PEPPERDINE UNIVERSITY

The Journal of Entrepreneurial Finance

Volume 27
Issue 1 *2025*

Article 1

4-2025

Effects of Bureaucratic Corruption on Firms' Financial Constraints

Obinna Franklin Ezeibekwe
Northern Illinois University

Recommended Citation

Ezeibekwe, Obinna Franklin (2025) "Effects of Bureaucratic Corruption on Firms' Financial Constraints," *The Journal of Entrepreneurial Finance*: Vol. 27: Iss. 1, pp. 1-30.
DOI: https://doi.org/10.57229/2373-1761.1505
Available at: https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1

Effects of Bureaucratic Corruption on Firms' Financial Constraints

Obinna Franklin Ezeibekwe
Northern Illinois University, DeKalb, IL USA
obifeze@gmail.com

Abstract: This study provides the first empirical assessment of the causal impact of bureaucratic corruption on firms' financial constraints in Nigeria by calculating treatment effects using linear and non-linear estimators to account for potential heterogeneous treatment effects across firm groups. Formally, the theoretical framework models how corruption may facilitate or restrain firms' financial access by shaping their cost functions, which consequently influences their success or failure and ability to raise the collateral for borrowing. My analysis, using the bivariate probit method and two binary instruments, reveals that corruption significantly increases the probability of a representative MSME and firm being financially constrained by approximately 62 to 64 and 61 to 63 percentage points, respectively. When the IV estimator is utilized to calculate local effects, I find that the effect is about 90 to 91 percentage points for a typical MSME facing obstacles with obtaining business licenses and tax administration, respectively. The effect is 92 percentage points for all firms using both instruments. Furthermore, the results show that Nigerian MSMEs are about 17 to 19 percentage points more likely to be financially constrained than large firms and that corruption's impact on firms' access to finance does not depend on firm size. Finally, firms that perceive corruption as a "minor" barrier experience the most difficulty obtaining external finance. This study highlights the severe constraint that corruption poses to Nigerian firms' access to finance and advocates for regulatory amendments to address issues with the tax administration and the ease of obtaining business licenses and permits.

Keywords: Corruption, Financial constraints, Nigeria, MSME, Bivariate probit

1. Introduction

Micro, small, and medium enterprises (MSMEs) are crucial to less-developed countries (LDCs) by creating employment opportunities, driving economic growth, and reducing poverty (Maksimov et al., 2017). However, MSMEs require access to sustainable finance to perform these critical developmental functions. Unfortunately, according to a 2021 survey report by the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) and the National Bureau of Statistics (NBS), access to finance remains the biggest challenge for MSMEs' growth in Nigeria.[1] Firms face financial constraints due to several factors, such as domestic ownership (Blalock et al., 2008), underdeveloped financial architecture (Love, 2003), and a weak legal and institutional environment (Qian and Strahan, 2007). One significant factor that undermines the institutional environment is corruption; however, there are still significant research gaps regarding how corruption impacts MSMEs' access to finance in LDCs. Therefore, the primary objective of this research is to estimate the treatment effects of corruption on Nigerian firms' financial constraints by comparing treatment effects estimates derived using linear and non-linear estimators.

Corruption, defined as the misuse of entrusted power for private gain, remains a substantial economic and social issue in most LDCs and its systemic nature makes it challenging to address. Economic research provides conflicting predictions regarding the impact of corruption on enterprises' access to finance. On the one hand, corruption could "sand the wheels" of access to finance in several ways. First, bribes reduce firm growth even more than taxation, making it more difficult for firms to raise collateral and acquire loans from financial institutions (Fisman and Svensson, 2007). Second, corruption depresses economic growth, which could consequently affect the ability of banks to lend (Johnson et al., 2011; Gründler and Potrafke, 2019; Mo, 2001; Méon and Sekkat, 2005).

Third, corruption negatively affects trust (Morris and Klesner, 2010; Banerjee, 2016), which could result in firms doubting their ability to acquire external finance or banks doubting their ability to recover loans in the event of default, thereby preventing them from lending. Fourth, corrupt public officials and agencies could misappropriate funds intended for the benefit of firms or industries or other purposes (Svensson, 2005; Mauro, 1998). On the other hand, corruption could "grease the wheels" of access to finance for firms by reducing bureaucracy and red tape associated with obtaining external finance (Dreher and Gassebner, 2013), reducing the time spent on queues (Lui, 1985), assisting firms to bypass government regulations (Jiang and Nie, 2014), and improving efficiency in countries with weak institutions (Méon and Weill, 2010).

Firms operating in Nigeria face several challenges, including multiple taxation, levies, and extortion by public officials and loosely organized gangs known as "area boys." These challenges, referred to as "lower-level corruption," result in a significant increase in the cost of doing business. However, "Upper-level corruption" entails the illegal diversion of government resources intended to support firms, thereby undermining business growth and impact. The history of anti-corruption efforts, to address both upper- and lower-level corruption, in Nigeria may be traced to the Second Republic when the pioneer anti-corruption agency, the Code of Conduct Bureau (CCB) was established in 1979. The Fourth Republic which started in 1999 witnessed the establishment of the Independent Corrupt Practices Commission (ICPC) in 2000 as a spe-

[1] https://smedan.gov.ng/wp-content/uploads/2022/03/2021-MSME-Survey-Report_1.pdf

DOI: 10.57229/2373-1761.1505

cialized agency to tackle public sector corruption, including graft, bribery, and abuse of office. The Economic and Financial Crimes Commission (EFCC) was introduced three years later as a law enforcement agency to investigate financial crimes like money laundering, advanced-fee fraud (known in Nigeria as "419"), and related offenses. These agencies have been instrumental in curbing corruption in Nigeria, but more work needs to be done to create a more enabling environment for businesses to thrive and contribute to Nigeria's economic growth and development.

Additionally, the government has made efforts to ensure that small businesses thrive. For example, SMEDAN was established in 2003 to coordinate the development of the MSME subsector. However, its lack of transparency makes it difficult to study its budgetary practices or identify the beneficiaries of its programs. The Central Bank of Nigeria (CBN) has also launched various programs aimed at supporting MSMEs, such as lending to government development finance institutions to enable MSMEs to access finance at more affordable rates. Notably, the CBN's Small and Medium Enterprises Equity Investment Scheme (SMEEIS) mandates all banks to reserve 10 percent of their after-tax profit for equity investment or to offer single-digit interest rate loans to small businesses. Similarly, the CBN approved ₦500 billion Naira debenture stock, to be issued to small firms by the Bank of Industry (BOI), and the ₦200 billion Naira Small and Medium Enterprises Credit Guarantee Scheme (SMECGS) was aimed at enhancing credit to MSMEs.[2] Nonetheless, the effectiveness of these CBN interventions is reliant on the degree of monitoring carried out by the CBN.

These efforts targeted at MSMEs and other firms are aimed at reducing high poverty and unemployment rates. Despite these efforts, poverty and unemployment rates in the country of 211 million people continue to skyrocket. The NBS, in collaboration with the National Social Safety-Nets Coordinating Office (NASSCO), the United Nations Development Programme (UNDP), the United Nations Children's Fund (UNICEF), and the Oxford Poverty and Human Development Initiative (OPHI), developed the National Multidimensional Poverty Index (NMPI)[3] to provide a more comprehensive measure of poverty that considers monetary poverty, education, and basic infrastructure. According to the NMPI, about 63 percent of Nigerians were multidimensionally poor in 2022, with 65 percent of this population living in Northern Nigeria and 72 percent living in rural areas. Additionally, the unemployment rate in Nigeria increased from 14 percent in 2017 to 33 percent in 2020, as reported by the NBS.

Because corruption may impact the growth of MSMEs and all firms, this research provides the first empirical assessment of the effects of bureaucratic corruption on Nigerian firms' financial constraints. Additionally, I estimate the models using data for MSMEs and all firms. Using two binary instruments that are relevant and valid, I employ the instrumental variable estimator to estimate the linear model and a bivariate probit estimator to estimate the average treatment effect (ATE) for compliers and non-compliers. This approach is important because the local effect is unlikely to be equivalent to the ATE when there are heterogeneous treatment effects across firm groups. Additionally, applying different estimators highlights the behavior of different estimators when certain assumptions are made.

There are many reasons why this research is essential. First, Nigeria, being the most populous country in Sub-Saharan Africa, is representative of the region and faces similar development challenges such as corruption and an underdeveloped MSME sub-sector, as other countries in the

[2]https://www.cbn.gov.ng/Devfin/smefinance.asp

[3]https://mppn.org/wp-content/uploads/2022/11/MPI_web_Nov15_FINAL.pdf

region. Therefore, the results of this study could be generalized to other countries in the region. Also, this study is relevant because of the emphasis placed on eradicating corruption and growing MSMEs during Nigeria's just concluded 2023 general elections. This paper provides policymakers with the first empirical evidence of how firm-related corruption, not corruption in general, affects the economy. Finally, this research would help to determine whether the present and future governments of Nigeria should prioritize anti-corruption campaigns.

The second section reviews the literature and the methodology is described in the third section. The fourth section presents the results and the fifth and final section concludes.

2. Literature Review

The existing literature examines the effects of corruption on firms' financial access, but limited research exists for countries in the Sub-Saharan African region. The literature also explores corruption-related factors that may affect firms' access to finance.

The main objective of Xu and Yano (2017) is to estimate the effect of anti-corruption efforts on the financing of and investing in innovation using firm-level data obtained from the China Stock Market and Accounting Research (CSMAR) database of 1895 establishments from 2009 to 2015. Anti-corruption efforts can improve the financing of and investment in innovation by reducing the expropriation problem, which argues that firms are less likely to undertake risky innovative pursuits if they fear that rents accruable from innovation could be expropriated by corrupt public officials thereby increasing the costs associated with innovation. The study employs a probit, GMM, and dynamic GMM model with three external instruments to account for endogeneity and estimate the financial access equation. The results indicate that stronger anti-corruption efforts are associated with improved access to finance, particularly long-term debt, for firms.

Utilizing the data for 79 countries, Amin and Motta (2023) investigate how bureaucratic corruption affects the access to finance of manufacturing small and medium enterprises (SME). The findings suggest that corruption increases the probability of these firms being financially constrained. The probability of being financially constrained increases by about 4 to 5 percentage points for a standard deviation rise in corruption. The rise in the probability of being financially constrained is smaller in countries where credit bureaus operate and credit markets function more freely. Park (2012) analyzes the impact of corruption on both the banking sector and economic growth, relying on data from 76 countries. The results indicate that corruption exacerbates issues related to non-performing loans in the banking sector. Additionally, corruption hampers economic growth by disrupting the allocation of bank resources, diverting them from viable projects to detrimental ones. This reduces the quality of private investments, consequently leading to a decline in economic growth.

Wellalage et al. (2019) study how corruption affects the access to credit for small and medium enterprises (SMEs) in South Asia. The methods used are the probit estimator and the instrumental variable probit to account for endogeneity. Accordingly, the binary dependent variable measures whether an SME is credit-constrained or not. The data is obtained from the 2014 WBES for Afghanistan, Bangladesh, India, Nepal, and Pakistan. The result shows that corruption increases the likelihood of SMEs being credit-constrained by about 7.6 percent. On the contrary, some research provides evidence that bribery may facilitate firms' access to bank credit facilities. In a study of 14 transition economies, Fungáčová et al. (2015) employ firm-level accounting data

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

to evaluate how bribery affects firms' total bank debt ratios, the total amount of bank debt divided by the total amount of assets. Their findings indicate that higher levels of bribery increase the total bank debt ratio, suggesting that bribery stimulates bank lending. Furthermore, bribery facilitates shorter-term bank debt ratios but impedes longer-term bank debt ratios.

Another strand of literature studied how factors related to corruption cause firms' financial constraints. Deploying a sample of 43 countries, Qian and Strahan (2007) regress the terms of loan contracts on some institutional and legal variables. Loan availability increases with stronger creditor rights because banks are more willing to extend cheaper loans with longer maturities if they can be protected during bankruptcy. Also, foreign banks tend to have a higher lending volume in countries with stronger creditor rights. Another study by Love (2003) utilizes data from about 5,000 firms from 36 countries from 1988 to 1998 to investigate how financial development reduces financial constraints. This evidence suggests that financial market development reduces the financial constraints faced by firms, leading to more efficient allocation of resources and enhancing economic growth.

This research differs from past studies by being the first to study the treatment effects across groups by comparing treatment effects estimates derived from linear and non-linear methods. In contrast to the study by Xu and Yano (2017), which focused on China, this research paper focuses on Nigeria, which provides a better setting for examining corruption and its impact on firms' financial constraints for some reasons. First, Nigeria's corruption level, according to the Corruption Perception Index (CPI) presented by Transparency International,[4] is higher than that of China, despite the anti-corruption campaigns and framework established by different past governments. The CPI ranks countries worldwide on a scale of 0 to 100 based on the perceived level of public sector corruption, where 100 means least perceived public sector corruption and 0 means most perceived public sector corruption. Nigeria's 2015 and 2022 CPI scores of 26 and 24 are in the 18th and 14th percentile while China's 2015 and 2022 CPI scores of 37 and 45 lie in the 50th and 64th percentile for the 168 and 180 countries studied, respectively. This evidence shows that corruption has gotten worse in Nigeria over time.

Second, Nigeria's non-bank and non-farm private MSMEs are less developed than those of China. For instance, small firms in China contribute over 60 percent of the country's gross domestic product, whereas in Nigeria, it is about 48 percent. Moreover, unlike Xu and Yano (2017) that investigated the impact of anti-corruption on the financing of all Chinese firms, this research focuses on how corruption affects the financing of MSMEs, which are more likely to face financial constraints (Oliveira and Fortunato, 2006; Hyytinen and Väänänen, 2006), as well as all firms. In developing the theoretical underpinnings of this study, I build upon the profit maximization problem using a Cobb-Douglas function while demonstrating how corruption increases or decreases the costs of inputs thereby affecting firm growth and consequently impacting firms' ability to access external finance.

2.1. Theoretical Framework

This study employs a profit maximization model to examine how corruption affects firms' financial constraints. Since corruption can either sand or grease the wheels of financial access, this study's theoretical framework formally demonstrates how corruption could hinder or stimulate

[4]https://www.transparency.org/en/cpi/2022

firms' access to finance by affecting firm growth. When firms have to pay bribes to operate normally, access government business support services, or secure contracts, their costs of inputs and business expenses increase, which undermines their growth and ability to obtain the collateral for accessing finance. However, in some cases, corruption can decrease input costs for firms, allowing them to circumvent compliance costs, get preferential treatment, receive more subsidies, or access resources at cheaper rates. These advantages can enable firms to reduce costs and allocate resources more efficiently.

I employ a Cobb-Douglas production function that accounts for two inputs, namely capital (K) and labor (L). This function approximates an actual production function and is easy to analyze. The production function of a representative profit-maximizing Nigerian firm, with $Y \in \mathsf{R}_{\geq 0}$, $K \in \mathsf{R}_{\geq 0}$, and $L \in \mathsf{R}_{\geq 0}$, is given as follows.

$$Y = K^{\alpha}L^{\beta}, \quad 0 < \alpha < 1 \quad \text{and} \quad 0 < \beta < 1 \tag{1}$$

I assume that output increases by less than the proportional change as all inputs. Also, firms have no initial funds and must acquire all the necessary inputs through borrowing. The total cost (TC) function is:

$$\mathrm{TC} = wL + rK \tag{2}$$

The costs of inputs L and K are represented by w and r, respectively. I represent the effect of corruption as an additional cost or benefit (E) incurred due to corruption and it is proportional to the level of corruption (C) in the economy.

$$E = \phi C, \quad \phi \in \mathsf{R} \quad \text{and} \quad C \in \mathsf{R}_{>0} \tag{3}$$

The coefficient ϕ denotes the magnitude of the effect of corruption on input costs. The conditions, $C \in \mathsf{R}_{>0}$ and $r > |\phi C| < w$, ensure that the corruption level is positive and input costs are never zero or negative. Computing $\frac{\partial E}{\partial C}$ gives ϕ. When $\phi > 0$, corruption leads to an increase in input costs. Firms reveal their higher level of financial constraints due to corruption by choosing suboptimal input levels. Conversely, when $\phi < 0$, corruption results in a decrease in input costs. This causes firms to reveal their lower level of financial constraints by choosing more optimal input levels. When $\phi = 0$, firms face financial constraints that are unrelated to corruption.

Adjusting the cost function to account for the influence of corruption gives:

$$\mathrm{TC} = (w + \phi C)L + (r + \phi C)K \tag{4}$$

I assume that ϕC is identical for all inputs. The optimization problem, subject to the input cost being less than or equal to the budget constraint, is:

$$\max_{K,\,L} \quad pK^{\alpha}L^{\beta} - (r + \phi C)K - (w + \phi C)L \tag{5}$$

Taking the first partial derivative of (5) with respect to K and L yields:

$$\frac{\partial \pi}{\partial K} = \alpha p K^{\alpha-1}L^{\beta} = r + \phi C \tag{6}$$

$$\frac{\partial \pi}{\partial L} = \beta p K^{\alpha}L^{\beta-1} = w + \phi C \tag{7}$$

Dividing (6) by (7) and solving for L, the value of L can be obtained.

$$L = \frac{\beta(r + \phi C)}{\alpha(w + \phi C)}K \tag{8}$$

DOI: 10.57229/2373-1761.1505

Plugging (8) into (6) produces the optimal capital input, K^*.

$$K^* = \left(\frac{p\alpha}{r+\phi C}\right)^{\frac{1-\beta}{1-\alpha-\beta}} \left(\frac{p\beta}{w+\phi C}\right)^{\frac{\beta}{1-\alpha-\beta}} \tag{9}$$

Plugging (9) into (8) gives the optimal labor input,

$$L^* = \left(\frac{p\alpha}{r+\phi C}\right)^{\frac{\alpha}{1-\alpha-\beta}} \left(\frac{p\beta}{w+\phi C}\right)^{\frac{1-\alpha}{1-\alpha-\beta}} \tag{10}$$

All things equal, the optimal input levels rise if $\phi < 0$, fall if $\phi > 0$, and are unaffected by corruption if $\phi = 0$. Plugging the optimal inputs into (1) gives the optimal output, Y^*, in the presence of corruption.

Expressing financial constraint F, which is a variable greater than or equal to zero and zero if negative, as the difference between profits in the absence of corruption and profits in the presence of corruption is as follows:

$$F = \Pi(\hat{Y}) - \Pi(Y^*, C) \tag{11}$$

F is positive when $\Pi(\hat{Y}) > \Pi(Y^*, C)$ and zero when $\Pi(\hat{Y}) < \Pi(Y^*, C)$ or $\Pi(\hat{Y}) = \Pi(Y^*, C)$, suggesting that there is no positive financial constraint induced by corruption. Taking the partial derivative of (11) to understand the impact of corruption on financial constraint yields:

$$\frac{\partial F}{\partial C} = \phi \times \underbrace{\frac{p\big((\alpha+\beta)\phi C+\alpha w+\beta r\big)}{(r+\phi C)(w+\phi C)\left(\frac{r+\phi C}{p\alpha}\right)^{\frac{\alpha}{1-\alpha-\beta}}\left(\frac{w+\phi C}{p\beta}\right)^{\frac{\beta}{1-\alpha-\beta}}}}_{+} \tag{12}$$

The model predicts that financial constraints become more stringent when the effect of corruption is positive. This means that the partial derivative of financial constraint (F) with respect to corruption (C) is positive when ϕ is greater than zero. Corruption increases the cost of inputs for firms, which hinders their profitability and growth. Consequently, it becomes more difficult for them to raise the required collateral to access external finance. On the other hand, financial constraints weaken when the effect of corruption is negative, $\phi < 0$. This implies that $\frac{\partial F}{\partial C}$ is negative. Corrupt practices reduce input costs by allowing them to bypass compliance costs or receive preferential treatments, which encourages firm growth. This makes it easier for firms to acquire the collateral necessary to secure external financing. When corruption has no effect ($\phi = 0$), $\frac{\partial F}{\partial C}$ becomes zero, indicating that financial constraints are not affected by corruption. This leads to the hypothesis that higher levels of corruption increase financial constraints for Nigerian firms, which I tested in my empirical research. The theoretical framework provides the economic interpretation of the estimates of corruption provided by the empirical analysis.

3. Methodology

3.1. Data

To investigate the causal impact of corruption on firms' access to finance in Nigeria, I analyze survey data from the 2014-2015 World Bank Enterprise Survey (WBES) conducted in Nigeria between April 2014 and February 2015. The WBES is a comprehensive and nationally representative survey of non-agricultural and non-financial private enterprises. The sample of

approximately 2,676 establishments was obtained using a stratified random sampling technique.[5]

The 2014-2015 WBES for Nigeria contains 2,676 observations (firms). According to the WBES, a micro firm has less than 5 employees, a small firm has between 5 to 19 employees, a medium enterprise has between 20 to 99 employees, and a large firm has 100 or more employees. Out of the 2,676 firms, 164 are micro, 1,611 are small, 720 are medium, and 181 are large. This research focuses on the 2,495 firms that identify as MSMEs although I also include large firms for some analyses to check if the results for MSMEs apply to all firms. After removing all the missing values, the remaining data set has 1,806 observations, and 1,696 (about 94 percent) are MSMEs. The data-cleaning process led to the loss of 870 observations (about 32 percent) out of the total 2,676 observations.

The dependent variable represents to what degree access to finance is an obstacle to the current operations of the establishment. Overall, about 22 percent of the firms in the sample of 1,696 MSMEs report access to finance as no obstacle, 29 percent rate it as a minor obstacle, 19 percent respond that access to finance is a moderate obstacle, 18 percent view it as a major obstacle, while 8 percent report that access to finance is a very severe obstacle. *Financial Constraints* equals one if the establishment identified access to finance as a minor, moderate, major, or very severe obstacle and zero if access to finance is not an obstacle. One reason for this specification is that it reduces subjectivity and response bias because it is more objective to determine if access to finance is or is not an obstacle than to determine if it is a minor, moderate, major, or very severe obstacle. There is reason to believe that firms that selected "no obstacle" were able to acquire finance or are financially unconstrained because of the aforementioned report by SMEDAN and NBS that identified access to finance as the biggest obstacle to Nigeria's MSMEs.

The independent variable of interest, *Corruption*, represents the extent to which corruption is an obstacle to the current operation of the firm. Generally, 14 percent of the firms in the sub-sample of 1,696 establishments (MSMEs) report corruption as no obstacle, 21 percent view corruption as a minor obstacle, 19 percent answer that it is a moderate obstacle, 34 percent respond that corruption is a major obstacle, while 13 percent identify corruption as a very severe obstacle. *Corruption* equals one if the firm identified corruption as a minor, moderate, major, or very severe obstacle and zero if corruption is not an obstacle. In subsection 4.2, I recode *Financial Constraints* and *Corruption* to test the sensitivity of the variable specifications.

For a deeper understanding of the variables used in this study, refer to Table 1, which provides definitions of variables that explain firm characteristics. Other covariates are as follows. The year the establishment was registered was used to create *Firm Age* that subtracts the year the firm was registered from 2014 and returns a whole number. The variable, *Revenue*, measures the firm's sales by deflating the total sales using the gross domestic product (GDP) deflator and taking the logarithm of the result (at constant 2010 Naira). *Manager Education* captures the highest level of education of the top manager, ranging from 0 (no education) to 26 years of schooling (other post-graduate degrees, like a Ph.D. or Master's, from a university in another country). The other variables employed in the research include indicators of firm location such as *Capital City*, *Business City*, and *South*; industry dummies such as *Manufacturing*, *Retail*, and *Other Services*; indicators of ownership structure such as *Sole Proprietor*, *Female Owner*, and *Subsidiary Firm*; *Innovation*; *Tax Admin*; and *License*. The last two binary variables, *Tax Admin* and *License*, are

[5]These establishments are located in 19 states across the country, namely Abia, Abuja, Anambra, Cross River, Enugu, Gombe, Jigawa, Kaduna, Kano, Katsina, Kebbi, Kwara, Lagos, Nasarawa, Niger, Ogun, Oyo, Sokoto, and Zamfara, representing the six geopolitical zones of North Central, North East, North West, South East, South-South, and South West.

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

Table 1: Definitions of Variables

Variable	Definition
Financial Constraints	Binary variable equals 1 if the firm identifies access to finance as a minor, moderate, major, or very severe obstacle to its current operations and equals zero otherwise
Corruption	Binary variable equals 1 if the firm identifies corruption as a minor, moderate, major, or very severe obstacle to its current operations and equals zero otherwise
Capital City	Binary variable equals 1 if the firm is in the capital city of the state and equals zero otherwise
Business City	Binary variable equals 1 if the firm is in the main business city of the state and equals zero otherwise
South	Binary variable equals 1 if the firm is in either Abia (coded 1), Anambra (3), Cross River (4), Enugu (5), Lagos (7), Ogun (17), and Oyo (9) states and equals zero otherwise
Manufacturing	Binary variable equals 1 if the firm is in the manufacturing subsector and equals zero otherwise
Retail	Binary variable equals 1 if the firm is in the retail subsector and equals zero otherwise
Other Services	Binary variable equals 1 if the firm is in the other services sector. They include wholesale (95 firms), information technology (27), hotels and restaurants (163), services of motor vehicles (118), construction (38), and transportation (72) and equals zero otherwise
Firm Age	The year the establishment was registered minus the year of the survey
Revenue	The logarithm of real total sales (constant 2010 Naira ₦)
Innovation	Binary variable equals 1 if the firm has introduced new or significantly improved products or services and equals zero otherwise
Sole Proprietor	Binary variable equals 1 if the firm is a sole proprietorship and equals zero otherwise
Manager Education	The number of schooling years that the manager has
Female Owner	Binary variable equals 1 if the firm has a female among owners and equals zero otherwise
Subsidiary Firm	Binary variable equals 1 if the firm is part of a larger firm and equals zero otherwise
MSME	Binary variable equals 1 if the firm identifies as an MSME and equals zero otherwise
Tax Admin	Binary variable equals 1 if the firm identifies tax administration as a minor, moderate, major, or very severe obstacle to its current operations and equals zero otherwise
License	Binary variable equals 1 if the firm identifies obtaining business licenses and permits as a minor, moderate, major, or very severe obstacle to its current operations and equals zero otherwise

ordinal variables but structured similarly to *Financial Constraints* and *Corruption*.

3.2. Summary Statistics

Descriptive statistics are reported in Table 2. The covariates, *Business City*, *South*, *Sole*

Table 2: Difference in Means Between Treated and Control Firms

	Treated	Control	Difference In Means
Financial Constraints	0.81	0.5	0.31
	(0.39)	(0.5)	[5 × 10⁻¹⁸]
Capital City	0.3	0.27	0.04
	(0.46)	(0.44)	[0.237]
Business City	0.45	0.3	0.16
	(0.5)	(0.46)	[1 × 10⁻⁶]
South	0.36	0.43	-0.07
	(0.48)	(0.5)	[0.03]
Manufacturing	0.52	0.53	-0.01
	(0.5)	(0.5)	[0.739]
Retail	0.18	0.17	0.01
	(0.38)	(0.38)	[0.73]
Other Services	0.3	0.3	0
	(0.46)	(0.46)	[0.936]
Firm Age	15	15.14	-0.14
	(11.13)	(12.2)	[0.865]
Revenue	14.46	14.65	-0.19
	(2.4)	(2.54)	[0.267]
Innovation	0.54	0.53	0.01
	(0.5)	(0.5)	[0.777]
Sole Proprietor	0.78	0.83	-0.05
	(0.41)	(0.37)	[0.048]
Manager Education	16.44	15.86	0.57
	(3.34)	(3.83)	[0.027]
Female Owner	0.18	0.17	0
	(0.38)	(0.38)	[0.871]
Subsidiary Firm	0.26	0.21	0.05
	(0.44)	(0.41)	[0.095]
MSME	0.94	0.94	0
	(0.24)	(0.25)	[0.79]
Tax Admin	0.89	0.49	0.4
	(0.32)	(0.5)	[2 × 10⁻²⁷]
License	0.78	0.4	0.38
	(0.42)	(0.49)	[3 × 10⁻²⁵]

The treated and control firms are 1,559 and 247 in number, respectively. The numbers in round brackets () are standard deviations and the numbers in square brackets [] are p-values for the two-sided Student's t-tests.

Proprietor, *Manager Education*, *Subsidiary Firm*, have statistically significant differences in means between the treated and control firms. In particular, firms that identify corruption as a barrier are significantly more likely to be located in business cities, have managers with significantly more years of schooling and have parent companies than the control group. The control firms, in contrast, are significantly more likely to be situated in southern Nigeria and be sole proprietors. The "assignment statuses," *Tax Admin* and *License*, have positive statistically significant mean differences at the one percent level, implying that they effectively assign firms to the treated and control groups. The significant differences in the means of the covariates underline the impor-

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

tance of controlling for covariates to ensure the robustness of the causal inference to selection on observables.

The summary statistics for MSMEs are presented in Table 3. The percentage of MSMEs that report access to finance and bureaucratic corruption as obstacles to their current operations are 78 percent and 86 percent, respectively. Less than half of these enterprises are situated in the capital or business cities and in the southern part of Nigeria. The majority are classified as manufacturing and the oldest is 89 years old. Approximately one-half have engaged in innovation. Finally, more than 70 percent encounter challenges with the tax administration, and more than four-fifths experience difficulties with obtaining business licenses and permits.

Table 3: Summary Statistics for 1,696 MSMEs (Less Than 100 Employees)

Statistic	Mean	Median	St. Dev.	Min	Max	N
Financial Constraints	0.780	1	0.414	0	1	1,696
Corruption	0.864	1	0.343	0	1	1,696
Capital City	0.302	0	0.459	0	1	1,696
Business City	0.425	0	0.494	0	1	1,696
South	0.353	0	0.478	0	1	1,696
Manufacturing	0.518	1	0.500	0	1	1,696
Retail	0.186	0	0.389	0	1	1,696
Other Services	0.295	0	0.456	0	1	1,696
Firm Age	14.157	13	9.428	0	89	1,696
Revenue	14.316	13.939	2.222	9.334	26.953	1,696
Innovation	0.532	1	0.499	0	1	1,696
Sole Proprietor	0.808	1	0.394	0	1	1,696
Manager Education	16.162	15	3.298	0	26	1,696
Female Owner	0.176	0	0.381	0	1	1,696
Subsidiary Firm	0.236	0	0.425	0	1	1,696
Tax Admin	0.841	1	0.365	0	1	1,696
License	0.733	1	0.442	0	1	1,696

The next summary statistics includes data for large firms with 100 or more employees. The summary statistics for all firms are presented in Table 4. The data indicates that approxi-

Table 4: Summary Statistics for 1,806 Firms

Statistic	Mean	Median	St. Dev.	Min	Max	N
Financial Constraints	0.769	1	0.422	0	1	1,806
Corruption	0.863	1	0.344	0	1	1,806
Capital City	0.298	0	0.458	0	1	1,806
Business City	0.431	0	0.495	0	1	1,806
South	0.365	0	0.482	0	1	1,806
Manufacturing	0.520	1	0.500	0	1	1,806
Retail	0.178	0	0.382	0	1	1,806
Other Services	0.302	0	0.459	0	1	1,806
Firm Age	15.020	13	11.282	0	116	1,806
Revenue	14.484	14.064	2.417	9.334	26.953	1,806
Innovation	0.539	1	0.499	0	1	1,806
Sole Proprietor	0.790	1	0.408	0	1	1,806
Manager Education	16.358	16	3.416	0	26	1,806
Female Owner	0.178	0	0.382	0	1	1,806
Subsidiary Firm	0.251	0	0.434	0	1	1,806
MSME	0.939	1	0.239	0	1	1,806
Tax Admin	0.833	1	0.373	0	1	1,806
License	0.725	1	0.447	0	1	1,806

mately 77 percent and 86 percent of firms report being financially constrained and facing corruption obstacles, respectively. This suggests that large firms are less likely to encounter these barriers than MSMEs. The introduction of large firms reduces the likelihood of a firm being situated in the capital city but increases the probability of operating from a business city. Large firms are more likely to operate in the south given the increase in mean. Larger firms dominate the manufacturing and other services sub-sectors while MSMEs dominate the retail sub-sector. The age of the oldest firm increases from 89 to 116 and the average age rises from 14 to 15 with the inclusion of enterprises with 100 or more workers. The average values of *Revenue*, *Innovation*, *Manager Education*, *Female Owner*, *Subsidiary Firm*, and *License* increase, suggesting that large firms are more likely to have these characteristics than MSMEs. In contrast, MSMEs tend to be sole proprietors and face tax administration hindrances. The summary statistics show that the data is a good representation of the country in terms of location, firm size, and industry spread. To explore causation, I utilize regression analysis to control for confounding variables and provide a more nuanced understanding of the relationship.

3.3. Empirical Models and Approach

I use linear and non-linear methods to estimate the empirical models. For the linear methods, the equation that relates access to finance to corruption and a variety of exogenous covariates is:

$$Financial\ Constraints_i = \boldsymbol{x}'_i\Gamma + \beta\ Corruption_i + u_i \quad (13)$$

where the subscript refers to firm *i*. β is the coefficient of the independent variable of interest, *Corruption*. The covariates in $\boldsymbol{x}'_i$ includes *Capital City*, *Business City*, *South*, *Manufacturing*, *Retail*, *Firm Age*, *Revenue*, *Innovation*, *Sole Proprietor*, *Manager Education*, *Female Owner*, and *Subsidiary Firm*. The coefficients of these covariates are in Γ.

The inclusion of covariates in causal analysis using instruments ensures that the conditional independence and exclusion restrictions underlying instrumental variable estimation may be more likely to be valid after conditioning on covariates. In addition, the covariates are included to analyze their impacts on firms' access to finance. Following the study by Xu and Yano (2017), I include *Firm Age* and *Revenue* in my study. It is important to control for these variables as older firms and firms with more sales are considered more successful, which makes them less financially constrained and more susceptible to corrupt practices.

In the same vein, I incorporate *Female Owner*, *Capital City*, *Sole Proprietor*, and *Manager Education* as covariates, as utilized by Wellalage et al. (2019) in their study of corruption and credit constraints. Firms that are managed by females may encounter gender-based discrimination in the credit market, resulting in limited access to financing. However, they may also face less corruption due to gender biases related to women's perceived lower ability to pay. Enterprises situated in the capital city of the state may have better access to finance due to their nearness to financial institutions, but they may also be exposed to higher levels of corrupt activities due to their proximity to government officials. Sole proprietors may encounter difficulties in acquiring loans and are less likely to pay bribes due to their limited financial resources. Firms with more educated managers may face fewer financial constraints and are less likely to encounter unscrupulous practices due to their ability to identify available funding sources and take legal action against corrupt officials.

The binary variable *South* was added to the study as southern Nigeria is reported to have

DOI: 10.57229/2373-1761.1505

better socioeconomic outcomes than northern Nigeria according to the aforementioned NMPI report. This suggests that enterprises in the southern region may have easier access to credit and may be more prone to paying bribes. Innovative firms, especially successful ones, may have higher chances of being well-funded and may face higher demands from corrupt officials due to their profitability. The variable, *Business City*, is also crucial as the capital and the main business cities in Nigerian states tend to be different. Companies located in business cities are more likely to have higher revenue due to increased economic activities, which may imply more bribes and easier access to credit (Lee and Luca, 2019; Chen, 2016). The *Manufacturing* and *Retail* subsectors have the highest number of MSMEs in the sample and are controlled for in the models. Finally, a firm that is part of a larger firm, *Subsidiary Firm*, especially if the larger firm is successful, may have better access to finance and may face higher demands for bribes. In each of the estimated models, a positive effect of corruption on firms' financial constraints is expected, all other things being equal.

The bivariate probit[6] is a non-linear method that has the added advantage of estimating the ATE for compliers and non-compliers (never takers, always takers, and defiers) by making distributional assumptions about the random unobserved components (Angrist and Pischke, 2009). The system of equations for the bivariate probit assumes that the expected values of the error terms ϵ_i and v_i are zero, and their variances are equal to one.

$$Corruption_i = 1[\boldsymbol{x}'_i\phi + \theta\, Instrument_i > \epsilon_i] \quad (14)$$

$$Financial\ Constraints_i = 1[\boldsymbol{x}'_i\Phi + \alpha\, Corruption_i > v_i] \quad (15)$$

The binary instrumental variables causally affect *Corruption* in (14), conditional on covariates, $\boldsymbol{x}'_i$. *Corruption* and *Financial Constraints* are binary variables. The omitted variable bias in this system of equations is the correlation between the bivariate normally distributed ϵ_i and v_i with $\rho = \text{Corr}(\epsilon_i, v_i)$. If $\rho \neq 0$, the probit estimation of (15) is inconsistent (Wooldridge, 2010). Assuming that the instruments are independent of these unobserved components and that the unobserved random components are normally distributed can help in identifying the model. The equation for the probit model is presented in (15). The covariates used in the linear and non-linear models are the same.

Omitted variable bias is a potential econometric issue when assessing the impact of corruption on firms' financial constraints. This occurs because some firm characteristics may be unobservable and may be correlated with both *Financial Constraints* and *Corruption*. Consider two firms, Firm A and Firm B, that share similar characteristics. Suppose public officials are rational and profit-maximizing in that they extract more bribes from more profitable firms and fewer bribes from less profitable firms as more profitable establishments have a higher ability to pay. If Firm A is more profitable than Firm B, government officials are more likely to impose higher bribes on Firm A, and the firm will also have better access to finance, all things equal. This problem implies that there may be endogeneity between *Financial Constraints* and *Corruption*. As a result, at least one instrument is needed to identify the effect of corruption on the financial constraints faced by firms.

The study applies two instruments, namely, *Tax Admin* and *License*. Higher levels of these variables are associated with higher levels of interaction with government officials, which suggests higher chances of paying bribes and identifying corruption as an obstacle (Svensson,

[6]Implemented in R using the *GJRM* package developed by Marra and Radice (2011). The function produces the same ATE estimates reported in Table 15.2 in Wooldridge (2010)

2003). For example, the absence of a transparent and efficient tax administration and business licensing creates opportunities for corrupt practices. Firms experiencing these impediments are more likely to seek assistance from government agencies, exposing them to corrupt officials who may demand bribes. Therefore, the instruments can predict the treatment status, *Corruption*, once the other exogenous covariates have been partialled out. This condition can be assessed empirically using the weak instrument test.

In addition, the instruments have no direct relationship with firms' financial access except through the first stage. Both instruments are primarily influenced by institutions, regulations, and administrative procedures, rather than financial constraints. Additionally, banks do not inquire about whether a firm is facing obstacles with the tax administration (this does not mean that the firm does not pay taxes) and obtaining licenses before deciding whether to approve or not approve a loan. The instruments are not correlated with any omitted factor in ϵ_i and v_i, such as the firm's profitability. The Sargan test, with a null hypothesis that the system has a solution, tests that all restrictions are internally consistent.

4. Results and Discussion

4.1. Main Findings

The linear models are estimated using the least squares method, while the non-linear models are estimated using maximum likelihood. The IV is estimated using one instrument and the 2SLS is estimated using two instruments. The IV estimator calculates the average treatment effect for compliers using a binary instrument (Imbens and Angrist, 1994; Angrist et al., 1996; Angrist and Pischke, 2009). This examination utilizes the ordinary least square (OLS), IV estimator, and 2SLS estimators to estimate the linear model and adopts the probit and bivariate probit to estimate the non-linear models. The standard errors for the OLS, IV, and 2SLS are heteroskedasticity-consistent (HC3), as indicated in Long and Ervin (2000). For the bivariate probit estimator, the standard errors were calculated by bootstrapping confidence intervals using 10,000 simulated coefficient vectors from the posterior distribution of the estimated model parameters. The estimates for ρ are significant in all cases. The variance inflation factor (VIF) was used to assess multicollinearity, and the result is reported in Table A.1. All the values are close to 1, the smallest possible value for VIF, indicating that multicollinearity is not a problem.

The first-stage result, reported in Table 5, indicates that both *Tax Admin* and *License* have positive, significant, and robust effects on *Corruption*. This holds whether they are used separately and together in regression and after adjusting for heteroskedasticity. The signs of the instruments from the first-stage regressions are positive and align with the hypothesized sign. The first-stage positive effects of *Tax Admin* and *License* on the probability of facing corruption are about 39 and 22 percentage points, respectively. The F-statistics from the three regressions are significant at the 1 percent level. The F-statistic increases from 3.7 by about 527 percent, 300 percent, and 559 percent when *Tax Admin*, *License*, and *Tax Admin* and *License* combined are included in the regressions, respectively.

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

Table 5: First-Stage Results

	Dependent variable:			
	Corruption			
	Ordinary Least Square (OLS)			
	(1)	(2)	(3)	(4)
Tax Admin		0.338***		0.275***
		(0.031)		(0.033)
License			0.218***	0.116***
			(0.023)	(0.023)
Capital City	−0.029	−0.009	−0.025	−0.010
	(0.019)	(0.018)	(0.018)	(0.018)
Business City	0.094***	0.074***	0.075***	0.068***
	(0.017)	(0.016)	(0.016)	(0.016)
South	−0.047**	−0.018	−0.038**	−0.019
	(0.020)	(0.019)	(0.019)	(0.019)
Manufacturing	−0.001	0.004	0.001	0.004
	(0.020)	(0.018)	(0.019)	(0.018)
Retail	0.005	0.009	0.007	0.010
	(0.024)	(0.022)	(0.023)	(0.022)
Firm Age	−0.0001	−0.0002	0.001	0.0002
	(0.001)	(0.001)	(0.001)	(0.001)
Revenue	−0.004	−0.002	−0.004	−0.002
	(0.004)	(0.004)	(0.004)	(0.004)
Innovation	−0.0003	−0.022	−0.004	−0.020
	(0.017)	(0.015)	(0.016)	(0.015)
Sole Proprietor	−0.009	−0.006	−0.002	−0.003
	(0.020)	(0.020)	(0.020)	(0.020)
Manager Education	0.006**	0.005	0.005*	0.004
	(0.003)	(0.003)	(0.003)	(0.003)
Female Owner	0.009	0.005	−0.003	−0.001
	(0.022)	(0.021)	(0.021)	(0.021)
Subsidiary Firm	0.038*	0.028	0.033*	0.027
	(0.020)	(0.019)	(0.020)	(0.019)
Constant	0.799***	0.518***	0.650***	0.492***
	(0.080)	(0.079)	(0.080)	(0.079)
Observations	1,696	1,696	1,696	1,696
R^2	0.026	0.152	0.103	0.169
Adjusted R^2	0.019	0.145	0.096	0.162
Residual Std. Error	0.340	0.317	0.326	0.314
F Statistic	3.706***	23.169***	14.802***	24.449***

Note: *p<0.1; **p<0.05; ***p<0.01
The numbers in round brackets () are standard errors. Standard errors are heteroskedasticity-consistent (HC3)

4.1.1. Effects of Bureaucratic Corruption on MSMEs' Financial Constraints

The effects of bureaucratic corruption on MSMEs' financial constraints using OLS, IV, 2SLS, probit, and bivariate probit methods are reported here. According to the OLS estimator that assumes that *Corruption* is exogenous, MSMEs (used interchangeably with small firms) that identified corruption as an obstacle are, on average, approximately 0.318 more likely to be financially constrained than those that did not identify corruption as an obstacle. Bribery increases input costs and inhibits firm growth, thereby making it more difficult for firms to obtain the collateral required for accessing external finance. The estimate of the non-linear estimator that assumes exogeneity is only 0.3 percent larger but they are the same to two decimal places. The probit estimator is also more efficient.

According to Table 6, the effect of *Corruption* nearly triples when either or both instruments are used. Although the IV and 2SLS estimates are similar, the IV using *Tax Admin* as an instrument has the largest estimate. The 2SLS estimate is closer to the IV estimate using *Tax Admin* because the IV estimator has a stronger first stage. Utilizing *Tax Admin* as an instrument, corruption is estimated to raise the likelihood of facing financial constraints for an MSME experiencing tax administration hindrances by 91 percentage points. Using the same instrument, the bivariate probit suggests that corruption increases the probability of a representative MSME being financially constrained by roughly 62 percentage points. The estimate derived from the linear IV estimator is approximately 47 percent higher than the non-linear estimate. For models using *License* as an instrument, if an MSME is grappling with obtaining business licenses and permits, it is about 90 percentage points more likely to be financially constrained due to corruption. The corresponding bivariate probit estimate indicates a 64 percentage point rise in the probability of becoming constrained financially. The IV estimate is 40 percent higher than the bivariate probit estimate. The theoretical framework provides the economic interpretation of the effect. The positive estimates imply that corruption increases firm costs, as a result, reducing their growth and ability to raise collateral for borrowing.

As expected, IVs and 2SLS estimators are less efficient than the OLS, but the 2SLS is more efficient than the IV estimators. The bivariate probit estimators are more efficient than their linear counterparts, whether one or two instruments are utilized. Also, the probit method has a superior explanatory power than the OLS. The Wu-Hausman tests suggest that *Corruption* is indeed endogenous, and the weak instrument tests confirm the relevance of the instruments used in all models. The 2SLS is used to compute the Sargan test, which suggests that the system has a solution. The statistically significant $\hat{\rho}$ estimates suggest the existence of omitted variable bias in the system of equations. Therefore, the OLS and probit estimators are inconsistent.

In Table 6, six covariates produce statistically significant estimates across the linear and non-linear methods: *Capital City*, *Business City*, *South*, *Retail*, *Firm Age*, and *Manager Education*. The analysis shows that there is geographical variation in financial constraints, with MSMEs located in the capital city experiencing higher levels of financial constraints. This could be due to their proximity to public officials, which increases the likelihood of paying bribes and becoming bankrupt. Additionally, higher operational costs and competition contribute to this problem. Firms in the capital cities tend to face higher rents, labor costs, and operational expenses, which require more capital to cover. Capital cities attract a large number of businesses, leading to increased competition and higher financial pressure to invest in marketing, research and development, and employee benefits to remain competitive. In addition, intense competition for funding

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

Table 6: Effects of Bureaucratic Corruption on MSMEs' Financial Constraints

	Dependent variable:							
	Financial Constraints							
	OLS	IV	IV	2SLS	Probit	Bivariate Probit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption	0.318***	0.907***	0.896***	0.903***	0.319***	0.617***	0.637***	0.623***
	(0.035)	(0.113)	(0.126)	(0.102)	(0.034)	(0.043)	(0.050)	(0.041)
Capital City	0.101***	0.118***	0.117***	0.118***	0.099***	0.092***	0.090***	0.092***
	(0.023)	(0.026)	(0.026)	(0.026)	(0.022)	(0.019)	(0.026)	(0.019)
Business City	−0.077***	−0.133***	−0.132***	−0.132***	−0.075***	−0.083***	−0.083***	−0.083***
	(0.022)	(0.027)	(0.027)	(0.026)	(0.022)	(0.019)	(0.019)	(0.019)
South	−0.079***	−0.051*	−0.052*	−0.051*	−0.078***	−0.055***	−0.053***	−0.053***
	(0.024)	(0.027)	(0.027)	(0.027)	(0.022)	(0.019)	(0.020)	(0.020)
Manufacturing	0.036	0.036	0.036	0.036	0.036	0.031	0.030	0.030
	(0.023)	(0.027)	(0.026)	(0.027)	(0.022)	(0.019)	(0.019)	(0.019)
Retail	0.076***	0.074**	0.074**	0.074**	0.075***	0.065***	0.062***	0.064***
	(0.028)	(0.031)	(0.031)	(0.031)	(0.025)	(0.023)	(0.022)	(0.023)
Firm Age	0.004***	0.005***	0.005***	0.005***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Revenue	0.005	0.008	0.008	0.008	0.006	0.007	0.007	0.007
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Innovation	0.006	0.006	0.006	0.006	0.006	0.002	0.003	0.002
	(0.020)	(0.022)	(0.022)	(0.022)	(0.019)	(0.017)	(0.017)	(0.017)
Sole Proprietor	−0.025	−0.019	−0.019	−0.019	−0.020	−0.015	−0.014	−0.014
	(0.025)	(0.028)	(0.028)	(0.028)	(0.024)	(0.021)	(0.021)	(0.021)
Manager Education	−0.005*	−0.009**	−0.009**	−0.009**	−0.005	−0.004***	−0.004***	−0.004***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.001)	(0.001)	(0.001)
Female Owner	0.032	0.027	0.027	0.027	0.029	0.024	0.023	0.027
	(0.026)	(0.029)	(0.029)	(0.029)	(0.025)	(0.022)	(0.021)	(0.024)
Subsidiary Firm	0.004	−0.018	−0.018	−0.018	0.004	−0.006	−0.007	−0.007
	(0.025)	(0.027)	(0.027)	(0.027)	(0.024)	(0.021)	(0.021)	(0.021)
Constant	0.459***	−0.012	−0.003	−0.009				
	(0.095)	(0.133)	(0.142)	(0.127)				
Observations	1,696	1,696	1,696	1,696	1,696	1,696	1,696	1,696
(Pseudo) R^2	0.102				(0.104)			
Weak IV (p)		2×10^{-16}	2×10^{-16}	2×10^{-16}				
Wu-Hausman (p)		5×10^{-16}	2×10^{-9}	2×10^{-16}				
Sargan (p)				0.918				
$\rho\hat{}$ (Std. Err.)						-0.6(0.1)	-0.6(0.1)	-0.6(0.1)

Note: *p<0.1; **p<0.05; ***p<0.01

The instrument for (2) and (6) is *Tax Admin*, the instrument for (3) and (7) is *License*, and the instruments for (4) and (8) are *Tax Admin* and *License*. Standard errors for (1), (2), (3), and (4) are heteroskedasticity-consistent (HC3). Standard errors for the bivariate probit were calculated from confidence intervals bootstrapped using 10,000 simulated coefficient vectors from the posterior distribution of the estimated model parameters. (5)-(8) are marginal effects. The numbers in round brackets () are standard errors and p means p-value. All equations were estimated with an intercept.

can make it harder for individual firms to secure the necessary capital, leading to greater financial constraints.

MSMEs located in business cities typically have better access to financing. This is because such cities have a larger concentration of financial institutions, such as banks and investment firms, which makes it easier for businesses to access financial products and services. Being located in a business city can also attract more investors and customers, leading to more funding and revenue for firms to meet their financial needs and grow. As expected, MSMEs in southern Nigeria have better access to finance due to their proximity to capital markets and the willingness of investors to invest in more prosperous regions with perceived stability and potential for higher returns. The superior consumer spending in southern Nigeria could enhance the revenue and profitability of these firms, making it easier for them to obtain loans.

Financial constraints are more prevalent in the retail sub-sector than in the manufacturing or other services sub-sectors. This is probably due to the intense competition that exists in the retail industry, which results in businesses having lower profits and limited financial power. As a result, they may struggle to cover expenses, leading to lower profitability. Additionally, older firms face challenges in obtaining finance as they are more likely to have accumulated debt over the years due to expansions or acquisitions. Servicing debts may limit their ability to take on additional debt, and the payment of dividends to shareholders may further limit the funds available for expansion. On the other hand, firms with more educated managers have lower financial constraints. This can be attributed to their superior financial literacy, which leads to better financial decision-making. This contributes to the financial stability of the firms they manage and reduces the chances of being financially constrained. Furthermore, more educated managers may also have a broader professional network and better knowledge of financial institutions, making it easier for them to secure external funding when needed.

4.1.2. Effects of Bureaucratic Corruption on Firms' Financial Constraints

Here, I add the 110 large firms with complete data to the 1,696 MSMEs and analyze the data for all firms to understand the overarching patterns across enterprises. I include a binary variable, *MSME*, which equals one if the establishment identifies as an MSME and zero otherwise.

The results for all firms are in Table 7. The results provide the treatment effects using linear and non-linear methods. Based on the IV estimates, corruption increases the probability of being financially constrained for a typical Nigerian firm facing impediments related to tax administration and obtaining business licenses and permits by approximately 92 percentage points. Using *Tax Admin* and *License* as instruments, the bivariate probit estimates imply that corruption increases the probability of being financially constrained by 61 to 63 percentage points, respectively. After including large enterprises with 100 or more employees, the estimates from the linear method are approximately two percent larger than the MSME IV estimates, using *Tax Admin* and *License* as instruments separately in regressions. In contrast, the bivariate probit estimate declines by one percent for *Tax Admin* and two percent for *License*. The economic interpretations of these estimates are based on the predictions of the theoretical framework. Including large enterprises with 100 or more employees did not substantially change the estimates. However, this could be due to the limited representation of these firms in the sample. Another reason could be that the effect of corruption is homogeneous across firm sizes. Furthermore, the diagnostic result remains stable after including large firms.

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

Table 7: Effects of Bureaucratic Corruption on Firms' Financial Constraints

	Dependent variable:							
	Financial Constraints							
	OLS	IV	IV	2SLS	Probit	Bivariate Probit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption	0.311***	0.921***	0.915***	0.919***	0.312***	0.611***	0.626***	0.616***
	(0.034)	(0.111)	(0.125)	(0.101)	(0.034)	(0.041)	(0.047)	(0.038)
MSME	0.212***	0.193***	0.193***	0.193***	0.211***	0.169***	0.166***	0.166***
	(0.050)	(0.055)	(0.055)	(0.055)	(0.052)	(0.046)	(0.045)	(0.045)
Capital City	0.102***	0.122***	0.122***	0.122***	0.100***	0.094***	0.093***	0.094***
	(0.022)	(0.025)	(0.025)	(0.025)	(0.021)	(0.019)	(0.019)	(0.019)
Business City	−0.073***	−0.124***	−0.124***	−0.124***	−0.070***	−0.077***	−0.077***	−0.078***
	(0.022)	(0.025)	(0.026)	(0.025)	(0.022)	(0.019)	(0.019)	(0.019)
South	−0.085***	−0.051**	−0.051**	−0.051**	−0.083***	−0.057***	−0.056***	−0.056***
	(0.023)	(0.026)	(0.026)	(0.026)	(0.022)	(0.019)	(0.019)	(0.019)
Manufacturing	0.035	0.036	0.036	0.036	0.035*	0.030	0.030	0.030
	(0.023)	(0.026)	(0.026)	(0.026)	(0.021)	(0.019)	(0.019)	(0.019)
Retail	0.081***	0.078**	0.078**	0.078**	0.080***	0.069**	0.066**	0.068**
	(0.028)	(0.031)	(0.031)	(0.031)	(0.025)	(0.022)	(0.022)	(0.022)
Firm Age	0.005***	0.005***	0.005***	0.005***	0.005***	0.004***	0.005***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Revenue	0.002	0.004	0.004	0.004	0.002	0.003	0.003	0.003
	(0.004)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
Innovation	0.005	0.008	0.008	0.008	0.005	0.002	0.004	0.002
	(0.019)	(0.022)	(0.022)	(0.022)	(0.019)	(0.017)	(0.017)	(0.016)
Sole Proprietor	−0.029	−0.015	−0.015	−0.015	−0.024	−0.015	−0.015	−0.015
	(0.024)	(0.027)	(0.027)	(0.027)	(0.023)	(0.021)	(0.020)	(0.020)
Manager Education	−0.005	−0.009**	−0.009**	−0.009**	−0.004	−0.004***	−0.004***	−0.004***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.001)	(0.001)	(0.001)
Female Owner	0.036	0.034	0.034	0.034	0.031	0.027	0.026	0.026
	(0.026)	(0.029)	(0.029)	(0.029)	(0.024)	(0.021)	(0.021)	(0.021)
Subsidiary Firm	−0.005	−0.028	−0.028	−0.028	−0.005	−0.014	−0.014	−0.014
	(0.024)	(0.026)	(0.027)	(0.026)	(0.023)	(0.020)	(0.020)	(0.021)
Constant	0.292***	−0.191	−0.186	−0.190				
	(0.109)	(0.143)	(0.152)	(0.139)				
Observations	1,806	1,806	1,806	1,806	1,806	1,806	1,806	1,806
R^2 (Pseudo R^2)	0.113				(0.114)			
Weak IV (p)		2×10^{-16}	2×10^{-16}	2×10^{-16}				
Wu-Hausman (p)		2×10^{-16}	2×10^{-10}	2×10^{-16}				
Sargan (p)				0.956				
$\hat{\rho}$ (Std. Err.)						-0.6(0.1)	-0.6(0.1)	-0.6(0.1)

Note: *p<0.1; **p<0.05; ***p<0.01

The instrument for (2) and (6) is *Tax Admin*, the instrument for (3) and (7) is *License*, and the instruments for (4) and (8) are *Tax Admin* and *License*. Standard errors for (1), (2), (3), and (4) are heteroskedasticity-consistent (HC3). The numbers in round brackets () are standard errors. Standard errors for the bivariate probit were calculated from confidence intervals bootstrapped using 10,000 simulated coefficient vectors from the posterior distribution of the estimated model parameters. (5)-(8) are marginal effects. The numbers in round brackets () are standard errors and p means p-value. All equations were estimated with an intercept.

Furthermore, Nigerian MSMEs are about 17 to 19 percentage points more likely to be financially constrained than large firms. One way to explain this effect is that small businesses have lower total revenue than large firms, indicating that smaller businesses are more likely to struggle to raise the collateral needed to obtain bank loans.

4.1.3. Analyzing Firm Size and Industry Heterogeneity and the Degrees of Corruption

Having observed the changes in the effect of *Corruption* after including large firms, I employ an interaction term to assess if the difference in financial constraints between MSMEs and large firms due to corruption is statistically significant. Table 8 shows the result for the interaction term between *Corruption* and *MSME*. The effect of the interaction term is not statistically significant, suggesting that the impact of corruption on financial constraints faced by Nigerian firms does not depend on firm size. Similarly, there is no evidence that the impact of corruption differs across industries (Table 9). However, the main conclusion that corruption restricts firms' access to finance remains unchanged.

Additionally, I employ the IV estimator to estimate the effects of the degrees of corruption on firms' access to finance. I retained *Financial Constraints* as a binary variable. The ordinal variables *Corruption*, *Tax Admin*, and *License* were divided into five binary variables, and the survey classifications are used to categorize the degree of corruption, tax administration challenges, and issues with obtaining licenses where 0 signifies no obstacle, 1 represents a minor obstacle, 2 indicates a moderate obstacle, 3 suggests a major obstacle, and 4 shows a very severe obstacle. The summary statistics of the new variables are presented in Table A.2. Given the endogeneity of *Corruption*, I utilize *Tax Admin (Minor)* and *License (Minor)* as instruments for *Corruption (Minor)* and so on. The results of the analysis, as presented in Table 10, indicate that firms that reported corruption as a "minor" barrier experience the highest level of financial constraints for both instruments. One would expect enterprises that perceive corruption as a "very severe" hindrance to their operation to have the largest estimated effect. This result may support the notion stated earlier that while ordinal variables allow the measurement of different levels of intensity, the interpretation of the different categories may be more subjective than that of a binary variable.

Overall, these findings underscore the pervasive and deteriorating impact of bureaucratic corruption on Nigerian firms and highlight the need for effective measures to combat corruption and reduce its adverse effects on firms and, consequently, economic growth and development.

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

Table 8: Effects of Corruption on Firms' Financial Constraints By Firm Size

	Dependent variable:		
	Financial Constraints		
	OLS	IV	IV
	(1)	(2)	(3)
Corruption	0.241*	1.146**	1.326*
	(0.132)	(0.500)	(0.770)
MSME	0.147	0.402	0.567
	(0.129)	(0.456)	(0.687)
Corruption × MSME	0.075	−0.243	−0.436
	(0.137)	(0.511)	(0.780)
Capital City	0.101***	0.123***	0.124***
	(0.022)	(0.025)	(0.026)
Business City	−0.074***	−0.121***	−0.119***
	(0.022)	(0.026)	(0.027)
South	−0.086***	−0.049*	−0.048*
	(0.023)	(0.027)	(0.028)
Manufacturing	0.035	0.036	0.036
	(0.023)	(0.026)	(0.026)
Retail	0.081***	0.078**	0.077**
	(0.028)	(0.031)	(0.031)
Firm Age	0.005***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)
Revenue	0.002	0.004	0.004
	(0.004)	(0.005)	(0.005)
Innovation	0.005	0.009	0.010
	(0.019)	(0.022)	(0.023)
Sole Proprietor	−0.030	−0.012	−0.009
	(0.024)	(0.029)	(0.030)
Manager Education	−0.005	−0.009**	−0.009**
	(0.003)	(0.004)	(0.004)
Female Owner	0.035	0.035	0.036
	(0.025)	(0.030)	(0.030)
Subsidiary Firm	−0.004	−0.028	−0.028
	(0.024)	(0.027)	(0.027)
Constant	0.354**	−0.391	−0.550
	(0.157)	(0.464)	(0.691)
Observations	1,806	1,806	1,806
R^2	0.113		
Weak IV (p)		2×10^{-16}	2×10^{-16}
Weak IV (p)		2×10^{-16}	2×10^{-16}
Wu-Hausman (p)		2×10^{-16}	1×10^{-9}

Note: *p<0.1; **p<0.05; ***p<0.01

The instrument for (2) is *Tax Admin* and the instrument for (3) is *License*. Standard errors are heteroskedasticity-consistent (HC3). The numbers in round brackets () are standard errors and p means p-value. All equations were estimated with an intercept.

Table 9: Effects of Corruption on Firms' Financial Constraints by Industry

	Dependent variable:		
	Financial Obstacle		
	LPM	IV	IV
	(1)	(2)	(3)
Corruption	0.234***	0.781***	0.893***
	(0.062)	(0.211)	(0.234)
MSME	0.209***	0.190***	0.192***
	(0.050)	(0.055)	(0.056)
Corruption × Manufacturing	0.083	0.124	−0.041
	(0.077)	(0.260)	(0.280)
Corruption × Retail	0.199*	0.374	0.245
	(0.103)	(0.295)	(0.365)
Capital City	0.103***	0.124***	0.122***
	(0.022)	(0.025)	(0.025)
Business City	−0.075***	−0.126***	−0.124***
	(0.022)	(0.025)	(0.026)
South	−0.084***	−0.049*	−0.049*
	(0.023)	(0.026)	(0.027)
Manufacturing	−0.037	−0.071	0.071
	(0.074)	(0.233)	(0.249)
Retail	−0.092	−0.248	−0.135
	(0.100)	(0.268)	(0.328)
Firm Age	0.004***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)
Revenue	0.002	0.005	0.005
	(0.004)	(0.005)	(0.005)
Innovation	0.007	0.012	0.010
	(0.019)	(0.022)	(0.022)
Sole Proprietor	−0.030	−0.017	−0.014
	(0.024)	(0.028)	(0.028)
Manager Education	−0.005	−0.009**	−0.009**
	(0.003)	(0.004)	(0.004)
Female Owner	0.034	0.031	0.032
	(0.026)	(0.029)	(0.029)
Subsidiary Firm	−0.006	−0.030	−0.029
	(0.024)	(0.026)	(0.027)
Constant	0.366***	−0.062	−0.169
	(0.121)	(0.226)	(0.245)
Observations	1,806	1,806	1,806
R^2	0.116		
Weak IV (p)		2×10^{-16}	2×10^{-16}
Weak IV (p)		2×10^{-16}	2×10^{-16}
Weak IV (p)		2×10^{-16}	2×10^{-16}
Wu-Hausman (p)		2×10^{-16}	5×10^{-9}

Note: *p<0.1; **p<0.05; ***p<0.01

The instrument for (2) is *Tax Admin* and the instrument for (3) is *License*. Standard errors are heteroskedasticity-consistent (HC3). The numbers in round brackets () are standard errors and p means p-value.

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

Table 10: Effects of Degrees of Corruption on Financial Constraints (All Firms)

	Dependent variable:	
	Financial Constraints	
	IV	IV
	(1)	(2)
Corruption (Minor)	1.376***	1.711*
	(0.350)	(0.889)
Corruption (Moderate)	1.100***	0.616
	(0.408)	(0.387)
Corruption (Major)	0.880**	1.539**
	(0.405)	(0.629)
Corruption (Very Severe)	1.157***	1.262***
	(0.254)	(0.444)
MSME	0.213***	0.219***
	(0.065)	(0.081)
Capital City	0.152***	0.184**
	(0.039)	(0.075)
Business City	−0.141***	−0.168***
	(0.032)	(0.058)
South	−0.056	0.018
	(0.053)	(0.078)
Manufacturing	0.025	0.021
	(0.032)	(0.042)
Retail	0.058	0.058
	(0.039)	(0.052)
Firm Age	0.004***	0.005**
	(0.001)	(0.002)
Revenue	0.001	0.002
	(0.006)	(0.008)
Innovation	0.033	0.034
	(0.031)	(0.045)
Sole Proprietor	−0.021	0.008
	(0.037)	(0.047)
Manager Education	−0.011**	−0.013*
	(0.005)	(0.007)
Female Owner	0.042	0.003
	(0.043)	(0.053)
Subsidiary Firm	−0.026	−0.028
	(0.031)	(0.040)
Constant	−0.256	−0.515
	(0.202)	(0.394)
Observations	1,806	1,806
Weak IV (Minor) (p)	4×10^{-10}	4×10^{-8}
Weak IV (Moderate) (p)	6×10^{-9}	6×10^{-7}
Weak IV (Major) (p)	7×10^{-11}	5×10^{-7}
Weak IV (Very Severe) (p)	2×10^{-16}	2×10^{-16}
Wu-Hausman (p)	1×10^{-14}	3×10^{-7}

Note: *p<0.1; **p<0.05; ***p<0.01

The instrument for (1) is *Tax Admin* and the instrument for (2) is *License*. *Corruption (Minor)* was estimated using *Tax Admin (Minor)* and *License (Minor)* as instruments and so on. The numbers in round brackets () are standard errors and p means p-value. Standard errors are heteroskedasticity-consistent (HC3).

4.2. Robustness Check Using Different Specifications

This subsection examines the sensitivity of variable specification related to converting the ordinal variables to binary variables. All the regressions for the robustness tests include all covariates.

In my check of the robustness of the model, I alter the definitions of key variables to assess if this changes the findings. In my primary analysis, I assumed that *Financial Constraints*, *Corruption*, *Tax Admin*, and *License* equals one if the firm identifies access to finance, corruption, tax administration, and obtaining licenses and permits, respectively, as a minor, moderate, major, or very severe obstacle and 0 if not an obstacle. Do the conclusions change if I recode these variables and re-estimate the models? The summary statistics for these variables are presented in Table A.3. For brevity, only the estimates for *Corruption* are reported in Table 11. Panel A of Table 11 shows results using *Financial Constraints1*, *Corruption1*, *Tax Admin1*, and *License1*. These variables equal one if the firm identified access to finance, corruption, tax administration, and obtaining licenses and permits as a moderate, major, or very severe obstacle and 0 if not an obstacle or a minor obstacle.

Panel B of the same table shows results when *Financial Constraints2*, *Corruption2*, *Tax Admin2*, and *License2* equal to one if the firm identified access to finance, corruption, tax administration, and obtaining licenses and permits as a very severe obstacle and zero if not an obstacle or a minor, moderate, or major obstacle. The results obtained from the new specifications are consistent with the primary estimates presented in Table 6. Moreover, the primary specifications have the highest explanatory power, as indicated by a larger R^2 and pseudo-R^2.

5. Conclusion and Policy Recommendations

This study has shown that bureaucratic corruption has a positive, causal, robust, statistically, and economically significant impact on the financial constraints of Nigerian firms. The effect becomes more pronounced after accounting for the endogeneity of corruption, with the impact increasing by two to three times. Using two instruments to estimate the average treatment effects, the bivariate probit suggests that corruption increases the probability of being financially constrained by approximately 62 to 64 and 61 to 63 percentage points for a representative MSME and firm, respectively. Following the prediction of the theoretical framework, corruption increases the input costs of Nigerian firms, which reduces their profits and makes it more difficult for them to obtain the collateral needed to acquire external finance.

The IV estimator of local effects shows that corruption increases the probability of being financially constrained by 90 to 91 for a representative MSME that faces obstacles with obtaining business licenses and permits and tax administration, respectively. The estimate is 92 percentage points for all enterprises, utilizing both instruments. In addition, MSMEs are about 17 to 19 percentage points more likely to be financially constrained than large firms. The impact of corruption on financial constraints does not change with firm size, and Nigerian firms that perceive corruption as a "minor" impediment to their operation have the most difficulty obtaining external finance. These results highlight the need for anti-corruption efforts.

To my knowledge, this study provides the first empirical assessment of the effects of corruption on firms' access to finance in Nigeria. It is also the first to juxtapose the average treatment effect (ATE) using bivariate probit with the treatment effect estimate from the IV estimator, tak-

DOI: 10.57229/2373-1761.1505

Table 11: Effects of Corruption on MSMEs' Financial Constraints Using Different Specifications (with Covariates)

	Dependent variable:							
	Financial Constraints1							
	OLS	IV	IV	2SLS	Probit	Bivariate Probit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption1	0.198***	0.893***	1.019***	0.935***	0.197***	0.547***	0.556***	0.543***
	(0.025)	(0.102)	(0.129)	(0.091)	(0.025)	(0.021)	(0.020)	(0.019)
Observations	1,696	1,696	1,696	1,696	1,696	1,696	1,696	1,696
R^2 (Pseudo R^2)	0.065				(0.065)			
Weak IV (p)		2×10^{-16}	2×10^{-16}	2×10^{-16}				
Wu-Hausman (p)		2×10^{-16}	2×10^{-16}	2×10^{-16}				
Sargan (p)				0.317				
$\hat{\rho}$ (Std. Err.)						-0.8(0.1)	-0.9(0.1)	-0.8(0.1)

Panel B: Effects of Corruption on MSMEs' Financial Constraints Using Different Specifications (with Covariates)

	Dependent variable:							
	Financial Constraints2							
	OLS	IV	IV	2SLS	Probit	Bivariate Probit		
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Corruption2	0.134***	0.322*	0.433**	0.380**	0.136***	0.414***	0.587***	0.416***
	(0.027)	(0.187)	(0.212)	(0.150)	(0.028)	(0.163)	(0.132)	(0.127)
Observations	1,696	1,696	1,696	1,696	1,696	1,696	1,696	1,696
R^2 (Pseudo R^2)	0.047				(0.054)			
Weak IV (p)		1×10^{-11}	1×10^{-12}	2×10^{-16}				
Wu-Hausman (p)		0.091	0.008	0.003				
Sargan (p)				0.537				
$\hat{\rho}$ (Std. Err.)						-0.5(0.2)	-0.7(0.2)	-0.5(0.2)

Note: *p<0.1; **p<0.05; ***p<0.01

The instrument for (2) and (6) is *Tax Admin1* and that of (10) and (14) is *Tax Admin2*. The instrument for (3) and (7) is *License1* and that of (11) and (15) is *License2*. The instruments for (4) and (8) are *Tax Admin1* and *License1* and that of (12) and (18) are *Tax Admin2* and *License2*. Standard errors for (1)-(4) and (9)-(12) are heteroskedasticity-consistent (HC3). Standard errors for the bivariate probit were calculated from confidence intervals bootstrapped using 10,000 simulated coefficient vectors from the posterior distribution of the estimated model parameters. (5)-(8) and (13)-(16) are marginal effects. The numbers in round brackets () are standard errors and p means p-value. All equations were estimated with an intercept.

ing into account that there may be heterogeneous treatment effects across firm groups. Nigeria is an ideal setting for this study because of the country's challenges with corruption and the poor performance of Nigeria's micro, small, and medium-sized enterprises (MSMEs). Fighting corruption and developing small businesses in Nigeria have been the focus of the national discourse, as seen during the 2023 general election campaign.

The results of this paper have significant policy implications. They include the need to establish robust institutions to embark on widespread anti-corruption campaigns, ensure that government agencies judiciously use public funds intended for MSMEs, regulatory fixes to eliminate illegal and multiple taxation, streamline the tax system, and eliminate issues with obtaining business licenses and permits.

My results suggest the benefits of enforcing anti-corruption measures. To ensure that government agencies, such as SMEDAN, that are responsible for developing MSMEs, utilize the assigned funds for their intended purposes, transparency and accountability must be a top priority in governance. These agencies should publish the names and contact details of the beneficiaries of their training and funding programs on their websites for public scrutiny. This will make their budgetary processes more transparent and accessible to the public. A policy recommendation that has been suggested in the economic literature for fighting corruption in low-income countries is paying public officials higher wages (Van Rijckeghem and Weder, 2001).

Similarly, the Nigerian government must place more emphasis on regulatory fixes to address issues such as multiple and illegal taxation and difficulty with obtaining licenses and permits, rather than trying to incentivize banks to lend to firms/MSMEs or allocate money to MSMEs through corruption-prone government agencies. Addressing these regulatory challenges will help improve the financial stability of firms and put them in a better position to obtain unsubsidized external finance. It is also imperative that there is better engagement between government agencies and the private sector to ensure that government programs aimed at growing the MSME subsector are addressing relevant issues using the best practices.

However, more work is still required in this area. It is important to evaluate whether the implementation of anti-corruption campaigns or increasing the remuneration of public officials has a considerable impact on reducing corruption and improving the financial standing of Nigerian firms. It is also important to investigate how corrupt practices affect the availability of financial resources and the willingness of financial institutions to lend to certain Nigerian firms (Beck et al., 2006; Barth et al., 2009). A longitudinal study would be beneficial to explore the long-term and dynamic effects of corruption. The data set has missing values for some important questions on the survey, such as "What was the main reason why this establishment did not apply for any line of credit or loan?" This question would have provided valuable information to identify firms that need external finance. Unfortunately, this information is not available, but it may not be a significant barrier as the aforementioned survey report by SMEDAN and NBS identified access to finance as the biggest challenge for Nigerian small businesses. Finally, the 2021 SMEDAN and NBS report, along with Nigeria's declining performance on Transparency International's corruption perception index from 2015 to 2022, provides evidence that the results of this study apply to the present Nigerian economic landscape.

https://digitalcommons.pepperdine.edu/jef/vol27/iss1/1
DOI: 10.57229/2373-1761.1505

References

Amin, M. and Motta, V. (2023). The impact of corruption on SMEs' access to finance: Evidence using firm-level survey data from developing countries. *Journal of Financial Stability*, 68:101175.

Angrist, J. D., Imbens, G. W., and Rubin, D. B. (1996). Identification of causal effects using instrumental variables. *Journal of the American Statistical Association*, 91(434):444–455.

Angrist, J. D. and Pischke, J.-S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.

Banerjee, R. (2016). Corruption, norm violation and decay in social capital. *Journal of Public Economics*, 137:14–27.

Barth, J. R., Lin, C., Lin, P., and Song, F. M. (2009). Corruption in bank lending to firms: Cross-country micro evidence on the beneficial role of competition and information sharing. *Journal of Financial Economics*, 91(3):361–388.

Beck, T., Demirgüç-Kunt, A., and Levine, R. (2006). Bank supervision and corruption in lending. *Journal of Monetary Economics*, 53(8):2131–2163.

Blalock, G., Gertler, P. J., and Levine, D. I. (2008). Financial constraints on investment in an emerging market crisis. *Journal of Monetary Economics*, 55(3):568–591.

Chen, T.-K. (2016). Does geography matter in a geographically small and culturally homogeneous country? Firm location and corporate credit risk. *International Review of Economics & Finance*, 44:323–348.

Dreher, A. and Gassebner, M. (2013). Greasing the wheels? The impact of regulations and corruption on firm entry. *Public Choice*, 155:413–432.

Fisman, R. and Svensson, J. (2007). Are corruption and taxation really harmful to growth? Firm level evidence. *Journal of Development Economics*, 83(1):63–75.

Fungáčová, Z., Kochanova, A., and Weill, L. (2015). Does money buy credit? Firm-level evidence on bribery and bank debt. *World Development*, 68:308–322.

Gründler, K. and Potrafke, N. (2019). Corruption and economic growth: New empirical evidence. *European Journal of Political Economy*, 60:101810.

Hyytinen, A. and Väänänen, L. (2006). Where do financial constraints originate from? An empirical analysis of adverse selection and moral hazard in capital markets. *Small Business Economics*, pages 323–348.

Imbens, G. W. and Angrist, J. D. (1994). Identification and estimation of local average treatment effects. *Econometrica: Journal of the Econometric Society*, pages 467–475.

Jiang, T. and Nie, H. (2014). The stained China miracle: Corruption, regulation, and firm performance. *Economics Letters*, 123(3):366–369.

Johnson, N. D., LaFountain, C. L., and Yamarik, S. (2011). Corruption is bad for growth (even in the United States). *Public Choice*, 147:377–393.

Lee, N. and Luca, D. (2019). The big-city bias in access to finance: Evidence from firm perceptions in almost 100 countries. *Journal of Economic Geography*, 19(1):199–224.

Long, J. S. and Ervin, L. H. (2000). Using heteroscedasticity consistent standard errors in the linear regression model. *The American Statistician*, 54(3):217–224.

Love, I. (2003). Financial development and financing constraints: International evidence from the structural investment model. *The Review of Financial Studies*, 16(3):765–791.

Lui, F. T. (1985). An equilibrium queuing model of bribery. *Journal of Political Economy*, 93(4):760–781.

Maksimov, V., Wang, S. L., and Luo, Y. (2017). Reducing poverty in the least developed countries: The role of small and medium enterprises. *Journal of World Business*, 52(2):244–257.

Marra, G. and Radice, R. (2011). Estimation of a semiparametric recursive bivariate probit model in the presence of endogeneity. *Canadian Journal of Statistics*, 39(2):259–279.

Mauro, P. (1998). Corruption and the composition of government expenditure. *Journal of Public Economics*, 69(2):263–279.

Méon, P.-G. and Sekkat, K. (2005). Does corruption grease or sand the wheels of growth? *Public Choice*, 122:69–97.

Méon, P.-G. and Weill, L. (2010). Is corruption an efficient grease? *World Development*, 38(3):244–259.

Mo, P. H. (2001). Corruption and economic growth. *Journal of Comparative Economics*, 29(1):66–79.

Morris, S. D. and Klesner, J. L. (2010). Corruption and trust: Theoretical considerations and evidence from Mexico. *Comparative Political Studies*, 43(10):1258–1285.

Oliveira, B. and Fortunato, A. (2006). Firm growth and liquidity constraints: A dynamic analysis. *Small Business Economics*, 27:139–156.

Park, J. (2012). Corruption, soundness of the banking sector, and economic growth: A cross-country study. *Journal of International Money and Finance*, 31(5):907–929.

Qian, J. and Strahan, P. E. (2007). How laws and institutions shape financial contracts: The case of bank loans. *The Journal of Finance*, 62(6):2803–2834.

Svensson, J. (2003). Who must pay bribes and how much? Evidence from a cross section of firms. *The Quarterly Journal of Economics*, 118(1):207–230.

Svensson, J. (2005). Eight Questions about Corruption. *Journal of Economic Perspectives*, 19(3):19–42.

Van Rijckeghem, C. and Weder, B. (2001). Bureaucratic corruption and the rate of temptation: do wages in the civil service affect corruption, and by how much? *Journal of Development Economics*, 65(2):307–331.

Wellalage, N. H., Locke, S., and Samujh, H. (2019). Corruption, gender and credit constraints: Evidence from South Asian SMEs. *Journal of Business Ethics*, 159:267–280.

DOI: 10.57229/2373-1761.1505

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT press.

Xu, G. and Yano, G. (2017). How does anti-corruption affect corporate innovation? Evidence from recent anti-corruption efforts in China. *Journal of Comparative Economics*, 45(3):498–519.

Table A.1: VIF of OLS Result

	VIF
Corruption	1.026
Capital City	1.354
Business City	1.310
South	1.196
Manufacturing	1.401
Retail	1.378
Firm Age	1.085
Revenue	1.079
Innovation	1.044
Sole Proprietor	1.048
Manager Education	1.106
Female Owner	1.054
Subsidiary Firm	1.164

Table A.2: Summary Statistics for All Firms

Statistic	Mean	St. Dev.	Min	Max	N
Corruption (Minor)	0.215	0.411	0	1	1,806
Corruption (Moderate)	0.184	0.387	0	1	1,806
Corruption (Major)	0.337	0.473	0	1	1,806
Corruption (Very Severe)	0.127	0.333	0	1	1,806
Corruption (No Obstacle)	0.137	0.344	0	1	1,806
Tax Admin (Minor)	0.375	0.484	0	1	1,806
Tax Admin (Moderate)	0.267	0.443	0	1	1,806
Tax Admin (Major)	0.162	0.368	0	1	1,806
Tax Admin (Very Severe)	0.029	0.169	0	1	1,806
Tax Admin (No Obstacle)	0.167	0.373	0	1	1,806
License (Minor)	0.378	0.485	0	1	1,806
License (Moderate)	0.237	0.425	0	1	1,806
License (Major)	0.095	0.293	0	1	1,806
License (Very Severe)	0.015	0.121	0	1	1,806
License (No Obstacle)	0.275	0.447	0	1	1,806

Table A.3: Summary Statistics for Recoded Variables

Statistic	Mean	St. Dev.	Min	Max	N
Financial Constraints1	0.485	0.500	0	1	1,696
Corruption1	0.654	0.476	0	1	1,696
Tax Admin1	0.461	0.499	0	1	1,696
License1	0.349	0.477	0	1	1,696
Financial Constraints2	0.076	0.265	0	1	1,696
Corruption2	0.127	0.333	0	1	1,696
Tax Admin2	0.031	0.172	0	1	1,696
License2	0.016	0.125	0	1	1,696

DOI: 10.57229/2373-1761.1505