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ABSTRACT

This paper examines the determinants of the decision of owners of small enterprises in Ghana to participate in the informal sector at start-up. For enterprises participating in the informal sector, the paper evaluates whether there are linkages with formal sector enterprises, and the determinants of the linkage. Data for the analysis is from the 2013 World Bank Enterprise survey. Using binary choice models, it is evident from the analysis that the informal sector in Ghana is dominated by people who have low levels of education, and hence, do not have otherwise employable skills. Undertaking economic activities in the informal sector becomes a means to survival, and not necessarily an attempt to evade compliance with formal sector regulations. The challenge to policy makers in Ghana is to find the right balance between policies that reduces the costs to enterprises of participating in the informal sector, whiles increasing the benefits for participating in the formal economy.

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INTRODUCTION

After its introduction in the literature in the 1970s, the term 'informal sector' continues to mean different things to different people at different times. The heterogeneity in the definition of the sector is partly responsible for the different perspectives on the informal sector in the literature. This notwithstanding, the informal sector captures a large segment of the economic activities of most developing countries—activities which are outside the domain of regulated economic activities. The informal sector serves as a source of employment and income for people—a reality one cannot wish away.

The International Labour Organisation (ILO) and the World Trade Organisation WTO (2009) report that in developing countries, the informal sector accounts for, on the average, 65% of employment, and 30% of output. In addition, according to the Ghana Statistical Survey (GSS, 2008), over 80% of those employed in Ghana are working in the informal sector: about 55.9 % are self-employed; twenty percent (20%) work in family enterprises and 18% are wage employees. In the rural parts of the country, 75% of informal sector work mainly involves agriculture, fishing, fish processing, and agro-based processing. In contrast, 43% of urban workers are engaged in non-agricultural activities.

The implication is that for some countries, the informal sector is no longer at the periphery, but plays a significant role in the economic growth of countries, in terms of

provision of jobs. This makes the informal sector an important part of the economy of most developing countries. However, discussions on the informal sector come with misconceptions, with relatively little work done to explore the nature, role, and character of the informal sector, particularly in developing countries.

Historically, perspectives on the linkages between formal and informal enterprises, and why the informal sector exists fall into three schools of thought: the dualist, the structuralist, and the legalist schools of thought. Sethuraman (1976) for instance, belongs to the dualist school. This school argues that informal enterprises operate as a unique sector of the overall economy with no linkages with the formal economy. On the other hand, the structuralist, exemplified by Portes, Castells and Benton (1989), see the informal sector as linked to the formal economy. Others like Moser (1984) see informal sector employment as marginalisation of the poor, and therefore argue for the need to generate employment opportunities in the formal sector to prevent the exploitation of workers in the informal sector. Chen (2006) argues that the informal sector occupies a position on the continuum of economic relationships, therefore cannot be isolated from the formal economy.

The legalists are concerned with whether or not an enterprise is formally registered and has a licence to operate. To the legalist, enterprises participate in the informal sector to escape the burden of taxes and regulations in the formal sector. This group includes the International Labour Organisation (ILO, 1972), Hart (1973), De Soto (1989), Feigie (1981), and Tanzi (1989). This view presents activities in the informal sector as illegal or criminal. Others argue that informal sector participants choose to participate there because it lends itself to flexible work schedules. This view is supported by Renooy (1990), Swaminathan (1991), and Hardins and Jenkins (1989).

Berger and Buvinic (1989) argue that the main motivation for participating in the informal sector is for the survival of families. That is, families set up informal enterprises to provide subsistence level of income. In terms of size and ownership, Tedds (2010) reports that enterprises in the informal sector are small and owned by sole proprietors. Gallaway and Bernasek (2002) report that women working in the informal sector are the least educated. The present study explores the role of education in the informal sector, but through a different channel, as explained below.

Torgler and Schneider (2009), Tedds (2010), Lacko (2000), and Nur-Tegin (2008) observe that the perception of poor quality of governance, the tax rate, and corruption are the driving forces behind enterprises operating in the informal sector. The empirical evidence on the influence of taxes is mixed. Bigsten *et al.* (2004) argue that the incentive to operate in the formal sector is weak; as a result, enterprises do not see any potential benefits from operating formally. In terms of sectors of the economy, Castells and Portes (1989) argue that in most developing countries, informal work is concentrated in the distribution sector, with a relatively low prevalence in manufacturing. Further, Losby and Edgecomb (2002) find that the construction sector lends itself to use the services of workers in the informal sector. In addition, Portes and Sassen-Koob (1987) find that the location of the owner is a critical determinant of the decision to participate in the informal sector. Concerning the linkages between formal and informal sector firms, Xaba *et al.* (2002), Hudson *et al.* (2012), and Chen (2006) report evidence of the existence of linkages between formal and informal sector enterprises, nevertheless, the determinants of the linkages remain to be determined.

Although the informal sector plays an important role in the economies of most developing countries, there is no consensus and unanimity in the literature on the motivation for firms participating in the informal sector. The effect of taxes, for instance, is ambiguous. There is very little research on the role of access to finance. Further, although the literature acknowledges the existence of linkages between formal and informal sector enterprises, it is relatively silent on the determinants of those linkages. The purpose of this study is to fill these gaps in the literature, especially relating to Ghana, while improving our understanding of the nature and character of the informal sector.

This study addresses the following questions: First, what are the determinants of the decision of the owner of a small enterprise to participate in the informal sector at start-up? Secondly, what are the determinants of the probability that an informal enterprise will have linkages with formal sector ones? In the first instance, this paper investigates the driving factors behind enterprises participating in the informal sector. The second question is an empirical extension of the observation by Chen (2006) and Hudson *et al.* (2012) on the linkages between formal and informal sector enterprises. This study extends those results by empirically analysing the determinants of the linkages.

In this paper, an enterprise is 'informal' if it is not in the official register of companies in the Registrar Generals' Department, the official authority responsible for registering new enterprises in Ghana. This definition is in line with the approach by De Soto (1989) and Renooy (1990). However, this approach differs from De Soto and Renooy in the sense that not being registered does not necessarily imply engaging in a criminal or illegal activity: the enterprises in the sample operate in open public spaces and do not invest in activities to avoid detection by regulating authorities. Thus, although not legally recognised, they are not engaging in illegal activities either. This approach is in line with what Chen (2006) calls "illegal process or arrangements" as opposed to "illegal goods and services," which connotes criminality. Chen's (2006) conceptualization closely matches the nature and character of the informal sector in Ghana.

This study is important because the informal sector serves as a source of employment and income in developing countries. As a result, one cannot talk about development issues in sub-Saharan Africa, in particular, without addressing the issues surrounding the informal sector. This requires understanding the nature and character of the informal sector. This study differs from previous studies in a number of ways. First, as explained later in the paper, Bigsten *et al.* (2004) identified the level of education of the owner as a determining factor in the decision to operate in the informal economy. However, they failed to account for a potential endogeneity problem, which could lead to biased estimates. To account for the potential endogeneity issues, this study adopts estimation techniques not previously used to investigate similar issues. Secondly, unlike the previous studies, this paper explicitly investigates the role of access to finance in the informal sector as a determinant. Thirdly, although previous papers acknowledge the existence of linkages between formal and informal sector enterprises, they do not analyse the determinants of those linkages, as is done in this paper.

DATA SOURCES, VARIABLE DESCRIPTION, AND SUMMARY STATISTICS

The data for the analysis is from the 2013 World Bank Informal Sector survey. The data was collected from four survey regions across Ghana; Tema, Accra, North and Takoradi using a standardized questionnaire developed by the World Bank. The sample size is 710 informal sector enterprises in Ghana, made of 180 enterprises each from Tema, Accra, and Takoradi, with additional 170 from the North. Tema is approximately 25 kilometers east of the capital city. It is the home of the largest seaport in Ghana with population of about 162, 000 people. Accra is the capital city of Ghana with an estimated population of over two million. It is the second largest city in Ghana. Both Accra and Tema are in the Greater Accra region of Ghana. Takoradi is about 185 kilometers from Accra and has a seaport. The data for the North is from Tamale, the third largest city in Ghana. Tamale is about 600 kilometers from Accra with an estimated population of 563,000 people.

Outcome Variables

There are two outcome variables: the first, 'registered at inception', which is related to the first research question, is a binary variable that measures whether an enterprise registered at start-up. This is based on responses to the question "was this enterprise or activity registered with the Registrar General at start-up?" The registered enterprise takes a value of one, and zero otherwise. The second outcome variable is 'supply contract', which relates to the second research question. Similar to the first, this variable is based on responses to the question "does this enterprise or activity produce or sell under contract for another enterprise or person in the formal sector?" Those with supply contracts take a value of one, and zero otherwise. The existence of supply contract is a proxy for linkages between the two sectors.

Explanatory Variables

The level of education of the owner, financial constraint, taxes, inspections, and meetings with government officials, payments of bribes, and the perception of no benefit from operating in the formal sector, gender of the owner, and bank account are the explanatory variables. The level of education of the owner of the enterprise entity is based on responses to the question "what is the highest level of education of the owner?" This variable measures those with primary and junior secondary school education, vocational training, and university education. The financial constraint and corruption variables come from whether enterprises consider these variables as obstacles to their operations. Enterprises indicated whether taxes, inspections, and meetings with government officials, payment of bribes, and no benefit from registration were the reasons for operating in the informal sector. The gender of the owner variable follows a similar approach. Responses to the question "did either of the owner's parents own an enterprise or do they currently own an enterprise in the informal sector?" is used to construct a variable 'parents own an enterprise'. This is to capture any potential herd behaviour among family members.

Summary Statistics

Table 1 presents the summary statistics of the variables. All the variables are within the expected range. With the exception of the log of level of education, all the variables are 0/1 dummy variables with a minimum of zero and maximum of one. On the average, 83% of the respondents have primary or junior secondary school education; 4% have university education. Forty five percent (45%) of the respondents operate in the manufacturing industry with 55% in the service industry. Females own 62% of the enterprises. Sixteen percent (16%) of the enterprises have supply contracts with formal sector firms. Forty three percent (43%) consider access to finance as a major obstacle to their decisions. Forty two percent (42%) operate informally because of taxes, and fifty-four (54%) operate informally because of the amount of time involved in complying with registration procedures and regulations of the formal sector. Thirty four percent (34%) of the respondents operate informally because there are no perceived benefits from participating in the formal economy.

TABLE 1. SUMMARY STATISTICS

Variable	Mean	Std. Dev.	Min	Max
Size of the city	1.65	0.83	1.00	5.00
Log of level of education	0.83	0.40	0.00	1.61
Registered	1.00	0.00	1.00	1.00
Manufacturing	0.45	0.50	0.00	1.00
Services	0.55	0.50	0.00	1.00
Female Owner	0.63	0.48	0.00	1.00
Registered at start up	0.05	0.21	0.00	1.00
University education	0.04	0.20	0.00	1.00
Prisec	0.88	0.33	0.00	1.00
Vocational training	0.23	0.42	0.00	1.00
Parents own enterprise	0.46	0.50	0.00	1.00
Location of the city	0.38	0.49	0.00	1.00
Corruption	0.13	0.33	0.00	1.00
Supply contract	0.16	0.36	0.00	1.00
Financial Constraint	0.43	0.50	0.00	1.00
Time	0.54	0.50	0.00	1.00
Taxes	0.42	0.49	0.00	1.00
Inspections	0.19	0.39	0.00	1.00
Bribes	0.18	0.39	0.00	1.00
No benefits	0.34	0.48	0.00	1.00

Source: Author's computation based on the 2013 World Bank Informal Sector Enterprise Survey data for Ghana. Notes: Sample size for all variables is 710.

METHODOLOGY

Hibbs and Piculescu (2007) provide a theoretical framework for thinking about the informal economy. They argue that the proportion of output enterprises decide to produce in the informal economy depends on the prevailing tax rate, institutional benefits from operating in the formal sector which vary over firms, the probability of detection of a corrupt official, penalties paid by corrupt officials when caught taking bribes and labor regulations. Similarly, Dabla-Norris *et al.* (2008) conceptualized and tested empirically the proportion of sales kept informally by enterprises. They noted that the share of sales kept informal depends on the productivity of the firm, the size of the firm, regulatory costs, and the quality of the legal system. The theoretical insights of Hibbs and Piculescu (2007) and the empirical model of Bigsten *et al.* (2004) motivate the selection of the explanatory variables in the model estimated in this paper.

Model Specification

This paper adopts the functional form of the model by Altonji, Elder, and Taber (2005b). The outcome variable denoting the decision by firm i to register at start-up is binary, as a result, we have a binary choice model of the form

$$P(y = 1|X) = G(X\beta) \equiv p(X)$$

$$X\beta = \sum_{i=1}^{n} \beta_i X_i \qquad i = 1,2, \ldots n$$

So that the response probability becomes

$$\phi(y = 1|X) = G(\textstyle\sum_{i=1}^{n} \beta_i X_i) + \epsilon \qquad (1)$$

where y is an outcome variable denoting registration status at start-up which equals one if the firm is registered, and zero otherwise; X is a vector of explanatory variables, β is a vector of parameters to be estimated, and the first elements of X is taken to be unity. The main explanatory variables are financial constraint and the level of education of owners; ϵ is the error term.

Similary, the model for the linkages between informal and formal sector enterprises is:

$$\phi(q = 1|\chi) = \textstyle\sum_{i=1}^{n} \gamma_i \chi_i + \xi \qquad (2)$$

where q is a binary variable denoting whether the informal sector enterprise has a supply contract with a formal sector firm; χ denotes vector of explanatory variables; γ denotes vector of parameters to be estimated, and ξ is the error term.

Econometric Methodology

Before proceeding to the substantive analysis, some econometric issues need attention. One of the explanatory variables in equation (1) is the level of education of the owner, x_k. However, x_k is potentially endogenous and correlated with ϵ in equation (1). Intuitively, as an explanatory variable, the intention is to understand the impact of the overall level of education of the owner on the decision to register an enterprise at start-up. The problem is, it is not possible to measure individuals non-education based capabilities, such as work ethics, which not only influence the decision to register, but also, the choice and ability to complete a degree or a attain a higher level of education. This argument is similar in spirit to the argument by Angrist and Krueger (1991). These capabilities are the unobserved heterogeneity, which can cause the estimated effects of education on the decision to register an enterprise to be biased. In this situation, ordinary least squares (OLS) estimates are inefficient because of the correlation between the error term in equation (1) and the education variable. That is,

$$Cov(x_k, \epsilon) \neq 0 \tag{3}$$

Consequently, equation (1) is estimated using the Instrumental Variable Probit (IV Probit) estimator.

Instrumental Variable Probit (IV Probit) Estimation

Following Wooldridge (2010), to use the IV approach with x_k endogenous, we need other observable variables, W not in equation (1), which satisfies two conditions: first, W should be uncorrelated with the error term, ϵ:

$$Cov(w_i, \epsilon) = 0 \qquad i = 1,2, \dots N \tag{4}$$

The second condition requires that from the linear projection of x_k onto all the exogenous explanatory variables

$$x_k = \varphi_0 + \varphi_1 x_1 + \cdots + \varphi_{k-1} x_{k-1} + \vartheta_1 w_1 + \cdots + \vartheta_{N-1} w_{N-1} + \sigma_k \tag{5}$$

$E(\sigma_k) = 0$ and σ_k should be uncorrelated with $x_1 \dots, x_{k-1}$ and w_i. The main assumption is that the coefficient on $w_i \neq 0$. Thus, the second condition can be stated as

$$\vartheta_i \neq 0 \tag{6}$$

This condition implies that w_i is partially correlated with x_k once the other exogenous variables $x_1 \dots, x_{k-1}$ have been netted out. Any variable that satisfies equations (4) and (6) is an instrumental variable (IV) candidate. The IV estimator that uses instruments $\hat{x}_i$ is:

$$\hat{\beta} = \left(\sum_{i=1}^{k} \hat{x}'_i x_i\right)^{-1} \left(\sum_{i=1}^{k} \hat{x}'_i y_i\right) = (\hat{X}'X)^{-1}(\hat{X}'Y) \quad (7)$$

The $\hat{\beta}$ in equation (7) is obtained as follows: first, obtain fitted values $\hat{x}_k$ from the first stage regression analogous to equation (5). In the second stage, run an OLS regression with the outcome variable y on all the exogenous explanatory variables and $\hat{x}_k$ to obtain $\hat{\beta}$. The estimation involves IV Probit with Maximum Likelihood Estimation (MLE) procedure. The MLE procedure is efficient than any two-step procedure.

Testing for Endogeneity

There is the suspicion that the overall level of education of the owner will be correlated with the error term in the decision to register at start-up model in equation (5). This suspicion is confirmed by two formal tests: the Wu-Hausman F test, and the Durbin-Wu-Hausman chi-square test. The Wu- Hausman F test (F (1,696)), with the null hypothesis that the regressor is exogenous, has an estimated value of 8.2082 with a p-value of 0.0043. The Durbin-Wu-Hausman chi-square (Chi-sq (1)) test, with the same null hypothesis, has an estimated value of 8.2757 with a p-value of 0.0040. The null hypothesis is rejected in both cases.

Consequently, the paper evaluates three potential instruments. Individuals with only primary and junior secondary education (prisec) instrument is a dummy variable that measures whether the owner has had some form of primary or junior secondary education, irrespective of whether they completed or not. This basic level of education does not depend on the intrinsic capabilities of the individual and hence, although correlated with the overall level of education, it is not correlated with the error term in equation (5). The second instrument measures whether the individual has received vocational training. Vocational training is more practical than academic and with emphasis on skills and abilities required to perform a job. Once the skills are acquired, these tasks become repetitive and less dependent on the intrinsic capabilities of an individual. The third instrument measures whether an individual has a separate bank account for the enterprise or not. Having a separate account signals the overall level of education, but not correlated with the error term in equation (5).

Testing for Validity of Instruments

There are three potential instruments with one endogenous regressor. Econometric theory predicts that using all instruments, assuming they are all valid, leads to the most efficient estimator. However, as Hahn and Hausman (2002) warn, that could lead to larger small-sample bias because the small-sample biases of IV estimators increase with the number of instruments. As a first step, Table 2 reports the pairwise correlations between the endogenous regressor and the three instruments. From Table 2, the pairwise correlations are not too low to flag a problem of weak instruments.

TABLE 2. PAIRWISE CORRELATION AMONG THE ENDOGENOUS REGRESSOR AND INSTRUMENTS

Variables		Bank	Prisec	Vocational
	Log of level of education	Account		
Log of level of education	1.00			
Bank account	0.21	1.00		
Prisec	-0.59	-0.10	1.00	
Vocational	0.34	0.04	-0.43	1.00

Source: Author's computation based on the 2013 World Bank Informal Sector Enterprise Survey data for Ghana.

Following Stock and Yogo (2005), a formal test of weak instruments is performed. This is an F test for the joint significance of instruments. The null hypothesis is that the instruments are weak, versus the alternative hypothesis of strong instruments. Table 3 reports the results of the test. Using the F statistic of 358.211 with a p-value of 0.000, the null hypothesis of weak instruments is rejected at the 1% level. Hence, there is no problem of weak instruments. The test of Overidentifying restrictions tests the null hypothesis that all the instruments are uncorrelated with the error term in equation (5). The Hansen's J chi-square (2) test statistic has a value of 2.5770 with a p-value of 0.2757. Based on this result, the null hypothesis cannot be rejected even at the 10% level. Based on these tests, equation (5) is estimated using IV Probit estimators. To check for robustness, and following Davidson and Mackinnon (1993), an IV 2SLS and IV GMM models are estimated and the results compared.

TABLE 3. TEST FOR WEAK INSTRUMENTS AND OVER IDENTIFYING RESTRICTIONS

Variable	R-sq	Adjusted R-sq	Partial R-sq	Robust F (3,695)	Prob > F
Education	0.4499	0.4388	0.3766	358.211	0.0000
Minimum eigenvalue statistic = 139.928					
Critical Values		# of endogenous regressors: 1			
H_o: Instruments are weak		# of excluded instruments: 3			
2SLS relative bias		5%	10%	20%	30%
		13.91	9.08	6.46	5.39
Critical Values		10%	15%	20%	25%
2SLS Size of nominal 5%		22.30	12.83	9.54	7.80
LIML Size of nominal 5%		6.46	4.36	3.69	3.32
Wald test					
Test of Overidentifying restriction:					
Hansen's J chi2(2) = 2.57698 (p = 0.2757)					

Source: Author's computation based on the 2013 World Bank Informal Sector Enterprise Survey data for Ghana.

For equation (2), the outcome variable is such that there is a high proportion of zeros in the dataset: eighty four percent (84%) of the respondents did not have a supply contract,

whiles 16% of them did have. Following the recommendation by Cameron and Trivedi (2010), the model is estimated using the maximum-likelihood complementary log-log regression with bootstrapping. The idea behind bootstrap is to use the data of a sample study at hand for approximating the sampling distribution of a statistic, that is, to resample with replacement from the sample data. The sample summary is then computed on each of the bootstrap samples. Bootstrapping is important in this case because of the relatively small sample size. To check for robustness, a probit and logit models are estimated and the results compared.

RESULTS

Determinants of the Decision to Participate in the Informal Sector

As discussed previously, the outcome variable is the decision to register at start-up. The explanatory variables include whether the parents of the owner of the enterprise activity own an enterprise, type of sector of the economy i.e. whether manufacturing or services, the sex of the owner, location of the enterprise, financial constraints, bribery, corruption, inspections from government officials, taxes, and no perceived benefits from registration. The robustness of the results is checked by comparing the results from IV Probit, IV GMM, and IV 2SLS estimation methods. Table 4 compares the performance of the three models in predicting the outcome variable. From Table 4, the IV Probit model performs better in predicting the outcome variable. The mean predicted probability from the IV Probit model is 0.051, which is closer to the benchmark of 0.050. As reported, the mean predicted probabilities from the other models are lower. In addition, the predicted probability from the IV Probit model has a relatively lower standard deviation. Consequently, the discussions proceed based on the results of the IV Probit model. However, the qualitative results are robust across the three estimation methods.

TABLE 4. COMPARING THE PREDICTIVE ABILITIES OF THE IV PROBIT, IV 2SLS AND IV GMM MODELS

Variables	Observations	Mean	Std. Dev.	Min	Max
Registered at inception	710.000	0.050	0.208	0.000	1.000
IV Probit Predict	710.000	0.051	0.058	0.000	0.418
IV 2SLS	710.000	0.042	0.059	0.143	0.214
IV GMM Predict	710.000	0.039	0.056	-0.127	0.208

Source: Author's computation.

Table 5 presents the results, after controlling for regional differences. As expected, the estimated coefficient on the log of level of education has a positive real effect on the decision to register at start-up; the coefficient of this variable is significant at the 1% level. If your parents own an enterprise in the informal sector, you are more likely to operate in the informal sector as well. This variable is significant at 10% and has negative real effects on registration at start-up. Access to finance is important. Financially constrained owners are less likely to register their economic activities at start-up—the coefficient on financial constraint is significant at 5% and has negative influence on the

decision to register. High level of taxes has negative real influence on the decision to register. If individuals perceive that there are no benefits from participating in the formal sector, they are less likely to register at start-up. The interaction between taxes and the perception of no benefit is also significant at 10%.

TABLE 5. AVERAGE MARGINAL EFFECTS BASED ON IV PROBIT AND IV GMM ESTIMATES

Variable	Average Marginal Effects: Delta-Method					
	IV Probit		IV GMM		2SLS	
	dy/dx	Robust Std. Err.	dy/dx	Bootstrap Std. Err.	dy/dx	Robust Std. Err.
Education	1.047***	0.268	0.121***	0.051	0.127***	0.032
Parents_own_enterprise	-0.323*	0.19	-0.034**	0.015	-0.030**	0.015
Manufacturing	-0.133	0.187	0.0006	0.012	-0.005	0.016
Female owner	-0.022	0.199	0.012	0.024	0.008	0.018
Location-City	0.22	0.175	0.015	0.017	0.016	0.016
Financial Constraint	-0.367*	0.206	-0.023	0.014	-0.022	0.016
Bribes	-0.125	0.274	-0.013	0.022	-0.014	0.023
Corruption	-0.328	0.308	-0.012	0.022	-0.020	0.024
Inspections	0.222	0.222	0.025	0.024	0.020	0.021
Taxes	-0.488**	0.248	-0.035*	0.019	-0.042**	0.020
Nobenefits	-0.598**	0.302	-0.034**	0.019	-0.035	0.023
Taxbenefit	1.181***	0.413	0.067***	0.03	0.083**	0.033
Tema	-0.627**	0.308	-0.392*	0.021	-0.034	0.022
Accra	0.135	0.239	0.005	0.025	0.008	0.023
North	0.139	0.2639	-0.008	0.032	0.012	0.023

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

Linkages with Formal Sector Enterprises

Table 6 compares the predicted probabilities of all three models of the outcome variable. The predicted mean and standard deviations for all three models are essentially the same, although exhibiting slight variations. However, the max prediction of the clog-log model is closer to the benchmark of one.

TABLE 6. COMPARING THE PREDICTIVE ABILITIES OF THE CLOG-LOG, PROBIT, AND LOGIT MODELS OF THE OUTCOME VARIABLE

Variable	Observations	Mean	Std. Dev.	Min	Max
Supply contract	710	0.155	0.362	0.000	1
Clog-log	710	0.154	0.134	0.018	0.934
Probit	710	0.155	0.133	0.009	0.814
Logit	710	0.155	0.134	0.015	0.837

Table 7 presents the results for all three models. As expected, owners of informal sector enterprises with some level of university education are much more likely to have linkages with formal sector enterprises. This makes intuitive sense as these owners will have the capacity to understand the full implications of entering into a contract agreement with another party. Informal sector enterprises with the intention to register in the future are more likely to have linkages with the formal sector. Similarly, having a separate enterprise account has a positive real effect on the probability of having a supply contract. Female owners are less likely to have linkages with the formal sector. This result makes intuitive sense when one recognises that about 57% of the total sample is made of women with up to secondary education. The interactions of these two forces imply that females are less likely to have supply contracts since most of those in the sample are less educated. Owners with some form of vocational or technical training are more likely to have supply contracts; this variable is statistically significant at the 1% and has real positive effects on the outcome variable.

TABLE 7. AVERAGE MARGINAL EFFECTS BASED ON MLE CLOG-LOG, PROBIT, AND LOGIT ESTIMATES

Variable	Average Marginal Effects: Delta-Method					
	Clog-log with Bootstrapping		Probit with Bootstrapping		Logit with Bootstrapping	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
Parents_own_enterprise	0.04	0.029	0.041	0.028	0.041	0.027
University Education	0.110*	0.062	0.140**	0.069	0.126*	0.075
Primary & Junior Second. Education	0.03	0.046	0.043	0.048	0.036	0.043
Intend to Register	0.083***	0.032	0.074***	0.028	0.075***	0.024
Bank Account	0.094***	0.029	0.095***	0.027	0.094***	0.024
Manufacturing Sector	0.052*	0.03	0.043*	0.025	0.049**	0.021
Female Owner	-0.047**	0.03	-0.046*	0.027	-0.047**	0.023
Vocational training	0.083***	0.035	0.102***	0.034	0.093***	0.031
Location_ City	0.038	0.027	0.03	0.028	0.034	0.024
Financial Constraint	-0.045	0.028	-0.037	0.028	-0.041	0.033
Nobenefits	-0.035	0.034	-0.044	0.031	-0.039	0.040
Tema	0.074	0.065	0.057	0.048	0.066	0.055
Accra	0.119**	0.053	0.109	0.044	0.113***	0.041
North	0.119**	0.055	0.115	0.042	0.117**	0.055

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

DISCUSSIONS, POLICY IMPLICATIONS, AND CONCLUSIONS

This study addresses two questions: First, what are the determinants of the decision of the owner of a small enterprise to participate in the informal sector at start-up? Secondly, what are the determinants of the probability that an informal enterprise will have linkages with formal sector ones? The analysis shows that the level of education of the owner, financial constraint, taxes, the perception of no benefits to be gained from participating in the formal economy are determining factors in the decision to participate in the informal economy at start-up. The result on education is consistent with the finding by Bernasek (2002). If your parents own an enterprise in the informal sector, you are more likely to operate in the informal sector as well. Financially constrained owners are less likely to register their economic activities at start-up. High level of taxes has negative real influence on the decision to register at start-up, consistent with previous results by Torgler and Schneider (2009), Tedds (2010), Lacko (2000), and Nur-Tegin (2008). If individuals perceive that there are no benefits from operating in the formal sector, they are less likely to register at start up, a result consistent with Bigsten *et al.* (2004).

These results take us to a question concerning the informal sector: how should governments respond to activities in the informal sector? Taking account of the different perspectives on the informal sector, different policy makers and researchers have favoured different positions. If one subscribes to the perspective that the informal sector is undesirable, and is depriving the state of tax revenue, one is likely to recommend policies to integrate them into the formal economy by favouring policies that attempt to encourage informal sector enterprises to formalize their activities. However, the formalization process imposes potential costs and benefits on the different participants in the informal sector. The administrative and bureaucratic costs, in addition to the costs incurred in meeting tax and labour regulations in the formal sector are non-trivial. Are there enough benefits to offset these costs? On the other hand, if one sees the informal sector as an integral part of the economy, one is likely to favour policies that tend to promote strong linkages between the two sectors, whiles reducing the costs of participating in the informal sector.

In the case of Ghana, if we begin with the premise that the enterprises in the informal sector do not exist primarily to evade taxes or to avoid compliance with labour regulations, the empirical findings in this paper have huge development policy implications. It is evident that the informal sector in Ghana is dominated mostly by people who have low levels of education, and hence, do not have otherwise employable skills. As a result, they engage in low-skill informal sector activities for survival. Moreover, the informal sector in Ghana is an integral part of the larger economy. Consequently, this paper is of the opinion that the challenge to policy makers in Ghana is to find the right balance between policies that reduces the costs of participating in the informal sector, whiles increasing the benefits for participating in the formal economy.

Development policies ought to provide tax incentives to enterprises to ease the burden of taxes. Policies ought to target the creation of tangible benefits from participating in the formal sector, such as secure property rights, and an efficient bureaucratic arrangement to facilitate the activities of enterprises, and capacity building of participants in the informal sector through technical and vocational training programs. The development of financial institutions in the economy has a role to play in easing the financial constraints of enterprises. In the end, one cannot gloss over the fact that in most cases, enterprises participating in the informal sector do so not necessarily to escape the burden of regulations in the formal sector, but by necessity and as a means for survival. This view of the informal sector ought to affect our perception and policy prescriptions for the informal sector.

ENDNOTES

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