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Macro-Structural Obstacles to Firm Performance:
Evidence from 2,640 Firms in Nigeria

by Amr Hosny

I N T E R N A T I O N A L   M O N E T A R Y   F U N D

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African Department

**Macro-Structural Obstacles to Firm Performance:
Evidence from 2,640 Firms in Nigeria**

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Abstract

A recent World Bank enterprise survey identified access to finance as the top constraint to
Doing Business in Nigeria. In this context, the objective of this paper is two-fold: (i) study firm
characteristics associated with more access to finance and export diversification; and (ii)
quantify the impact of these structural obstacles on firm performance. Results suggest that (i)
larger and export-oriented firms are about 40 percentage points less likely to report access to
finance as a business obstacle, while firms perceiving access to finance as a constraint are, on
average, about 10-40 percentage points less likely to be export-oriented diversified firms; and
(ii) better access to finance and export diversification can help firm employment —as much as
80 percent higher— and capacity utilization. Results are largely robust to different
specifications and estimation methods.

I. INTRODUCTION AND CONTRIBUTION TO THE LITERATURE

Allowing the private sector to become an engine of growth and job creation requires understanding the constraints to Doing Business. The Nigerian authorities' Economic Recovery and Growth Plan (ERGP) states that *"... Economic recovery and transformative growth cannot be achieved by the government alone. It is essential to harness the dynamism of business and the entrepreneurial nature of Nigerians .... The plan prioritizes the provision of a more business friendly economic environment ..."*. To do this, one needs to understand the perception of private sector firms regarding the business environment in which they operate.

Recently, the World Bank conducted an Enterprise Survey (WBES) to better understand the business environment in Nigeria.[2] This is part of the World Bank's global efforts to promote improved business environments through collecting objective survey data of representative samples of economies' private sector, which to date has covered over 135,000 firms in 139 different countries. The Nigeria-specific survey–conducted in 2014-15 and covering 2,640 private firms in the manufacturing and services sectors in 19 states in Nigeria – asked firms about their experiences in a broad range of dimensions of the business environment in which they operate, as well as information on individual firm characteristics. WB (2009a; 2009b) outline the general survey methodology, WB (2015) reports the Nigeria enterprise survey questions, and WB/IFC (2015) summarizes Nigeria country responses.

In this context, the objective of this study is two-fold. First, is to study firm characteristics associated with more access to finance and export diversification. Second, is to quantify the impact of access to finance and export diversification on firm performance in Nigeria.

The study contributes to the literature by using firm-level data in Nigeria, an important developing country, for the first time including through linking access to finance and export diversification. Although a few studies in the empirical literature utilized the WBES on African countries (Islam et al 2016; Abdu and Jibir 2018), and on determinants of access to finance (Kuntchev et al 2013; Asiedu et al 2013), this is the first study to focus on determinants of access to finance using firm-level data and the first study to quantify the impact of better access to finance and export diversification on firm performance in Nigeria.

Given mixed theoretical underpinnings, the relationship between access to finance and firm performance is ultimately an empirical question. While an extensive theoretical and empirical literature exists on the relationship between finance and economic growth (see Levine 2004 for a survey), the link between access to finance and firm level performance (such as job

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[2] The full questionnaire, sampling methods, and data are accessible at http://www.enterprisesurveys.org/

growth or export orientation) is less clear. Ayyagari et al (2016) argue that, on one hand, a case of jobless growth may arise if firms grow by increasing investments though better access to finance but without increasing labor; while on the other hand, some theoretical literature suggests that labor has a fixed cost component that requires upfront financing related to training and hiring (Benmelech et al 2011) and entering foreign markets (Melitz 2003; Bellone et al 2010). Similarly, recent studies theorize that credit frictions may explain episodes of trade declines during the global financial crisis (Chor and Monva 2012; Ahn et al 2011), while others relate it to changing sectoral compositions of world trade and declines in manufacturing production and efficiency not the credit channel (Eaton et al 2016; Levchenko et al 2010). Ultimately, the finance-growth-exports relationship is an empirical question, something which this paper seeks to quantify using firm-level data in the case of Nigeria.

Stylized facts from the WBES surveyed firms in Nigeria show: (i) Access to finance as the number one constraint to business by one-third of surveyed firms. This was followed, although to a lesser extent, by electricity and corruption; and (ii) only larger firms have been able to invest in improving their research and production methods, and perform better. Higher employment and capacity growth rates have been observed in firms with a higher degree of export diversification.
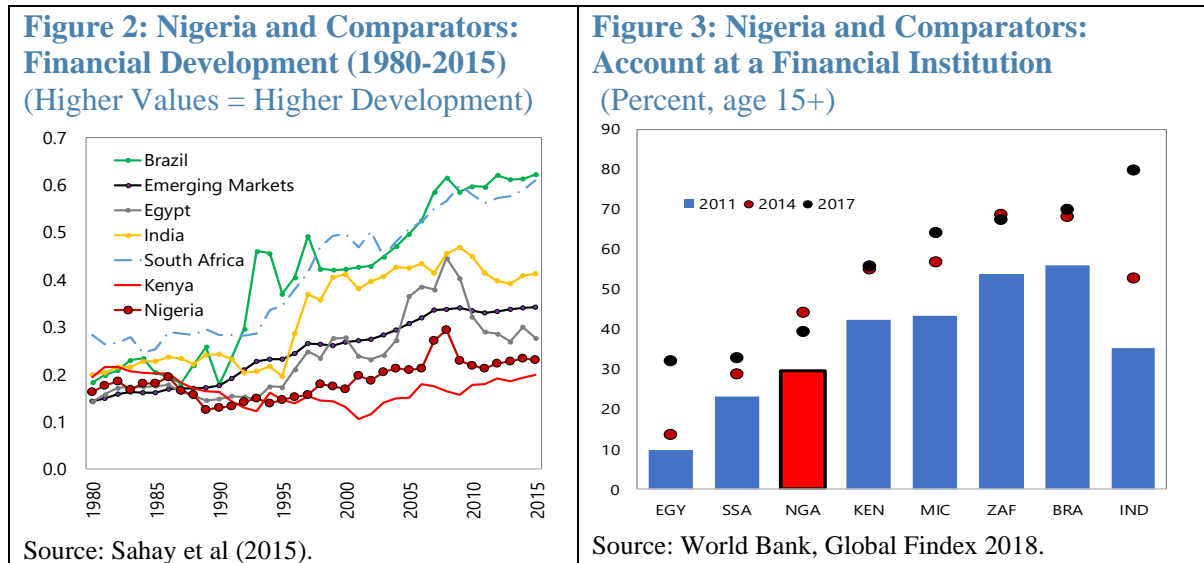
These survey results seem at odds with the existing supportive legal environment for access to credit. Nigeria's "getting credit" sub-component of the overall ease of doing business index[3], is among the best in the world (Figure 1), reflecting a supportive legal environment for access to credit. Yet firm survey responses suggest that there must be implementation gaps and/or impediments to accessing credit. For example, banks' lending to the private sector is limited by high risk aversion, which along with high-yield risk-free government and Central Bank of Nigeria (CBN) bills, are not conducive for lending given fear of credit risk.

Figure 1: Ease of Doing Business

World Bank Doing Business Indicators
(Higher scores indicate a worse rating)

Sources: World Bank Doing Business Indicators, 2018 Report.

Financial development in Nigeria has been lagging peer economies. While financial development in Nigeria (index capturing financial access and efficiency across financial institutions and markets) was similar
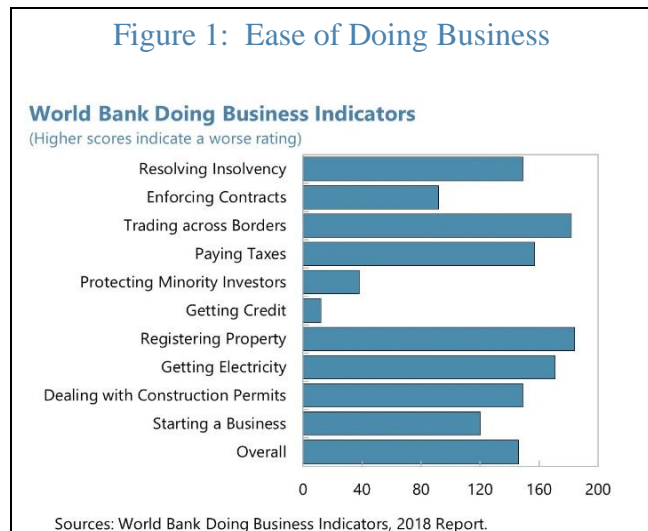
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in the 1980s to current emerging market and frontier economies, it has only slightly improved over the past three decades (Figure 2). On average, while financial access in Nigeria (measured by ownership of an account at a financial institution) has increased significantly between 2011 and 2017, it has remained relatively flat between 2014 and 2017 (Figure 3).

Figure 2: Nigeria and Comparators: Financial Development (1980-2015) (Higher Values = Higher Development)

Source: Sahay et al (2015).

Figure 3: Nigeria and Comparators: Account at a Financial Institution (Percent, age 15+)

Source: World Bank, Global Findex 2018.

Using several estimation methods and model specifications, we find that:

- The easier the access to credit, the more diversified firms are. Larger and, export-oriented firms are, on average, about 40 percentage points less likely to report access to finance as a business obstacle, compared to smaller and non-export-oriented firms. Younger, domestic-owned firms with access to finance constraints are associated with less diversified exports. Specifically, firms perceiving access to finance as a constraint are, on average, about 10-40 percentage points less likely to be export-oriented diversified firms. These empirical results shed light on the characteristics of firms that view access to finance as a constraint, which in turn hinders their efforts at diversifying their exports. Results hold under different econometric estimation techniques (ordered logit/probit vs binary logit/probit), as well as other robustness checks such as changing model specifications and inclusion of country fixed dummies.

- Better access to finance and export diversification improve firm performance. For example, results suggest that firms who perceive access to credit as a constraint to their business have, on average, around 80 percent lower employment growth and around 30 percent lower capacity utilization growth, compared to firms where access to finance is not perceived as a constraint. Robustness of results is confirmed using an endogenous treatment regression approach that corrects for potential endogeneity and allows causal interpretation.

This paper is structured as follows. Section II will analyze Nigeria survey responses. Section III will present the econometric model, methodology and results. Finally, Section IV will conclude and provide some policy implications.

II. AN INITIAL LOOK AT THE DATA

The WBES covers a representative sample of formal private sector firms in Nigeria. According to WB (2015) and WB/IFC (2015), private firms need to be formally registered, have employees,[4] and operate in the manufacturing, retail or other services sectors to be included in the survey.[5] Firms with 100 percent state ownership are excluded. Firms are chosen through random sampling, stratified by industry, size and region. This led to a sample of 2,640 private firms in Nigeria. See appendix for survey questions corresponding to each of the following areas.
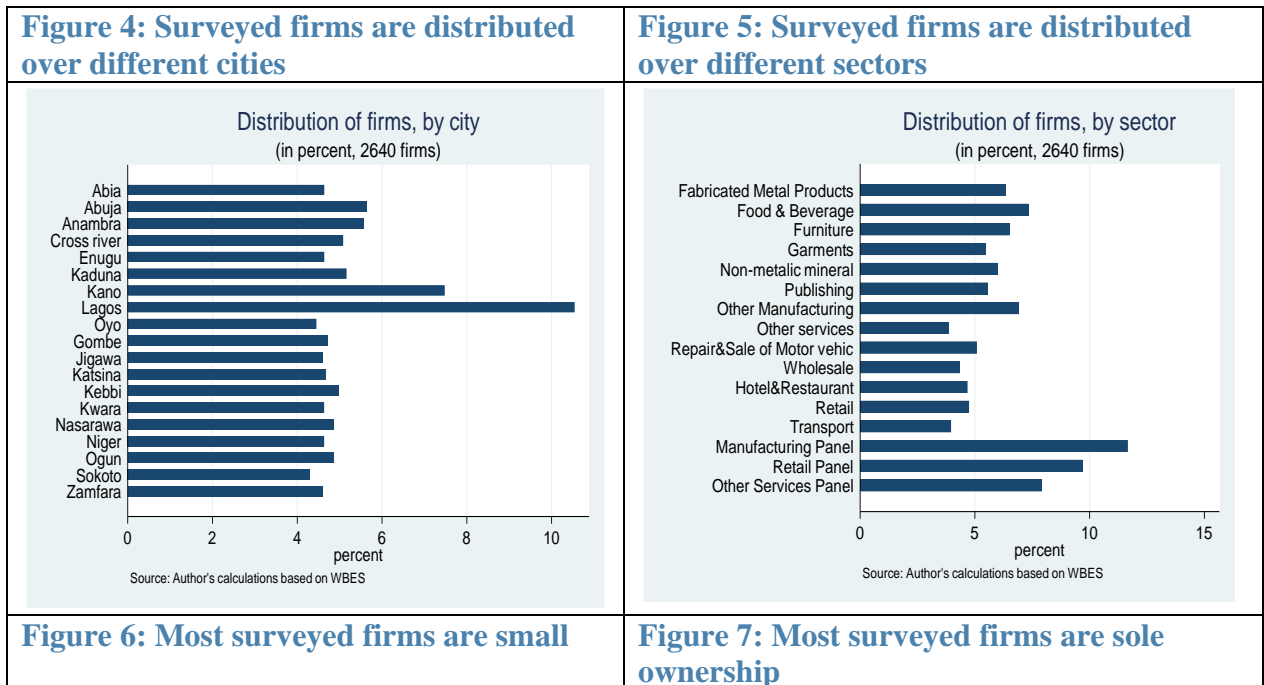
Survey responses also reveal that:

- Firms vary in their characteristics. Figure 4 shows the geographical distribution, Figure 5 the sectoral distribution and Figure 6 the size distribution of surveyed firms. Most surveyed firms are single ownership (Figure 7), with their sales directed toward the domestic market (Figure 8) and are mostly domestically owned (Figure 9). On average, firms reported around 16 years of operations, ranging from an average low of 14 years in small firms to a high of 27 years in large firms (Figure 10). Specific technical skills are the most important in hiring decisions, followed by social skills (Figure 11), while skills are not a constraint to hiring women in more than 60 percent of cases (Figure 12).

- Firm performance also varied. Micro-sized firms appear to have experienced the highest growth in both their employment and capacity utilization rates (Figure 13).

- Access to finance is identified as the top obstacle to firm operations in almost one-third of the surveyed firms (Figure 14). Electricity and corruption came in second and third place. By firm size, access to finance appears to be the top obstacle in micro and small firms, while electricity is more of a binding constraint in medium and large-sized firms (Figure 15). Beck et al (2005) using a firm-level survey covering 54 countries also find that it is mostly small firms who are typically the most credit constrained.

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[4] Firm size is defined as micro (less than 5 employees), small (5-19), medium (20-99), and large (more than 99 employees).

[5] Agriculture, fishing and extractive industries, utilities and some services sectors, (such as financial services, education and healthcare) are not included in the survey.

- Investments in research and production methods is rather limited. Responses indicate that over 80 percent of surveyed firms did not spend on formal research and development activities over the last 3 years (Figure 16), especially so in smaller firms.

Combining diversification efforts with firms' export orientation, we define a measure of export diversification as an interaction variable of each firm's export orientation (whether exports are above 10 percent of sales) multiplied by a measure of diversification (spending on R&D or improved production methods). An analysis of survey results suggest that firm performance seems to be better in firms with higher export diversification (Figure 17). Regarding production methods, only large firms seem to have marginally invested in improving their underlying methods for production or supply of products (Figures 18 and 19). Relatedly, Abdu and Jibir (2018), using WBES for Nigeria, find that export status is an important determinant of firm's propensity to invest in R&D.

Figure 4: Surveyed firms are distributed over different cities	Figure 5: Surveyed firms are distributed over different sectors
Distribution of firms, by city (in percent, 2640 firms) Source: Author's calculations based on WBES	Distribution of firms, by sector (in percent, 2640 firms) Source: Author's calculations based on WBES
Figure 6: Most surveyed firms are small	**Figure 7: Most surveyed firms are sole ownership**

Distribution of firms, by size
(in percent, 2640 firms)

Micro <5

Small >=5 and <=19

Medium >=20 and <=99

Large >=100

percent

Source: Author's calculations based on WBES

Firm legal status
(in percent, 2640 firms)

DON?T KNOW (SPONTANEOUS)

Shareholding company with shares

Shareholding company with non-tr

Sole proprietorship

Partnership

Limited partnership

OTHER (SPONTANEOUS?SPECIFY)

percent

Source: Author's calculations based on WBES

Figure 8: Most firms sell to national markets
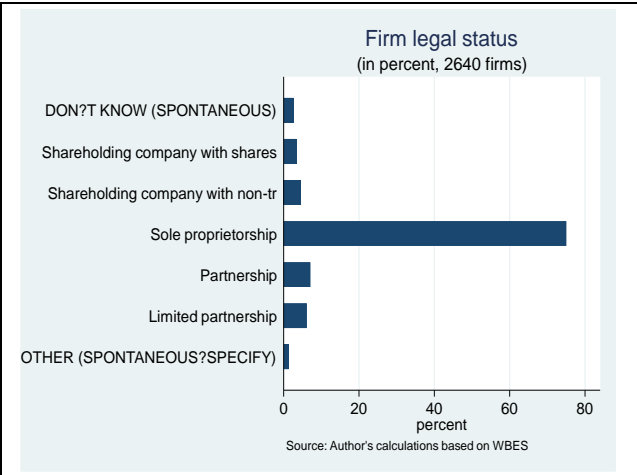
Figure 9: Most firms are domestically owned

Destination of firm's sales
(percentage, average per firm size)

Micro <5

Small >=5 and <=19

Medium >=20 and <=99

Large >=100

Domestic | Indirect exports
Direct exports

Source: Author's calculations based on WBES
Note: Indirect exports are domstic sales to third parties that export

Firm ownership structure
(percentage, average per firm size)

Micro <5

Small >=5 and <=19

Medium >=20 and <=99

Large >=100

Private domestic | Private foreign
Government/State | Other

Source: Author's calculations based on WBES
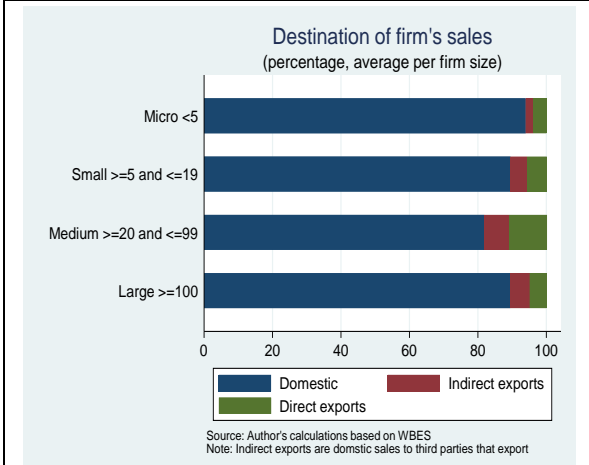
Figure 10: Firms, on average, are 16 years old
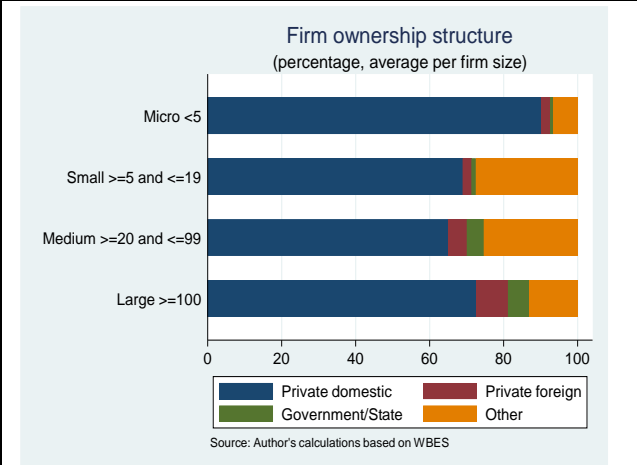
Figure 11: Technical skills are the most important in hiring decisions

Firm years in operation
(years, average per firm size)

Micro <5

Small >=5 and <=19

Medium >=20 and <=99

Large >=100

mean of life

Source: Author's calculations based on WBES

Most importnat skill when hiring?
(in percent, 2640 firms)

Social skills such as communicat

Foreign language skills

Basic skills (e.g., reading, wri

Specific technical and operation

percent

Source: Author's calculations based on WBES

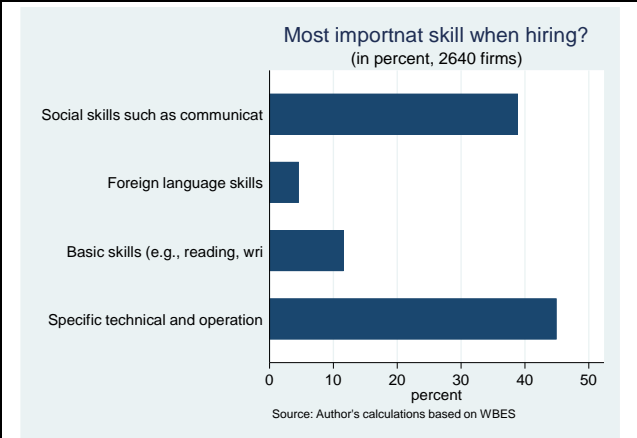**Figure 12: Skills is typically not a constraint in hiring women**

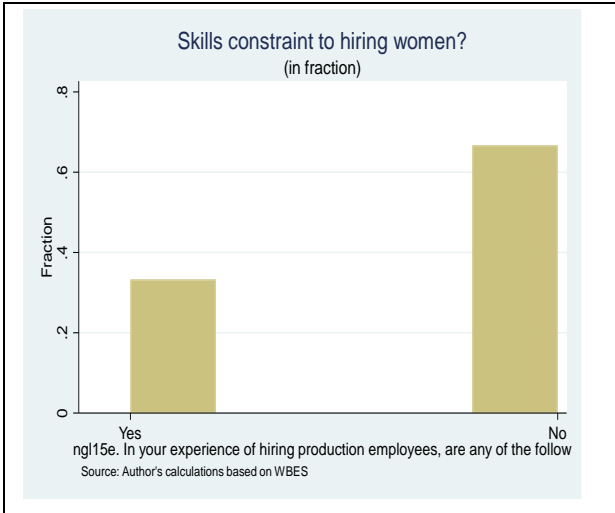**Figure 13: Performance varied across firm sizes**

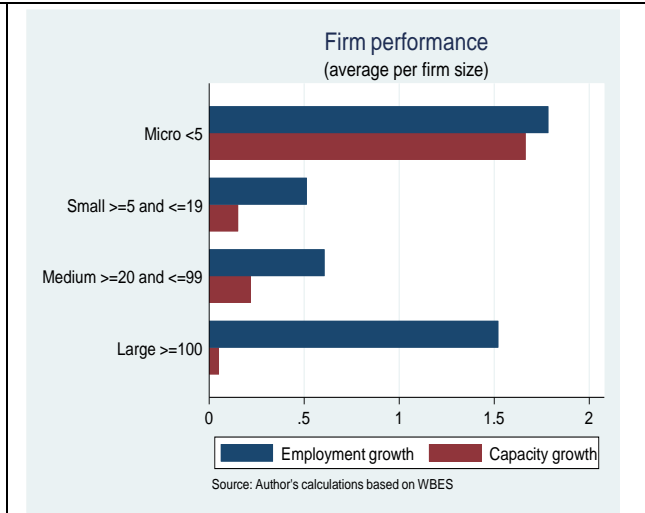**Figure 14: Access to finance is the top obstacle to firm operations**

Figure 15: Especially in smaller firms

Figure 16: Most firms did not spend on research and development recently
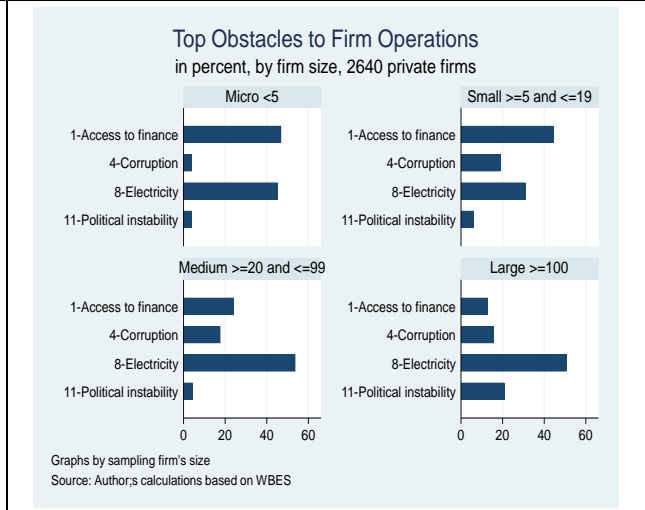
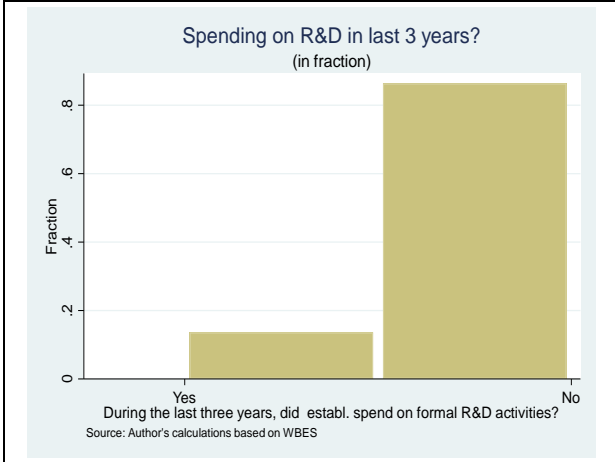**Figure 17: Better firm performance with more export diversification**

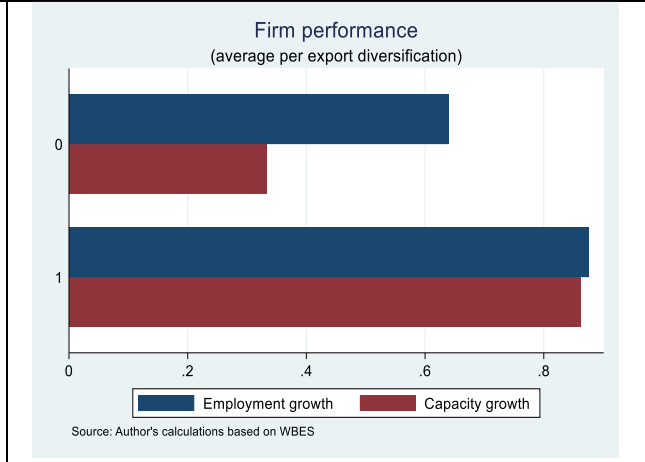**Figure 18: Half of the sample only recently improved production methods**

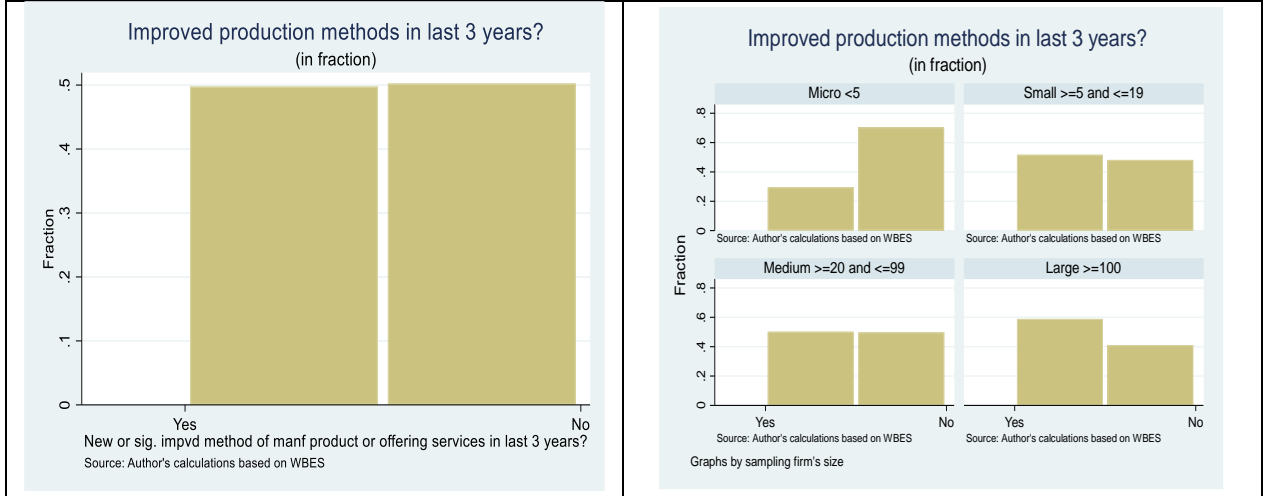**Figure 19: Especially in large firms**

Source: Author's calculations based on WBES

III. THE MODEL, METHOD AND RESULTS

A. Access to Finance and Firm Characteristics

An ordered logit/probit model is estimated to study which firms perceive access to finance as a constraint to business. The dependent variable is "Access to finance" constructed from the ordinal[6] responses to the question: *To what degree is access to finance an obstacle to their current operations of this establishment?* Responses ranged from "No obstacle" (taking a value of 0) to "Very severe obstacle" (a value of 4). Estimation is done by maximum pseudo-likelihood:

$$Accesstofinance_{ist} = f(X_{ist}, ExportDiversification_{ist})$$

where the dependent variable $Accesstofinance_{ist}$ of firm i in sector s at time t is a function of X_{ist} a set of independent/control variables representing firm characteristics. $Accesstofinance_{ist}$ would range from 0 to 4 in the ordered logit/probit, while we also suppress the responses into a simpler 0 1 for use in a binary logit/probit.[7] Firm characteristics, the independent variables, come from survey questions covering aspects such as firm age, export status, size, ownership structure, and manager experience and education levels. Importantly, we are also interested in *ExportDiversification_{ist}*, as defined above. The choice of explanatory variables builds on recent

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[6] An ordinal variable is a variable that is categorical and ordered.

[7] The binary indicator would take the value of 1 if responses are "major constraint" or "very severe constraint", and 0 otherwise, following EBRD/EIB/WB (2016) and Hosny (2017). Binary models allow easier interpretation of results and can be used as first step regressions in treatment-effect estimators as explained below.

work by Kuntchev et al. (2013) on more than 100 countries, EBRD/EIB/WB (2016) and Hosny (2017) on a sample of MENA countries, and Hosny (2018) on Egypt.

Results of the model imply:

- Larger, export-oriented firms are less likely to report access to finance as a business obstacle (table 1, models 1-3). Coefficients attached to firm size (higher value implies larger firm) and export orientation (firms with exports representing 10 percent or more of sales, following definition in Bellone et al 2010 and EBRD/EIB/WB 2016) are negative and statistically significant. Specifically, results suggest that larger and export-oriented firms, on average, are about 40 percentage points less likely to report access to finance as a constraint compared to smaller and non-export-oriented firms. These types of firms may have stronger financial balance sheets and as such have easier access to credit. This is in line with Castagnino et al (2013) who, using Argentinian firm-level data, find that larger firms typically perform better in exports markets, partly due to their easier access to credit.

- Higher manager education levels (models 1 and 3) and foreign firm ownership (model 2) show some evidence of easier access to credit. For example, foreign firms are, on average, around 30 percentage points less likely to report access to finance as a constraint compared to domestic-owned firms, which could possibly be explained by their easier access to foreign sources of credit.

- There is weak evidence on gender and access to finance constraints (model 4). The dummy variable on female top manager is positive and weakly statistically significant in one of the models. This result is close to Asiedu et al's (2013) finding that female-owned firms in Sub-Saharan Africa are more likely to be financially constrained than male-owned firms using WBES data 34,342 firms from 90 developing countries.

- Surprisingly, results suggest that export diversification has an inconclusive impact on access to credit. This could be explained by the fact that the statistically significant coefficient on export orientation is already capturing some of this aspect or by reverse causality—that access to credit influences export diversification rather than the other way around. We return to this point in the section on export diversification below.

Table 1: Determinants of Access to Finance: Ordered and Binary Logit/Probit

Dep. variable: Access to finance	Ordered Logit/Probit			Binary Logit/Probit		
	(1) Logit	(2) Probit	(3) Logit	(4) Logit	(5) Probit	(6) Logit
Firm size	-0.273*	-0.182**	-0.259	-0.441**	-0.27***	-0.436

Dep. variable: Access to finance	Ordered Logit/Probit			Binary Logit/Probit		
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit	Probit	Logit	Logit	Probit	Logit
	(0.162)	(0.086)	(0.168)	(0.184)	(0.096)	(0.281)
Young firm (Y/N)	0.015	0.091	-0.014	0.341	0.410	1.349*
	(0.472)	(0.297)	(0.481)	(0.473)	(0.309)	(0.782)
Manager experience, in years	-0.005	-0.005	-0.004	0.006	0.003	-0.000
	(0.012)	(0.006)	(0.012)	(0.013)	(0.008)	(0.024)
Foreign ownership (Y/N)	-0.306	-0.314*	-0.114	-3.522***	-1.81***	-3.40***
	(0.326)	(0.188)	(0.345)	(0.891)	(0.422)	(1.020)
Manager education level	-0.123*	-0.009	-0.130*	-0.112	0.001	0.017
	(0.069)	(0.045)	(0.069)	(0.091)	(0.054)	(0.158)
Exports oriented firm (Y/N)	-0.41**	-0.335**	-0.195	-0.566*	-0.56***	-0.144
	(0.204)	(0.135)	(0.177)	(0.296)	(0.174)	(0.531)
Top manager female (Y/N)	0.174	0.246	0.178	0.603*	0.406	
	(0.356)	(0.189)	(0.362)	(0.364)	(0.282)	
Export oriented * Improved methods			-0.79**	-0.194	-0.171	-0.137
			(0.353)	(0.449)	(0.245)	(0.741)
Export oriented * R&D			0.779**			-1.036
			(0.379)			(1.187)
Observations	2498	2498	2447	2471	2471	759
City/Region FE	Yes	No	Yes	Yes	No	No

Standard errors in parentheses. Estimation is done using survey weights. Constant and dummies not reported.
*** p<0.01, ** p<0.05, * p<0.1

As other robustness checks, we replace the 10 percent exports dummy (Y/N) with the ordered exports variable, as well as foreign ownership dummy (Y/N) with the ordered foreign ownership variable. Results are also largely similar if we define the binary dependent variable as taking the value of 1 if responses also include "moderate obstacle", while taking the value of 0 for "no" and "minor" obstacles only.

B. What Drives Firm's Export Diversification?

What are the determinants of export diversification at the firm level? We estimate a logit/probit where the dependent variable is a binary export diversification, as defined above. We include typical firm characteristics and access to finance as explanatory variables.

Access to finance is associated with higher likelihood of firms' export diversification. Table (2) shows results using a binary logit and probit, using both the ordered and the binary variable on access to finance defined above. Results suggest that firms perceiving access to finance as a constraint are, on average, about 10-40 percentage points less likely to be export-oriented diversified firms (models 7-10). Adding sectoral dummies, to account for any sector-specific fixed effects (for example if certain sectors by nature are more reliant on credit as argued in

Chor and Monva 2012), does not change the results (models 8 and 10). Similar evidence is reported in Castagnino et al (2013) using WBES firm-level data in Argentina and Kumarasamy and Singh (2018) using WBES data in 16 Asian-Pacific countries. They show that firms with more access to credit are more likely to export, and those with more access to foreign financing can have more diversified exports. This is also in line with the general finding that improving access to credit helps with export diversification especially so in commodity exporting countries given the Dutch disease effect (Giri et al 2019).

Table 2: Determinants of Export Diversification: Binary Logit/Probit

Dependent variable: Export diversification	Logit		Probit	
	(7)	(8)	(9)	(10)
Young firm (Y/N)	-0.753*	-0.701*	-0.396*	-0.393**
	(0.457)	(0.414)	(0.202)	(0.186)
Manager experience, in years	0.00516	-0.00232	0.000507	-0.00258
	(0.0116)	(0.0123)	(0.00597)	(0.00614)
Foreign ownership (Y/N)	1.971***	1.759**	1.150***	1.050**
	(0.700)	(0.713)	(0.423)	(0.426)
Manager education level	0.149	0.193	0.0598	0.0788
	(0.172)	(0.159)	(0.0708)	(0.0701)
Access to finance obstacle, ordered	-0.107*	-0.133***		
	(0.0584)	(0.0495)		
Access to finance obstacle, binary			-0.382*	-0.433**
			(0.198)	(0.184)
Observations	2,539	2,539	2,539	2,539
Size FE	YES	YES	YES	YES
Sector FE	NO	YES	NO	YES

Standard errors in parentheses. Estimation is done using survey weights. Constant and dummies not reported.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Other results show that younger, domestic-owned firms are associated with less diversified exports (models 7-10). Specifically, results suggest that younger firms are, on average, 40-75 percentage points less likely to report diversified exports. Moreover, foreign ownership seems to be associated with more diversified exports in all specifications as well. Adding sectoral fixed effects does not change the results (models 8 and 10).

C. Access to Finance and Firm Performance

Does access to finance affect firm performance? In what follows, the dependent variable is firm performance as in the following specification:

$$Y_{ist} = f(X_{ist}, Accesstofinance_{ist}, ExportDiversification_{ist})$$

where the dependent variable Y_{ist} is a measure of firm performance (growth of employment and capacity utilization) of firm i in sector s at time t. The change in capacity utilization can also be inferred as changes in firm productivity (Kumarasamy and Singh 2018). Independent variables include X_{ist} a set of control variables representing firm characteristics as identified in previous sections. Variables of interest are $Accesstofinance_{ist}$ and $ExportDiversification_{st}$, as defined above.

The perception of access to finance can be endogenous to firm performance where an unobserved variable affects both firm performance and access to finance. In our context, our objective is to study the effect of access to finance on firm performance. But suppose that a third variable (for instance, political connections) affects both the treatment (perception of access to finance) and the outcome (firm performance), then we have an endogeneity problem.[8] As a result, OLS estimates could suffer from a selection bias problem. To address this issue, we use *an endogenous treatment-regression model* originating from the program evaluation literature that allows the estimation of a linear regression which includes an endogenous binary treatment variable.

We use treatment-effects estimators to extract experimental-style causal effects from observed data. To use non-experimental data to obtain causal effects, in this context, each firm's probability to receive a binary treatment is estimated (with a probit or logit) as a function of observables (firms' characteristics). Firms with similar probabilities are matched. When firms have similar probabilities, their assignment to the treated group is largely random with respect to the relevant covariates, and thus mimics a controlled experiment, allowing identification of causal effects. Specifically, the estimator compares between treated (firms who perceive access to finance as a business constraint) and control (firms who do not) units and measures the average treatment effect on the outcome (firm performance), conditional on a set of observables (firm characteristics).

Estimation is done by MLE. Heckman (1976, 1978) introduces the model, and Maddala (1983) derives the maximum likelihood (MLE) estimator. Cameron and Trivedi (2005) and Wooldridge (2010) later introduced the endogenous treatment-effects model.

Better access to finance can have positive *causal* effects on firm performance. In all models of Table (3), using both measures of firm performance, the estimated coefficient on access to finance shows the expected negative sign (higher value implies it is perceived as more of an

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[8] Similarly, suppose we wish to know the effect of a job training program on employment, and suppose that a third variable (for instance, motivation) affects both the treatment (participation in job program) and the outcome (employment). We have an endogeneity problem since we cannot observe motivation.

obstacle) and is statistically significant; giving confidence in interpreting the results as casual effects, after controlling for endogeneity. Results imply, for example, that firms who perceive access to credit as a constraint to their business have, on average, around 80 percent lower employment growth and around 30 percent lower capacity utilization growth, compared to other firms. These results are in line with the theoretical priors that better access to finance can alleviate upfront financing fixed costs inhibiting firms' job and exports orientation (Melitz 2003). Ayyagari et al (2016) also find a negative and causal impact of access to credit on employment growth using matching propensity score techniques and jobs growth data from 50,000 firms across 70 developing countries. Results (not shown for space considerations) hold after including sectoral fixed effects in all regressions.

Better firm performance is associated with higher export diversification and manager education and gender. The coefficient on our two measures of export diversification is positive and statistically significant (models 12 and 14). Higher manager education seems to correlate positively with firm performance (models 11 and 14)[9], and there is some evidence that better performance is associated with female managers in one of the models (model 14). Other factors like years of manager experience do not seem to be associated with better firm performance.

Table 3: Endogenous Treatment Regression: Firm Performance

Dependent variable:	Employment growth		Capacity utilization growth	
	(11)	(12)	(13)	(14)
Independent variables:	MLE	MLE	MLE	MLE
Access to finance obstacle?	-0.780**	-0.868***	-0.24***	-0.28***
	(0.363)	(0.301)	(0.069)	(0.059)
Young firm (Y/N)	-0.106	0.217	0.043	0.029
	(0.545)	(0.500)	(0.041)	(0.034)
Foreign ownership (Y/N)	-0.411	-1.705**	0.028	0.019
	(0.713)	(0.831)	(0.097)	(0.066)
Top manager female (Y/N)	0.126	0.143	0.042	0.053**
	(0.432)	(0.347)	(0.033)	(0.026)
Exports oriented firm (Y/N)	0.670		0.009	
	(0.444)		(0.046)	
Manager experience, in years	0.007	0.009	0.001	0.001
	(0.017)	(0.015)	(0.001)	(0.001)
Education of manager	-0.200**	-0.117	-0.001	-0.02***
	(0.078)	(0.080)	(0.009)	(0.005)
Export oriented * R&D		1.020*		-0.015
		(0.571)		(0.048)
Export oriented * Improved methods		-0.389		0.073**

[9] Higher values of this indicator indicate lower levels of education.

Dependent variable:	Employment growth		Capacity utilization growth	
	(11)	(12)	(13)	(14)
Independent variables:	MLE	MLE	MLE	MLE
		(0.326)		(0.031)
Observations	895	884	978	965
rho	.0123	.0209	.526	.579
LR test for independent equations	219.40***	220.48***	10.13***	20.47***
Log likelihood	-3441.283	-3403.866	-595.496	-590.481
AIC	6914.566	6845.732	1222.992	1218.963
BIC	6991.316	6936.637	1301.16	1311.534
Size FE	NO	YES	NO	YES

Estimation is done using survey weights. Survey weights are not used to estimate the LR test for independent equations, Akaike's Information Criteria (AIC) and Bayesian Information Criteria (BIC). Constant and dummies not reported. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

MLE: Estimator using Maximum Likelihood Estimation, with linearized standard errors in parentheses.

The treatment effects model corrects for endogeneity. In all reported models, the likelihood-ratio test (LR test for independent equations) rejects the null hypothesis of no correlation between the treatment-assignment and outcome errors. Furthermore, the estimated correlation between the treatment-assignment errors and the outcome errors, ρ, is positive in all models, indicating that unobservables that raise firm performance tend to occur with unobservables that raise the perception of effect of access to finance on firm operations. This proves the importance of using the treatment effects estimator as it corrects for such endogeneity bias. Model (12) and (14) are preferred as they report lower -LogLikelihood and AIC.

IV. CONCLUSION AND POLICY IMPLICATIONS

The goal of this paper was to understand firm's characteristics and performance in relation to finance, export diversification, and their characteristics and performance. Using survey data from 2,640 private firms in Nigeria, we (i) study firm characteristics associated with their perception of access to finance as a business obstacle and export diversification, and (ii) quantify the causal effect of these macro structural elements on firm performance. We find that (i) larger and export-oriented firms are about 40 percentage points less likely to report access to finance as a business obstacle, while firms perceiving access to finance as a constraint are, on average, about 10-40 percentage points less likely to be export-oriented diversified firms; and (ii) better access to finance and export diversification could have positive causal effects of 80 percent higher employment growth and 30 percent higher capacity utilization growth. Ownership structure and firm age can also explain firm performance in some model specifications. Results hold under different specifications and estimation techniques.

Increasing access to finance – as argued in the ERGP – is key for diversification. Hence, the initiatives taken by the government to improve access to credit information and collateral

registry are important, as it gives borrowers the legal right to inspect their credit data from credit bureaus, as well as the 2017 Secured Transactions in Movable Assets Act (collateral registry) which enables micro, small and medium enterprises (MSMEs) to obtain credit using movable assets as collateral instead of traditional fixed assets. However, more efforts are needed to ensure banks make full use of the National Collateral Registry and to increase credit registry coverage (which in Nigeria as a percentage of adults stood at 0.1% compared to OECD's average of 63.7%). Accelerating the implementation of the government's financial inclusion strategy, including by reforming the regulatory framework and leveraging the potential for mobile payments, would help boost access to credit in more remote areas. Recent empirical evidence suggests that raising financial development and inclusion in Nigeria to the average level in emerging market economies could yield additional real per capita GDP growth of more than 0.8 percentage points per year (IMF 2019).

Export diversification is key to long term growth. Our empirical results are in line with recent studies in the literature on determinants of growth in natural resource rich countries which find that export diversification via an emphasis on technology and innovation is the key to higher and sustainable growth (Cherif and Hasanov (2016), and Cherif, Hasanov and Wang (2018)). That, combined with the fact that most employment and output contribution in developing countries originates from SMEs, emphasizes the importance of developing diversified non-oil tradable sectors not just for better firm performance but also for faster and more sustainable overall growth in the long run. Country experience emphasizes the importance of both vertical and horizontal diversification in existing and new exports industries with an emphasis on technological upgrading and competition in international markets (Callin et al (2014) and Cherif, Hasanov and Zhu (2016)).

Addressing longstanding structural challenges that hamper growth and inhibit economic diversification remains urgent. Beyond efforts to strengthen the business environment through the Presidential Enabling Business Environment Council (PEBEC), overcoming structural constraints requires: increasing public investment efficiency; accelerating the implementation of the Power Sector Recovery Plan; stepping up efforts to improve education and health outcomes; and strengthening governance, transparency and anti-corruption initiatives. These reforms are in line with the ERGP's objectives and several reforms already initiated must continue.

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Appendix: Sample Survey Questions

Question number	Question
Firm characteristics	
B.1	What is the firm's legal status?
D.3a-c	What percentage of this establishment's sales were national sales? Indirect exports? Direct exports?
B.2a-d	What percentage of this firm is owned by private domestic? Private foreign? Government/state? Other?
B.5	In what year did this establishment begin operations?
NGL.28	What is the most important skill that typical applicants lack when filling vacancies for production workers?
NGL.15a-e	In your experience of hiring production employees, are any of the following constraints to hiring women?
MNAB.7b	What is the highest level of education completed by the Top Manager?
Firm performance	
NGF.1-1a	In this financial year, and three financial years ago, what was this establishment's sales or services rendered as a proportion of the maximum possible using all the resources available (capacity utilization)?
L.1-2	In this fiscal year, and three fiscal years ago, how many permanent, full-time employees worked in this establishment?
Obstacles to firms' operations	
M.1	Which of the elements of the business environment included in the list, if any, currently represents the biggest obstacle faced by this establishment?
K.30	To what degree is access to finance an obstacle to their current operations of this establishment?
Export diversification	
H.7	During the last three years, did this establishment spend on formal research and development activities, either in-house or contracted with other companies?
H.3	During the last three years, has this establishment introduced any new or significantly improved methods for the production or supply of products or services?

Source: http://www.enterprisesurveys.org/Methodology