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The Impact of Business Formalization on the Performance of Newly Formalized Microenterprises in Nigeria

Emmanuel Umoru Haruna[a]
Yuichiro Uchida[b]

While the formalization program for informal enterprises is a popular policy instrument in many developing countries, its effects on the performance of informal microenterprises are unclear. This study scrutinizes the effects of business formalization on the performance of informal microenterprises in Nigeria over the two-year period, 2018 and 2020. This study uses the difference-in-difference（DID）estimators, and the results indicate that business formalization of microenterprises led to higher annual valued added and annual net profits. Specifically, the newly formalized microenterprises increased their value added by 26% and net profits by 27% on average. The findings also show that the channels through which these increases occurred are improved access to electricity, increased microenterprise size, increased property investment, and access to and the use of mobile phones.

Keywords　formalization, informal economy, microenterprises, Nigeria

1　Introduction

Over the last decade, a number of developing countries have taken steps to minimize the size of informal sector since the proliferation of unregistered businesses can result in low domestic tax mobilization, increased inequality, low productivity, and disruption of macroeconomic policies（Berdiev and Saunoris, 2016；Capasso and Jappelli, 2013；Schneider and Enste, 2000；Tanzi, 1999）. Between 1991 and 2018, the size of informal sector in Nigeria was, on average, 57.1% of GDP（Medina and Schneider, 2019）, having the third largest informal sector in Africa.

The informal business activities in Nigeria are generally home-based, with no fixed premises

a　Graduate School of International Cooperation Studies, Kobe University, emharry22@yahoo.com
b　Graduate School of International Cooperation Studies, Kobe University, yuichiro.uchida@port.kobe-u.ac.jp

or operating outdoors (National Bureau of Statistics, 2018). The Government of Nigeria launched the Business Incentive Strategy (BIS) program in January, 2019 and later extended it from May to August, 2019, enabling informal enterprises to register their operations, open bank accounts, gain access to finance, and benefit from other government incentives such as grants. The program was a nation-wide initiative, and one of the first direct attempts implemented by the Corporate Affairs Commission (CAC), aiming at formalizing informal business activities.

As part of a government strategy to encourage the registration of informal enterprises, business registration fees were reduced by half, from N10,000 (about $ 25) to N5,000 (about $ 13). In addition, through the BIS program, government provided an online platform to register their businesses, as well as to allow a third-party registration platform (mostly by registered legal firms) to register on behalf of their clients. According to the CAC report 2019, the BIS initiative has registered over 2.8 million microenterprises since it started. The essence of the reforms is to make business registration and regulation as simple as possible for the overall benefit of the Nigerian economy.

This study investigates the effect of business formalization prompted by the BIS initiative in 2019 on the performance of newly formalized microenterprises using recent Nigerian survey data. The term, business formalization, refers to the process in which an informal enterprise turned its informal business activities to formal ones by having a government registration license to operate formally and legally (see Fajnzylber et al., 2011; McKenzie and Sakho, 2010; Rand and Torm, 2012). This study uses the data for the two-year period, 2018 and 2020, that is, the years before and after the BIS initiative in order to scrutinize the effects of business formalization of informal microenterprises on annual value added and annual net profits. The results indicate that the newly formalized microenterprises increased their annual value added by 26% and their annual net profits by 27% on average.

The remainder of the study is organized as follows. Section 2 describes data and methodology. Section 3 provides and discusses the results, and Section 4 draws a conclusion.

2 Data and Methodology

This study uses the data from the Access to Financial Services in Nigeria survey (A2F), 2018 and 2020, conducted by Enhancing Financial Innovation & Access (EFInA, 2020) to investigate the effects of business formalization on the performance of newly formalized microenterprises in Nigeria. In order to conduct difference in difference (DID) estimations, data was collected

for the two-year period, 2018 and 2020, that is the years before and after the Business Incentive Strategy (BIS) formalization program implemented in 2019. The sample of 11,821 informal microenterprises is obtained from the survey data, and these are divided into 4,472 treatment group consisting of the newly formalized microenterprises (informal microenterprises as in 2018 and became formal microenterprises by 2020) and 7,349 control group consisting of the informal microenterprises that remained informal as in 2020. Through the unique enterprise identifier, these microenterprises were tracked and matched between the two-year period. For those that could not be matched as a result of changes of locations were dropped from the sample.

To estimate the performance of the newly formalized microenterprises, this study uses the OLS estimation of the difference-in-differences (DID) method adopted by Demenet et al. (2016). The following is the empirical specification in this study:

$$Y_{it}=\beta_0+\beta_1 Treated_{it}+\beta_2 Post_{it}+\beta_3(Treated_{it}*Post_{it})+\beta_4 X_{it}+\varepsilon_{it} \quad (1)$$

where Y_{it} is the dependent variable (annual value added or annual net profits) of microenterprises i at period t. $Treated$ represents the assignment of a microenterprise to the treatment group, with a value of 1 indicating that a microenterprise is formalized, and 0 indicates otherwise. $Post_{it}$ is the time dummy for 2020, representing the period following the formalization program in 2019, and β_3 ($Treated_{it}*Post_{it}$) is a variable of interest and captures the effect of business formalization. X_{it} is the set of control variables, and ε_{it} is the error term.

In addition, this study also uses the fixed effect (FE) estimation of the DID method by adding fixed effects and endogeneity controls that are linked to time-invariant local and unobservable factors, such as microenterprise owner's characteristics and regulatory compliance, and it is specified as follows:

$$Y_{it}=\beta_0+\beta_1 Treated_{it}+\beta_2 Post_{it}+\beta_3(Treated_{it}\ \mathrm{x}\ Post_{it})+\beta_4 X_{it}+\delta_t+\lambda_t+\varepsilon_{it} \quad (2)$$

This specification includes microenterprise-level fixed effects to account for unobserved time-invariant factors that may be endogenous or omitted (see Mummolo and Peterson, 2018). These are the variables that may affect the performance of the newly formalized microenterprises. Accordingly, in this specification, δ_t and λ_t capture the fixed effects of the microenterprises and state-specific fixed effects, with standard errors clustered at the microenterprise-level. The primary aim of the DID approach is to achieve an unbiased estimate of the impact of business formalization, which includes two time periods ("pre" and "post") and two groups ("treatment" and "control") (Goodman-Bacon, 2021). Meyer (1995) argues that DID designs, particularly those employing a two-group (treated and control) and two-period approach, pro-

vide greater credibility and robustness in addressing endogeneity concerns that occur when comparing groups with differing characteristics. In line with the existing literature (see McKenzie and Sahko, 2010; Rand and Torm, 2012; Demenet et al., 2016; Do and Van Vu, 2021), this study considers two dependent variables, annual value added and annual net profits, and a set of covariates to include various microenterprise characteristics that may influence formalization decisions, namely age, sex, education, migration, and motivation. The analysis also controls for scale of operation (microenterprise size, borrowed money, bookkeeping, etc.), intensity of competition (supply, customers, etc.), access to infrastructure, and property investment.

3 Results

Table 1 shows the results for the effects of business formalization on annual value added of the newly formalized microenterprises in Nigeria by applying the DID-OLS and DID-FE estimators. Columns 1 to 3 show the results of DID-OLS, in which annual value added is positive and statistically significant for the newly formalized microenterprises. This indicates that the newly formalized microenterprises achieved a 26% increase in annual value added in 2020 compared with their annual value added in 2018. The DID-FE results from Columns 4 to 6 show almost the same level of the increases of annual value added even with additional controls (enterprise age, region, sector, education, sex, migration, age, and motive to begin a business) and with microenterprise owner's characteristics in panel A and B (columns 3 and 6). This finding indicates that becoming a formal microenterprise leads to higher annual value added in Nigeria.

In addition, the coefficients for the North dummy (Columns 2 to 3) are positive and statistically significant, indicating that Northern Nigerian newly formalized microenterprises are likely to have higher annual value added than Southern Nigerian counterparts. However, when microenterprise-level fixed effects are accounted for in the DID-FE results (columns 5–6), the effect becomes negative, implying that unobserved, microenterprise and state-specific factors may influence the relationship between location and annual value added. A possible explanation for these differences in the results is that certain unobserved factors unique to individual microenterprises, such as management practices or local market conditions in Northern Nigeria in which the Northern Nigerians are predominantly "Hausa-Fulani" ethnic people who have a history of migration from one area to another in pursuit of greener pastures, may have a major impact on annual value added of the newly formalized microenterprises.

Table 2 shows the results for the effects of business formalization on annual net profits of the newly formalized microenterprises in Nigeria. The effect of business formalization on annual

Table 1 The effects of business formalization on annual value added

	Annual value added (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	DID-OLS	DID-OLS	DID-OLS	DID-FE	DID-FE	DID-FE
Explanatory						
Post	0.330***	0.339***	0.340***	0.330***	0.331***	0.332***
	(0.0208)	(0.0208)	(0.0208)	(0.0208)	(0.0214)	(0.0214)
Treated	−0.005	0.012	0.007	0.323	0.317	0.292
	(0.0188)	(0.0188)	(0.0189)	(0.3873)	(0.3886)	(0.4039)
Formalization (treated*post)	0.265***	0.258***	0.255***	0.266***	0.265***	0.256***
	(0.0281)	(0.0280)	(0.0281)	(0.0281)	(0.0282)	(0.0283)
Panel A: (Controls) Microenterprise's Characteristics						
Region: North		0.059***	0.056***		−0.301***	−0.295***
		(0.0187)	(0.0194)		(0.0828)	(0.0720)
Enterprise age:						
3–5 years		−0.043***	−0.043***		−0.015	−0.018
		(0.0162)	(0.0165)		(0.0228)	(0.0231)
>10 years		0.013	0.012		0.021	0.014
		(0.0228)	(0.0229)		(0.0363)	(0.0365)
Sector:						
Manufacturing		−0.025	−0.022		−0.015	−0.012
		(0.0506)	(0.0506)		(0.0673)	(0.0673)
Trade		−0.052	−0.049		0.009	0.011
		(0.0438)	(0.0439)		(0.0571)	(0.0570)
Service		−0.043	−0.040		0.003	0.004
		(0.0439)	(0.0441)		(0.0570)	(0.0570)
Panel B: (Controls) Head Characteristics						
Sex			0.001			−0.015
			(0.0130)			(0.0199)
Migrant			0.032*			0.075***
			(0.0167)			(0.0248)
Education:						
Secondary school			0.005			−0.011
			(0.0149)			(0.0237)
Tertiary school			−0.030			−0.037
			(0.0358)			(0.0567)
Age:						
36–45 years			−0.012			−0.030
			(0.0169)			(0.0254)
46–65 years			−0.018			−0.031
			(0.0177)			(0.0261)
66+			−0.027			−0.049
			(0.0288)			(0.0430)
Motive to start a microenterprise:						
Reason: better income			−0.084***			−0.057**
			(0.0161)			(0.0266)
Reason: independent			−0.036			−0.021
			(0.0257)			(0.0390)
Reason: family/other			−0.081***			−0.057
			(0.0219)			(0.0385)
Constant	4.038***	4.046***	4.106***	3.914***	4.100***	4.160***
	(0.0144)	(0.0456)	(0.0493)	(0.1467)	(0.1651)	(0.1709)
R-squared	0.059	0.061	0.062	0.105	0.105	0.106
Control: head char.	×	✓	✓	✓	✓	✓
Control: all	×	×	✓	×	×	✓
Fixed Effects						
Enterprise FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	23,642	23,642	23,642	23,642	23,642	23,642
No. of newly formalized microenterprises	4,472	4,472	4,472	4,472	4,472	4,472

Notes: Dependent variable is annual value added, which is in log, and Post is a dummy indicating year after the formalization program, Treated is a dummy indicating microenterprises that formalized their businesses, and Formalization (treated*post) is the variable of interest. Values in parentheses are calculated using robust standard errors and are clustered at the enterprise-state level. ***, **, * show statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 2 The effects of business formalization on annual net profits

	Annual Net Profits (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	DID-OLS	DID-OLS	DID-OLS	DID-FE	DID-FE	DID-FE
Explanatory						
Post	0.280***	0.284***	0.285***	0.280***	0.283***	0.283***
	(0.0217)	(0.0218)	(0.0218)	(0.0217)	(0.0221)	(0.0222)
Treated	0.004	0.027	0.030	0.024	0.010	0.007
	(0.0200)	(0.0199)	(0.0202)	(0.3251)	(0.3317)	(0.3333)
Formalization (treated*post)	0.249***	0.245***	0.246***	0.249***	0.245***	0.243***
	(0.0301)	(0.0300)	(0.0300)	(0.0301)	(0.0301)	(0.0304)
Panel A: (Controls) Microenterprise's Characteristics						
Region: North		0.097***	0.056***		−0.763***	−0.753***
		(0.0202)	(0.0194)		(0.2125)	(0.1964)
Enterprise age:						
3–5 years		−0.014	−0.043***		−0.003	−0.004
		(0.0167)	(0.0165)		(0.0234)	(0.0236)
>10 years		0.011	0.012		−0.012	−0.014
		(0.0262)	(0.0229)		(0.0410)	(0.0413)
Sector:						
Manufacturing		0.073	−0.022		0.085	0.086
		(0.0535)	(0.0506)		(0.0814)	(0.0814)
Trade		−0.039	−0.049		−0.038	−0.037
		(0.0460)	(0.0439)		(0.0694)	(0.0694)
Service		−0.028	−0.040		−0.017	−0.016
		(0.0461)	(0.0441)		(0.0688)	(0.0689)
Panel B: (Controls) Owner's Characteristics						
Sex			0.002			0.014
			(0.0136)			(0.0189)
Migrant			−0.015			0.017
			(0.0190)			(0.0276)
Education:						
Secondary school			−0.004			−0.008
			(0.0159)			(0.0234)
Tertiary school			−0.025			−0.034
			(0.0389)			(0.0597)
Age:						
36–45 years			−0.002			0.001
			(0.0171)			(0.0241)
46–65 years			−0.018			−0.013
			(0.0190)			(0.0272)
66+			−0.014			0.004
			(0.0300)			(0.0378)
Motive to start a microenterprise:						
Reason: better income			−0.037**			−0.016
			(0.0170)			(0.0244)
Reason: independent			−0.023			−0.009
			(0.0258)			(0.0367)
Reason: family/other			−0.040*			−0.052
			(0.0231)			(0.0362)
Constant	4.023***	3.982***	4.018***	4.034***	4.526***	4.528***
	(0.0143)	(0.0486)	(0.0520)	(0.1236)	(0.1950)	(0.1908)
R-squared	0.044	0.047	0.047	0.078	0.079	0.079
Control: owner's char.	×	✓	✓	✓	✓	✓
Control: all	×	×	✓	×	×	✓
Fixed Effects						
Enterprise FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	23,642	23,642	23,642	23,642	23,642	23,642
No. of newly formalized microenterprises	4,472	4,472	4,472	4,472	4,472	4,472

Notes: Dependent variable is annual net profits, which is in log, and Post is a dummy indicating year after the formalization program, Treated is a dummy indicating microenterprises that formalized their businesses, and Formalization (treated*post) is the variable of interest. Values in parentheses are calculated using robust standard errors and are clustered at the microenterprise-state level. ***, **, * show statistical significance at the 1%, 5%, and 10% levels, respectively.

net profits is statistically significant, and the newly formalized microenterprises, on average, achieved a 27% increase in annual net profits in 2020 compared with their annual net profits in 2018. This indicates that business formalization brings about an increase in annual net profits in Nigeria.

Table 3 shows the results of the potential channels through which business formalization increases annual value added of the newly formalized microenterprises. These include access to infrastructure, scale of operations, and the number of reported issues (Demenet et al., 2016; Boly, 2018). The newly formalized microenterprises are divided into three groups: all microenterprises, sole-owned microenterprises, and microenterprises with one or more employees. The results for the all microenterprises show that electricity and property investment are positively correlated with annual value added, implying that access to reliable electricity and property ownership significantly enhance business operations.

In the case of sole-owned microenterprises, the DID-FE results indicate that electricity has a positive and substantial impact on annual value added, and the effect of mobile phones on annual value added is also positive and significant. The significant effect of electricity suggests that power availability directly supports business operations, whereas the positive impact of mobile phone usage implies the importance of business communications via mobile phone. These findings indicate how basic investments to infrastructure can help boost small businesses. The DID-OLS results show that property investment has a positive and statistically significant effect on annual value added, implying that owning or improving property assets can help boost small businesses as well. This suggests that property investments are likely to provide stable operational spaces, contributing to higher annual value added of the newly formalized microenterprises.

Further, compared with sole-owned microenterprises, the results for the microenterprises with one or more employees are weak, except for the statistically significant and positive effect of microenterprise size on annual value added.

Finally, the results obtained for the all microenterprises show that outdoor premises have a statistically significant negative effect on annual value added, as indicated by the DID-OLS and DID-FE results. This suggests that the microenterprises operating outside are unlikely to achieve higher annual value added. For the sole-owned microenterprises, the effect of outdoor premises on annual value added is negative and statistically significant (DID-OLS and DID-FE results). The results also show that for the microenterprises with one or more employees, outdoor premises have a negative and statistically significant effect on annual value added (DID-

Table 3 Channels through which business formalization improves annual value added

	Annual Value Added (log)					
	All enterprises		Sole-owned		1 + employee	
Variable	(1) DID-OLS	(2) DID-FE	(3) DID-OLS	(4) DID-FE	(5) DID-OLS	(6) DID-FE
Access to infrastructure:						
Water	−0.025	−0.062	−0.026	−0.097	0.047	0.038
	(0.0599)	(0.0497)	(0.0782)	(0.0493)	(0.0658)	(0.0735)
Electricity	0.006	0.016*	0.046	0.051**	−0.013	0.002
	(0.0244)	(0.0059)	(0.0343)	(0.0099)	(0.0288)	(0.0062)
Telephone	−0.012	0.007	−0.166*	−0.119	0.011	0.022
	(0.0388)	(0.0235)	(0.0924)	(0.1254)	(0.0414)	(0.0204)
Mobile phone	−0.025	0.006	−0.009	0.031*	−0.024	0.004
	(0.0174)	(0.0124)	(0.0290)	(0.0106)	(0.0209)	(0.0137)
Internet	0.013	−0.011	0.012	−0.013	0.009	−0.015
	(0.0203)	(0.0244)	(0.0309)	(0.0618)	(0.0235)	(0.0237)
Scale of operation:						
Enterprise size	0.005	0.006	0.012*	0.010	0.001	0.010*
	(0.0058)	(0.0042)	(0.0068)	(0.0062)	(0.0068)	(0.0040)
Outdoor premises	−0.040*	−0.042**	−0.088**	−0.077**	−0.030	−0.032*
	(0.0230)	(0.0110)	(0.0357)	(0.0133)	(0.0281)	(0.0130)
Borrowed money	−0.001	−0.004	−0.050*	−0.059	−0.000	−0.003
	(0.0165)	(0.0187)	(0.0266)	(0.0268)	(0.0194)	(0.0276)
Investment: property	0.030*	0.010	0.061**	0.034	0.017	−0.004
	(0.0167)	(0.0062)	(0.0262)	(0.0162)	(0.0188)	(0.0112)
Bookkeeping	0.002	−0.011	−0.018	−0.046	0.011	−0.000
	(0.0184)	(0.0110)	(0.0302)	(0.0210)	(0.0205)	(0.0162)
Reported issues:						
Supply	−0.020	−0.001	0.010	0.030	−0.030	−0.019
	(0.0194)	(0.0024)	(0.0294)	(0.0158)	(0.0225)	(0.0122)
Customers	−0.009	−0.023*	−0.013	−0.030	0.006	−0.012
	(0.0166)	(0.0077)	(0.0242)	(0.0144)	(0.0202)	(0.0075)
Competitors	−0.016	−0.023**	−0.011	−0.016	−0.017	−0.024*
	(0.0153)	(0.0042)	(0.0238)	(0.0110)	(0.0179)	(0.0082)
R-squared	0.060	0.136	0.068	0.181	0.062	0.141
Fixed Effects						
Enterprise FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	23,642	23,642	9,377	9,364	17,623	17,619
No. of newly formalized microenterprises	4,472	4,472	2,026	2,026	4,465	4,465

Notes: Values in parentheses are calculated using robust standard errors and are clustered at the enterprise-state level. ***, **, * show statistical significance at the 1%, 5%, and 10% levels, respectively.

FE result), whereas the effect is insignificant (DID-OLS result). This weakly suggests that outdoor premises are also likely to result in lower annual value added of those microenterprises.

Finally, Table 4 shows the results of the potential channels through which business formalization increases annual net profits of the newly formalized microenterprises. Following the previous table, the newly formalized microenterprises are divided into the three groups. The re-

Table 4 Channels through which business formalization improves annual net profits

	Annual Net Profits (log)					
	All sample		Sole-owned		1 + employee	
Variable	(1) DID-OLS	(2) DID-FE	(3) DID-OLS	(4) DID-FE	(5) DID-OLS	(6) DID-FE
Access to infrastructure:						
Water	−0.039	−0.114	−0.092	−0.188*	−0.003	−0.064
	(0.0696)	(0.0489)	(0.0946)	(0.0635)	(0.0820)	(0.0453)
Electricity	−0.028	−0.002	−0.009	−0.011	−0.039	−0.014
	(0.0263)	(0.0471)	(0.0354)	(0.0363)	(0.0311)	(0.0615)
Telephone	−0.015	0.005	−0.171*	−0.119	−0.002	0.013
	(0.0400)	(0.0529)	(0.0903)	(0.0731)	(0.0428)	(0.0559)
Mobile phone	0.044	0.012*	0.062*	0.036**	0.034	0.002*
	(0.0170)	(0.0132)	(0.0264)	(0.0110)	(0.0201)	(0.0090)
Internet	0.014	−0.016	0.012	0.004	0.009	−0.023
	(0.0218)	(0.0115)	(0.0317)	(0.0143)	(0.0246)	(0.0165)
Scale of operation:						
Enterprise size	0.005	0.003	0.011	0.006	0.006	0.011*
	(0.0059)	(0.0041)	(0.0069)	(0.0095)	(0.0068)	(0.0053)
Outdoor premises	−0.011	−0.010	−0.068*	−0.071	0.000	−0.003
	(0.0247)	(0.0254)	(0.0387)	(0.0491)	(0.0306)	(0.0215)
Borrowed money	0.010	0.007	−0.036	−0.031	0.012	0.009
	(0.0177)	(0.0141)	(0.0269)	(0.0316)	(0.0206)	(0.0190)
Investment: property	0.037**	0.009	0.074***	0.042*	0.026	0.007
	(0.0171)	(0.0240)	(0.0259)	(0.0143)	(0.0192)	(0.0216)
Bookkeeping	0.002	−0.011*	0.016	−0.006	−0.002	−0.009
	(0.0190)	(0.0045)	(0.0314)	(0.0350)	(0.0212)	(0.0180)
Reported issues:						
Supply	−0.030	−0.017	−0.014	0.009	−0.037	−0.031*
	(0.0200)	(0.0112)	(0.0296)	(0.0211)	(0.0237)	(0.0105)
Customers	0.014	0.010	−0.003	−0.010	0.019	0.004
	(0.0176)	(0.0097)	(0.0255)	(0.0155)	(0.0218)	(0.0193)
Competitors	0.007	−0.001	0.051**	0.040*	0.007	−0.001
	(0.0154)	(0.0161)	(0.0234)	(0.0133)	(0.0183)	(0.0116)
R-squared	0.045	0.132	0.056	0.189	0.047	0.140
Fixed Effects						
Enterprise FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Observations	23,642	23,642	9,377	9,364	17,623	17,619
No. of newly formalized microenterprises	4,472	4,472	2,026	2,026	4,465	4,462

Notes: Values in parentheses are calculated using robust standard errors and are clustered at the microenterprise-state level. ***, **, * show statistical significance at the 1%, 5%, and 10% levels, respectively.

sults for the all microenterprises using DID-OLS indicate a positive correlation between property investment and annual net profits, suggesting that these microenterprises derive financial benefits from investing in or owning property. Likewise, the mobile phone usage is positively associated with an increase in annual net profits, implying that mobile phone usage enhances business operations.

In the case of sole-owned microenterprises, the effects of property investment on annual net profits are positive and statistically significant. This indicates that property investment has a positive impact on annual net profits for the sole-owned microenterprises, with a particularly strong effect under the DID-OLS. In addition, the effects of competitors on annual net profits are positive and statistically significant. This implies that the presence of competitors may stimulate the business operations of the microenterprises, ultimately enhancing their annual net profits. Further, the mobile phone usage shows a positive and statistically significant impact on annual net profits. This suggests that the mobile phones usage help enhance business communications just like the result for annual value added, leading to improved annual net profits of the microenterprises.

Finally, compared with the sole-owned microenterprises, the results for the microenterprises with one or more employees are weak, except for the statistically significant and positive impact of the mobile phones usage on annual net profits (DID-FE result). Overall, these findings highlight the importance of property investment, mobile phone usage, and competitors' presence in achieving higher annual net profits of the newly formalized microenterprises in Nigeria.

4 Conclusion

This study investigated the effect of business formalization on the performance of the newly formalized microenterprises in Nigeria, using the DID estimators. Overall, the results indicate that business formalization resulted in higher annual value added and annual net profits. Specifically, this study found that the newly formalize microenterprises in Nigeria, on average, achieved a 26% increase in annual value added and a 27% increase in annual net profits. Further, it investigated the possible channels through which these increases occurred. This study identified improved and/or increased access to electricity, increased enterprise size, mobile phone usage, and increased property investment as the channels through which business formalization improved the performance of the newly formalized microenterprises.

Appendices

Table A1: Descriptive statistics

Variable	Post-treatment (2020)				Pre-treatment (2018)			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Annual Value Added (log	4.46	1.00	0.00	7.24	4.03	0.85	0.00	6.51
Annual Net Profits (log)	4.39	1.06	0.00	7.24	4.02	0.85	0.00	6.25
Formalization (business registration)	0.37	0.48	0.00	1.00	0.37	0.48	0.00	1.00
Formalization (tax registration)	0.02	0.16	0.00	1.00	0.03	0.17	0.00	1.00
Enterprise age	1.64	0.73	1.00	3.00	1.36	0.64	1.00	3.00
Sex: Male	0.45	0.49	0.00	1.00	0.45	0.49	0.00	1.00
Primary or less	0.57	0.49	0.00	1.00	0.57	0.49	0.00	1.00
Secondary school	0.39	0.49	0.00	1.00	0.39	0.49	0.00	1.00
Tertiary school	0.02	0.16	0.00	1.00	0.02	0.16	0.00	1.00
Age of enterprise-owner	38.80	15.89	20	96	37.56	15.97	18.00	94.00
Migrant	0.22	0.41	0.00	1.00	0.16	0.36	0.00	1.00
Construction	0.02	0.14	0.00	1.00	0.02	0.16	0.00	1.00
Manufacturing	0.05	0.22	0.00	1.00	0.06	0.23	0.00	1.00
Trade	0.45	0.49	0.00	1.00	0.45	0.49	0.00	1.00
Service	0.47	0.50	0.00	1.00	0.46	0.49	0.00	1.00
Region	0.62	0.48	0.00	1.00	0.62	0.48	0.00	1.00
Motivation: no work	0.25	0.43	0.00	1.00	0.25	0.43	0.00	1.00
Motivation: better income	0.47	0.50	0.00	1.00	0.47	0.50	0.00	1.00
Motivation: independent	0.07	0.26	0.00	1.00	0.07	0.26	0.00	1.00
Motivation: family/other	0.18	0.39	0.00	1.00	0.18	0.39	0.00	1.00
Water	0.02	0.14	0.00	1.00	0.01	0.06	0.00	1.00
Electricity	0.16	0.37	0.00	1.00	0.04	0.21	0.00	1.00
Telephone	0.06	0.24	0.00	1.00	0.01	0.08	0.00	1.00
Mobile phone	0.76	0.42	0.00	1.00	0.28	0.44	0.00	1.00
Internet	0.25	0.43	0.00	1.00	0.07	0.26	0.00	1.00
Enterprise size	1.26	1.32	0.00	17	0.80	0.93	0.00	15.00
Outdoor premises	0.02	0.16	0.00	1.00	0.11	0.31	0.00	1.00
Borrowed money	0.20	0.43	0.00	1.00	0.14	0.35	0.00	1.00
Investment: property	0.32	0.46	0.00	1.00	0.15	0.36	0.00	1.00
Bookkeeping	0.62	0.48	0.00	1.00	0.07	0.26	0.00	1.00
Supply	0.58	0.49	0.00	1.00	0.09	0.28	0.00	1.00
Customers	0.11	0.32	0.00	1.00	0.28	0.45	0.00	1.00
Competitors	0.41	0.49	0.00	1.00	0.26	0.44	0.00	1.00

Note: This table reports the descriptive statistics for the baseline sample of 23,642 over two periods (2018 and 2020).

Table A2: Definitions of the variables used in the empirical analysis

Variable	Description	Measurement
Formalization (business registration)	Whether the microenterprise owner register a business	1 = yes; 0 = otherwise
Formalization (tax registration)	Whether the microenterprise owner have a tax ID	1 = yes; 0 = otherwise
Log of Value added	Logarithms of annual Naira value of sales minus the costs used as intermediate inputs in production such as materials and services used.	Logarithm of the amount
Log of Net profits	Logarithms of annual value added minus total pay bill and taxes.	Logarithm of the amount
Microenterprise age	Years since microenterprises started operation.	Years
Age	Years (in age) of the microenterprise owner, active working age 36–65.	Years
Investment	Whether the microenterprise owner have investment such as property, land, machinery, and equipment.	1 = yes; 0 = otherwise
Sector	Sector of operation of microenterprise-owner.	1 = yes; 0 = otherwise for each sub-sector
Male	If the microenterprise owner is a male or not.	1 = yes; 0 = otherwise
Migrant	Whether microenterprise owners migrate to different locations.	1 = yes; 0 = otherwise
Education	Years of education of the microenterprise owner.	Years of education
North	Whether or not the microenterprise owner operates in the Northern region.	1 = yes; 0 = otherwise
Motivation	Reason for the microenterprise owner to start a business.	1 = yes; 0 = otherwise
Water	Whether or not the microenterprise owner has access to water.	1 = yes; 0 = otherwise
Electricity	Whether or not the microenterprise owner has access to electricity.	1 = yes; 0 = otherwise
Telephone	Whether the microenterprise owner has telephone access.	1 = yes; 0 = otherwise
Mobile phone	Whether the microenterprise owner has access to a mobile phone.	1 = yes; 0 = otherwise
Internet	Whether the microenterprise owner has internet access.	1 = yes; 0 = otherwise
Enterprise size	Number of employees engaged by the microenterprise-owner.	Values
Outdoor premises	Whether the microenterprise's owner operates an outside business.	1 = yes; 0 = otherwise
Borrowed money	Whether the microenterprise owner has access to financing.	1 = yes; 0 = otherwise
Bookkeeping	Whether the microenterprise owner keeps accurate financial records.	1 = yes; 0 = otherwise
Supply	Whether the microenterprise owner's access to raw materials is constrained.	1 = yes; 0 = otherwise
Customers	Whether the microenterprise owner's ability to sell products is constrained.	1 = yes; 0 = otherwise
Competitors	Whether the microenterprise owner has more competition.	1 = yes; 0 = otherwise

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