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Does access to formal finance matter for stimulating entrepreneurship in developing countries? Evidence from non-farm entrepreneurial activities in Nigeria

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Abstract

The role of finance in stimulating entrepreneurship in developing countries is well documented. However, the specific impact of finance on part-time entrepreneurship is less well known. Drawing on the entrepreneurship discourse that self-employment is not a sufficient measure of entrepreneurship in developing countries, this study extends the finance–poverty debate by investigating the impact of finance on households' part-time and self-employed entrepreneurship choices. It also examines the role of external finance in enterprise growth, with a focus on the 'missing lower-end' of the industrial scale. Using Nigeria Living Standard Measurement Study (LSMS) surveys, our analysis suggests heterogeneity in the effects of finance on households' non-farm entrepreneurial choices, with part-time entrepreneurs more likely to be financially constrained. The empirical evidence shows that self-employed entrepreneurs are seemingly not financially constrained. This is, however, not to say that self-employed entrepreneurs are not financially constrained; it may just be that they are concentrated in the informal sector or less capital-intensive sectors of the economy. The results also show that, contrary to findings in previous studies, external finance does not strongly explain household enterprise growth. The results are robust to the use of an alternative econometric approach on identical models and specifications. The policy implication is that improving access to formal financial services may not, on its own, be sufficient to drive the structural transformation process without the integration of the informal financial sector into the mainstream financial system.

Keywords

Access to finance, entrepreneurship, enterprise growth, external finance, part-time entrepreneurship, self-employed entrepreneurship

JEL Codes

C21, C330, E51, J24, L26, Q12

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1. Introduction

One interim channel of the finance–poverty relationship is through occupational choices (Klapper et al., 2006; Beck et al., 2007). Exploring this channel is particularly important in an era of rising unemployment, especially among young people (International Labour Organisation, 2011). For instance, it is estimated that about 170 million young people in Africa are expected to enter the labour market between 2010 and 2020 (Fox and Pimhidzai, 2013; Nagler and Naude, 2014). One strong implication of this statistic for the region is that these individuals will, at one point or the other, be faced with the choice between working for themselves and working for somebody else. In the stylised literature on entrepreneurship, entrepreneurship is proxied by self-employment. As such, self-employment is seen as a rational choice of utility-maximising individuals who opt to work for themselves if they expect higher returns from doing so compared to being involved in wage employment (Rees and Shah, 1986; Goedhuys and Sleuwaegen, 2000). This rational choice tends to be seen as a driver of structural transformation and innovation, as well as a way out of poverty.

At the same time, controversies remain as to whether self-employment does indeed represent dynamic entrepreneurship, as opposed to being more akin to hidden unemployment, particularly in the face of fading formal employment opportunities (Maloney, 2004; De Mel et al, 2010). There is also recognition of the fact that pecuniary factors are not the only drivers of occupational choices, including of entrepreneurship (Hamilton, 2000). In particular, there is a range of household and institutional characteristics that explain household occupational choices, broadly classified in the distinctive categories of 'push' and 'pull' factors (Dimova and Sen, 2010; Margolis, 2014).[1]

While both the conceptual and empirical debates on whether self-employed individuals-cum-entrepreneurs are opportunity- or necessity-driven and whether their drivers are predominantly of a push or pull nature continue (Blanchflower, 2004; Poschke, 2013b), recent research has ventured into conceptually innovative new categorisations of entrepreneurs. A case in point is the distinction between full-time and part-time entrepreneurs, the latter being individuals who have paid employment as their primary occupation, but who also have a side business as secondary work (Verheul et al., 2002). Some emerging literature has attempted to find out why part-time entrepreneurs exist and why these entrepreneurs are not fully devoted to entrepreneurship (for instance, Petrova, 2005; Petrova, 2012).

[1] For detailed discussion on the pull–push determinants of entrepreneurship, see Storey, D. J. (1994). Understanding the small business sector. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.

One hypothesis proposed in the literature for the existence of part-time entrepreneurs is that such entrepreneurs are financially constrained, hence they maintain their wage-employment pending the operational efficiency and sustainability of their enterprises (Petrova, 2005). Although the literature has examined the nature of this type of entrepreneurship in developed countries, little is known of the impact of financial constraints on part-time entrepreneurs in such countries, even though, as suggested by the literature on livelihood diversification, the proportion of such entrepreneurs may be sizeable (Ellis, 2000b).

Irrespective of how they are categorised, prospective entrepreneurs require capital in order to undertake investment decisions both before opening a business and later on, in the process of business development and for potential growth (Fan and Zhang, 2017). These investment decisions depend on factors, such as the availability of personal resources, external finance and/or the functioning of the financial markets (Fazzari et al., 1988). There is ample evidence suggesting that entrepreneurs are financially constrained, and that only entrepreneurs with sufficient personal and internal resources are likely to participate in entrepreneurial activities as well as undertake the necessary investment decisions (Evans and Jovanovic, 1989; Petrova, 2005). Those without rely on external finance from the financial markets to support their start-up and working capital needs. In this perspective, studies have emphasised that efficient, well-functioning financial systems enhance entrepreneurship development by broadening affordable and sustainable finance to a larger proportion of promising entrepreneurs, and channel capital to the most profitable projects (Beck et al, 2007). These studies conclude that relaxing financial market imperfections enables poor and low-income entrepreneurs, who usually lack collateral, finance histories and social networks to access formal finance, to participate in productive economic activities in the absence of formal employment.

While the role of finance in making a choice between self-employment and salaried employment has been the main focus of this research, evidence suggests that about 80% of nascent entrepreneurs are wage-employed (Petrova, 2012). In other words, it is plausible that part-time entrepreneurship is either a livelihood diversification-focused end in itself or a stepping stone to full-time entrepreneurship. As the extant conventional models do not reflect the complexity of entrepreneurship in a developing country context, it is useful to explore these two entrepreneurial dimensions, namely full-time and part-time entrepreneurship in a developing country context.

This study contributes to the entrepreneurship literature – and, in particular, to the finance for entrepreneurship literature – in less developed countries in two ways. First, it explores how access to formal financial services affects households' entrepreneurship propensity in a developing country context. In keeping with the above-mentioned innovations in the conceptual literature on entrepreneurship, it distinguishes between full-time and part-time entrepreneurs. Second, it examines the role of access to external credit for enterprise

growth. Indeed, while making a choice to become an entrepreneur is important not only for an individual but also for an economy at large, the health of both an economy and a household's livelihood strategy is dependent on the ability of individual businesses to grow and prosper. Although a prolific literature exists on the role of external finance for enterprise development, much of this focuses on medium and large enterprises (Aghion et al., 2007; Ayyagari et al., 2008). Advances in the proliferation of substantial evidence on the role of finance for the growth of small enterprises in developing countries are typically constrained by data limitations, particularly the ability of researchers to track businesses over time. Although only two waves are available in the Nigerian household panel, the ability to assess small enterprise growth at least between two consecutive years is a positive step in the right direction.

The next section describes the methodologies used in our analysis. In Section 3, we discuss the data source for our study and present the summary statistics. Section 4 reports and discusses the empirical results. Section 4 concludes.

2. Empirical methodology

2.1. Access to finance and household entrepreneurship choice

As indicated in the preceding section, we first explore the effect of access to finance on the propensity of households to participate in entrepreneurial activities, which we disaggregated into full-time and part-time entrepreneurial activities. We estimate a static, rather than dynamic, model, mainly because of data constraints and the short time interval between the surveys (two years – 2010–11 and 2012–13). The implicit assumption is that an individual faces a set of only three occupational choices – full-time wage-employed, wage-employed (part-time) entrepreneurship and self-employed (full-time) entrepreneurship. Our focus is only on those who have chosen to operate a non-farm enterprise either full time or part time.

Since the outcomes are binary, we estimate a probit model of an individual's propensity to participate in entrepreneurial activities of the following form:

[1] $$Y_i = X_i\beta_i + \delta_i F + \varepsilon_i$$

where X_i is a set of explanatory variables, β_i denotes the associated vector of coefficients and δ_i captures the direct effect of access to finance on entrepreneurship choice. The residual ε_i is assumed to follow a normal distribution, such that $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$. In equation [1], access to finance *F* is treated as exogenous. However, given that finance is not likely to be randomly allocated, that is, $E(\varepsilon_i|F) \neq 0$, it is imperative that we correct for possible selectivity bias in our estimation. If access to financial services is driven by households' assets or credit worthiness, or if households are excluded for reasons of self-selection or exclusion, our probit estimates of propensity to participate in entrepreneurial activities, if

not corrected for selectivity, will be biased. To control for the endogeneity of access to finance and a household's entrepreneurship choices, we need first to estimate the correct access to formal finance effect adjusted for selectivity into the entrepreneurship choice. A reduced form probit model is employed to estimate households' probability of access to formal finance parameters conditioned on a set of individual and household characteristics and the results. We therefore define the access to finance equation as:

[2] $$F^* = X_F\beta_F + Z_F\theta_F + \mu_F$$

where F^* is the latent variable measuring the propensity to access finance. Z_F is a vector of explanatory variables, θ_F denotes the associated estimates and μ_F is an error term. F^* is unobserved, but we observe F = 1 when F^* > 1 and F = 0 otherwise. Under the assumption that μ_F follows normal distribution, such that $\mu_F \sim N(0,1)$, the corresponding specification is a probit model. Hence, $\Pr(F = 1) = \Phi(Z_F\theta_F)$ and $\Pr(F = 0) = \Phi(-Z_F\theta_F)$, where Φ(.) is the normal distribution.

Equations [1] and [2] define recursive simultaneous system equations, which we estimate with the use of a recursive bivariate probit model defined under the assumption that $E[\varepsilon_i] = E[\mu_F] = 0$, $Var[\varepsilon_i] = Var[\mu_F] = 1$ and $Cov[\varepsilon_i, \mu_F] = \rho$. The coefficient of interest is δ_i. The model is appropriate when both the dependent variable and the endogenous variable are binary (Woodridge, 2002). A similar model is used in Dimova and Wolff (2008) to examine the effect of private transfers on poverty and inequality in Bulgaria. ρ measures the correlation between the error terms in equations [1] and [2], while a likelihood ratio test of the significance of ρ is a direct test of the endogeneity of Y_i^* and F_i^* (Wooldridge, 2002). If $\rho = 0$, the use of a univariate probit model is appropriate, but if $\rho \neq 0$, this suggests that access to finance and a household's entrepreneurship choices are endogenous. In this case, the univariate probit results would be biased; the recursive bivariate probit model is thus most appropriate.

Although the model is identified by the normality condition of the probit model, we opt for a choice of additional excluded variables that exogenously determine access to finance, but do not directly affect the choice of opening one's own business. These include access to mobile phone, access to the internet and average years of formal education in the community. The access to mobile phone variable measures whether the household head has access to a mobile phone, while the access to the internet proxies whether the household has access to the internet. Evidence suggests that access to mobile phone and the internet are key drivers of access to formal financial services in Nigeria, particularly following the introduction of the agent banking and mobile banking frameworks, aimed at broadening financial services to a larger share of rural and geographically excluded bankable Nigerians (EFInA, 2012; EFInA, 2014; Iliasov and Mirzoyants, 2014). The third instrument, namely district-level measures of the educational attainment of household

heads, proxies the quality of human capital at the district level. In empirical research, this is a common instrument of financial inclusion (Rajesh and Sen (2013).

These excluded variables should meet two conditions. First, they should not be partially correlated with access to finance once the other explanatory variables have been netted out ($\delta_i \neq 0|X$), otherwise the instrumental variable (IV) estimators will be inconsitsent (Bound et al, 1995). An empirical test for weak instruments is to use a likelihood ratio test to test the joint significance of *Z* in the equation [2]. Second, they should be orthogonal to the error term in the welfare equation [1], that is, $Cov[Z, \varepsilon_i] = 0$. According to Wooldridge (2002), however, the exogeneity of the instruments in this model cannot be tested.

For our choice of explanatory variables, we adopt individual capabilities and household characteristics in the stylised literature on the determinants of entrepreneurship choices in developing countries. In addition, our unit of analysis is the household. In deriving variables that capture individual capabilities, the study focuses on the household head who, in practical terms, is the household's major breadwinner. Given the lack of sufficient information on other household members, certain attributes of the household head serve as a relatively fair proxy of the demographic characteristics of the entire household, especially as the study does not intend to explore the complications associated with the explicit modelling of the occupational decision making of other family members. Table A1 in the Appendix presents the definition of the dependent and explanatory variables used in the analysis.

2.2. Access to external finance and household enterprise growth

So far, this paper has described how we intend to obtain unbiased estimates of the effect of access to finance on the propensity of individuals to participate in entrepreneurial activities. This does not inform us of whether the use of external finance has an impact on the growth of household enterprises after start-up. The interest in this section is, therefore, to examine how the use of formal finance affects household enterprise growth. In measuring enterprise growth, studies have used a combination of both financial and non-financial measures. The financial measures include return on investment, return on equity, earnings per share and net sales revenue (Santos and Brito, 2012; Chong, 2008). These measures have the advantage of being objective, simple and easy to understand, but are unfortunately not easily available or, when available, are usually historical and subject to potential manipulation (Fowowe, 2017). The non-financial measures of enterprise growth include employee size, market share, customer satisfaction and environmental performance. These measures are suggested to have the disadvantage of being subjective (Santos and Brito, 2012; Chong, 2008; Nichter and Goldmark, 2005).

As a result of data limitations, this study uses the growth in an enterprise's employee size between 2010–11 and 2012–13. Our choice of this measure is also premised on the

argument that the number of employees working within an enterprise is often documented and can be easily verified, yielding the most accurate and comparable data, unlike other measures which may be susceptible to ambiguity, volatility of inflation or may be affected by methodological issues (Nichter and Goldmark, 2005). Moreover, the literature on the distinction between opportunity and necessity-driven entrepreneurship tends to use the ability of a small enterprise to employ workers as a sign of dynamic entrepreneurship (Poschke, 2013a). In other words, expansion of the employment pool of a small business can be seen as a movement from necessity- to opportunity-driven entrepreneurship.

Following the preceding discussion, enterprise growth is defined as:

[3] $$G_{it} = \beta_1 X_{it} + \delta_{it} C + \varepsilon_{it}$$

where G_{it} is the observed dependent variable which takes the value of one if an enterprise recorded growth in its employee size between 2010–11 and 2012–13 (in which case $G_{it} > 0$) and zero otherwise ($G_{it} \leq 0$). X_{it} is a set of explanatory variables, β_1 is the associated vector of coefficients, and δ_{it} captures the impact of access to credit C. The residual ε_{it} is the error term reflecting unobserved characteristics that may also affect G_{it}. Since our dependent variable is a binary variable, equation [3] could be estimated using a univariate probit model. Following the analogical discussion in section 2.1, we correct for potential selectivity of access to finance in the enterprise growth equation by estimating a recursive bivariate probit model, where the access to credit equation is thus defined as:

[4] $$C_i^* = \gamma Z_i + \theta X_i + u_i$$

where C_i^* is the latent variable measuring the propensity of an enterprise accessing credit, Z_i represents the instruments, X_i is the vector of the explanatory variables and a disturbance, u_i.

Similarly, for our choice of explanatory variables in the analysis of the determinants of household enterprise performance, we employ a number of entrepreneur-specific (here, houshehold head as well) and enterprise-specific characteristics used in extant studies exploring the determinants of enterprise growth in developing countries. Table A2 in the Appendix presents the definition of the dependent and explanatory variables used in the analysis.

3. Data and descriptive statistics

The data used for our analysis is drawn from the General Household Survey (GHS–Panel), a subset of Nigeria's LSMS surveys of 2010–11 and 2012–13, which are designed to capture information on households' income, expenditure, demographics, labour activity, credit and savings, financial capability, household assets, agricultural activities, and welfare indicators (National Bureau of Statistics, 2014). The sampling procedures for the GHS–Panel ensure that the surveys are not only nationally representative but also

representative at the zonal levels (urban and rural). As the core of this study is to explore the role of access to finance in an individual's decisions to participate in entrepreneurial activities, the most relevant sections of the dataset are those documenting main and secondary economic activities. We focus on household heads mainly because their role as key breadwinners in the household enhances the importance of their occupational choices in the household. For the time being, we ignore the complication of explicitly modelling the occupational decision making of other family members.

As the core of our empirical analysis is on involvement in non-farm entrepreneurship, we omit households (and household heads) involved in farm-related activities and those where data on key variables is missing. The key variables for the two sets of our analysis, namely the role of access to, and use of formal finance for, (1) entry into entrepreneurship and (2) entrepreneurial growth are taken from two different, yet related modules in the dataset, namely the labour force module and the module on household enterprise dynamics. For the first part of the analysis, our final sample of the 2010–11 data set has 2,214 household heads comprising 319 part-time entrepreneurs, 1,036 full-time entrepreneurs and 859 household heads not engaged in any forms of non-farm entrepreneurship.I In the 2012–13 dataset, there are 2,037 entrepreneurs in the sample, comprising 367 part-time entrepreneurs, 1,037 full-time entrepreneurs and 633 household heads not involved in any forms of non-farm entrepreneurship. The latter are classified as a control group for comparative descriptive statistics analysis only.[2]

As the second objective of the study is to estimate our enterprise growth model, we benefit from the panel feature of the survey data sets, which captures information on households' non-farm income-generating activities. The survey shows that, between 2010–11 and 2012–13, 689 enterprises interviewed in wave 1 could not be traced in the wave 2 interview, while 1,694 new enterprises were reported to have been established by the same households in the sample. The fact that many of the entrepreneurs s interviewed in 2010-2011 are not re-interviewed in 2012–13 may further point to one of several things: voluntary dissolution, bankruptcy, merger with other enterprises, acquisition by other enterprises, or relocation by households/business owners or operators, details of which are not captured in the surveys. This grants support to the proposition in Grimm et al. (2011) that most households in Sub-Saharan Africa expand their activities through the creation of new enterprises rather than by expanding existing ones.

Given the focus of this study, we restrict our analysis to entrepreneurs that were re-interviewed in both waves (that is, interviewed in 2010–11 and are re-interviewed in 2012–13) and exclude enterprises engaged in farm-related activities and those with observations on key variables missing. Consequently, we establish a balanced panel of 2,118 small enterprises, which allows us to compare the dynamics of small enterprise growth in

[2] We did not exclude the unemployed from the control group. Though a small percentage, excluding the unemployed will result in misrepresentations in our comparative descriptive analysis.

Nigeria. Of the 2,118 enterprises in our final panel data set, 567 (or 26.77%) enterprises recorded growth in employee size between 2010–11 and 2012–13.

The heterogeneity in household characteristics between part-time entrepreneurial households and self-employed entrepreneurial households in our sample is highlighted in Tables 1 and 2, with some interesting themes emerging. Notably, about 62% of wage-employed entrepreneurs are aged between 30 and 49, and only 4% are female-headed households. Among the full-time entrepreneurs in the sample, 54% are aged between 30 and 50, while 22% are female. By contrast, the majority (63%) of household heads not involved in any non-farm entrepreneurial activities are aged over 50 years. We also find that 70% of the part-time entrepreneurs have an education above the primary level, compared to 42% of the self-employed entrepreneurs and 54% of those who do not participate in non-farm entrepreneurial activities. Interestingly, about the same percentage of part-time and full-time entrepreneurs are found in urban areas across all the groups in the sample. This may suggest that more educated household heads living in urban areas are more likely to be entrepreneurs, as they seek alternative non-farm livelihood sources to smoothen their households' consumption and reduce risk and vulnerability (see Alobo Loison, 2015). The results are consistent with the findings of previous studies in developing countries, such as Babatunde and Qaim (2010) and Dehejia and Gupta (2016).

For the purposes of this analysis, it is imperative to look closely at the access to finance statistics, which studies have documented as being relatively low in Nigeria (EFInA, 2014). In 2010–11, 73% of part-time entrepreneurs in the sample accessed finance, compared to 49% of full-time entrepreneurs and 53% of those not involved in entrepreneurial activities. The corresponding statistics for 2011–12 are: 76% of part-time entrepreneurs, 39% of full-time entrepreneurs and 55% of those not involved in entrepreneurial activities. While access to finance improved among the other groups in the sample, a decline is observed in full-time entrepreneurs' access to finance over the period. It is interesting to note that community characteristics with respect to financial sector development and access do not differ significantly among the three groups of people. In other words, these two sets of entrepreneurs are qualitatively different groups of individuals, at least with respect to their access to and use of formal finance, despite being placed in similar community-level environments. Specifically, in 2010–11 33% of the full-time entrepreneurs are reported to have a formal bank situated within their community, against 32% for the part-time entrepreneurs and 33% for the control group. In 2012–13, about 38% of part-time entrepreneurs reported having a formal bank within their community, which is slightly higher than the 31% reported by self-employed entrepreneurs and 32% for the control group.

Table 1: Descriptive statistics: households by functions – LSMS wave 1 (2010–11), *N=2,214*

	People not involved in entrepreneurial activities		Part-time entrepreneurs		Self-employed entrepreneurs		Full sample	
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Household head characteristics								
Age	52.010	18.086	44.746	10.324	48.013	13.631	49.093	15.350
Female	0.177	0.382	0.034	0.183	0.235	0.424	0.183	0.387
Married	0.710	0.454	0.953	0.212	0.729	0.445	0.754	0.431
Divorced	0.045	0.208	0.006	0.079	0.051	0.220	0.042	0.202
Widowed	0.149	0.356	0.019	0.136	0.167	0.373	0.139	0.346
Single	0.094	0.292	0.022	0.147	0.051	0.220	0.064	0.244
Number of formal education years	9.313	5.846	11.517	4.540	7.610	5.109	8.834	5.500
Can read and write	0.763	0.426	0.940	0.237	0.738	0.440	0.777	0.416
No formal education	0.197	0.398	0.050	0.219	0.216	0.412	0.185	0.388
Maximum of primary education	0.246	0.431	0.229	0.421	0.360	0.480	0.297	0.457
Minimum of secondary education	0.558	0.497	0.721	0.449	0.424	0.494	0.519	0.500
Either parent self-employed	0.317	0.465	0.417	0.494	0.442	0.497	0.390	0.488
Household characteristics								
Household size	4.650	2.807	6.182	2.754	5.144	2.883	5.102	2.878
Number of children	1.668	1.865	2.755	1.955	2.214	2.089	2.080	2.020
Number of adults	2.981	1.765	3.426	1.690	2.930	1.664	3.021	1.715
Size of land owned m^2/1000 (log)	2.204	11.611	3.716	13.196	1.532	5.580	2.107	9.612
Number of rooms	3.314	1.948	3.420	1.968	3.095	1.913	3.227	1.938
Access to internet	0.123	0.329	0.110	0.313	0.032	0.176	0.079	0.269
Financial resources								
Access to formal credit	0.527	0.500	0.727	0.446	0.383	0.486	0.489	0.500
Per capita expenditure (log)	11.675	0.711	11.721	0.569	11.641	0.577	11.666	0.632
Household's community characteristics								
Household head's average formal years of education	9.246	3.283	9.971	2.769	8.142	2.945	8.834	3.133
Presence of a formal bank	0.328	0.470	0.326	0.469	0.304	0.460	0.317	0.465
Distance to markets	0.232	0.422	0.295	0.457	0.287	0.452	0.266	0.442
Distance to major town/city	0.795	0.404	0.727	0.446	0.799	0.401	0.787	0.409
Urban residency	0.492	0.500	0.564	0.497	0.569	0.496	0.538	0.499
North-central	0.141	0.348	0.213	0.410	0.135	0.342	0.149	0.356
North-east	0.099	0.299	0.154	0.361	0.068	0.251	0.092	0.289
North-west	0.100	0.300	0.147	0.355	0.125	0.330	0.118	0.323
South-east	0.201	0.401	0.075	0.264	0.193	0.395	0.179	0.384
South-south	0.279	0.449	0.166	0.373	0.160	0.367	0.207	0.405
South-west	0.179	0.384	0.245	0.430	0.319	0.467	0.254	0.436
Number of observations	*859*		*319*		*1036*		*2214*	

Source: Author's computation from Nigeria's LSMS 2010–11.

Note: SD= standard deviation

Table 2: Descriptive statistics: households by functions – LSMS wave 2 (2012–13), *N=2,037*

	People not involved in entrepreneurial activities		Part-time entrepreneurs		Self-employed entrepreneurs		Full sample	
Variables	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Household head characteristics								
Age	57.761	18.054	47.155	10.783	48.809	13.204	51.293	15.167
Female	0.220	0.414	0.038	0.192	0.219	0.414	0.187	0.390
Married	0.690	0.463	0.918	0.274	0.746	0.435	0.760	0.427
Divorced	0.041	0.199	0.022	0.146	0.058	0.234	0.046	0.210
Widowed	0.194	0.396	0.033	0.178	0.152	0.360	0.144	0.351
Single	0.070	0.255	0.027	0.163	0.043	0.204	0.049	0.215
Number of formal education years	8.875	6.288	11.341	4.357	7.639	4.995	8.690	5.497
Can read and write	0.714	0.452	0.959	0.198	0.767	0.423	0.785	0.411
No formal education	0.261	0.439	0.038	0.192	0.203	0.403	0.191	0.394
Maximum of primary education	0.202	0.402	0.253	0.436	0.375	0.484	0.299	0.458
Minimum of secondary education	0.537	0.499	0.708	0.455	0.421	0.494	0.509	0.500
Either parent self-employed	0.306	0.461	0.401	0.491	0.431	0.495	0.387	0.487
Household characteristics								
Household size	5.209	3.174	6.970	3.102	5.905	3.071	5.881	3.164
Number of children	1.733	1.927	3.090	2.223	2.556	2.296	2.397	2.227
Number of adults	3.476	2.163	3.880	2.077	3.349	1.797	3.484	1.977
Size of land owned m^2/1000 (log)	1.798	6.012	2.696	8.819	1.675	6.760	1.898	6.971
Number of rooms	3.442	1.925	3.657	1.992	3.249	1.842	3.382	1.901
Access to internet	0.156	0.364	0.166	0.373	0.044	0.206	0.101	0.302
Financial resources								
Access to formal credit	0.548	0.498	0.763	0.426	0.392	0.489	0.508	0.500
Per capita expenditure (log)	11.702	0.705	11.703	0.603	11.631	0.591	11.666	0.631
Household's community characteristics								
Household head's average formal years of education	9.024	3.452	9.741	2.844	8.115	2.804	8.690	3.091
Presence of a formal bank	0.310	0.463	0.379	0.486	0.286	0.452	0.310	0.463
Distance to markets	0.231	0.422	0.294	0.456	0.270	0.444	0.262	0.440
Distance to major town/city	0.796	0.403	0.790	0.408	0.800	0.400	0.797	0.402
Urban residency	0.490	0.500	0.550	0.498	0.542	0.498	0.527	0.499
North-central	0.133	0.340	0.199	0.400	0.141	0.348	0.149	0.356
North-east	0.139	0.346	0.114	0.319	0.073	0.261	0.101	0.302
North-west	0.095	0.293	0.147	0.355	0.108	0.311	0.111	0.314
South-east	0.223	0.416	0.109	0.312	0.188	0.391	0.185	0.388
South-south	0.239	0.427	0.232	0.422	0.202	0.401	0.218	0.413
South-west	0.172	0.378	0.199	0.400	0.288	0.453	0.236	0.425
Number of observations	633		*367*		*1037*		*2037*	

Source: Author's computation from Nigeria's LSMS 2012–13.

Note: SD = standard deviation

Table 3 highlights the descriptive statistics of small enterprises in our panel data set. Focusing on access to external finance, measured by reference enterprises' use of a credit facility, the results show that access to credit by household enterprises is quite low in Nigeria: in 2010–11 only 7% and in 2012–13 only 8% of household enterprises in the sample accessed credit for their working capital and growth financing needs. (Onyeiwu, 2012; Dada, 2014) report similar findings. This low access to finance could be attributed to the fact that most household enterprises in Nigeria are relatively small in size, informal and rural-based, and hence may be constrained by documentation and collateral requirements from accessing external finance (Hassan and Olaniran, 2011; EFInA, 2014). They may therefore have to rely on internal or informal finance for their financial needs. This contrasts with the much higher numbers related to access to finance by prospective entrepreneurs, indicating that, while a large proportion of potential entrepreneurs do need formal finance in order to establish a business, few of the established enterprises use formal finance for expansion of existing businesses.

The results also indicated a significant improvement in operational efficiency over the period, as capital productivity, a measure of cash flow turnaround efficiency, improved from 78% in wave 1 to 89% in wave 2, thus suggesting growth in the activities and operations of household enterprises in the sample. These findings are also consistent with Grimm et al. (2008) results showing that even people with well-performing enterprises in Sub-Saharan Africa often do not want them to grow.

Other results are as expected: most of the entrepreneurs are men, with only about 7% of the household enterprises formally registered, and half operating from the entrepreneurs' homes. While registration of enterprises in Nigeria may be optional, studies have presented evidence that such enterprises do contribute significantly to government revenue, particularly at the local government level (Bakeine, 2009) and play an important role in local economic growth and development (Fox and Sohnesen, 2012). The summary statistics also suggests that the majority of the household enterprises are less than two years old and are largely involved in trading (51% in both waves). Further, the statistics show that the majority of the enterprises are within proximity of State capitals (52% in both 2010–11 and 2012–13), reflecting the former's access to infrastructure and possible markets. Access to mobile phones is notably high, with 85% of the entrepreneurs shown to have access in 2010–11 (and 91% in 2012–13).

In sum, the majority of the household enterprises are urban based, owner-only enterprises, male-owned, operating within the household home and located within certain economic sectors. This may suggest their consideration in the literature as a residual category created by the scarcity of formal wage employment. Proctor (2014), however, notes that these informal employment opportunities may be a preferred choice for some households, particularly in developing countries.

Table 3: Descriptive statistics: small enterprise characteristics by year, ***N = 2118***

	2010–11			2012–13		
	Part-time entrepreneur	Full-time entrepreneur	Aggregate hhd ents	Part-time entrepreneur	Full-time entrepreneur	Aggregate hhd ents
Entrepreneur						
Age	45.769	47.878	47.624	47.950	50.076	49.855
Gender	0.027	0.108	0.099	0.032	0.106	0.099
Years of formal education	10.353	6.509	6.972	10.909	6.515	6.972
Part-time entrepreneur	0.000	0.000	0.120	0.000	0.000	0.104
Full-time entrepreneur	0.000	0.000	0.880	0.000	0.000	0.896
Age group of enterprises						
< 6 months	0.059	0.081	0.078	0.050	0.066	0.065
6–24 months	0.937	0.904	0.908	0.950	0.934	0.935
25–48 months	0.000	0.010	0.008	0.000	0.000	0.000
> 48 months	0.004	0.005	0.005	0.000	0.000	0.000
Formality of enterprise						
Officially registered	0.067	0.076	0.075	0.091	0.056	0.060
Location of enterprise						
Home	0.569	0.488	0.498	0.568	0.479	0.488
Commercial sites	0.196	0.254	0.247	0.305	0.301	0.301
Others	0.235	0.258	0.255	0.127	0.220	0.211
Labour size and categorisations						
< 2 employees	0.725	0.785	0.778	0.655	0.654	0.654
2–5 employees	0.247	0.196	0.203	0.336	0.332	0.332
6–10 employees	0.012	0.013	0.013	0.005	0.010	0.009
> 10 employees	0.016	0.005	0.006	0.005	0.004	0.004
Fixed assets and categorisations						
No fixed assets	0.071	0.095	0.092	0.073	0.067	0.068
N1–N20,000	0.471	0.526	0.519	0.395	0.491	0.481
N20,001–N100,000	0.318	0.255	0.263	0.332	0.305	0.308
N100,001–N500,000	0.098	0.098	0.098	0.150	0.108	0.112
N500,001–N1,000,000	0.012	0.008	0.008	0.023	0.015	0.016
> N1,000,000	0.031	0.018	0.019	0.027	0.014	0.016
Productivity measure						
Capital productivity	0.810	0.772	0.777	0.883	0.886	0.885
Enterprise financial access						
Access to credit	0.071	0.067	0.068	0.095	0.079	0.081
Sector						
Manufacturing	0.141	0.187	0.182	0.200	0.193	0.194
Construction	0.035	0.040	0.040	0.009	0.038	0.035
Trading	0.553	0.503	0.509	0.523	0.511	0.512
Transportation	0.055	0.068	0.066	0.068	0.065	0.066
Services	0.039	0.031	0.032	0.055	0.034	0.036
Others	0.176	0.171	0.171	0.145	0.160	0.158
Closeness to infrastructure						
Urban	0.549	0.383	0.403	0.595	0.382	0.404
Proximity to State capital	0.576	0.512	0.519	0.505	0.521	0.519
Proximity to financial institution	0.282	0.216	0.224	0.350	0.194	0.211
Access to mobile phone at district level	0.925	0.835	0.846	0.952	0.907	0.911
Number of observations	*255*	*1863*	*2118*	*220*	*1898*	*2118*

Source: Author's computation from Nigeria's LSMS 2010–11 and 2012–13.

Note: SD = standard deviation

4. Empirical results

4.1. Determinants of households' entrepreneurship choices

We first take a look at the marginal effects from the bivariate probit model on the role of finance for entry into entrepreneurship, defined by equations [1] and [2]. The corresponding estimates for full-time and part-time entrepreneurs are highlighted in Table 4 (for 2010–11) and Table 5 (for 2012–13). Note the log-likelihood test of no correlation between the residuals from the access to finance and entry into entrepreneurial activities equations, confirming the appropriateness of the bivariate probit in our case.

The most notable result for the purposes of this study is the fact that, while – in both years – access to finance has a positive and significant effect on entering part-time entrepreneurship, access to finance has negative implications for entering full-time entrepreneurship. This is consistent with findings from the broader (largely developed countries-based) literature on full- and part-time entrepreneurship, which argues that part-time entrepreneurs tend to be finance-constrained and to use a combination of salaried employment and self-employment as a potential stepping stone for entering entrepreneurial activities full time.

That part time and full-time entrepreneurs are very distinctive groups of individuals becomes obvious also from the remaining determinants of entry into the two different forms of entrepreneurship. While parental background – in particular, whether either parent of the respondent was self-employed – has a strong positive influence on being a full-time entrepreneur, it does not have a significant influence on being a part-time entrepreneur. At the same time, infrastructural and household characteristics have a much stronger influence on being a part-time as opposed to a full-time entrepreneur: although proximity to markets and household size have a positive influence on entering part-time entrepreneurial activities, they have no impact on becoming a full-time entrepreneur. Most interestingly, higher levels of education have a stronger influence on entering part-time entrepreneurship than they do on either entering full-time entrepreneurship or on not undertaking any entrepreneurial activities (the control group). This is consistent with the descriptive statistics presented in Table 1. Overall, the results are consistent with the possibility that part-time entrepreneurship may be more of a rational choice variable of opportunity-driven, livelihood-diversifying individuals with better human capital and other endowments who choose to diversify their portfolio across entrepreneurial and salaried activities. By contrast, family background and networks, as well as associated informal forms of finance appear to be greater drivers of entering full-time entrepreneurship.

Table 4: Determinants of household entrepreneurship choice, wave 1 (2010–11)

Dependent variable:	Part-time entrepreneur		Self-employed entrepreneur	
	Entrepreneurship	Access to finance	Entrepreneurship	Access to finance
	(1)	(2)	(3)	(4)
Constant	-3.005***	-3.774***	-1.237***	-3.728***
	(0.562)	(0.369)	(0.301)	(0.363)
Age	0.042*	0.062***	0.069***	0.064***
	(0.024)	(0.014)	(0.012)	(0.014)
Age squared	-0.001**	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Gender–female	-0.141	-0.381***	0.153	-0.350***
	(0.186)	(0.119)	(0.106)	(0.117)
Married	0.551***	0.339***	0.182*	0.332***
	(0.172)	(0.113)	(0.103)	(0.111)
Maximum of primary education	0.322**	0.180*	0.027	0.267**
	(0.153)	(0.108)	(0.088)	(0.109)
Minimum of secondary education	0.239	1.023***	0.129	1.063***
	(0.199)	(0.114)	(0.117)	(0.114)
Either parent self-employed	0.111		0.238***	
	(0.075)		(0.053)	
Household size	0.092*	-0.010	-0.027	-0.007
	(0.052)	(0.015)	(0.034)	(0.015)
Household size squared	-0.004		0.002	
	(0.003)		(0.002)	
% of members aged < 5 years	-0.079	-0.721***	-0.072	-0.731***
	(0.266)	(0.216)	(0.193)	(0.213)
% of members aged < 6–14 years	-0.139	-0.376*	0.190	-0.362*
	(0.251)	(0.196)	(0.175)	(0.193)
% of members aged < 60 years	-0.203	-0.234	-0.290	-0.256
	(0.426)	(0.225)	(0.188)	(0.223)
Size of land owned m^2/1000 (log)	0.007**	-0.003	-0.006*	-0.003
	(0.003)	(0.004)	(0.004)	(0.004)
Distance to markets	0.195**	-0.075	0.008	-0.056
	(0.086)	(0.076)	(0.065)	(0.074)
Distance to major town/city	-0.106	0.078	-0.034	0.071
	(0.093)	(0.082)	(0.072)	(0.081)
Urban dummy	-0.038	0.135*	0.256***	0.109
	(0.087)	(0.071)	(0.062)	(0.069)
Regional dummy	-0.385***	-0.027	0.180***	-0.019
	(0.082)	(0.072)	(0.063)	(0.070)
Access to finance	**0.928*** **		**-1.530*** **	
	(0.245)		**(0.106)**	
Access to mobile phone		0.790***		0.500***
		(0.140)		(0.133)
Access to the internet		0.814***		0.878***
		(0.148)		(0.133)
Average years of formal education in community		0.079***		0.092***
		(0.012)		(0.011)
Number of observations	2214		2214	
Log likelihood	-1900.388		-2488.428	
Rho	-0.324		0. .743	
Likelihood-ratio test of rho=0	3.687(0.055)		40.307(0.000)	
Wald test of Rho	4.795		45.487	
Prob > X^2	0.028		0.000	

Source: Author's computation from Nigeria's LSMS 2010–11.

*Notes: Standard deviation in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Bivariate probit model

Default: No formal education, % of members aged 15–60 yrs (working household members)

Table 5: Determinants of household entrepreneurship choice, wave 2 (2012–13)

Dependent variable	Part-time entrepreneur		Self-employed entrepreneur	
	Entrepreneurship	Access to finance	Entrepreneurship	Access to finance
	(1)	(2)	(3)	(4)
Constant	-3.401***	-4.078***	-1.110***	-3.880***
	(0.586)	(0.447)	(0.364)	(0.437)
Age	0.058**	0.072***	0.076***	0.073***
	(0.024)	(0.016)	(0.014)	(0.016)
Age squared	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Gender–female	-0.380**	-0.333***	0.086	-0.335***
	(0.172)	(0.121)	(0.108)	(0.119)
Married	0.128	0.175	0.144	0.192*
	(0.146)	(0.113)	(0.101)	(0.111)
Maximum of primary education	0.462***	0.480***	0.240**	0.512***
	(0.161)	(0.108)	(0.093)	(0.106)
Minimum of secondary education	0.424**	1.172***	0.205*	1.152***
	(0.206)	(0.114)	(0.121)	(0.111)
Either parent self-employed	0.048		0.243***	
	(0.074)		(0.054)	
Household size	0.079**	0.005	0.001	0.006
	(0.039)	(0.014)	(0.028)	(0.013)
Household size squared	-0.003		-0.000	
	(0.002)		(0.001)	
% of members aged < 5 years	0.136	-0.450*	-0.013	-0.451**
	(0.260)	(0.231)	(0.206)	(0.225)
% of members aged < 6–14 years	0.178	-0.322*	0.074	-0.338*
	(0.230)	(0.196)	(0.176)	(0.191)
% of members aged < 60 years	0.256	0.012	-0.154	-0.085
	(0.342)	(0.240)	(0.201)	(0.238)
Size of land owned m^2/1000 (log)	0.003	0.007	0.003	0.006
	(0.005)	(0.005)	(0.004)	(0.005)
Distance to markets	0.204**	-0.179**	-0.108	-0.163**
	(0.086)	(0.080)	(0.069)	(0.078)
Distance to major town/city	0.008	-0.004	-0.029	-0.023
	(0.091)	(0.081)	(0.072)	(0.079)
Urban dummy	-0.099	0.161**	0.208***	0.141**
	(0.084)	(0.071)	(0.064)	(0.070)
Regional dummy	-0.288***	0.232***	0.378***	0.244***
	(0.079)	(0.073)	(0.064)	(0.071)
Access to finance	**0.959*** **		**-1.773*** **	
	(0.242)		**(0.096)**	
Access to mobile phone		0.674***		0.333**
		(0.165)		(0.152)
Access to the internet		1.036***		1.017***
		(0.146)		(0.132)
Average years of formal education in community		0.075***		0.085***
		(0.013)		(0.012)
Number of observations	2037		2037	
Log likelihood	-1872.483		-2236.923	
Rho	-0.278		0.803	
Likelihood-ratio test of rho=0	2.877(0.090)		41.244(0.000)	
Wald test of Rho	3.160		29.897	
Prob > X^2	0.075		0.000	

Source: Author's computation from Nigeria's LSMS 2012-2013.

*Notes: Standard deviation in parentheses *** p<0.01, ** p<0.05, * p<0.1*

Bivariate probit model.

Default: No formal education, % of members aged 15–60 yrs (working household members)

4.2. Access to external finance and household enterprise growth

In this section, the study goes a step further by attempting to address the question: what is the role of access to external finance (that is, credit) in a household enterprise's post-entry growth? Addressing this question is particularly important, as it tells us whether access to external finance really explains the growth of household enterprises after start-up, especially within the first few years of establishment. As noted earlier in Section 3, of the 2,118 enterprises in the panel, only 567 enterprises recorded growth in employee size over the period, with an average value of the proportional increase in employee size of 0.481 over the period. That is, of those 567 enterprises with growth in employee size, the average enterprise grew said size by about half between 2010–11 and 2012–13.

As indicated in Section 2.2, the role of access to finance on enterprise growth is explored with the use of a recursive bivariate probit model. The results from the corresponding estimations are presented in Table 6. The most striking result is that access to finance has a negative impact on employee growth (similar findings was found in Lang et al., 1996), most plausibly indicating that growing businesses are more likely to rely on generated income and informal sources of income than on the formal financial sector in order to grow. Consistent with this result, young businesses are less likely to grow. This is consistent with the proposition that they are perhaps too young to have accumulated sufficient internal resources. By contrast, and at first sight counter-intuitively, larger enterprises as measured by asset size are less likely to increase their labour force. One obvious explanation would be that they are capital- as opposed to labour-intensive. Alternatively, this result might be consistent with Grimm et al's (2008) story that social norms and pressure may preclude successful businesses in Africa from growing. Not surprisingly, the businesses of better-educated owners, as well as formally registered businesses, are more likely to grow.

Overall, our regression results indicate that the effects of access to formal credit on household enterprise growth may be more complex and multifaceted than those highlighted in the literature on the impact of access to external finance. This thus raises a policy implication: although access to external finance appears to have an unexpected effect on household enterprise growth, careful examination of its expansion and inclusion in entrepreneurship development programmes should be carried out, in order to understand how the expansion of formal financial services to household enterprises may translate into poverty and inequality reduction in Nigeria.

Table 6: Determinants of household enterprise growth

Dependent variable	Access to credit	Enterprise growth
Enterprise: accessed credit		**-1.113****
		(0.526)
Household head: age	-0.022	0.001
	(0.019)	(0.014)
Household head: age squared	0.000	-0.000
	(0.000)	(0.000)
Household head: gender	0.490***	0.269**
	(0.120)	(0.111)
Household head: education	0.022**	0.016**
	(0.009)	(0.007)
Household head: previous experience (formally employed)	0.032	-0.069
	(0.132)	(0.101)
Enterprise: formally registered	0.240	0.218*
	(0.163)	(0.126)
Enterprise: operates from commercial sites	0.118	-0.003
	(0.096)	(0.073)
Enterprise: operates from other sites	-0.000	-0.067
	(0.123)	(0.086)
Enterprise: age (log)	0.027	-0.137*
	(0.104)	(0.073)
Enterprise: size – assets (log)	-0.016	-0.047***
	(0.016)	(0.012)
Enterprise: capital productivity	0.103	0.023
	(0.144)	(0.101)
Sector: manufacturing	-0.050	0.001
	(0.114)	(0.082)
Sector: Construction	-0.938**	0.261
	(0.419)	(0.178)
Sector: transportation	-0.246	0.002
	(0.202)	(0.141)
Sector: services	-0.127	-0.048
	(0.220)	(0.164)
Sector: others	-0.411***	-0.180*
	(0.135)	(0.095)
Enterprise: urban	0.229**	0.052
	(0.093)	(0.069)
Enterprise: proximity to State capital	0.028	0.417***
	(0.090)	(0.069)
Enterprise: proximity to financial institution	-0.184*	
	(0.104)	
Household head: district-level access to a mobile phone	0.685**	
	(0.311)	
Constant	-1.747***	-0.142
	(0.608)	(0.414)
Number of enterprises		2118
Log-likelihood		-1740.804
Rho		0.633
Likelihood-ratio test of rho=0		2.716(0.099)
Wald test of Rho (Chi2(1)		4.11(0.043)

Source: Author's computation from the panel based on Nigeria's LSMS 2010–11 and 2012–13.
*Notes: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.*

Default: Not formally employed, enterprise operates from home, % of members aged 15–60 yrs (working household members), trading sector

5. Conclusion

The stylised literature on financial sector development has suggested that improved access to finance is essential for households' participation in economic activities. In particular, the literature emphasises the role of access to finance for both entry into entrepreneurship and enterprise growth. The policy implication of this proposition is that developing countries with economic growth targets should invest in expanding financial services to a larger proportion of their population. This is premised on the assumption that one of the major institutional constraints to households' participation in entrepreneurial activities is their limited access to finance, resulting from financial market impediments, which often restrict poor and low-income households' access. Given the academic and policy importance of this topic, this paper has explored the underlying latent impacts of financial constraints on developing country households' participation in entrepreneurial activities, as well as the post-entry growth of these activities, by examining the role of access to finance in non-farm entrepreneurship choice and household enterprise development in Nigeria.

The study explored the dynamic relationship using cross-sectional and panel household-level data sets from the General Household Survey–Panel section of the World Bank's Nigeria LSMS surveys for 2010–11 and 2012–13. Disaggregated between part-time and full-time entrepreneurs, the study examined the heterogeneity of entrepreneurs in terms of the effects of access to finance, using a recursive bivariate probit model conditioned on individual, household and infrastructural factors. It then went a step further to estimate the determinants of household enterprise growth through access to external finance. The results of our estimations present some interesting findings on the influence of access to credit on household enterprise development in developing countries, some of which challenge conventional wisdom.

Overall, our results challenge the conventional argument that access to formal finance necessarily has a similar relationship across conceptually different entrepreneurs, such as those who are full-time entrepreneurs and those who combine entrepreneurship with salaried employment activities. While the latter appear to be better integrated into the formal economy, including showing a greater propensity to use formal finance, the former appear to be more informally linked, in that family background and networks are greater determinants of their establishment than reliance on formal finance. Moreover, the use of formal finance for expansion of existing enterprises is very low. The growth of such enterprises is low as well, and those who do expand in the direction of enhancing their labour force appear to rely more on their generated resources than on access to the formal financial sector.

From a policy perspective, notwithstanding the vagaries of informal finance and its propensity to lead to a debt burden and create a poverty trap, it is worth noting that informal finance may also play a role in entrepreneurship development. Indeed, empirical evidence shows that self-employed households rely more on informal financial markets, as they are less likely to be attracted to formal finance because of

the documentation requirements and geographical proximity challenges. Thus, if integrated into the mainstream financial system, the informal financial sector might help create a pathway for more progressive forms of entrepreneurship and household enterprise development in Nigeria. Our findings on the effect of access to external finance on household enterprise growth call for a re-evaluation of this relationship for a better understanding of the interactions with poverty and inequality reduction.

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Appendix 1

Table A1: Definition of variables for determinants of household's entrepreneurship choice

Variable details	Definition
Dependent variables	
Part-time entrepreneurship	Dummy=1 if household head is a wage-employed entrepreneur, otherwise=0
Self-employed entrepreneurship	Dummy=1 if household head is a self-employed entrepreneur, otherwise=0
Explanatory variables	
Household head: age	Household head's age in years
Household head: age squared	Household head's age squared
Household head: gender	Dummy=1 if household head is female, otherwise=0
Household head: married	Dummy=1 if household head is married, otherwise=0
Household head: divorced	Dummy=1 if household head is divorced, otherwise=0
Household head: widowed	Dummy=1 if household head is widowed, otherwise=0
Household head: single	Dummy=1 if household head is single, otherwise=0
Household head: formal education (years)	Number of years in formal education
Household head: can read and write	Dummy=1 if household head can read and write, otherwise=0
Household head: no education (default)	Dummy=1 if household head has no formal education, otherwise=0
Household head: maximum primary education	Dummy=1 if household head has maximum primary education, otherwise=0
Household head: minimum secondary education	Dummy=1 if household head has secondary education, otherwise=0
Household head: either parent self-employed	Dummy=1 if either parent is a self-employed household head, otherwise=0
Household head: accessed finance	Dummy=1 if household head has accessed formal credit or formal savings or owns a bank account, otherwise=0
Household: size	Number of members in household head household
Household: % of members aged ≤ 5	Number of household members aged 5 years

Variable details	Definition
	and below
Household: % of members aged 6–14	Number of household members aged 6–14 years
Household: % of members aged 15–60 (default variable)	Number of household members aged 15–60 years
Household: % of members aged > 60	Number of household members aged more than 60 years
Household: access to the internet	Dummy=1 if household has access to the internet, otherwise=0
Household: accessed to mobile phone	Dummy=1 if household has access to mobile phone, otherwise=0
Household: number of rooms	Number of rooms in household
Community: average head's formal education (years)	Mean number of years of household head's formal education in community
Region: north-central	Dummy=1 if household is situated in north-central, otherwise=0
Region: north-east	Dummy=1 if household is situated in north-east, otherwise=0
Region: north-west	Dummy=1 if household is situated in north-west, otherwise=0
Region: south-east	Dummy=1 if household is situated in south-east, otherwise=0
Region: south-south	Dummy=1 if household is situated in south-south, otherwise=0
Region: south-west	Dummy=1 if household is situated in south-west, otherwise=0
Household: proximity to markets	Dummy=1 if household community is situated within 5 km of markets, otherwise=0
Household: proximity to major town/city	Dummy=1 if household community is situated within 20 km of town with 20,000 population
Household: urban	Dummy=1 if household is located in an urban area, otherwise=0
Household: regional dummy	Dummy=1 if household is situated in southern Nigeria, otherwise=0
Household: presence of formal bank	Dummy=1 if a formal financial institution is located in close proximity to household, otherwise=0

Table A2: Definition of variables for enterprise growth

Variable details	Definition
Dependent variables	
Employee size growth	Dummy=1 if enterprise recorded growth in employee size, otherwise=0
Explanatory variables	
Household head: age	Household head's age in years
Household head: age squared	Household head's age squared
Household head: gender	Dummy=1 if household head is female, otherwise=0
Household head: education	Number of years in formal education
Household head: formally employed	Dummy=1 if household head is formally employed, otherwise=0
Household head: not formally employed (default)	Dummy=1 if household head is not formally employed, otherwise=0
Enterprise: accessed credit	Dummy=1 if enterprise has access to formal credit, otherwise=0
Enterprise: age (< 6 months)	Enterprise aged less than 6 months
Enterprise: age 6–24 months	Enterprise aged between 6 and 24 months
Enterprise: age 25–48 months	Enterprise aged between 25 and 48 months
Enterprise: age > 48 months	Enterprise aged more than 48 months
Enterprise: size – no fixed assets	Enterprise has no fixed assets
Enterprise: size N1–N20,000	Enterprise has fixed valued between N1 and N20,000
Enterprise: size N100,001–N500,000	Enterprise has fixed valued between N100,001 and N500,000
Enterprise: size N500,001–N1,000,000	Enterprise has fixed valued between N500,001 and N1,000,000
Enterprise: size > N1,000,000	Enterprise has fixed valued over N1,000,000
Enterprise: employee size < 2 employees	Enterprise has less than 2 employees
Enterprise: employee size 2–5 employees	Enterprise has between 2 and 5 employees
Enterprise: employee size 6–10 employees	Enterprise has between 6 and 10 employees
Enterprise: employee size > 10 employees	Enterprise has more than 10 employees
Enterprise: formal legal status	Dummy=1 if household head is female, otherwise=0
Enterprise: capital productivity(log)	Difference in sales revenue/difference in total

Variable details	Definition
	assets over the period
Enterprise: operates from home (default)	Dummy=1 if enterprise operates from home, otherwise=0
Enterprise: operates from commercial site	Dummy=1 if enterprise operates from a commercial site, otherwise=0
Enterprise: operates from other locations	Dummy=1 if enterprise operates from other locations, otherwise=0
Sector: manufacturing	Dummy=1 if enterprise operates in manufacturing sector, otherwise=0
Sector: construction	Dummy=1 if enterprise operates in manufacturing sector, otherwise=0
Sector: trade (default)	Dummy=1 if enterprise operates in trade sector, otherwise=0
Sector: transportation	Dummy=1 if enterprise operates in transportation sector, otherwise=0
Sector: services	Dummy=1 if enterprise operates in services sector, otherwise=0
Sector: others	Dummy=1 if enterprise operates in other sectors, otherwise=0
Enterprise: closeness to major road	Dummy=1 if enterprise community is situated within 5 km of major roads, otherwise=0
Enterprise: closeness to major town	Dummy=1 if enterprise community is situated within 20 km of town with 20,000 population
Enterprise: presence of formal bank	Dummy=1 if a formal financial institution is located in close proximity to enterprise, otherwise=0
Enterprise: Urban	Dummy=1 if enterprise is located in an urban area, otherwise=0
Household head: district-level access to mobile phone	Dummy=1 if household accesses internet at the district level, otherwise=0