and ninety-nine are medium; and those with more than hundred employees, large. The sample consists of 61% small, 27% medium, and 12%

large enterprises. Trade credit and the share of credit to the private sector are additional control variables.

2.4.4 Econometric model specification

The analyses involve a three-way error component model of the form

$$y_{ict} = reform_{ct}\beta_1 + x'_{ict}\beta_2 + z'_{ic}\beta_3 + Incomegrp_{ct}\beta_4 + credit\ to\ private\ sector / GDP_{ct}\beta_5 + u_{ict} \quad (6)$$

$$\text{where } u_{ict} = \mu_i + \eta_c + \lambda_t + v_{ict} \quad (i = 1, \dots, N, \quad t = 1, \dots, T; c, \dots, M) \quad (7)$$

Where y_{ict} is one of the three indicators of access to debt financing: *credit*—whether an enterprise i in country c at time t has a line of credit or loan or not, and the different categories of the ordinal outcome variables *State_1* and *State_2* as defined earlier. The main explanatory variable is $reform_{ct}$ which captures time varying structural policy reforms in the various countries. The covariates include x_{ict} which is a vector of time varying enterprise characteristics comprising age, and size. z_{ic} is a vector of time independent variables including registration status at start up, the ownership structure of the enterprise — foreign-owned, sole proprietorship, product market, the legal status of the enterprise, use of trade credit, and type of industry (manufacturing or services). $Incomegrp_{ct}$ denotes the income group classification of the country; $credit\ to\ private\ sector / GDP_{ct}$ denote the share of credit to the private sector as a percentage of GDP. μ_i denotes the unobserved enterprise specific heterogeneity; η_c denotes country specific effect. λ_t denotes time specific effect and v_{ict} denotes the remainder disturbance. Also, $\mu_i \sim IID(0, \sigma_i^2)$, $\eta_c \sim IID(0, \sigma_c^2)$, $\lambda_t \sim IID(0, \sigma_t^2)$, and $v_{ict} \sim IID(0, \sigma_{ict}^2)$.

Greene (2012, p. 717) reports that in the case of binary choice models with panel data, in estimating a fixed effects model of equation (6), one has to contend with incidental parameters problem. This problem, Greene argues, makes the maximum likelihood estimator inconsistent.

The random effects model too, Greene (2012) argues, requires the assumption that μ_i and x_{it} are uncorrelated, but offers consistent estimates, hence it is the approach adopted in the estimation of equation (6).

Concerning the ordered categorical outcome variables *State_1* and *State_2*, the usual approach to ordered models proceeds with the assumption that the threshold parameters are the same for every unit in the sample and assumes that the estimated coefficients β are the same for all categories. However, according to Pfarr (2011), in this situation, an increase in the independent variable shifts the cumulated distribution without any shift in the slope of the distribution. Greene & Hensher, (2009) also argue that the assumption of equal thresholds for all units in the sample is questionable. Overcoming this weakness requires relaxing the assumption of same thresholds across all enterprises in the sample. If the assumption is relaxed, the threshold parameters depend on the explanatory variables in the model. Allowing for variation in the threshold parameter allows for heterogeneity in the β parameters, leading to heterogeneity across the different categories of the ordinal dependent variable.

For panel data, the specification by Pfarr (2011) allows two sources of heterogeneity in the analysis. First, the random effects generalised ordered probit specification preserve the unobserved enterprise heterogeneity. The second source of heterogeneity comes from differences in the threshold parameters resulting in heterogeneity in the estimated coefficients for each category. However, the type of research question analysed in this paper does not place emphasis on the heterogeneity of the effects. As a result, the study adopts a conservative approach by estimating random effects ordered probit and logit models.

2.4.5 Estimation strategy

There are three indicators of the financial status of the enterprise, namely, *State_1*, *State_2*, and *credit*, as already defined. For each of the indicators, the estimation proceeds in two stages. First, in the basic model, there is an estimation of each model using the composite form of the primary explanatory variable, *reform* (for structural policy reforms index) and the control variables. For each model, if the primary explanatory variable is statistically significant, the second stage involves re-estimating the model, but this time, using the disaggregated policy variables. Again, the structural policy variable consists of trade, financial sector reforms, and the business regulatory environment. The second stage involves using these three as separate explanatory variables to estimate the full model. The final step involves robustness checks.

2.5 Results

2.5.1 Basic model results

Table 2.2 presents the results from the binary outcome variable *credit*. Column 2 of Table 2.2 shows the average marginal effects. The coefficient on *reform* is significant at 5% with a positive sign, as expected. A one-unit improvement in the structural policy environment increases the probability of access to debt financing by 10%. Meaning, as the policy environment improves, there is a higher chance of an enterprise having debt financing. Figure 2.4 is an illustration of the effects of progressive increases in *reform* on the probability of having debt finance.

Concerning the covariates, again, trade credit is significant at 1% with a positive sign, as expected. In this case, too, one could infer that trade credit is a signaling device and complements formal credit. An increase in the size and age of the Enterprise correlates with a higher chance of having credit. Enterprises with female managers are more likely to have credit. Publicly traded enterprises are less likely to have a line of credit than those not traded. Foreign-

owned businesses and sole proprietors are less subject to have credit. Also, the probability that an enterprise has a line of credit or loan increases with the share of credit to the private sector.

Table 2.3 reports the results for the basic *State_1* model. As reported, *reform* is statistically significant at 1% with a negative sign. The negative coefficient is indicative that progressive structural reforms have the potential to ease debt - financing constraints. Concerning the covariates, the probability of being fully credit constrained decreases as the share of credit to the private sector increases. Trade credit is statistically significant at 1% and with a negative sign. Enterprises with certification to export, publicly traded shares and foreign-owned enterprises are less likely to have difficulties accessing debt financing. For the enterprise distinct characteristics, there is a significant negative statistical relation between the size of the enterprise and the outcome variable. For age, the results show a negative, and statistically significant association with being credit constrained. Table 2.4 reports the results of the basic model for the outcome variable, *State_2*. The inference drawn from the results of *State_2* model is consistent with the conclusions from the *State_1* model.

2.5.2 Full model results

The results so far show that an increase in *reform* increases the ease of access to debt financing. The problem is *reform* is an index consisting of three (3) components: business regulatory environment, financial sector reforms, and trade policy. From a practical point of view, which of these three policymakers ought to prioritize? For policy relevance, there is a repeat of the analysis, but this time, using the disaggregated policy variables. Column 4 of Table 2.2 presents the average marginal effects using the disaggregated policy variables for the *credit* model. From the table, a one-unit improvement in the business regulatory environment increases the likelihood of access to debt financing by 16%; trade sector reforms reduces the probability by 13%. Figure 2.5 illustrates the average marginal effects of all three policy variables. In Figure

2.5 access to debt financing increases with progressive improvements in the business regulatory environment. The impact of trade sector reforms is negative and provides a reason for policymakers to rethink some of the reforms. From Figure 2.7, trade sector reforms initially increase the likelihood of debt financing by 20% until a policy score of 3.5. Beyond a score of 3.5, successive reforms in the trade sector reduce the probability by as much as 13% below the initial rate, thereby negating the gains from the initial reforms. Tables 2.5 and 2.6 present the results for the *State_1* and *State_2* models. Again, the inferences from these tables are consistent with the results presented on the *credit* model. Reforms in the business regulatory environment, financial sector and trade regime and facilitation reforms ease debt-financing constraints on enterprises.

2.5.3 Robustness checks

One of the challenges with panel data analysis is the problem of attrition—the non-responsiveness of a unit in the next wave, in this case, an enterprise, after the first round of data collection. A non-response could be due to the operation shutting down, or a refusal by the enterprise to participate in the survey. It is not possible to tell ahead of time the cause of the non-response. As Baltagi (2012) notes, attrition can potentially distort the random sampling design. If the non-response is not random, inference from the analysis of the population can potentially be misleading as the data may not be representative of the population. Testing for attrition in this study follows Verbeek & Nijman (1992). The first step involves creating a dummy variable that takes a value of one if the enterprise is re-interviewed, and zero otherwise. This variable becomes an additional covariate. If the coefficient on the dummy variable has a p-value ≤ 0.05 , the conclusion is that there is attrition bias. In the *credit* model, the dummy variable on attrition has a coefficient of -0.01, a standard error of 0.047, and a p-value of 0.830. In the *State_1* model,

the coefficient is 0.042 with a standard error of 0.026, and a p-value of 0.112. There is no problem of attrition bias in the sample.

Cage (2013) has questioned the usefulness of the CPIA measures on policy performance. According to Cage, the CPIA policy variables positively correlate with output and are weak predictors of future economic growth. Consequently, to test the robustness of the previous results, there is a repeat of the analysis, using policy variables on Economic Freedom of the World Index (EFI) from the Fraser Institute, reported by Gwartney, Lawson, & Hall (2013). The following discussion draws heavily from Gwartney, Lawson, & Hall (2013). According to Gwartney, Lawson, & Hall (2013), the building blocks of economic freedom include “personal choice, voluntary exchange, freedom to enter markets and compete, and security of the person and privately owned property.” Again, according to Gwartney, Lawson, & Hall (2013), the index depends on 42 subcomponents grouped into five main areas. The five main areas include “the size of government including expenditures, taxes, and enterprises; security of property rights; access to sound money; freedom to trade internationally; and regulation of credit, labor, and business.” For this study, the last two constitute the main relevant variables as they correlate with the previous policy variables from the CPIA reported earlier. The index involves data from the International Monetary Fund, World Bank, and the World Economic Forum. Each component and sub-component are rated on a scale of zero to 10, with ten corresponding to higher freedom.

Concerning *freedom to trade internationally*, the object is to measure the extent to which goods and services and financial assets can move across borders without impediments. The impediments take the form of tariffs, quotas, and capital controls. A country with low import tariffs and fewer capital controls gets a high rating. Within the sub-component on import tariffs, countries with no import taxes get a score of ten. However, countries with import taxes greater

than 15% get a zero rating. The *credit market and business regulations* component focus on the extent to which the regulatory environment constraints freedom of exchange in the credit, labor and goods markets. According to Gwartney, Lawson, & Hall (2013), countries with privately held deposits greater than 95% receive a score of ten. Countries with private deposits of between 75% and 95% get a rating of 8; between 40% and 75% get a score of 5; those between 10% and 40%, get a score of 2; those with private deposits of less than 10% get a score of zero. Also, concerning the labor market, countries that permit the forces of demand and supply in the labour market to determine wages receive higher rating than those that do not. The subcomponent on the goods market is concerned with the ease or otherwise of entry and exit into an industry. Countries with regulations that facilitate entry and exit into an industry receive a high rating.

In the case of the *credit* model, and as reported in column 6 of Table 2.2, the average marginal effect on *freedom to trade internationally* is -0.036. It is significant at 1%. The average marginal impact of a unit change in the *credit market and business regulations* is 0.03, which is significant at 1%. A unit improvement in the *credit market and business regulations* increases the probability of an enterprise having debt financing by 3%. From Figure 2.8 initial increases in the score on the trade sector reforms increase the likelihood of debt financing up to 19%. However, beyond a score of 6, further increases in the score decreases the probability of debt financing by 21% below the initial percentage, again, negating the initial improvement.

2.6 Discussion and policy implications

This chapter examines the issue of whether structural reforms, from the World Bank's perspective, can influence the credit climate for particular firms in sub-Saharan Africa. The results are indicative that although nonlinear, an improvement in the structural policy environment increases the probability of access to debt financing. There is heterogeneity in the effects of

reforms on enterprises by the size of the enterprise. When the structural policy environment improves, the credit climate improves more for relatively large enterprises than small ones. Concerning the effectiveness of individual policies, the results are indicative that improvements in the business regulatory environment increase the likelihood of access to debt financing by 16%; while trade sector reforms reduce the probability by 13%. There are nuances in the effect of trade sector. Trade sector reforms initially increase the likelihood of debt financing by 20% until a policy score of 3.5. Beyond a score of 3.5, successive reforms in the trade sector reduce the probability by as much as 13% below the initial rate, thereby negating the gains from the initial reforms.

The empirical results on the impact of trade sector reforms provide an opportunity to rethink some of the policies promoted in developing countries. For instance, according to the guidelines for the CPIA rating on trade sector reforms, a country gets a score of one if the average most favored nation (MFN) tariff in addition to all other import taxes is above 20%, and with peaks above 50%. A country gets a score of three out of six if the average MFN in addition to all other import taxes is between 15-20%, and receives a rating of four out of six if the import tax is between 10 and 15%. A country gets a score of six if the average MFN tariff in addition to import taxes is 5%. The results of the study are indicative that, reducing the average most favored nation tariff in addition to all other import taxes below 15% could negatively affect local enterprises due to the potential competition from imports. The competition makes the balance sheets of the local businesses worse, thereby making it harder to attract debt financing.

On the other hand, there is empirical support for continuous reforms in the business regulatory environment and the financial sector. Reforms in the financial sector could involve expansion of credit to the private sector, encouraging the expansion of branch networks of

financial institutions. The changes could also mean opening up of financial markets for international investment, and enacting laws that promote diversification of financial markets. Reforms could also include improvements in records on information about credit history and property registration. Further changes could mean promoting competition in the banking sector to avoid bank concentration, and discouraging the tendency of commercial banks to hold government debt instead of lending to private enterprises. Potential reforms could involve promoting competition in the private sector, and changes that cut the cost and time of doing business, which also includes the cost of starting one. These changes are essential to reducing poverty and promoting economic growth in developing countries.

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Table 2.0: Distribution of enterprises across countries in the sample

Country	Sample Size	Number of Panels	Sample Period	
			First Data Point	Second Data Point
Angola	449	363	2006	2010
Burkina Faso	533	445	2005	2009
Cameroon	535	460	2005	2009
Cape Verde	254	201	2005	2009
Democratic Republic of Congo	699	594	2006	2010
Ghana	1214	751	2007	2013
Kenya	1370	1287	2007	2013
Malawi	310	233	2005	2009
Rwanda	453	383	2006	2010
Tanzania	1142	1117	2006	2013
Uganda	1203	1116	2006	2013
Zambia	1204	1052	2006	2013
Total	9,366	8,002		

Source: The author's compilation based on data from the WBES database.

Table 2.1: Distribution of variables in the sample

Country	Variable	Credit	NCC	MCC	PCC	FCC
Angola	Total	449	449	449	449	449
	Count	41	165	24	57	143
	Percentage	9.13%	36.75%	5.35%	12.69%	31.85%
Burkina Faso	Total	533	533	533	533	533
	Count	153	76	115	108	145
	Percentage	28.71%	14.26%	21.58%	20.26%	27.20%
Cameroon	Total	535	535	535	535	535
	Count	197	97	181	146	86
	Percentage	36.82%	18.13%	33.83%	27.29%	16.07%
Cape Verde	Total	254	254	254	254	254
	Count	106	86	49	44	59
	Percentage	41.73%	33.86%	19.29%	17.32%	23.23%
Democratic Republic of Congo	Total	699	699	699	699	699
	Count	67	98	49	169	270
	Percentage	9.59%	14.02%	7.01%	24.18%	38.63%
Kenya	Total	1370	1370	1370	1370	1370
	Count	536	320	156	120	71
	Percentage	39.12%	23.36%	11.39%	8.76%	5.18%
Malawi	Total	310	310	310	310	310
	Count	107	53	55	46	93
	Percentage	34.52%	17.10%	17.74%	14.84%	30.00%
Rwanda	Total	453	453	453	453	453
	Count	187	0	128	57	26
	Percentage	41.28%	0.00%	28.26%	12.58%	5.74%
Tanzania	Total	1142	1142	1142	1142	1142
	Count	180	275	103	416	253
	Percentage	15.76%	24.08%	9.02%	36.43%	22.15%
Uganda	Total	1203	1203	1203	1203	1203
	Count	218	376	106	389	246
	Percentage	18.12%	31.26%	8.81%	32.34%	20.45%
Zambia	Total	1204	1204	1204	1204	1204
	Count	102	494	94	298	275
	Percentage	8.47%	41.03%	7.81%	24.75%	22.84%
Ghana	Total	1214	1214	1214	1214	1214
	Count	245	246	187	421	285
	Percentage	20.18%	20.26%	15.40%	34.68%	23.48%
Total	Total	9366	9366	9366	9366	9366
	Count	2139	2286	1247	2271	1952
	Percentage	22.84%	24.41%	13.31%	24.25%	20.84%

Table 2.2: Estimates for the Credit Model-Average Marginal Effects (Delta-Method)

	Basic Model ¹		Full Model ²		Full Model ³	
	Coefficient	Robust S.E	Coefficient	Robust S.E	Coefficient	Robust S.E
Reform	0.104**	0.052	-	-	-	-
Business Regulatory	-	-	0.160***	0.035	-	-
Financial sector	-	-	0.021	0.027	-	-
Trade	-	-	-0.131***	0.043	-	-
Freedom to Trade	-	-	-	-	-0.036***	0.005
Regulation	-	-	-	-	0.027***	0.007
Private sector credit	0.086***	0.027	0.060**	0.024	0.084***	0.013
Size	0.060**	0.011	0.056***	0.012	0.061***	0.007
Age	0.027***	0.004	0.023***	0.004	0.021***	0.004
Foreign-owned	-0.032**	0.014	-0.036**	0.014	-0.033***	0.012
Trade Credit	0.123***	0.019	0.110***	0.018	0.123***	0.009
Publicly traded	0.032	0.028	0.042**	0.019	0.021	0.013
Registration	0.012	0.018	0.029	0.015	-0.015	0.011
Female Manager	0.034**	0.014	0.029**	0.012	0.019	0.013
Services	-0.003	0.015	-0.003	0.016	0.005	0.013
Manufacturing	0.010	0.019	0.012	0.020	0.011	0.012
Sole Proprietor	-0.036	0.021	-0.036	0.023	-0.043***	0.011
Country control	Yes		Yes		Yes	Yes
Income group control	Yes		Yes		Yes	Yes
Time control	Yes		Yes		Yes	Yes
Number of observations:	7761					
Number of groups:	7150					

Source: Author's computation based on data from the WBES, CPIA, and the Fraser Institute
Notes: Dependent variable: *credit*. *** Significant at 1 percent; ** Significant at 5 percent; *Significant at 10 percent. ¹ Average marginal effect on a model with an index on structural policies from CPIA; ² Average marginal effects on from model with disaggregated policy variables from CPIA; ³ Average marginal effects based on a model with policy variables from the Fraser Institute.

Table 2.3: Random-effects Ordered Probit and Logit Estimates for the Basic State_1

Variable	Panel Ordered Probit		Panel Ordered Logit	
	Coefficient	Robust S.E	Coefficient	Robust S.E
Reform	-0.207***	0.057	-0.313***	0.099
Credit to private sector	-0.131***	0.037	-0.245***	0.063
Size	-0.134***	0.021	-0.220***	0.037
Age	-0.074***	0.011	-0.124***	0.018
Trade Credit	-0.198***	0.027	-0.292***	0.048
Export certification	-0.190***	0.038	-0.306***	0.063
Publicly traded	-0.107***	0.037	-0.163**	0.061
Registration	-0.189**	0.03	-0.140**	0.056
Foreign-owned	-0.181***	0.038	-0.310***	0.064
Manufacturing	0.124***	0.026	0.215***	0.044
Sole Proprietorship	0.015	0.032	0.033	0.054
Income group control	Yes		Yes	
Time controls	Yes		Yes	
Country controls	Yes		Yes	
Cut 1	-1.119***	0.172	-1.806***	0.294
Cut 2	-0.749***	0.172	-1.195***	0.291
Cut 3	0.056	0.173	0.148	0.291
Sigma2_mu	0.013	0.050	0.092	0.147
N	7761		7761	
AIC	20153.54		20158.36	
BIC	20285.72		20290.54	

Source: Author's computation based on data from the WBES database

Notes:

- *** Significant at the 1 percent level
- ** Significant the 5 percent level
- *Significant at the 10 percent level

Table 2.4: Random-effects Ordered Probit and Logit Estimates for the Basic *State_2*

Variable	Panel Ordered Probit		Panel Ordered Logit	
	Coefficient	Robust S.E	Coefficient	Robust S.E
Reform	-0.110**	0.046	-0.218***	0.099
Credit to private sector	-0.004*	0.001	-0.006*	0.003
Size	-0.164***	0.035	-0.270***	0.060
Age	-0.031**	0.012	-0.054**	0.021
Trade Credit	-0.022	0.027	-0.032	0.045
Export certification	-0.148***	0.038	-0.253***	0.065
Publicly traded	-0.388***	0.042	-0.408***	0.065
Registration	-0.189**	0.03	-0.140**	0.056
Foreign-owned	-0.235***	0.038	-0.408***	0.065
Manufacturing	0.249***	0.027	0.426***	0.046
Sole Proprietorship	-0.005	0.020	-0.009	0.054
Income group control	Yes		Yes	
Time controls	Yes		Yes	
Country controls	Yes		Yes	
Cut 1	0.081	0.175	0.202	0.294
Cut 2	0.608***	0.177	1.072***	0.291
Cut 3	1.393	0.182	2.409***	0.291
Sigma2_mu	0.013	0.050	0.139	0.135
N	7754		7754	
AIC	20274.73		20278.87	
BIC	20399.94		20404.08	

Source: Author's computation based on data from the WBES database

Notes:

*** Significant at the 1 percent level

** Significant the 5 percent level

*Significant at the 10 percent level

Table 2.5: Random-effects Ordered Probit and Logit Estimates for the *State_1* Model with Disaggregated Policy Variables (Full Model)

Variable	Panel Ordered Probit		Panel Ordered Logit	
	Coefficient	Robust S.E	Coefficient	Robust S.E
Reform	-	-	-	-
Business Regulatory	0.181***	0.035	0.298***	0.059
Financial sector	-0.031	0.049	-0.029	0.084
Trade	-0.386***	0.057	-0.647***	0.097
Credit to private sector	-0.226***	0.048	-0.416***	0.082
Size	-0.146***	0.021	-0.240***	0.034
Age	-0.082***	0.011	-0.138***	0.018
Trade Credit	-0.215	0.027	-0.318***	0.048
Export certification	-0.187***	0.038	-0.306***	0.063
Publicly traded	-0.091**	0.036	-0.135**	0.059
Registration	0.001	0.033	-0.140**	0.056
Foreign-owned	-0.179***	0.038	-0.310***	0.062
Manufacturing	0.133***	0.026	0.228***	0.044
Sole Proprietorship	0.017	0.032	0.032	0.054
Income group control	Yes		Yes	
Time controls	Yes		Yes	
Country controls	Yes		Yes	
Cut 1	-2.520***	0.215	-4.206***	0.379
Cut 2	-2.148***	0.212	-3.592***	0.372
Cut 3	-1.345***	0.207	-2.248***	0.359
Sigma2_mu	0.013	0.050	0.090	0.146
N	7761		7761	

Source: Author's computation based on data from the WBES database

Notes:

*** Significant at the 1 percent level

** Significant the 5 percent level

*Significant at the 10 percent level

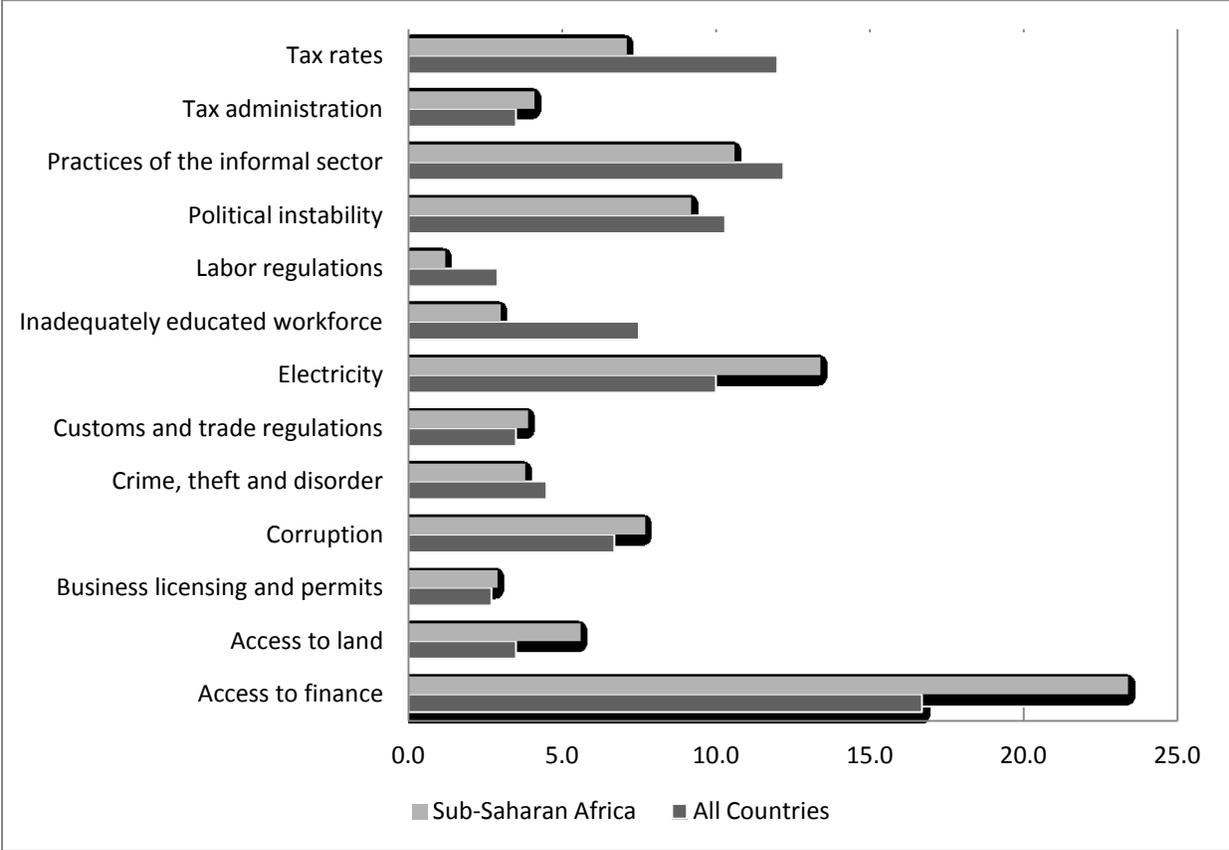
Table 2.6: Random-effects Ordered Probit and Logit Estimates for the *State_2* Model with Disaggregated Policy Variables (Full Model)

Variable	Panel Ordered Probit		Panel Ordered Logit	
	Coefficient	Robust S.E	Coefficient	Robust S.E
Reform	-	-	-	-
Business Regulatory	-0.103**	0.044	0.164**	0.073
Financial sector	-0.000	0.049	-0.014	0.082
Trade	-0.102**	0.052	-0.159*	0.087
Credit to private sector	-0.238***	0.038	-0.400***	0.062
Size	-0.162***	0.035	-0.258***	0.059
Age	-0.022*	0.012	-0.041*	0.021
Trade Credit	-0.066	0.026**	-0.099**	0.044
Export certification	-0.127***	0.038	-0.213***	0.064
Publicly traded	-0.310**	0.039	-0.516***	0.067
Foreign-owned	-0.232***	0.038	-0.399***	0.063
Manufacturing	0.233***	0.027	0.388***	0.044
Sole Proprietorship	-0.044	0.032	-0.070	0.053
Income group control	Yes		Yes	
Time controls	Yes		Yes	
Country controls	Yes		Yes	
Cut 1	-1.772***	0.164	-2.921***	0.271
Cut 2	-1.236***	0.161	-2.056***	0.263
Cut 3	-0.435***	0.158	-0.715***	0.257
Sigma2_mu	0.021	0.048	0.006	0.138
N	7754		7754	

Source: Author's computation based on data from the WBES database.

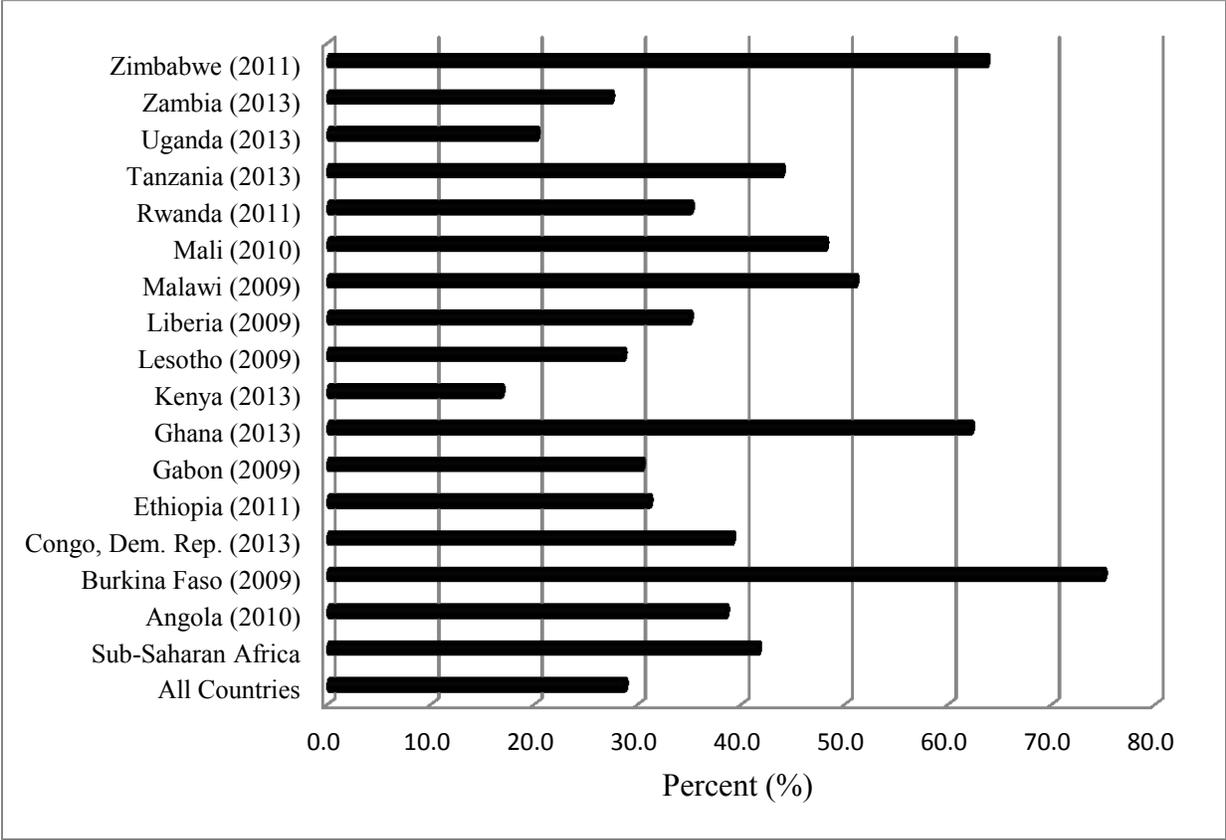
Notes: ***Significant at 1%; **Significant at 5%; * Significant at 10%.

Figure 2.1: Business Environment Constraints



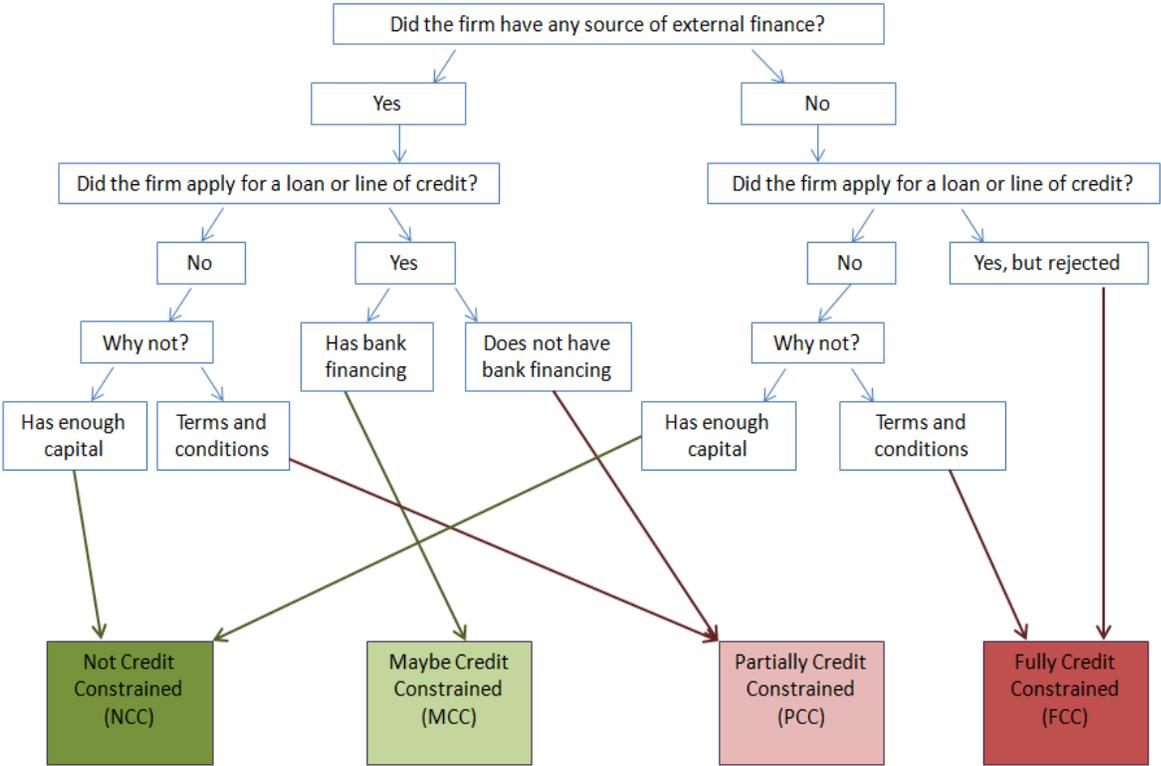
Source: Author’s calculation based on data from the WBES

Figure 2.2: Percent of Enterprises Identifying Access to Finance as a Major Constraint



Source: Author’s calculation based on data from the WBES

Figure 2.3: Categories in State_1 Outcome Variable



Source: Kuntchev et al. (2014)

Figure 2.4: Structural Reforms and Debt Financing

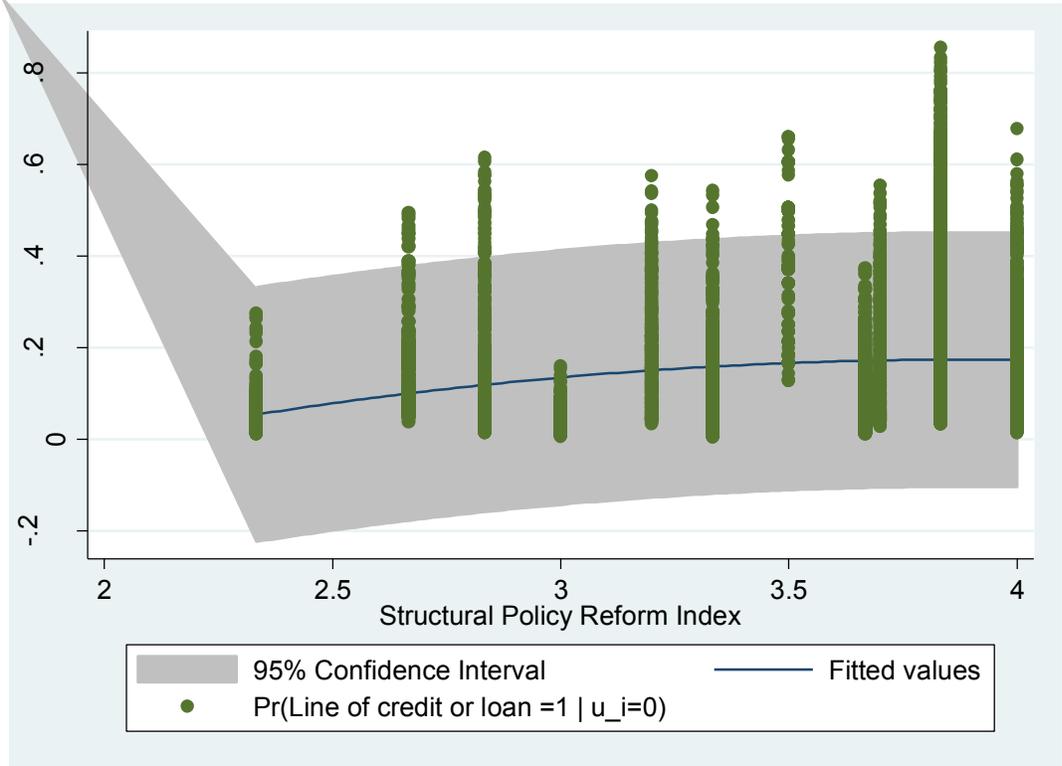


Figure 2.5: Business Environment Regulations, Trade, and Financial Sector Reforms

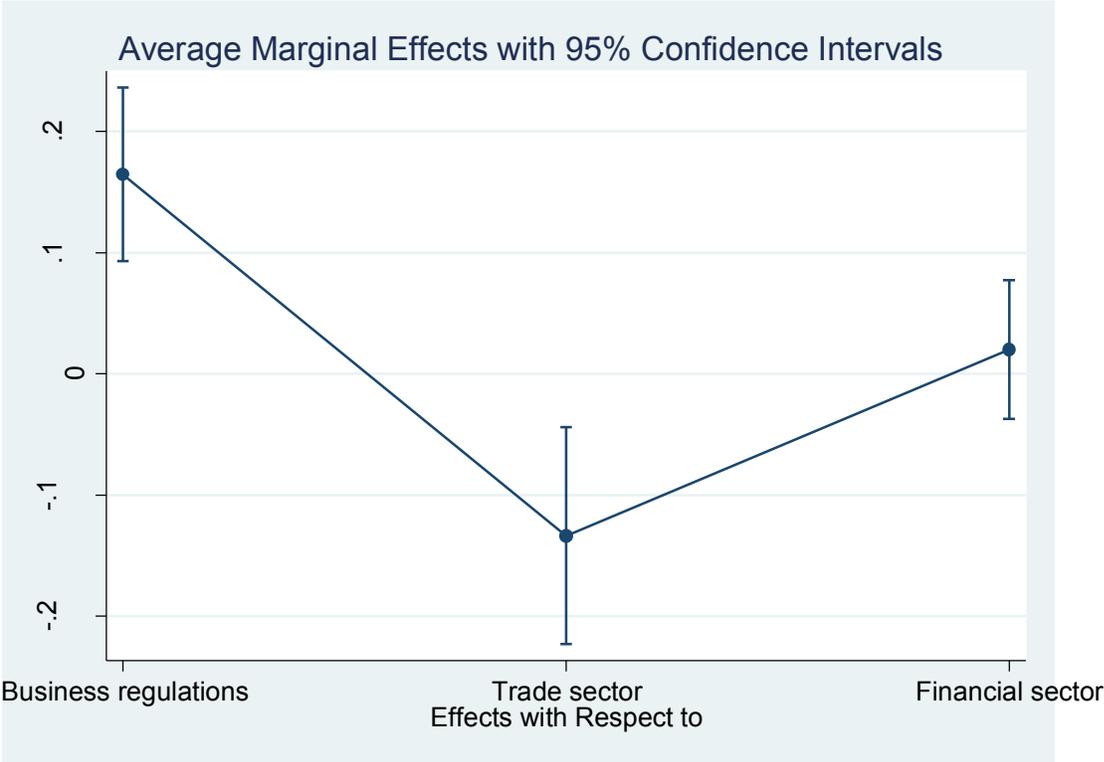


Figure 2.6: Business Environment Regulations, Trade, and Financial Sector Reforms—By Size

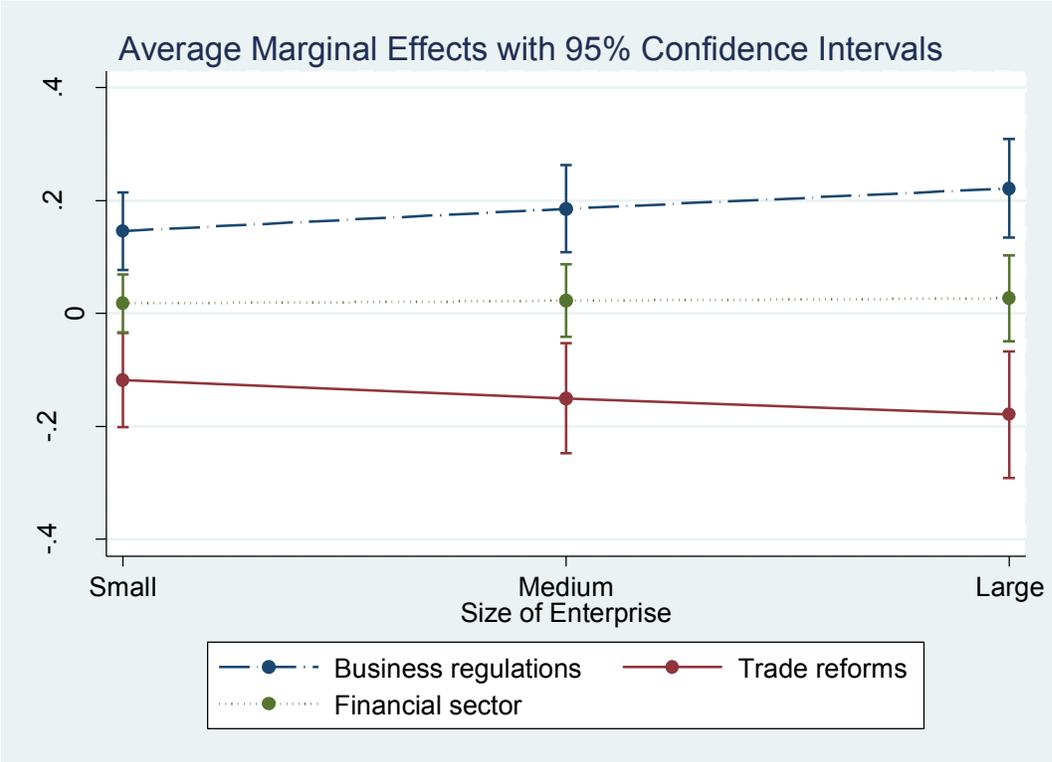


Figure 2.7: Trade Sector Reforms

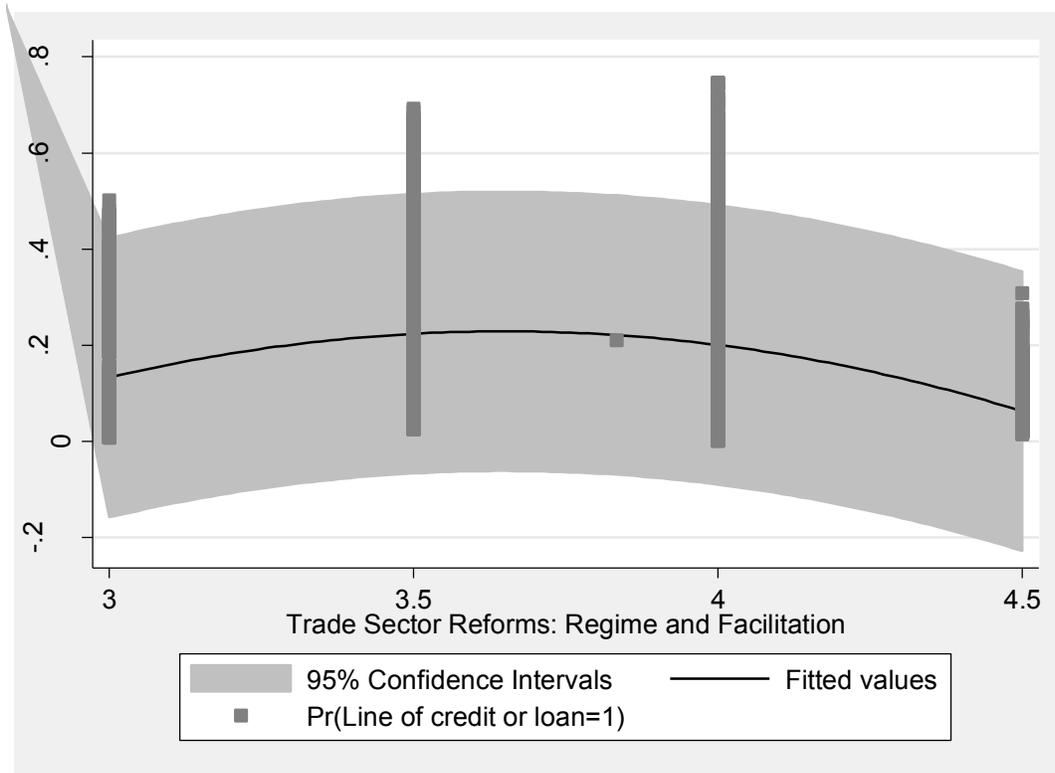
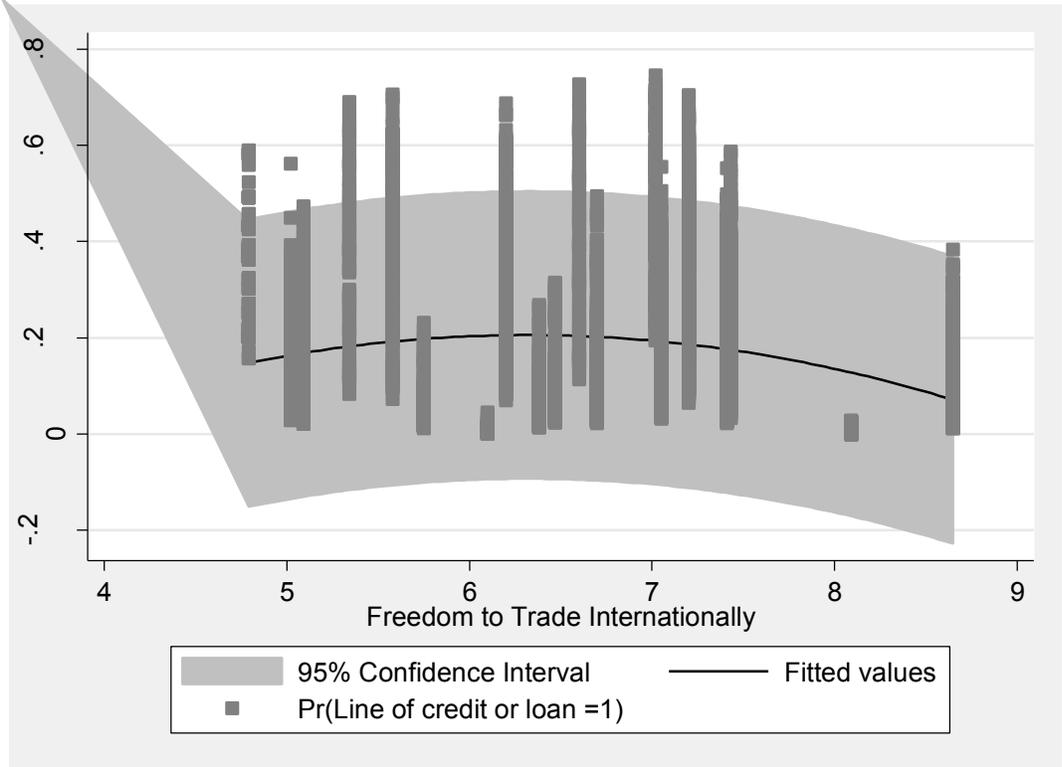


Figure 2.8: Freedom to Trade Internationally



3. Social Capital, Liquidity Constraints and the Choice between the Formal and Informal Sectors in sub-Saharan Africa

Abstract

The literature on entrepreneurship in the informal sector identifies the desire to evade compliance with formal sector tax and labour regulations as the factors that drive entrepreneurs into the informal sector. However, research on entrepreneur level factors that encourage informality remains unknown. This paper examines how social capital, human capital, and liquidity constraints influence the decision to operate in either the formal or the informal sector. As a novelty, the analysis involves data from both the formal and informal sectors, providing a unique opportunity to investigate the research question from entrepreneurs and enterprises in both sectors in one framework. The study demonstrates that the likelihood that an entrepreneur operates in the informal sector decreases with human capital while social capital, and financing constraints increases this likelihood. These findings have implications for the design and implementation of entrepreneurial policy.

JEL Classification: E26; O17; K42

3.1. Introduction

The literature on entrepreneurship in the informal sector identifies institutional weaknesses and the general lack of faith in formal institutions and the opportunity to exploit family resources as the factors that drive entrepreneurs into the informal sector. The problem is that these factors are situational in nature, highlighting the overall business environment, and do not emphasize individual level factors that promote informality. Moreover, as acknowledged by Webb, Bruton, Tihanyi, & Ireland (2013), research on entrepreneur level factors that encourage informality, particularly in developing countries, is lacking in the literature. The objective of this paper is to examine how entrepreneur level factors, such as social capital, education (a human capital variable), and liquidity constraints influence the decision to join either in the formal sector or informal sector.

Two pieces of statistics motivate this paper. First, out of 8,826 formal sector enterprises surveyed as part of the World Bank Enterprise Surveys (WBES) from 2009 to 2013, in thirteen countries in sub-Saharan Africa, 45% started in the informal sector. Second, a similar Survey of the informal sector shows that approximately 5% of the enterprises began in the formal sector and ended up in the informal sector. In the same Survey, when asked whether they intend to register their economic activities and leave the informal sector, approximately 48% responded “yes,” while 53% prefers not to leave the informal sector. It is possible that the 45% of enterprises that started in the informal sector before switching to the formal sector chose to do so in order to learn and develop their entrepreneurial skills. In this sense, and as Thai & Turkina (2014) observe, entrepreneurship in the informal sector could be a necessary step for formal enterprises. On the other hand, it is possible that the 5% of businesses that started in the formal sector and ended up in the informal sector ended up there because they did not renew their

registration permits. It could be that they chose the informal sector to evade formal sector rules and regulations.

Bennett (2009) provides another framework for thinking about the observations in the data. Bennet argues that since operating either in the formal or informal sector occurs under uncertainty, at least initially, entrepreneurs participate in the informal sector as a “stepping stone” toward formality. During this time, they discover the profitability or otherwise of their business. If the enterprise is not profitable, they may leave the industry altogether or stay informal. To Bennet, informality may be a “consolation prize;” a firm may enter an industry (formally) because they recognize that if they do not break-even, they can switch to informality. In this sense, the possibility of falling back into informality, in the case of lack of profitability in the formal sector could promote entry into the formal sector in the first place. There is a further complication: there is unavailable data on questions that ask enterprises, especially those currently operating in the formal sector, why they started in the informal sector. These confounding issues notwithstanding, this study take the position that the choice of which sector to run is a decision made in the context of constrained rationality.

Entrepreneurship is essential for economic growth. The informal sector provides income and employment in developing countries. Schneider (2013), report that in sub-Saharan Africa, the informal sector is about 41% of GDP. Schneider finds that the informal sector is 39% of GDP in Europe and Central Asia and 38.8% of GDP in Latin America and the Caribbean. Also, according to Thai & Turkina (2014), the informal sector exists in both developing and developed countries. Thus, the size of the informal sector in the global economy makes it an imperative to understand the determinants of operating in the sector. However, there is no consensus in the literature on the factors that promote entrepreneurship in the informal sector.

Nyström (2008) reports that secure property rights, efficient legal system, fewer regulations in the credit and labour markets, and relatively small government sector promote entrepreneurship. In a contrasting find, Naudé (2009) argue that good governance and low costs of doing business correlates positivey with entrepreneurship. Thai & Turkina (2014) find that concerning the demand for entrepreneurship, economic opportunity, and the quality of governance correlates positively with entrepreneurship in the formal sector while these factors correlate negatively with entrepreneurship in the informal sector. Further, they find that the level of education of people drives the supply of entrepreneurs. Concerning informal sector enterprises, they find that cultural norms promote entrepreneurship in the informal sector while a merit-based culture promotes entrepreneurship in the formal sector. Cultural norms invariably define the environment of informal enterprises. However, research on entrepreneur level factors that encourage informality remains unknown.

The purpose of this paper is to examine the role of social capital, human capital, and liquidity constraints in facilitating entrepreneurship in the informal sector. This study is similar to Thai & Turkina (2014) in the sense that it addresses a similar question but differs in scope and methodology. Thai & Turkina (2014) uses derived data on the informal sector while the current study uses survey data from the informal and formal sectors in sub-Saharan Africa. Second, while Thai & Turkina (2014) evaluate macro-level factors, the current analysis is at the micro level.

The analysis proceeds as follows. First, the data from the informal sector survey is analysed. The analysis of the data from the informal sector is based on two outcome variables. The first is about whether the enterprises registered at start-up. The second measures whether or not those in the informal sector will want to formalise, each analysed in a separate regression model. In each

of the cases, the analysis starts with the full sample. The result of the full sample is compared to two subsamples: enterprises under five years old and those over five years old. The subsamples provide an opportunity to characterize the issues related to young and old businesses in the informal sector. Similarly, in the case of the data from the formal sector survey, the result for the full sample is compared with those from two other subsamples, namely, female owned enterprises and male-owned enterprises.

This paper attempts to make the following contributions to the literature. First, if one begins with the premise that enterprises are essential for economic growth, then any study that attempts to improve our understanding of the determinants of the choice of participating sector in entrepreneurship is critical for policy. Understanding entrepreneurship in both the formal and informal sector is, arguably, crucial to the design of any successful policy on the informal sector. Second, this paper empirically tests the explanatory power of social and human capitals in the decision to participate in the informal sector. Also, as a novelty, the study involves data from enterprises that are currently in the informal sector who previously were in the formal sector and those currently in the formal sector, although started in the informal sector, providing a unique opportunity to examine the research question from different perspectives.

The rest of the paper is organised as follows. Section 3.2 presents a review of the literature. Section 3.3 presents the methodology. The section includes a detailed discussion of the data and the description of variables, econometric model specification, and testing for specification error and goodness of fit for each of the three outcome variables analysed. Section 3.4 presents the results while Section 3.5 presents a discussion of the results.

3.2. Literature review

The literature review proceeds with a definition of the formal and informal sectors, followed by a discussion of socioeconomic factors that influences the decision whether or not to operate in the informal sector, and a discussion of the definition of and measurement of social capital.

3.2.1. Defining formal and informal sector entrepreneurship

Acs, Desai, & Klapper (2008) define entrepreneurship as “the activities of an individual or a group aimed at initiating economic activities in the formal sector under a legal form of business.” The ILO (2012) defines enterprises in the informal sector as “private unincorporated enterprises that are unregistered or small regarding the number of employed persons.” Williams (2014), on the other hand, defines the informal sector as consisting of "private firms that are unincorporated as separate legal entities and do not keep a complete set of accounts for tax and social security purposes, and are also either unregistered or small." Following the ILO (2012), the absence of incorporation implies that these enterprises are not separate distinct legal entities and are not separate from their owners. The lack of registration suggests that the enterprises are not recognised as legal entities as prescribed by national laws and regulations for social security and tax purposes. The possession of licenses and trade permits, consistent with local regulatory requirements, is not a substitute for formal registration. However, following Webb et al. (2013), there is no attempt to equate informality with illegality. As Webb et al. (2013) argue, entrepreneurship takes place within informal institutional structures, although outside of formal institutional boundaries.

3.2.2. Socioeconomic drivers and social capital

Webb et al. (2013) in a literature review provided a framework for thinking about the informal sector. They organised research on entrepreneurship around institutional, motivation-related, and resource allocation theories. They argue that, in essence, institutional theory helps one to understand how the institutional context, for example, the degree of enforcement of laws, and differences in legitimacy, impact entrepreneurship in the informal economy. Motivation-related theories, they argue, provide structure to research examining the motivations that lead individuals to operate informally. These motives include cost/benefits considerations, lack of faith in formal institutions, and role models from entrepreneurship in the informal sector. In a resource constrained environment, Webb et al. (2013) argue that resource allocation underlines the strategies adopted by informal sector entrepreneurs. These strategies include operating on a small scale and using family resources freely.

Tedds (2010) argues that perceived corruption, low quality of governance and tax rates push prospective entrepreneurs into the informal sector. This argument is similar to Echazu and Bose (2008). Echazu & Bose (2008) in a theoretical paper demonstrate that the size of the informal sector depends on the amount of bribe demanded by bureaucratic regulators, and the intensity of monitoring by regulators. In this framework, the request for bribes and corruption by regulators in the formal sector drives entrepreneurs into the informal sector. The size of the informal sector is an increasing function of the level of bribery in the country. The argument on the role of bribery and corruption is debatable. It is conceivable that in some cases, formal sector enterprises actively try to influence regulators in the formal sector. They do this so that they will not have to pay the required income tax, for instance, or obey environmental laws and regulations. These enterprises will prefer to operate in the formal sector and enjoy the benefits of the protection of property rights and other incentives from the formal sector while engaging in activities that

undermine the business environment. Consequently, one could argue that the choice of the sector is more nuanced than often presented.

Loayza (1996) is of the opinion that the decision to take part in the formal or informal sector at start-up is a rational decision. Loayza argues that entrepreneurs evaluate the costs and benefits of formal registration on one hand, and the resource and institutional constraints that accompany participating in the formal sector. For the informal sector, the costs involve penalties when caught, and the inability to access government-sponsored business enabling facilities such as credit guarantees. However, this argument is based on the assumption that enterprises in the informal sector try to avoid detection by the authorities. In fact, in most cases, they do not: these businesses operate in the public open space. The decision to run in the informal sector is, at best, made in the context of bounded rationality.

It is important not to conflate the activities of the participants in the informal sector with those in the underground economy. The former are, at best, 'extra-legal' while the latter, illegal or criminal. However, Loayza argues that although the choice of which sector to participate in is a rational decision made by entrepreneurs, there are situations in which entrepreneurs simply do not have a choice. This study extends this reasoning by adding societal norms, specifically, the role of social capital. As argued by Bigsten, Kimuyu, & Lundvall (2004), to some entrepreneurs, there are no tangible benefits from operating in the formal sector. The lack of advantages or incentives pushes entrepreneurs into the informal sector at start-up.

One factor that has received relatively little attention in the literature is how social capital influences the decision of a prospective entrepreneur whether to operate in the formal or informal sector. Social capital is not a homogenous concept. Putnam (1993) defines social capital as

“features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions.” The OECD (2001) defines social capital as “networks together with shared norms, values and understandings that facilitate cooperation within or among groups.” In this context, networks comprise links between individuals or groups or business partners in the formal or informal sector. Networks consist of family members, former schoolmates, or workmates. Importantly, these networks promote trust, which enables individuals to work together. As articulated by Coleman (1990), societal norms help categorize the actions that a group of persons can regard as acceptable and unacceptable in society. These may take the form of conventions. Societal norms may not have a legal basis, and may even be in conflict with established rules and regulations in the formal setting.

The World Bank (2010), on the other hand, defines social capital as “the norms and networks that enable collective action.” According to the World Bank, social capital “encompasses institutions, relationships, and customs that shape the quality and quantity of society's social interactions.” Scrivens & Smith (2013) define social capital as “the productive value of social connections, where productive is here understood not only in the narrow sense of the production of market goods and services but regarding the production of a broad range of well-being outcomes.” The different definitions of social capital highlight the multidimensional nature of the concept.

According to Scrivens & Smith (2013), there are four aspects of social capital, namely, “personal relationships, social network support, civic engagement, and trust and cooperative norms.” Again, according to Scrivens & Smith (2013), the personal relationship aspect of social capital is concerned with whom one knows and how one maintains that relationship. The social network is about “the level of resources or support that a person can draw from their personal

relationships” for personal and economic gain. The civic engagement is concerned with “the actions and behaviors that contribute positively to the collective life of a community or society.” The trust and cooperative norms are concerned with the “trust and cooperative norms or shared values that shape the way people behave towards each other and as members of society.”

However, how does social capital impact economic behavior and how is it measured? Knack & Keefer (1997) find that, albeit informally, the economic value of social capital depends on the degree of inclusiveness of the social links, and the level of enforceability of exchanges. It also depends on the depth and extensiveness of social ties. Social links serve to provide information that is necessary for businesses. Hence, social capital influences economic outcomes by relaxing constraints on economic activities resulting from asymmetric information between economic actors. However, according to Annen (2013), the empirical support for economic benefits of social capital is inconclusive.

According to Papagapitos & Riley (2009), higher levels of social capital lead to more stocks of physical capital, which increases the productivity of human capital. Deng, Lin, & Gong (2012) observe that social capital serves as “a conditioning information variable that indicates the quality and productivity of human capital.” Further, Guiso et al. (2004) observe that social capital is important for financial development while Akçomak & ter Weel (2009) argue that social capital promote investment by a venture capitalist. Stiglitz, Sen, & Fitoussi (2010) also note that social capital is critical for sustainable development. Again, none of these studies directly examines the role of social capital in the choice of the formal or informal sector.

Siegler (2014) identifies two approaches to measuring social capital. The first method involves assigning monetary values to social capital by first estimating values for “social capital

assets.” The problem is assigning a monetary value to what is a social construct is problematic. According to Siegler (2014), the second approach to measuring social capital involves using relevant responses to survey questions, so long as the question and the response capture some aspect of social capital. The current study follows the second approach to measuring social capital.

Shideler & Kraybill (2009) examine the effect of individual and community characteristics on an individual’s social capital investment behavior. More importantly, Shideler & Kraybill (2009) construct their measure of social capital from responses to survey questions. For instance, the authors use answers to the question “How often do you do favors for your neighbors?” to construct a proxy for social capital. In their results, Shideler & Kraybill (2009) find a positive correlation between an individual’s level of education and social capital.

3.2.3. Summary of the literature review

Bribery and corruption, taxes, and poor quality of social services are some of the factors driving entrepreneurs into the informal economy. The role of social capital in deciding whether to operate in the formal or informal sector remains unclear. Also, the role of education (a human capital variable) and financing constraints remains unclear—providing an opportunity for further research. Any empirical study on the informal sector has to confront the challenge of doing work without a unified theory of the informal sector. However, the theoretical and empirical literature cited guide the structural equations for the empirical analysis, which is the focus of the next section.

3.3.Methodology

3.3.1. Data and description of variables

Data for the analysis is from the World Bank Formal and Informal Sectors Surveys. There are thirteen (13) countries in the sample, all from sub-Saharan Africa. The sample size is a maximum of 3,079 informal sector enterprises, and 8,826 formal sector enterprises. Table 3.1 presents the distribution of businesses across the countries in the sample. There are two classes of analyses; one based on data from the Informal Sector Survey (ISS) and the other from the Formal Sector Survey (FSS).

3.3.2. Switch from formal to informal

The study evaluates two outcome variables from the Informal Sector Survey data. The first in this category is *leave informal*. It is a binary variable constructed from responses to the question “would you like for your business or activity to be registered with the Registrar General?” A yes response takes a value of one and zero otherwise. The question attempts to elicit from respondents whether or not they intend to leave the informal sector. Moreover, responses to the question are indicative of the long-term intentions of the entrepreneurs on whether they intend to stay informal or formalise their economic activities. The second outcome variable in this category is *registered*. *Registered* is also a binary variable, constructed from responses to the question “was this business or activity registered with the Registrar General at start-up?” A yes response takes a value of one and zero otherwise.

The covariates include a proxy for human capital, a proxy for social capital, taxes, and access to finance (credit). The proxy for human capital comes from responses to the question “what is the highest level of education of the owner?” and the responses take on ordinal values. Responses include “No Education,” “Primary School (complete or not),” “Secondary School (complete or not),” “Vocational Training,” and “University training (complete or not).” A “No

Education” response takes a value of one, while “University training (complete or not)” response takes a value of five. The education variable is a human capital variable. Responses to the question “did either of the owner’s parents own an enterprise or do they currently own a business in the informal sector?” is used to construct *parents own an enterprise*. *Parents own an enterprise* variable is an indicator of social capital, following the second approach to measuring social capital highlighted by Siegler (2014).

Response to the question, “please indicate if any of the followings is a reason this business or activity is not registered with the Registrar General: Because of the taxes that need to be paid if registered.” A yes response takes a value of one and zero otherwise. The covariate *tax* comes from the responses. The access to finance variable is constructed based on answers to the question “is limited access to finance or loans a severe obstacle to the current operations of this business or activity?” A yes response takes a value of one and zero otherwise. *Corruption* variable comes from answers to the question “is corruption a severe obstacle to the current operation of this business or activity?” A yes response takes a value of one and zero otherwise.

There is a control for specific country differences and the location of enterprises. The data collection takes place in different years for different countries, although there is some overlap in the years for some countries. For instance, for Mauritius, the sample period is 2008, while for Ghana, the sample period is 2013. There is a control for the differences in the sample period for the various countries in the analysis. Concerning location, enterprises could be located in the capital city, metropolitan area, urban, town, and village centres. An enterprise is in the *capital* if located in the capital city of the country. An enterprise is in the *metro* if situated in a town with a population of over one million, other than the capital city. The business is located in the *urban-centre* if situated in a city with a population of over 250,000 to 1 million. Cities with a

population of 50,000 to 250,000 are *towns*. However, enterprises located in towns with a population of less than 50,000 are in *village* centres. There is a control for gender, type of industry, and the possession of a separate business bank account. The *separate bank account* variable comes from replies to the question “do you use a separate bank account for your household?” A yes response takes a value of one and zero otherwise. Intuitively, an entrepreneur with a different bank account for the households and one for the business signals the type of the entrepreneur. In a sense, entrepreneurs who can separate household accounts from business accounts are ‘high ability’ entrepreneurs.

3.3.3. Switch from informal to formal sector

In the case of the analysis based on data from enterprises currently in the formal sector, the outcome variable is *registered*. Again, this is a binary variable based on whether the enterprise registered at start-up. Again, the primary explanatory variables include an indicator for social capital and a proxy for financing constraints, using trade credit. Beck, Demirgüç-Kunt, & Maksimovic (2008) find that in most countries trade credit is the second source of external finance, second only to bank credit. Similarly, Cuñat (2007) highlight the role of trade credit in the financing of small businesses. Cuñat (2007) finds that younger enterprises, especially start-ups rely on trade credit as a form of external financing. The intuition is that at start-up, enterprises do not have collateral, financial and credit history, so are unable to attract bank loans. In this situation, enterprises depend on trade credit for working capital financing.

As Garcia-Appendini (2011) observes, using trade credit enables the enterprise to establish a record of credit history. The credit record facilitates access to bank finance at a later stage. In this study, trade credit plays two roles. For new enterprises, that is, enterprises under five years old, access to trade credit is indicative of social capital, while the utilization of trade credit by relatively old enterprises, that is, enterprises that are over five years old is indicative of financing constraints.

Here is the intuition. With trade credit, instead of requiring enterprises to pay during the delivery of supplies, a supplier could permit deferred payments up to a specified date, and in some cases, allow payments in installments. The flexibility offered by trade credit is critical, particularly, at start-up since trade credit offers to finance at no cost so long as there is no violation of the terms, requires no guarantees, and collateral. Consequently, having one is, therefore, indicative of social capital, which depends on networking, and in some cases, trust. The use of trade credit in this context as a proxy for social capital is consistent with Siegler (2014).

Concerning the formal sector firm size, enterprises with at least five but less than twenty full-time workers are small. Those with full-time employees of between twenty and ninety-nine are medium; and those with more than hundred workers, large. The covariates include the size, type of industry—manufacturing or services; ownership structure—foreign owned, sole proprietorship; product market—whether the products are for the export or the local market, and trade credit. Again, there is a control for location and country of the enterprise and year of data collection.

3.3.4. Econometric model

The analysis involves two models, one for each outcome variable. Let *informal sector model* represent the model based on data from the informal sector, and *formal sector model* represents the model based on data from the formal sector.

3.3.4.1. Informal sector model

In the case of the informal sector model, consider the binary choice model of the form:

$$\Pr(y = 1|x) = G(\beta_1 + \beta_2x_2 + \dots + \beta_Kx_K)$$

$$\Pr(y = 1|x) = G(x\beta) + \epsilon \tag{1}$$

Where y is one of the outcome variables; \mathbf{x} is a vector of explanatory and control variables; β is a vector of unknown parameters; ϵ is the error term; and G is a non-linear cumulative density function with values between zero and one. There is some suspicion that one of the explanatory variable x_k , the level of education of the entrepreneur, may be endogenous. Klein & Vella (2009), argue that an individual's level of education depend on socioeconomic and unobserved factors. These unobservable characteristics include ability and motivation. However, there is no data on motivation. There is no data on ability. These unobservable characteristics are also likely to affect the decision to operate either in the formal or informal sector. Because of this potential omitted variable problem, testing for endogeneity is critical for the analysis of how education affects the choice of the sector. This argument is similar in spirit to the case by Angrist & Krueger (1991).

A person's level of education is inherently immeasurable. Nevertheless, there are proxies for level of education. A person's level of schooling is a proxy for a person's level of education, albeit, imperfect. The intuition is that a person's level of education, apart from depending on socioeconomic factors, also depends on one's self motivation. Highly motivated persons are more likely to attain higher levels of education. Similarly, highly motivated entrepreneurs, having evaluated the costs and benefits, will most likely choose to participate in the formal. The problem is, is the education variable capturing only the effects of education or does it also reflect the results of some underlying personal characteristics which is not included in model? The analysis involves testing for endogeneity. If endogeneity is an issue, estimation of equation (1) involves instrumental variables approach following Wooldridge (2010).

It is not certain *a priori*, whether or not the model suffers from endogeneity.

Econometrically, one has to assume endogeneity to test for endogeneity, using instrumental variables (IV). According to Wooldridge (2010), to use the IV approach with x_k endogenous requires other variables, W not in equation (1), which satisfies two conditions. The first condition is about the exogeneity of the instruments, that is, W should be uncorrelated with the error term, ϵ :

$$\text{Corr}(w_i, \epsilon) = 0 \quad i = 1, 2, \dots, N \quad (2)$$

The second condition is about the relevance of the instrument. The second condition requires that from the linear projection of x_k onto all the exogenous explanatory variables as in equation (3),

$$x_k = \varphi_0 + \varphi_1 x_1 + \dots + \varphi_{k-1} x_{k-1} + \vartheta_1 w_1 + \dots + \vartheta_{N-1} w_{N-1} + \sigma_k \quad (3)$$

the coefficients on $w_i \neq 0$. Thus, the second condition becomes

$$\vartheta_i \neq 0 \quad (4)$$

This condition implies that w_i partially correlates with x_k once the other exogenous variables $x_1 \dots, x_{k-1}$ cancel out. Any variable that satisfies equations (2) and (4) is an instrumental variable (IV) candidate for x_k .

There are four potential instruments. The first available instrument is *vocational training*, following Koto (2015). Choosing vocational training may be a signal for the intention to go into self-employment later. The second instrument is *prisec* for entrepreneurs with only primary and junior secondary education. *Prisec* is a dummy variable. It measures whether the entrepreneur has had some form of primary or junior secondary education or not, irrespective of whether they

completed or not. *Prisec* takes a value of one if the entrepreneur has primary or junior secondary education, and zero otherwise. The intuition is that basic level of education does not depend on the inherent abilities of the entrepreneur. Hence, although correlated with the overall level of education, there is no correlation between *prisec* and the error term in (1). The third instrument measures whether an entrepreneur has a *bank account* or not. Those with a *bank account* take a value of one and zero otherwise. Having a bank account is indicative of the overall level of education, especially, in countries in sub-Saharan Africa where a large majority of the population do not bank. The fourth potential instrument is entrepreneurs without any education.

3.3.4.2. Formal Sector Model

The formal sector model also takes the form of equation (1), but, in this case, there is no suspicion of endogeneity. As opposed to the previous model, data on the level of education of the owner, the proxy for human capital, is not available. Again, the dependent variable is binary. It comes from whether the enterprise started in the informal sector before transitioning to the formal sector. As a binary outcome variable, equation (1) could be estimated using probit or logistic specifications. The analysis involves estimating the two specifications and testing for specification and goodness of fit tests to decide on either a logit or a probit specification.

3.4. Results

3.4.1. Switch from formal to the informal sector

Column 2 of Table 3.2 reports the IV-Probit estimates for the *registered* outcome variable. For the full sample, the results show that the likelihood of operating in the formal sector, as opposed to the informal sector, increases with the entrepreneurial level of education, which relates to human capital. Second, social capital increases the likelihood of not formalising economic activities at start-up. Also, the perception of the high level of taxes increases the likelihood that a prospective entrepreneur operates in the informal sector. For those entrepreneurs who do not

consider taxes as an obstacle, the perception that there are no tangible benefits from formalisation reduces the likelihood of formalisation. Also, financially constrained enterprises are more likely than not to be in the informal sector. As argued elsewhere, using a separate bank account for the enterprise is indicative of entrepreneur type regarding ability. The results are indicative that those with separate business accounts, the high ability entrepreneurs are more likely than not to have registered at start-up. Moreover, for the high ability entrepreneurs, the fact that they are operating in the informal sector is attributable to factors other than individual ability. Column 4 of Table 3.2 presents results for the enterprises less than five years of age. Again, the results from the full sample concerning education, social capital, and taxes follow through as well. However, as reported in Column 5 of Table 3.2, in the case of enterprises over five years old, the most important determining factor is financing constraints, which correlates formalisation negatively at start-up. Overall, the results for this part of the analysis highlights heterogeneity in the determining factors based on the age of the enterprise.

Column 2 of Table 3.3 reports the results of the analysis with the outcome variable *leave informal*. Again, it is constructed based on responses to the question “would you like for your business or activity to be registered with the Registrar General?” A yes response takes a value of one and zero otherwise. The question attempts to elicit from respondents whether or not they intend to leave the informal sector. For the full sample, the results are indicative that the perception of the high incidence of taxes, and the belief that there are no benefits from formalisation reduces the likelihood that an enterprise will leave the informal sector to the formal one. Even for those who do not think taxes are an issue, the perception of no benefits from formalisation reduces the likelihood that they will leave the informal sector for the formal one. However, there is no empirical evidence that human capital and social capital play a role in the

long-term decision to leave or stay in the informal sector. For enterprises under five years old, the perception that there are no benefits from carrying out economic activities in the formal sector reduces the chances of formalisation while financing constraints increase the chance of formalisation. For enterprises operating for over five years, taxes, no benefits, and financing constraints influence the decision of whether or not to formalise.

3.4.1.1. Instrument validity tests

There are four potential instruments with one endogenous regressor. Econometric theory favours using all instruments, assuming they are all valid, leads to the most efficient estimator. However, as Hahn & Hausman (2003) warn, as the number of instruments increases, there is a corresponding rise in the small sample biases of the instrumental variable (IV) estimators. As a first step, to check the relevance of the instruments, Table 3.5 reports the pairwise correlations between the endogenous regressor and the instruments. As reported, the correlation coefficients are indicative that all the instruments are statistically correlated with the endogenous regressor.

The Wald and the Smith and Blundell tests test for endogeneity for each model. The Wald test has a null hypothesis that the covariates are exogenous. In the case of the model with the outcome variable *registered*, the estimated Wald test of exogeneity has a chi-square (1) value of 6.91, with a p-value of 0.009. In addition, the Smith and Blundell test have the same null hypothesis as the Wald test. The calculated Smith-Blundell test of exogeneity has a chi-square (1) value of 6.77, with a p - value of 0.0093. Therefore, both tests reject the null hypothesis. Similarly, in the case of the model with the outcome variable *leave informal*, the Wald test of exogeneity has a chi-square (1) value of 5.75, with a p-value of 0.017. The Smith-Blundell test of exogeneity has a chi-square (1) value of 5.63, with a p - value of 0.018. Again, both tests reject the null hypothesis.

Finlay & Magnusson (2009) argue that in the presence of weak instruments, Wald tests are not reliable, and point estimates are biased. Testing for robustness of instruments follows Finlay & Magnusson (2009). Following Finlay & Magnusson (2009), the robustness tests include the Anderson–Rubin (AR) statistic by Anderson & Rubin (1949), the Kleibergen–Moreira Lagrange multiplier (LM) test by Moreira (2003) and Kleibergen (2007); the overidentification (J) test, and the conditional likelihood ratio (CLR) test. These tests are not dependent on distributional assumptions. The AR test, a joint test of the structural parameter and the overidentification restrictions, consists of the LM, and the J statistics. According to Finlay & Magnusson (2009), the combination of the LM-J test is more efficient than the single AR test.

According to Andrews, Moreira, & Stock (2008), the CLR test is the most powerful among valid tests that do not change with changes in the order of instruments. These tests have a composite null hypothesis that the coefficients on the instruments are identically equal to zero, versus the alternative hypothesis that they differ from zero. Table 3.6 presents results of the robust tests of weak instruments. From Table 3.6 panels (A) and (B), the null hypothesis is rejected for the CLR, AR, LM, and LM-J tests, with the conclusion that the coefficients on the instruments are different from zero, and the overidentification restrictions are valid.

However, how well does the estimated model fit the data? Testing for the predictive power of the model follows a receiver operating characteristics (ROC) analysis. The ROC analysis measures the precision of diagnostic tests based on how well the model can predict the outcome. An area of size 0.5 corresponds to a model with no predictive power while a good fit has an area with size 1. Figure 3.1 is the ROC curve for *registered*. The predicted area under the curve is 0.75, which indicates that the model has high predictive power. Also, panels (A) and (B) of Table 3.7 reports the goodness of fit for the *registered* and *leave informal*. From panel (A) the

overall rate of correct classification is 95.35%. The implication is that the estimated model correctly predicts the outcome variable 95.35% of the time. Similarly, from the panel (B), the overall rate of correct classification is 70.53%. Thus far, the results of all the diagnostic and specification tests on the estimated 'informal sector model' indicates that one can draw valid inferences from the outcome of the models.

3.4.2. Results: From informal to the formal sector

Column 2 of Table 3.8 reports the results for the full sample from the model of enterprises that started in the informal sector before switching to the formal sector. The primary explanatory variables are again, social capital and access to finance. The indicator of financing constraints, trade credit, is statistically significant at 1%, with the implication that funding constraints could determine whether an entrepreneur chooses to operate in the informal sector or not. At start-up, and as argued already, access to trade credit is indicative of social capital. The implication is that entrepreneurs with some social capital are less likely to formalise their economic activities at start-up. Since over 90% of the enterprises in the sample have been operating for over five years, one could argue that the utilisation of trade credit, particularly to finance working capital, is indicative of difficulties in accessing external financing. The negative correlation between access to trade credit and formalisation holds for both male and female-owned enterprises. Also, the likelihood of formalisation increases with firm size. There is a positive association between businesses that possess export certification and the likelihood of formalisation. Businesses owned through sole proprietorship and partnerships are less likely to formalise at start-up. Also, as expected, there is a high likelihood that foreign-owned enterprises formalised at start-up.

3.4.2.1. Specification and goodness of fit tests

The linktest of Pregibon (1980) tests for specification error. The null hypothesis is that the logit or the Probit specification, whichever the case, represents the correct functional form versus the

alternative hypothesis of wrong functional form. The linktest depends on the principle that a correct specification of a regression equation implies no additional independent variables should be significant, except by chance. The linktest tests for a particular type of error in the specification referred to as a link error, where an outcome variable requires transformation to relate correctly to the explanatory variable. The test is implemented using the linktest program from stata. In the implementation, the linktest creates two new variables, the variable of prediction, *_hat*, and the variable of squared prediction, *_hatsq*. The expectation is that *_hatsq* should not be significant. In the Probit specification, the *_hat* has a coefficient of 1.26 with a p-value of 0.00 while the *_hatsq* has a coefficient of -0.18 with a p-value of 0.00. Thus, there is enough evidence to reject the null hypothesis for the probit model. For the logit specification, the *_hat* has a coefficient of 1.16 with a p-value of 0.00 while the *_hatsq* has a coefficient of -0.07 with a p-value of 0.051. In this case, there is not enough evidence to reject the null hypothesis. The implication is that there is no specification error in the logit model.

The Hosmer, Lemeshow, and Sturdivant (2013) specification test tests the goodness-of-fit of the model. The null hypothesis is that the estimated model fits. The alternative hypothesis is that the model does not fit. In the Probit model, the estimated Hosmer-Lemeshow chi-square (8) statistic is 17.44, with a p-value of 0.02, rejecting the null hypothesis. For the logit model, the estimated Hosmer-Lemeshow chi-square (8) statistic is 10.92, with a p-value of 0.21. The null hypothesis is not rejected, with the conclusion that the estimated logit model fits the data. The implication is that valid inference can be drawn based on the results of the logit model.

3.5. Discussions and policy implications

This paper examines the role of social capital, education, and financing constraints on the selection of sector—whether formal or informal. The examination is from entrepreneurs

currently in the informal sector and enterprises that started in the informal sector, but now operate in the formal sector. There is empirical evidence that the likelihood of formalisation increases with human capital while social capital, financing constraints and the perception of the high level of taxes reduces the likelihood. Even for entrepreneurs who do not consider taxes as an obstacle, the perception that there are no tangible benefits from formalisation reduces the likelihood of formalisation.

Further, on whether entrepreneurs currently in the informal sector plan to formalise, there is empirical evidence that the perception of the high incidence of taxes, and the belief that there are no benefits from formalisation impede formalisation while human capital and social capital do not play a role in the decision to formalise. In the case of entrepreneurs who started in the informal sector but currently operate in the formal sector, there is empirical evidence that financing constraints at start-up could determine whether an entrepreneur chooses to operate in the informal sector or not. The result is consistent with the outcome of the previous analysis based on data from the informal sector. The result of human capital is consistent with Koto (2015). The result that high level of taxes has a real negative influence on the decision to register at start-up is also consistent with Koto (2015). It is also consistent with Torgler & Schneider (2009), and Tedds (2010). The result of social capital is indicative of the desire to operate in the informal sector driven mostly by social forces that transcend the desire to evade regulations in the formal sector. This insight has far-reaching implications for how we think about the informal sector in developing countries.

What do these results mean for how to think about the informal sector? If human capital, financing constraints, taxes, the perception that there are no benefits from running in the formal sector, and social capital are the main driving forces behind whether or not to formalise, what

then, ought to be the policy response, assuming that formalisation is a good thing? Thinking about the appropriate policy response starts with the recognition that participants in the informal sector are not necessarily driven there by the desire to evade rules and regulations in the formal sector, but rather by circumstances. As demonstrated, these entrepreneurs may have low levels of education, do not have the needed financing, and thrive on informal existing social networks in their community for livelihood.

Attempts at compelling these entrepreneurs into the formal sector will have to include skills and job training. Formalisation strategies could include giving tax incentives to enterprises. It also includes policies that facilitate access to external financing in the form of credit guarantees or concessionary loans and improving the quality of service delivery in the formal sector. If prospective entrepreneurs do not see any benefits from participating in the formal economy, that could be an indication of institutional failures in the economy. These institutional failures could include the non-enforceability of property rights of those in the formal sector, perceived partiality of the judiciary, and a general mistrust of government. Promoting participation in the formal sector will necessarily involve institutional reforms that improve the business regulatory environment. However, it also means recognising that, not every sector of a country's economy will operate under the formal rules and regulations, especially, in an environment where societal norms triumph laws.

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Table 3.1: Distribution of enterprises across countries in the sample

Formal sector			Informal sector		
Country	Sample Size	Year	Country	Sample Size	Year
Angola	449	2010	Angola	119	2010
Burkina Faso	394	2009	Botswana	99	2010
Cameroon	363	2009	Burkina Faso	120	2009
Cape Verde	156	2009	Cameroon	122	2009
DRC	695	2010	Cape Verde	129	2009
Ghana	1197	2013	DRC	480	2013
Ivory Coast	129	2008	Ghana	729	2013
Kenya	1369	2013	Ivory Coast	129	2008
Malawi	150	2009	Kenya	533	2013
Tanzania	1070	2013	Madagascar	127	2008
Uganda	1198	2013	Mali	120	2010
Rwanda	453	2011	Mauritius	132	2008
Zambia	1203	2013	Rwanda	240	2011
Total	8,826			3,079	

Source: Author's compilation based on data from the World Bank Enterprise Survey

Table 3.2: Estimates for *Registered Model*

Dependent variable: <i>Registered (0/1)</i>				
	Full sample (IV-Probit)	Full sample (Probit)	< five years (IV-Probit)	> five years (IV-Probit)
Education	0.106* (1.98)	0.007 (0.18)	0.168* (2.25)	0.04 (0.50)
Social capital	-0.380*** (-3.49)	-0.383*** (-3.58)	-0.522*** (-3.16)	-0.247 (-1.64)
Credit	-0.292** (-2.68)	-0.295** (-2.72)	-0.253 (-1.60)	-0.318* (-1.99)
Taxes	-0.371** (-2.99)	-0.388** (-3.15)	-0.489** (-2.63)	-0.270 (-1.55)
Corruption	0.146 (1.13)	0.156 (1.22)	0.109 (0.58)	0.195 (0.99)
Separate account	0.295** (3.01)	0.327** (3.38)	0.219 (1.53)	0.345* (2.43)
Services	-0.026 (-0.26)	-0.002 (-0.02)	-0.110 (-0.76)	0.105 (0.70)
No benefits	0.047 (0.28)	0.049 (0.30)	0.120 (0.49)	-0.014 (-0.06)
Tax*benefit	0.314 (1.25)	-0.514** (-2.22)	0.270 (0.76)	0.700 (1.37)
Gender	0.003 (0.03)	0.003 (0.03)	-0.035 (-0.25)	0.054 (0.36)
Constant	-8.383 (-0.03)	-8.123 (-0.03)	-7.779 (-0.08)	-5.279 (-0.04)
Location control	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes
N	2690	2690	1444	1174

Note: t-statistics in parentheses; *significant at 5%, **significant at 1%,
***significant at 0.1%

Source: Author's compilation based on data from the World Bank Enterprise Survey

Table 3.3: Estimates for *Leave informal Model*

Dependent variable: <i>Leave informal (0/1)</i>				
	Full sample (IV-Probit)	Full sample (Probit)	< five years	> five years
Education	0.052 (1.64)	0.223*** (10.53)	0.068 (1.62)	0.035 (0.71)
Social capital	0.006 (0.11)	0.080 (1.45)	-0.009 (-0.12)	0.039 (0.46)
Credit	0.254*** (4.42)	0.188 *** (3.49)	0.227** (2.83)	0.322*** (3.79)
Taxes	-0.164* (-2.50)	-0.008 (-0.12)	-0.076 (-0.85)	-0.269** (-2.73)
Corruption	0.187** (2.64)	0.210** (2.99)	0.235* (2.43)	0.153 (1.42)
Separate account	0.224*** (4.12)	0.183*** (3.54)	0.375*** (4.94)	0.078 (0.97)
Services	-0.094 (-1.67)	-0.031 (-0.57)	-0.132 (-1.69)	-0.024 (-0.27)
No benefits	-0.786*** (-9.44)	-0.812*** (-9.80)	-0.832*** (-7.15)	-0.733*** (-6.00)
Tax*benefit	-0.264* (-2.24)	-0.049 (-0.42)	-0.150 (-0.92)	-0.417* (-2.39)
Gender	-0.210*** (-3.82)	-0.140*** (-2.67)	-0.115 (-1.54)	-0.342*** (-3.93)
Constant	0.398 (1.56)	-0.951*** (-6.99)	0.009 (0.02)	0.581 (1.52)
Location control	Yes	Yes	Yes	Yes
Country control	Yes	Yes	Yes	Yes
N	2952	3,079	1526	1298

Note: t-statistics in parentheses; *significant at 5%, **significant at 1%, ***significant at 0.1%
Source: Author's computation based on data from the World Bank Enterprise Survey

Table 3.4: First stage of IV for both models

	Model: <i>Registered (0/1)</i>	Model: <i>Leave informal (0/1)</i>
Social capital	0.006 (0.19)	0.007 (0.22)
Credit	-0.025 (-0.62)	-0.018 (-0.57)
Taxes	-0.004 (-0.10)	-0.008 (-0.20)
Corruption	0.022 (0.54)	0.022 (0.55)
Separate account	-0.004 (-0.13)	0.003 (0.10)
Services	0.216*** (6.39)	0.213*** (6.59)
No benefits	-0.037 (-0.76)	-0.042 (-0.90)
Tax*benefit	0.007 (0.10)	0.011 (0.17)
Gender	-0.072** (-2.21)	-0.069** (-2.32)
No education	-0.460*** (-12.40)	-0.460*** (-12.97)
Vocational Training	0.042 (1.17)	0.042 (1.21)
Bank Account	0.229*** (6.78)	0.194*** (6.27)
Prisec	-1.890*** (-46.13)	-1.897*** (-48.58)
Constant	4.445*** (24.16)	4.405*** (34.26)
Location control	Yes	Yes
Country control	Yes	Yes
N	2690	3,079

Note: t-statistics in parentheses; *significant at 5%, **significant at 1%, ***significant at 0.1%
Source: Author's computation based on data from the World Bank Enterprise Survey

Table 3.5: Pearson correlation with the endogenous variable and the instruments

	Education_owner	No education	Vocational training	Bank account	Prisec
Education_owner	1.00				
No education	-0.13**	1.00			
Vocational training	0.45**	-0.06**	1.00		
Bank account	0.07**		0.04	1.00	
Prisec	-0.69**	0.15**	-0.45**	-0.07**	1.00

Source: Author's computation based on data from the World Bank Informal Sector Enterprise Survey

Table 3.6: Weak instrument robust tests results

Panel (A). Dependent variable: Registered		
Test	Statistic	p-value
CLR	Stat (.) = 2.90	Prob > stat = 0.080
AR	Chi2 (4) = 15.74	Prob > chi2 = 0.003
LM	Chi2 (1) = 2.89	Prob > chi2 = 0.089
J	Chi2 (3) = 12.85	Prob > chi2 = 0.005
LM-J H_0 rejected at 5% level		

Panel (B). Dependent variable: Leave informal		
Test	Statistic	p-value
CLR	Stat (.) = 2.50	Prob > stat = 0.114
AR	Chi2 (4) = 41.46	Prob > chi2 = 0.000
LM	Chi2 (1) = 2.47	Prob > chi2 = 0.116
J	Chi2 (3) = 38.99	Prob > chi2 = 0.000
LM-J H_0 rejected at 5% level		

Source: Author's computation based on data from the World Bank Informal Sector Enterprise Survey

Table 3.7: Goodness of fit test for the Probit estimates

Panel (A). Dependent variable: registered at start-up		
Classified + if predicted $\Pr(D) \geq 0.5$		
True D defined as registered at inception $\neq 0$		
Sensitivity	$\Pr(+ D)$	0.00%
Specificity	$\Pr(- \sim D)$	100.00%
Positive predictive value	$\Pr(D +)$	0.00%
Negative predictive value	$\Pr(\sim D -)$	95.35%
False + rate for true $\sim D$	$\Pr(+ \sim D)$	0.00%
False - rate for true D	$\Pr(- D)$	100.00%
False + rate for classified +	$\Pr(\sim D +)$	0.00%
False - rate for classified -	$\Pr(D -)$	4.65%
Correctly classified		95.35%

Panel (B). Dependent variable: leave informal		
Classified + if predicted $\Pr(D) \geq 0.5$		
True D defined as registered at inception $\neq 0$		
Sensitivity	$\Pr(+ D)$	78.33%
Specificity	$\Pr(- \sim D)$	62.86%
Positive predictive value	$\Pr(D +)$	67.45%
Negative predictive value	$\Pr(\sim D -)$	74.70%
False + rate for true $\sim D$	$\Pr(+ \sim D)$	37.14%
False - rate for true D	$\Pr(- D)$	21.67%
False + rate for classified +	$\Pr(\sim D +)$	32.55%
False - rate for classified -	$\Pr(D -)$	25.30%
Correctly classified		70.53%

Source: Author's computation based on data from the World Bank Informal Sector Enterprise Survey

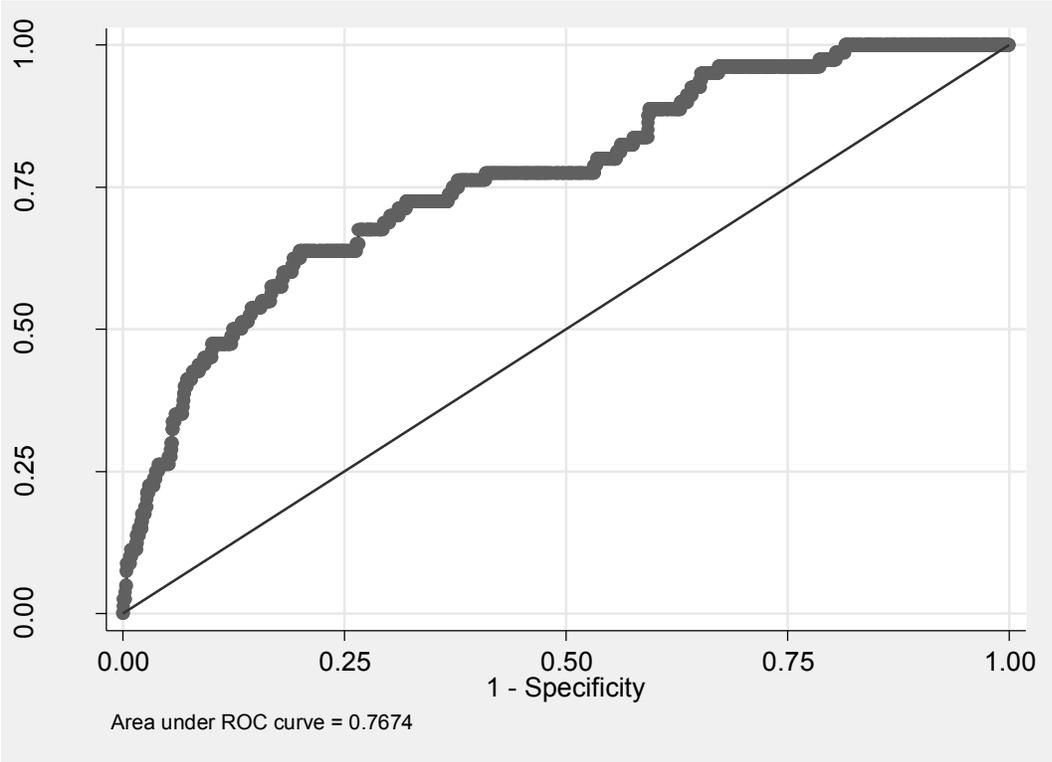
Table 3.8: Logit Estimates for Formal Sector Model

Dependent variable: <i>Registration</i> (0/1)			
	Full sample	Female owners	Male owners
Social capital/Trade credit	-0.205** (-2.19)	-0.397* (-2.24)	-0.359** (-2.67)
Line of credit	0.126 (0.12)	0.143 (0.73)	0.208 (1.23)
Size	0.743*** (6.31)	0.752*** (3.62)	0.737*** (4.28)
Corruption	0.042 (1.36)	0.039 (0.70)	0.103* (3.75)
Services	0.597*** (6.30)	0.155 (0.97)	0.988*** (7.49)
Foreign owned	0.610*** (4.40)	0.255 (1.13)	0.879*** (4.13)
International certification	0.469*** (3.73)	0.410* (2.04)	0.745*** (3.75)
Female Manager	-0.245** (-2.25)	-0.523*** (-3.35)	0.301 (1.47)
Partnership	-0.672*** (-4.48)	-1.108*** (-4.86)	-0.321 (-1.31)
Sole proprietorship	-0.623*** (-5.48)	-0.841*** (-4.27)	-0.525** (-3.02)
Constant	0.607 (1.85)	1.513** (2.77)	-0.305 (-0.56)
Location control	Yes	Yes	Yes
Country control	Yes	Yes	Yes
N	3660	1169	1814
AIC	3610.99	1142.94	1865.09
BIC	3753.71	1239.15	1969.65

Note: t-statistics in parentheses; *significant at 5%, **significant at 1%, ***significant at 0.1%

Source: Author's computation based on data from the World Bank Enterprise Survey

Figure 3.1: Area under the ROC Curve



4. Social and Human Capital and the Linkages between the Formal and Informal Sectors

Abstract

This paper examines whether or not social and human capital influences the probability that an enterprise in the informal sector forms linkages with those in the formal sector. Previous research focused on the role of the productive capacities of the enterprises in the informal sector. As a novelty, having linkages with the formal sector is treated as a rare event. Consequently, the analysis involves flexible binary generalized extreme value models. The study demonstrates that for both male and female entrepreneurs, social and human capitals have significant positive real effects on the likelihood of linkages. From a policy point of view, if one sees the informal sector as a source of jobs and as a stepping-stone to the formal sector, there is a case for skill training programs and recognition of the role of informal institutions and networks in the design of entrepreneurial policy.

Keywords: Informal sector; social capital; human capital; rare event; bgeva

4.1. Introduction

This study is about the relationship between enterprises in the informal sector and those in the formal sector. Previous studies, including, Moreno-Monroy, Pieters, & Erumban (2014), Böhme & Thiele (2014), and Hudson, Williams, Orviska, & Nadin (2012) have analysed the existence of linkages between the two sectors. However, the issue of the determinants of whether or not an enterprise in the informal sector gets to form linkages with those in the formal sector remains unclear. Williams (2014), defines the informal sector as consisting of "private firms that are unincorporated as separate legal entities and do not keep a complete set of accounts for tax and social security purposes, and are also either unregistered or small." This definition applies to the enterprises in this study. If one starts with the premise that linkages between the formal and informal sectors contribute to job creation and source of livelihood in the informal sector, identifying the determinants of the linkages beyond technological and productive capacities is essential for the design of entrepreneurial policy. Such empirical work is rare in the literature.

Two features characterise the informal sector in the past few decades. First, the informal sector is persistent and is growing in importance. An ILO report (2014) argues that there is evidence that the informal sector can sustainably coexist parallel with growth and expansion in the formal sector in developing countries. According to the report, the size of the informal sector is 18.4 % of GDP in 2013 in the European Union and an average of 8.6% in Canada and the United States. Schneider (2013), reports that the informal economy contributes 33% to GDP globally. Besides, de Laiglesia & Jütting (2009), report that about 60% of the global workforce work in the informal economy. Second, in the era of slow economic recovery from the 2008-2009 recessions, the informal sector's role in job creation is likely to be more essential, going forward. The ILOs World Employment and Social Outlook – Trends (2015), report that in 2014, sub-Saharan Africa had a labour force participation rate of 70.9%, compared with the global

average of 63.5%. From the report, approximately 77% of employed persons in sub-Saharan Africa in 2014 are in “vulnerable forms of employment.” The global average is 45%. The vulnerable forms of employment consist of “own-account” workers and unpaid family workers. The “vulnerable forms of employment” are most likely to be in the informal sector. The implication is that about 77% of those with jobs in sub-Saharan Africa are in the informal sector. Thus, the importance of the informal economy cannot be underestimated. According to Jenkins, Portes, Castells, & Benton (1991), and Chen (2005), the linkage between the two sectors shows up when enterprises in the formal sector subcontract certain tasks to those in the informal sector.

Arimah (2001) examines the type of links between the formal and informal sector in Nigeria, and the characteristics of the informal sector that promote or inhibit the formation of linkages. According to Arimah, the various types of linkages include direct and indirect linkages, distributive and productive linkages, consumption linkages, credit financing linkages, subcontracting linkages, technological linkages and backward and forward linkages. Arimah argues that backward linkages take the form of the supply of inputs for production from the formal sector to the informal sector, including raw materials, equipment and machinery, finance, information and expertise, and the training of informal sector workers. The forward linkages, Arimah argues, include the utilization of inputs from the informal sector in the production of goods and services in the formal sector. Forward linkages could take the form of subcontracting. To Arimah, subcontracting occurs when enterprises in the formal sector contract those in the informal sector to either supply inputs, final products or to perform specific functions in the manufacturing process in the formal sector.

Arimah (2001) finds that the forward and backward linkages depend on the level of investment, income of the entrepreneur, number of employees, level of experience of the

entrepreneur and the level of education of workers. One difference between the current study and that of Arimah (2001) is the definition or identification of an informal sector enterprise. Arimah classifies some currently registered enterprises as informal and argues that current registration promote linkages. In this study, unregistered enterprises are in the informal sector. Also, the present study evaluates whether an enterprise currently in informal sector had previously registered at start up. Böhme & Thiele (2014) examine the existence of forward and backward linkages between informal and formal sector enterprises from six cities in West African. The cities include Cotonou in Benin, Ouagadougou in Burkina Faso, Abidjan in Cote d' Ivoire, Bamako in Mali, Dakar in Senegal and Lome in Togo. They find evidence of backward linkages, not forward linkages between the two sectors.

Moreno-Monroy, Pieters, & Erumban (2014) analysed the relationship between subcontracting in the formal sector and informal sector employment using survey data from manufacturing enterprises in India. They find a positive relationship between formal sector subcontracting and the growth in jobs in the “modern segments” of the informal sector. Moreno-Monroy, Pieters, & Erumban (2014) use subcontracting as a proxy for linkages between the two sectors. Although they observe subcontracting by the formal sector in the data, they are unable to tell whether the subcontracting is on other enterprises in the formal sector or with enterprises in the informal sector. Consequently, their measurement of “linkages” is problematic. This study uses, in my view, a cleaner measure of linkages between the two sectors.

In a literature review, Moreno-Monroy, Pieters, & Erumban (2014) identifies two views on production linkages between the formal and the informal sector, namely, “stagnation” and “modernisation.” According to the *stagnation* view, formal sector enterprises subcontract their activities to those in the informal sector to reduce their variable costs by imposing pricing

conditionalities on those in the informal sector thereby increasing their profitability. In the *stagnation* view, enterprises in the informal sector cannot invest and accumulate capital and hence are stuck in a “Survivalist mode.” Informal sector enterprises in the “stagnant survivalist mode,” they argue, form part of the “traditional segment” of the informal sector. Thus, increases in this type of linkage between the formal and informal sector decrease the chances of “modernisation” in the informal sector. In the “modernisation” view, Moreno-Monroy, Pieters, & Erumban (2014) observe that entrepreneurs in the formal sector look beyond cost minimisation when subcontracting to the informal sector: They watch the quality and timeliness of delivery. Consequently, formal sector enterprises consider the “productive and technological” endowments of those in the informal sector in deciding to subcontract. Moreover, so informal sector enterprises with “modern” technologies are more likely to have production linkages with those in the formal sector. The current study adds to the literature by showing that social and human capital could potentially be valuable in determining the linkages between the two sectors, particularly, for enterprises in sub-Saharan Africa.

Hudson, Williams, Orviska, & Nadin (2012) investigate the extent to which enterprises in the formal sector face competition from those in the informal sector. Their analysis uses data on enterprises in South East Europe. They find that firms in the two sectors compete against each other for the market. Chen (2005) articulates a different perspective. Chen argues that, in essence, in the manufacturing sector, the two sectors complement each other. Williams (2013) reports the results of a study on the informal sector in Europe using data from the Eurobarometer Survey. When participants were asked to rank the main reasons for participating in the informal sector, 46.7% of them picked "both parties benefited from it." Meaning, they perceive the economic activities in the informal economy to be beneficial to those in the formal sectors. As

Williams (2013) notes, if participants in the two sectors benefit from the linkages, understanding and facilitating those linkages will be essential for job creation. Also, as Thai & Turkina (2014) and Bennett (2009) notes, entrepreneurs participate in the informal sector as a “stepping stone” toward becoming formal. During this time, they discover the profitability or otherwise of their business. If the enterprise is not profitable, they may leave the industry altogether or stay informal. Bennet further observes that informality may be a “consolation prize.” In this sense, an entrepreneur will only enter an industry formally, knowing that if they are not profitable, they can switch to informality. When the switch occurs, the networks already formed could enhance the productivity of the entrepreneur.

Thus far, the literature cited acknowledges the existence of linkages, whichever form it takes, between enterprises in the formal and informal sector. However, the role of social and human capital in the formation of those linkages remains unclear. The purpose of this study is to uncover, at least in part, whether or not social and human capitals are important in promoting linkages between enterprises in the formal and the informal sector. This study contributes to the literature in the following ways. First, if one starts with the premise that linkages between the formal and informal sectors contribute to job creation and source of livelihood in the informal sector, then identifying the determinants of the linkages beyond technological and productive capacities is essential for the design of entrepreneurial policy. Second, as a novelty, and as explained in later sections, this study treats the existence of linkages between the two sectors as a rare event. Further, the present study represents an empirical extension of Chen (2005) in particular, and Hudson, Williams, Orviska, & Nadin, (2012). The current study does not take any position on whether the existences of the linkages between the sectors hurt or help entrepreneurs

in either sector. What is important is that a linkage exists, and participants in these relationships chose to participate, guided by bounded rationality.

The analysis uses survey data on informal sector enterprises from the World Bank Informal Sector Enterprise survey. The study utilizes the flexible binary generalised extreme value models. The geographic scope of the study is thirteen countries from sub-Saharan Africa. The outcome variable is whether the informal sector enterprise has supply contracts with those in the formal sector. Thus, a supply contract between the enterprises in the two sectors is a proxy for the existence of linkages. There are proxies for the primary explanatory variable, social capital. The covariates include enterprise-specific characteristics. There is a control for regional and country differences. Amongst others, the results are indicative that social and human capitals have significant positive real effects on the probability that an enterprise in the informal sector forms linkages with those in the formal sector. The rest of the paper consists of four sections. Section 4.2 presents a discussion on the notion of social capital. Section 4.3 presents the methodology. Section 4.4 presents the results. Section 4.5 presents specification tests and section 4.6 present an analysis of the results.

4.2. Social capital and the behavior of economic agents

There is considerable debate on the definition of the concept of social capital, partly due to its multidimensional and multidisciplinary nature. According to Putnam (1993), social capital consists of “features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions.” Coleman (1990) defines social capital as “a resource consisting of obligations between parties in a network.” According to Guiso, Sapienza, & Zingales (2004), “the source of social capital lies with the people a person relates to” in society.

Portes (1998) provide two motives for why some people are willing to make their resources available to others without expecting compensation. First, Portes (1998) observes that people do what they do because of internalized norms. These norms explain why people feel obligated to follow traffic rules and do charities, for instance. Second, as Portes (1998) notes, social capital affects the behavior of individuals because of the fear of punishment. Thus, people do what they do because of the fear of punishment from society. In a sense, this represents an instrumental motive for social capital. However, what is the effect of social capital on economic behavior?

Putnam (1993) writes that social capital encourages the formation of trust, and trust improves the quality of governance, which contributes to economic growth. Routledge & von Amsberg (2003) demonstrate that social structure determines the frequency of trade. This rate of commerce affects economic agents' decisions on whether to trade cooperatively or not. Routledge & von Amsberg (2003) argue further that under certain conditions, a decrease in the social capital could lead to a decline in social welfare. According to Guiso et al. (2004), social capital contributes to higher financial development, especially in communities with weak enforcement of laws, and among people with low educational levels. Akçomak & ter Weel (2009) argue that venture capitalist invest more in innovation in the presence of social capital.

Ahlerup, Olsson, & Yanagizawa (2009) demonstrate that social capital has a larger positive effect on economic growth at lower levels of institutional development. However, at higher levels of institutional development, the impact of social capital on growth is moderate. The result by Ahlerup, Olsson, & Yanagizawa (2009) is not surprising if one acknowledges that social capital directly refers to access to a set of (mostly informal) institutions (where we define

informal institutions as norms and informal rules and associated enforcement mechanisms). As such, social capital may serve as a substitute for formal institution density (development).

Keefer & Knack (2002) observe that in heterogeneous societies, where trust is low, property rights, and contractual rights are subject to instability. Consequently, there is the possibility of diverting investments toward risky projects, which could undermine economic growth. Zak & Knack (2001) also observe that under conditions of low trust, especially in heterogeneous societies, economic agents are more risk averse and spend time and resources investigating each other, which reduces investment and economic growth. Thus, low trust hurts the quality of public policies and siphons resources from productive uses towards inspecting and monitoring other groups.

Concerning the relationship between social and human capital, Knack & Keefer (1997) argue that trust and civic involvement (indicators of the densities of social capital) improve the quality of governance, which raises the quality of public-provided education. Second, trust is linked to stronger contract enforcement, which encourages investments in innovation that lead to a higher return to higher education. Also, Papagapitos & Riley (2009) write that higher levels of social capital lead to more stocks of physical capital, which increases the productivity of human capital. Thus, as observed by Deng, Lin, & Gong (2012) social capital serves as “a conditioning information variable that indicates the quality and productivity of human capital.”

The literature on social capital provides evidence that social capital promotes a better quality of governance, encourages financial development and investment, enhances the quality of human capital, and promotes economic growth. However, the role of social capital in the linkages between formal and informal sector enterprises remains unknown. Filling this gap in the

literature is an objective of this study. The conceptualization of social capital follows Scrivens & Smith (2013), who identify four aspects of social capital, namely, “personal relationships, social network support, civic engagement, and trust and cooperative norms.” Also, the measurement of social capital follows Siegler (2014) and involves using relevant responses to survey questions, so long as the survey questions and the responses reflect some of the four aspects of social capital. The next section presents the methodology.

4.3. Methodology

4.3.1. Data

The analysis uses data from the World Bank Informal Sectors Surveys. There are thirteen (13) countries from sub-Saharan Africa in the sample. The sample size is a maximum of 3,079 entrepreneurs in the informal sector. Table 4.1 shows the distribution of countries in the sample.

4.3.2. Description of variables

The dependent variable is *supply contract*. It is a binary variable. It is from answers to the question, “does this enterprise or activity produce or sell under contract for another business or person in the formal sector?” A yes response takes a value of one and zero otherwise. The existence of a supply contract is an indicator of linkages between the informal and formal sectors. The primary explanatory variable is social capital. Again, the measurement of social capital follows Siegler (2014). There are four indicators of social capital. The first is *parents_own_business* and comes from a response to the question "did either of the owner's parents own an enterprise or do they currently own business in the informal sector?" A yes response takes a value of one and zero otherwise. The intuition is that existing networks provide a vital starting point for developing one's networks. The second indicator of social capital is *Regisd_Inception*. It is also a binary variable based on whether or not the enterprise registered

and previously operated in the formal sector. The expectation is that an entrepreneur now in the informal sector draws on earlier links and networks established while in the formal sector. The third indicator is whether the enterprise has a bank account. The *bank account* variable comes from responses to the question "do you have a bank account to run this business or activity?" A yes response takes a value of one and zero otherwise. The intuition for utilising bank account as an indicator of social capital relies on Guiso et al. (2004), who examine the relationship between social capital and financial development. Guiso et al. (2004) argue that social capital influence economic efficiency through its effect on the level of trust. They argue further that financial contracts depend on trust, and consequently, on social capital. Thus having *bank account* facilitates building trust between the entrepreneur and the bank, while expanding the financial networks of the entrepreneur. Having *bank account* also helps to bridge information asymmetries and establishes a relationship between the entrepreneur and the prospective financier (bank), which becomes essential for future loan applications.

The covariates include firm size, human capital variables including the age of the enterprise, vocational training, and level of education of the entrepreneur. The covariates also include finance as an obstacle and female ownership. The finance variable comes from responses to the question "is limited access to finance or loans a severe obstacle to the current operations of this business or activity?" A yes response takes a value of one and zero otherwise. The model includes a control for type of industry. There is also control for country differences and the location of enterprises. Concerning location, enterprises could be located in the capital city, metropolitan area, urban centre, town centre, and villages. An enterprise is denoted as in the 'capital' if situated in the capital city of the country. An enterprise is in the 'metro' if it is in a town with a population of over one million, other than the capital city. The enterprise is located

in the 'urban-centre' if situated in a city with a population of over 250,000 but less than one million. Enterprises located in the cities with 50,000 but less than 250,000 inhabitants are 'town.' However, enterprises located in the towns with a population of less than 50,000 are in 'village.'

Figure 4.1 presents the percent of selected variables with 'yes' responses in the data. From Figure 1, the capital cities contribute 34% of the businesses in the sample, the urban centre 16%, a town 13%, and Village 4%. Regarding industry, the manufacturing sector contributes 37%, while services contribute 38%. There is forty-one percent (41%) female owners of enterprises in the sample. Only 4% of the respondents started in the formal sector before switching to the informal sector. Regarding the level of education of the entrepreneurs, 8% had some form of university education, 79% had some primary and secondary school education, and 39.2% had vocational training. Thirty-five percent (35%) of the entrepreneurs had, at least, one parent who previously had a business in the informal sector. Thirteen percent (13%) of entrepreneurs in the informal sector had supply contracts with those in the formal sector while 48% of the entrepreneurs intend to formalise their business in the future. Thirty-seven percent (37%) had access to trade credit while 40% of them had separate bank accounts for their business. Thirty-eight percent (38%) of the respondents indicated that the level of taxation in their country motivated their decision to run in the informal sector. Fifteen percent (15%) reported bribery, 15.2% said inspection from the regulatory agencies and 27% indicated a lack of benefits from operating in the formal sector as the driving factor.

4.3.3. Econometric model

Two features of the dependent variable dictate the choice of a model. The dependent variable is binary, and it represents a rare event. A rare event in the sense that only 13% of enterprises in the informal sector have supply contracts with formal sector firms. Calabrese, Marra, & Osmetti

(2013) recommend that in this situation, a logistic regression underestimates the probability of the rare event. Also, King & Zeng (2001) argue a logistic regression of rare event increase the bias associated with maximum-likelihood estimators (MLEs). As a result, the analysis in this study involves the flexible binary generalised extreme value (BGEVA) model of Calabrese, Marra, & Osmetti (2013). Calabrese, Marra, & Osmetti (2013) developed and applied the BGEVA model to examine the bankruptcy rates in Italian SMEs, treating the rate of default among SMEs as a rare event.

4.3.3.1. Problems with the Logit Specification

Following Calabrese, Marra, & Osmetti (2013), assume y_i represent a binary variable describing the event that an enterprise has a supply contract ($y_i = 1$) and no supply contract ($y_i = 0$) for the i^{th} enterprise. The logistic model takes the form

$$\text{logit}(PSC_i) = \ln\left(\frac{PSC_i}{1 - PSC_i}\right) = \alpha + \sum_{j=1}^p \beta_j x_{ji} = \eta_i, \quad j = 1, 2, \dots, p, \quad i = 1, 2, \dots, n, \quad (1)$$

where PSC_i is the probability of supply contract; α is the intercept term; x_{ji} denote covariates; β_j represent the regression coefficients; and n the sample size. According to Calabrese, Marra, & Osmetti (2013), there are two problems with model (1). First, they argue the possibility of underestimating the response probability PSC_i . The intuition is that since the number of enterprises in the sample with supply contract is 13%, and following Calabrese, Marra, & Osmetti (2013), having a supply contract is a rare event. Consequently, using a Logit link function in estimating model (1) may not be appropriate because the link function is symmetric around 0.5. The assumption of symmetry implies that the response curve $PSC_i = 1/\{1 + \exp(-\eta_i)\}$ approaches zero at the same rate as it approaches one. According to Calabrese, Marra, & Osmetti (2013), the fact that the response curve approaches zero and one at the same

rate is not appropriate because the attributes of the enterprises with supply contracts will have more information than those without supply contracts. Thus using the Logit link function underestimates the PSC_i .

Second, Calabrese, Marra, & Osmetti (2013) argue that implicit in model (1) is the assumption of a linear relationship between the covariates and the probability of having a supply contract. The linear assumption hides potential non-linearity that could affect the accuracy of the estimated model. The two problems of symmetric link function in the case of the logit link function and the pre-specified relationship between the explanatory and the explained variable necessitate the need for a more flexible model.

4.3.3.2. Flexible binary generalized extreme value model

Again, following Calabrese, Marra, & Osmetti (2013), the link function of the generalised extreme value (GEV) model takes the form

$$\frac{[-\ln (PSC_i)]^{-\tau} - 1}{\tau}, \quad (2)$$

where τ is the shape parameter. Consequently, (2) replaces $\text{logit}(PSC_i)$ in (1). Depending on the value of the shape parameter, there are three distributions—if $\tau > 0$, we have Frechet-type distribution. If $\tau < 0$, we have the Weibull-type distribution, and if $\tau \rightarrow 0$, we have the Gumbel-type distribution. Calabrese, Marra, & Osmetti (2013) show that if $\tau \rightarrow 0$, model (2) generalises to the complementary log-log model using the quantile function of the GEV distribution as a link function. The GEV link function allows for asymmetric specification, overcoming a weakness of the logit link specification.

To correct for the assumption of linear relationship inherent in the logit link function, Calabrese, Marra, & Osmetti (2013) make the following adjustments. First, they propose replacing the right-hand side of model (1) $\alpha + \sum_{j=1}^p \beta_j x_{ji} = \eta_i$, with $\alpha + \sum_{j=1}^p f_j(x_{ji})$, where the $f_j(\cdot)$ are the unknown functions of the covariates x_{ji} .

Thus using the GEV link function, the flexible binary generalized extreme value (BGEVA) model becomes

$$\frac{[-\ln(PSC_i)]^{-\tau} - 1}{\tau} = \alpha + \sum_{j=1}^p f_j(x_{ji}) = \eta_i \quad (3)$$

The GEV framework is consistent with Cameron & Trivedi (2009). Cameron and Trivedi recommend that with the dependent variable skewed, estimation by the maximum-likelihood complementary log-log regression is more appropriate. The complementary log-log regression is a special case of the GEV model by Calabrese & Giudici (2013). Calabrese & Giudici (2013) generalise the complementary log-log model by using the quantile function of the GEV distribution as a link function. Following Calabrese & Giudici (2013), model (3) is defined for observations for which $1 + \tau\eta_i \geq 0$.

4.3.4. Estimation strategy

According to Greene (2012), estimating a model by maximum likelihood entails a full specification of the distribution of the variables. An incorrect specification of the distribution leads to a misspecification of the full likelihood function and a failure to obtain consistent estimates. However, pseudo-likelihood estimation does not require assumptions about the joint distribution of the data, and hence, is semi-parametric. The analysis involves using pseudo-likelihood estimators. There are four specifications of model (3). First, following Calabrese, Marra, & Osmetti (2013), the shape parameter τ is set to -0.25 and the model estimated. Second,

the shape parameter τ is set to zero. This specification corresponds to the complementary log-log regression. The third and fourth specifications involve the logit and Probit regressions for robustness checks.

There is testing for multicollinearity among the variables using two approaches. The first method involves computing the pairwise correlation coefficients for the three proxies for social capital. Table 4.2 presents the results of the correlation analysis. From Table 4.2, all the indicators of social capital positively correlate with the outcome variable, *supply contract*. Overall, the estimated correlation coefficient for all variables ranges from a high of 0.125 to a low of 0.034. The second approach involves testing for multicollinearity using the variance inflation factor (VIF), following Greene (2012). The results of the VIF analysis, (not reported here) shows that the mean VIF of the variables is 2.63. The highest VIF estimated is 5.72 with a low of 1.32. Since all the VIF values fall below the 10, the implication is that there is no problem of multicollinearity in the model. Computation of the models is in the R environment using the *bgeva* package of Calabrese, Marra, & Osmetti (2013).

4.4. Results

Table 4.3 shows the results of the flexible binary generalized extreme value (BGEVA) model, the complementary log-log model, the logit and the probit models. As reported, the inferences drawn from all four models are the same. From columns 2, 3, 4, and 5 of Table 4.3, all the three indicators of social capital are significant at 1% and with a positive sign. Table 4.3 includes two variables that are indicators for education; vocational training and University education. From the results, the coefficient on vocational training is significant, but the coefficient on University education is not. The insignificance of the coefficient on University education is attributable to

the fact that from Figure 4.1, only 8% of the respondents had some form of University education, while 39.2% of the interviewees had some vocational training.

Thus entrepreneurs in the informal sector with vocational training are more likely to have linkages in the formal sector. Also, the probability of having linkages increases with the age of the enterprise—a human capital variable. By implication, the longer one runs a business in the informal sector, the more one is likely to gain from learning by doing, and the higher the chance of developing social and business networks. The networks enhance the chances of having linkages with those in the formal sector. The probability of linkages also increases with whether or not the entrepreneur intends to operate in the formal sector in the future. That is, entrepreneurs who intend to formalise their operations in the future are more likely than not to have linkages. However, female entrepreneurs in the informal sector are less likely to have linkages. Again, these conclusions are the same for all four specifications of the model.

Columns 6 and 7 of Table 4.3 show the results of two subsamples: male and female entrepreneurs. The object is to find out whether or not the determining factors are gender specific. For male and female entrepreneurs in the informal sector, again, social and human capitals play a significant role in the linkages. However, unlike the full sample, for male entrepreneurs, the intention to leave the informal sector in the future does not make any difference to whether or not they have linkages now. For female entrepreneurs, the plan to leave the informal sector in the future makes a difference as to whether they have linkages now or not, in addition to social and human capital.

4.5. Model specification test

This section presents the results of the specification test for the model, using the deviance and the *linktest* tests. The null hypothesis of the deviance test is that the estimated model with only an intercept fits better than a model with covariates. The test statistic is the difference between the residual deviance for the model with covariates and the null model, with only an intercept. The test statistic is chi-square with degrees of freedom equal to the differences in degrees of freedom between the model with covariates and the null model. In the case of the complementary log-log model, the estimated null deviance is 2076.4 with 2690 degrees of freedom. The deviance of the full model is 1834.5 with 2669 degrees of freedom. The change in deviance is 241.87. The difference in degrees of freedom is 21. The p-value is 0.000; the null hypothesis rejected. The null hypothesis is rejected for the probit and logit models as well.

The *linktest* depends on the principle that a correct specification of a regression equation implies no additional independent variables should be significant, except by chance. The *linktest* tests for a particular type of error in the specification referred to as a link error, where an outcome variable requires transformation to relate correctly to the explanatory variable. The test implementation involves using the *linktest* program from stata. In the implementation, *linktest* creates two new variables, the variable of prediction, `_hat`, and the variable of squared prediction, `_hatsq`. The expectation is that `_hatsq` should not be significant. The results of the *linktest* (not reported here) are indicative that there is no specification error in the model.

4.6. Discussions and policy implications

The results support the view that social and human capitals have significant positive real effects on the probability that an entrepreneur in the informal sector will have linkages with those in the formal sector. The finding that the age of the enterprise (an indicator of experience, a human capital variable) is also a determining factor is consistent with Arimah (2001). The role of the level of education of entrepreneurs in the informal economy—a human capital variable is also necessary. One observes that entrepreneurs with vocational training have a higher chance of having linkages with those in the formal sector. These results, taken together with the observation that about 79% of the entrepreneurs in the sample have only basic education, compared with 8% with university education make the role of education and skill training programs relevant. From a policy point of view, if one sees the informal sector as a stepping-stone to the formal sector, there is a case for skill training programs in developing countries.

As highlighted in the literature review section, empirical work on the linkages between the formal and the informal sector is scanty. Consequently, the results of the current study represent a significant contribution to the literature. In the minimum, the results of this study can encourage further conversations on the linkages between the formal and informal sectors. However, how one reads the results and the policy implications of this study depends on one's view of the informal sector and the relationship between the two sectors.

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Table 4.1: Distribution of enterprises in countries in the sample

Country	Sample	Year
Angola	119	2010
Botswana	99	2010
Burkina Faso	120	2009
Cameroon	122	2009
Cape Verde	129	2009
DRC	480	2013
Ghana	729	2013
Ivory Coast	129	2008
Kenya	533	2013
Madagascar	127	2008
Mali	120	2010
Mauritius	132	2008
Rwanda	240	2011
Total	3,079	

Source: Author's compilation based on data from the World Bank Enterprise Survey

Table 4.2: Pairwise correlations between the outcome variable and the indicators of social capital

Variable	Supply contract	Bank account	Regisd_Inception	Parents owner a business
Supply contract	1.000			
Bank account	0.125***	1.000		
Regisd_Inception	0.094***	0.096***	1.000	
Parents owner a business	0.085***	0.034*	-0.066***	1.000

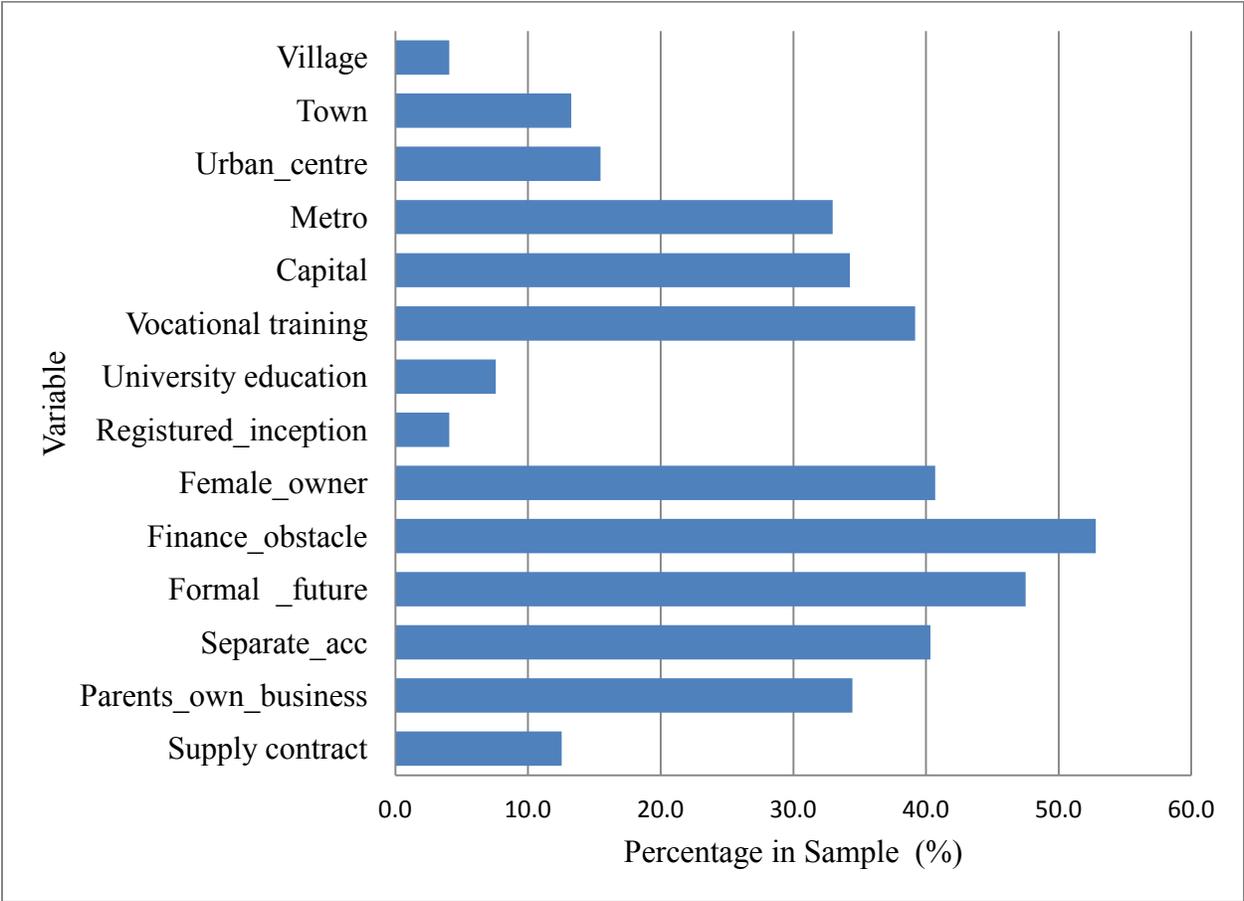
Source: Authors computation based on data from the WBES.

Table 4.3: Results of BGEVA, Clog-log, Logit, and Probit Models

	Dependent Variable: Supply Contract					
	Full Sample				Male	Female
	BGEVA	Clog-log	Logit	Probit	BGEVA	BGEVA
Parents_own_business	0.291*** (0.078)	0.445*** (0.115)	0.498*** (0.130)	0.255*** (0.070)	0.319** (0.097)	0.316* (0.136)
Separate Account	0.309*** (0.079)	0.449*** (0.118)	0.507*** (0.130)	0.279*** (0.070)	0.250* (0.097)	0.371** (0.138)
Formal_start-up	0.431** (0.144)	0.563** (0.197)	0.696** (0.242)	0.404** (0.137)	0.472** (0.170)	0.319 (0.290)
Female_owner	-0.257** (0.082)	-0.367** (0.122)	-0.424** (0.135)	-0.232** (0.073)	-	-
Vocational training	0.233** (0.079)	0.365** (0.117)	0.394** (0.132)	0.202** (0.071)	0.216* (0.097)	0.306* (0.143)
Finance constraints	-0.036 (0.079)	-0.070 (0.118)	-0.068 (0.131)	-0.026 (0.070)	-0.058 (0.098)	-0.012 (0.134)
Log age of the enterprise	0.445*** (0.092)	0.646*** (0.136)	0.738*** (0.152)	0.401*** (0.081)	0.371** (0.115)	0.543*** (0.156)
University education	0.156 (0.133)	0.211 (0.191)	0.293 (0.223)	0.150 (0.122)	0.192 (0.153)	-0.127 (0.286)
Formal_future	0.185* (0.079)	0.251* (0.120)	0.299* (0.131)	0.172* (0.070)	0.155 (0.099)	0.229* (0.134)
Constant	-2.778*** (0.373)	-5.158*** (0.669)	-5.317*** (0.699)	-2.777*** (0.320)	-3.310*** (0.490)	- 2.474*** (0.576)
N	2691	2690	2690	2690	1584	1107
AIC	-	1878.5	1877.8	1878.5	-	-

Notes: ***Significant at the 1 percent level.
 **Significant at the 5 percent level.
 *Significant at the 10 percent level.

Figure 4.1: Percentage of Variables in the Sample



5 Conclusions

The thesis examines three research questions:

1. Are the structural policy reforms, supported by the World Bank effective in reducing debt-financing constraints of formal sector enterprises?
2. Do social and human capital and financing constraints help explain why entrepreneurs choose to operate in the informal sector?
3. Does social and human capital increase the likelihood that an enterprise in the formal sector forms linkages with those in the informal sector?

The primary results are chapter specific and summarised within the three empirical chapters.

What follows is a synthesis of the main ideas from the results as they relate to the three research questions.

Concerning the first research question, the results are indicative that taken together; structural policy reforms reduce debt-financing constraints. However, disaggregating the reforms, there are substantial differences in their effectiveness. Empirical results support the view that reforms in the business regulatory environment and the financial sector increase the likelihood of access to debt financing. However, the case is different for trade sector reform. Beyond a CPIA rating of 3.5 on the trade sector, further reductions in the tariff and non-tariff barriers makes it harder for enterprises to access debt financing.

Concerning the second research question, the study examines this issue from two angles: First, using data from enterprises that started in the formal sector but ended in the informal sector and second, using data from enterprises that started in the informal sector but are currently in the formal sector. In the first case, the study further examines the research question from enterprises who did not register at start-up and for those currently in the informal sector, whether they plan to register shortly or not. For enterprises that did not register and under five years of operations, the study finds evidence that the likelihood of running in the informal sector, as opposed to the formal sector, decreases with the entrepreneurial human capital while social capital increases this likelihood. Also, credit constrained enterprises are more likely than not to be in the informal sector.

Further, the perception of the high level of taxes increases the likelihood that a prospective entrepreneur operates in the informal sector. Even for entrepreneurs in the informal sector who do not consider taxes as an obstacle, the perception that there are no benefits from operating in the formal sector discourages them from working in the formal sector. However, for enterprises in the informal sector, which are over five years old, financing constraints impedes formalisation. Also, there is empirical evidence that the perception of the high incidence of taxes, and the belief that there are no benefits from formalisation reduces the likelihood that an enterprise will leave the informal sector to the formal one. Thus, in the long run, the decision to stay informal or formalise depends on financing constraints, the perception of the high incidence of taxes in the formal sector and no benefits from operating in the formal sector.

Concerning the third research question, there is unambiguous empirical evidence that social and human capitals have significant positive real effects on the probability that an entrepreneur in the informal sector will have linkages with those in the formal sector. One observes that

entrepreneurs with vocational training, a human capital variable, have a higher chance of having linkages with those in the formal sector. The implication is that the probability that an enterprise in the informal sector forms linkages with those in the formal depends not only on their productive capacities but also, on social and human capital.

Amongst others, this study demonstrated that the current trade sector reforms within the CPIA cluster on structural policy reforms supported by the World Bank are not making the anticipated impact, at least in the credit market. There is a need to rethink this aspect of the reforms. However, reforms in the business regulatory environment and the financial sector appear to be making the anticipated impact in the credit market. The identification of financing constraints, the incidence of taxes, and the perception that there are no benefits for operating in the formal sector as a driving force for working in the informal sector highlights structural and institutional weaknesses. These findings underline the need for entrepreneurial policy that incentivizes entrepreneurship. There is also a role for skill training programmes, particularly for participants in the informal sector to enhance their productivity. The interconnectivity of the formal and informal sector in sub-Saharan Africa implies that policies that promote entrepreneurship in the formal sector have rippling effects on those in the informal sector if one acknowledges that the two sectors are permanent features of modern economies and that they both contribute to job creation and economic growth.

The study offers an evaluative perspective on the role of structural reforms in the credit market, and implications of institutional and structural weaknesses on the decision on whether or not an entrepreneur operates in the formal sector. As a result of the methodology adopted in addressing all three research questions, the study had some limitations. First, concerning research question one, the analyses involves panel data models. However, there were only two data points

($T = 2$) for each enterprise in the sample. For instance, for enterprises in Tanzania, the first data collection occurred in 2006, while the second took place in 2013. The study could have benefited a lot from more data points. However, notwithstanding this limitation on the data, the results are empirically robust.

Second, concerning research question two, there were difficulties obtaining proxies for social capital from the formal sector survey data. Also, there were difficulties in obtaining a common proxy for social capital that is comparable across the two data sources from the formal and informal sector surveys. The limitation is a product of using secondary data sources from two different surveys for the analysis. Again, the limitation identified does not distract from the main results of the study. Also, it was not possible to test the role of human capital in the formal sector model. The difficulty here arises from the fact that there is no data on the education attainment levels for the owners of the enterprises in the formal sector. Third, concerning the third research question, it is not possible to disaggregate the data by the kind of linkage. Are the linkages forward or backwards linkages? Do the linkages incorporate the informal sector at the level of production, distribution, services or trade? These disaggregated analyses are necessary because forward linkages in service delivery and commerce do not offer a great opportunity for growth. Further research is required to ascertain whether or not the type of linkages will make any difference to the results of this study.

Notwithstanding calls for structural reforms in the economies of developing countries in policy debates, these improvements in some cases do more harm than good, particularly in the credit market. Again, notwithstanding the often repeated claim that entrepreneurs operate in the informal sector to escape compliance with formal sector regulations, the study points to institutional weaknesses in the economy as responsible, at least, in part, for

driving entrepreneurs into the informal sector. Consequently, an entrepreneurial policy with a chance to succeed needs to accommodate and reflect these realities.