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Michael Machokoto; O Omotilewa

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The impact of borrowing concentration on innovation: When is one not just enough?

Michael Machokoto [a,b,*], Oluwatoba James Omotilewa [c]

[a] African Development Bank Group, Avenue Joseph Anoma, 01 BP 1387, Abidjan 01, Cote d'Ivoire
[b] School of Economics and Finance, University of the Witwatersrand, 1 Jan Smuts Avenue, Johannesburg, Braamfontein, 2000, South Africa
[c] International Finance Corporation, Development Impact Measurement Department, 2121 Pennsylvania Avenue NW, Washington, DC, 20433, USA

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ABSTRACT

Using a survey dataset of small and medium-sized enterprises (SMEs) in Tanzania and Kenya, we find that nearly half of these SMEs concentrate their borrowings exclusively with a single bank. These SMEs rely heavily on internal financing, have limited access to external finance, and are less likely to introduce new or improved products, processes, or services in both local and international markets. Our findings provide valuable insights into the financing decisions of SMEs in developing markets and their impact on critical outcomes such as innovation. They also highlight the need for policy interventions to improve access to finance and diversify financing options to promote sustainable and inclusive economic growth.

1. Introduction

A crucial objective for academia, industry, and government, particularly in developing countries, is encouraging innovation, which is a major driver of sustainable economic growth. The significance of this objective in academia is reflected in the extensive and growing body of literature on the determinants of innovation. Among these determinants, the impact of access to finance has emerged as an area of particular interest.[1] However, despite the considerable progress made in this field to date, an important aspect remains underexplored: the effect of borrowing concentration, or relying solely on one bank, on innovation. This aspect is particularly relevant within the context of developing countries, where access to finance and innovation are both disconcertingly low.[2]

The research area above holds particular interest because of the conflicting literature in developed countries on the advantages and disadvantages of concentrating borrowings on one or a few banks. On the one hand, concentrating borrowings can increase incentives for banks to collect information and monitor their borrowers, leading to improvements in efficiency and credit allocation, and ultimately, better credit access (see Carletti, 2004; Diamond, 1984; Gobbi and Sette, 2014; Hernàndez-Cànovas and Martìnez-Solano, 2010; Ramakrishnan and Thakor, 1984). Additionally, diversifying borrowings can increase bankruptcy costs, as lenders, some of whom may be geographically dispersed, must coordinate efforts to resolve insolvency, as noted in studies such as Gobbi and Sette (2014), Bolton and Scharfstein (1996), and Bris and Welch (2005). On the other hand, concentrating borrowings can also be detrimental to enterprises, especially during contractions in credit supply or when the lender experiences liquidity issues, which could result in limited or no access to credit. Furthermore, research such as Detragiache et al. (2000), Gobbi and Sette (2014), Hernàndez-Cànovas and Martìnez-Solano (2010), Rajan (1992), and Sharpe (1990) suggests that lenders may take advantage of borrowers, charge high-interest rates, require additional collateral, and threaten to cut credit when borrowings are concentrated. Therefore, it is unclear whether concentrating borrowings is beneficial or not and how it may impact real decisions, such as investments in innovation, beyond access to finance, particularly for small and medium-sized enterprises (SMEs) in developing countries where research is limited.

* Corresponding author at: School of Economics and Finance, University of the Witwatersrand, 1 Jan Smuts Avenue, Johannesburg, Braamfontein, 2000, South Africa.
E-mail addresses: m.machokoto@afdb.org, michael.machokoto@wits.ac.za (M. Machokoto), oomotilewa@ifc.org (O.J. Omotilewa).

[1] Several studies have investigated the relationship between access to finance and innovation, including Gorodnichenko and Schnitzer (2013), Gorodnichenko et al. (2010), Machokoto et al. (2023), Machokoto and Nyantakyi (2023), and Wellalage et al. (2020).

[2] See, Asiedu et al. (2013), Hansen and Rand (2013), Gorodnichenko and Schnitzer (2013) and Machokoto et al. (2023).

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Table 1
The impact of borrowing concentration and diversification and access to finance on innovation.

Dependent variables Independent variables	INNOV1 (1)	INNOV1 (2)	INNOV1 (3)	INNOV1 (4)	INNOV1 (5)	INNOV1 (6)	INNOV1 (7)	INNOV1 (8)
One bank	−0.3397***				−0.3254***			
	(0.1154)				(0.1204)			
Internal funds		−0.3475***				−0.4353***		
		(0.1297)				(0.1339)		
LogBanks			0.6698***				0.5735***	
			(0.1655)				(0.1782)	
Borrowings				0.4479***				0.5036***
				(0.1171)				(0.1228)
Gender					0.3945***	0.3952***	0.3636***	0.3689***
					(0.1192)	(0.1200)	(0.1193)	(0.1218)
Small sized firm					−0.5667**	−0.6459***	−0.4908**	−0.6295***
					(0.2204)	(0.2220)	(0.2254)	(0.2264)
Medium sized firm					−0.5004**	−0.5447**	−0.4620**	−0.5389**
					(0.2204)	(0.2251)	(0.2227)	(0.2276)
Firm age					0.0819	0.0974	0.0535	0.1160
					(0.1115)	(0.1099)	(0.1154)	(0.1120)
Owner manger					0.3351**	0.4112***	0.3311**	0.4336***
					(0.1411)	(0.1492)	(0.1412)	(0.1507)
Foreign ownership					0.4459**	0.4264**	0.4531**	0.4127**
					(0.1811)	(0.1843)	(0.1831)	(0.1840)
Experience					−0.0834	−0.1037	−0.0569	−0.1074
					(0.1130)	(0.1132)	(0.1168)	(0.1151)
Collateral					−0.0545	−0.0474	−0.0882	−0.1134
					(0.2710)	(0.2664)	(0.2704)	(0.2709)
Capital city					0.0892	0.0980	0.1099	0.1207
					(0.1423)	(0.1455)	(0.1424)	(0.1477)
Constant	−0.5223***	−0.5148***	−1.3594***	−0.8386***	−0.5594	−0.5257	−1.2893**	−0.9040*
	(0.1761)	(0.1761)	(0.2692)	(0.1868)	(0.4696)	(0.4705)	(0.5235)	(0.4810)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	770	770	770	770	770	770	770	770
Pseudo-R^2	0.074	0.073	0.084	0.083	0.118	0.123	0.123	0.132

***, **, * indicate significance at the one, five, and ten percent levels, respectively, based on heteroskedasticity-consistent firm-clustered standard errors.

In an effort to shed light on this important and understudied effect of borrowing concentration on access to finance and innovation in a developing market context, we collected data from a unique survey of SMEs in Kenya and Tanzania in 2019 and 2020. This survey, which was supported by the African Development Bank, aimed to improve our understanding of the challenges facing SMEs in accessing finance, particularly trade finance, in Africa. Using this survey dataset, we develop several measures of innovation, borrowing concentration and diversification, reliance on internal funds, and access to finance. To ensure the reliability of our findings, we employed several approaches, including multivariate probit models with control variables and industry and country fixed effects, alternative variable definitions, propensity score matching, and falsification tests.

Our empirical analyses using the above approaches suggest that SMEs that concentrate their borrowings with a single bank are more likely to rely on internal financing sources, less likely to borrow, and, crucially, less likely to innovate. Specifically, they are less likely to introduce new or improved products, processes, or services in both local and international markets. These findings are significant because they highlight the impact of borrowing concentration not only on financing decisions but also on real business choices, such as innovation, which is disconcertingly low in developing countries and yet under-researched. Therefore, our findings underscore the importance of expanding the financing options available to SMEs to promote sustainable and equitable growth. The following sections discuss our data, methodology, results, and conclusions.

2. Data

Our dataset is drawn from a survey of 800 SMEs in Kenya and Tanzania, conducted in 2019 and 2020 as part of an initiative by the African Development Bank (AfDB) to understand the constraints faced by SMEs in accessing finance, particularly trade finance, in Africa. We excluded SMEs with missing observations on the variables utilized, which is a standard practice in the literature (see Asiedu et al., 2013; Aristei and Gallo, 2016; Wellalage et al., 2020; Machokoto et al., 2023). The final sample consists of 770 SMEs, with 374 from Kenya and 382 from Tanzania. All variables used in this study are defined in detail in the Online Appendix, in Table A.1.

3. Methodology

We employ the following models to investigate the impact of borrowing concentration and diversification on innovation and access to finance:

$$Pr\left(y_{ijkt}=1\right)=\alpha_0+\boldsymbol{\alpha_1 FINANCE_{ijkt}}+\theta \boldsymbol{X}_{ijkt}+\eta_j+\eta_k+\eta_t+\xi_{ijkt} \quad (1)$$

where the indices *i*, *j*, *k* and *t* refer to the enterprise, industry, country, and year, respectively. *y* is either *INNOV1* or *INNOV2*. *INNOV1* is a dummy that takes a value of one if the enterprise has introduced a new or improved product, process, or service (*INNOV1*), and zero otherwise. *INNOV2* is a dummy that takes a value of one if the enterprise has introduced a new or improved product, process, or service that is being exported, and zero otherwise. α_0 is a constant. $\boldsymbol{\alpha_1}$ and θ are coefficients to be estimated. ***FINANCE*** is a proxy for borrowing concentration (*One Bank*, a dummy equals one if an enterprise works with one bank), diversification of borrowings (*Two Bank*, a dummy equals one if an enterprise works with two or more banks; *Three Bank*, a dummy equals one if an enterprise works with three or more banks; and *LogBanks*, the logarithm of the number of banks borrowed from private and state-owned banks), access to finance (*Borrowings*, a dummy variable that equals one if an enterprise has borrowed from banks; *Credit Access*, a dummy equals one if an enterprise has access to external finance) and reliance on internal funds (*Internal Funds*, a dummy equals one if

an enterprise relies on internal funds). The vector of control variables is denoted by $\boldsymbol{X}$ and described below. The industry, country and year fixed effects are denoted by η_j, η_k and η_t, respectively, while the error term is denoted as ξ_{ijk}.

Following the aforementioned literature,[3] we include the following control variables in vector $\boldsymbol{X}$: a dummy variable *Gender*, which equals one if an enterprise has women among its owners; a dummy variable *Small-Sized Enterprise*, which equals one if an enterprise has fewer than twenty employees; a dummy variable *Medium-Sized Enterprise*, which equals one if an enterprise has between twenty and ninety-nine employees; a variable *Enterprise Age*, representing the logarithm of the number of years since the establishment of the enterprise; a dummy variable *Owner Manager*, which equals one if an enterprise has an owner in the top management; a dummy variable *Foreign Ownership*, which equals one if an enterprise has foreign ownership; a variable *Experience*, representing the logarithm of the number of years the top/lead manager has worked with an enterprise; and a dummy variable *Collateral*, which equals one if an enterprise owns equipment, buildings, or land. Additionally, we include the dummy variable *Capital City*, which equals one if an enterprise is located in the capital city of the country.

4. Empirical results

The summary statistics and correlations are presented in the Online Appendix, in Table A.2. Approximately 48% of the SMEs surveyed concentrate their borrowings by relying on one bank, with few using more than three banks (18%), which might limit access to external finance (see Carletti, 2004; Gobbi and Sette, 2014). Furthermore, 32% of SMEs indicate that they rely mostly on internal funds, which might be insufficient to meet all their investment needs. Innovation is relatively low among the SMEs surveyed as is synonymous with developing countries (see Gorodnichenko and Schnitzer, 2013; Machokoto et al., 2023), with the likelihood of investing in innovation averaging around 6% to 18%.

The correlations presented in the Online Appendix, in Table A.2 also show interesting associations, as innovation is negatively associated with concentration of borrowings and the reliance on use of internal funds, and positively associated with diversification of borrowings and access to external finance. This highlights the need to improve access to external finance. The rest of the correlations are as expected and not very high, indicating that multi-collinearity is unlikely to be a major issue in this case.[4]

Table 1 presents the results estimating Eq. (1). The table includes four univariate regressions (Columns 1 to 4) and four multivariate regressions (Columns 5 to 8). The multivariate regressions control for various factors associated with innovation in previous studies (see, among others, Gorodnichenko and Schnitzer, 2013; Gorodnichenko et al., 2010; Machokoto et al., 2023; Machokoto and Nyantakyi, 2023; Wellalage et al., 2020). The results indicate that a higher level of borrowing concentration (*One Bank*) and reliance on internal funds (*Internal Funds*) have a significant negative association with the likelihood of investing in innovation. In contrast, we find that diversification of borrowings (*LogBanks*) and access to finance (*Borrowings*) have a significant positive association with innovation. These findings suggest that diversifying financing sources and improving access to finance can spur innovation, which is crucial for economic growth but is worryingly low in developing countries, particularly those in Africa.

To check the accuracy and reliability of our empirical findings, we perform a series of robustness tests which are presented in Table 2. In Panel A of Table 2, we evaluate the sensitivity of our results by using an alternative indicator of innovation and alternative measures of access to finance. Specifically, we use the alternative indicator of innovation, *INNOV2*, as well as alternative measures of access to finance, such as *Credit Access*, *Two Banks*, and *Three Banks*. These additional empirical analyses show that the use of alternative variable definitions does not significantly impact our conclusions, providing further evidence of the robustness and reliability of our findings.

To further validate the robustness and reliability of our results, we employ a propensity score matching (PSM) technique in Panel B of Table 2. PSM enables us to address causality and endogeneity issues as we closely match enterprises based on several key characteristics. This ensures that our findings are not influenced by sample selection issues and differences in firm-specific attributes (see Wellalage et al., 2020; Machokoto and Nyantakyi, 2023). The results based on propensity-matched samples confirm our main results, further underscoring their validity.

To provide additional confirmation of the robustness of our findings, we conducted falsification tests. In these tests, we randomly assign enterprises to groups of enterprises that diversify and do not diversify their borrowings, those that rely on and those that do not rely on internal funds, and those with and without access to external finance. The results of these tests are presented in Panel C of Table 2. The coefficients for the randomly allocated group of enterprises are not significant, indicating that our findings pass the falsification tests and are not influenced by differences in other firm-specific factors. These findings add further weight to our results and increase the confidence in the conclusions drawn.

In addition, we estimated the average treatment effects on the treated (ATT) for the effect of borrowing concentration and diversification, reliance on internal funds, and access to external finance on innovation as part of our robustness tests. The ATTs are presented in the Online Appendix, in Table A.3. Specifically, we used several propensity score matching techniques to ensure the robustness of our findings, including *k*-nearest neighbors matching (*k*-NNM), *k*-nearest neighbors matching-noreplacement (*k*-NMM norep.), radius matching (Radius), kernel matching (Kernel), spine matching (Spline), and local linear regression (Local Linear). Again, the ATTs are significant and consistent with our main findings. They show that borrowing concentration and reliance on internal funds are negatively associated with innovation, while access to finance and diversification of borrowings are positively associated with innovation.

5. Conclusion

In this short empirical study, we explore the impact of borrowing concentration, borrowing diversification, reliance on internal funds, and access to external finance on innovation, a pivotal driver of sustainable economic growth, particularly in under-researched development market settings such as Africa. Utilizing a survey dataset of small and medium-sized enterprises (SMEs) in Kenya and Tanzania, we find that nearly half of the enterprises rely on a single bank for their borrowing needs. Unfortunately, this borrowing concentration negatively impacts innovation, as these enterprises require more access to several external financing sources and depend heavily on internal funds, which are often insufficient to meet their aspirations for investment and growth. Our results underscore the imperative for policymakers to enact measures that enhance access to finance, enabling enterprises to invest more in innovation, which is a critical need in developing countries beleaguered by institutional voids. This highlights the pressing need to augment access to external and alternative financing options for SMEs, given their pivotal role in driving innovation, fostering economic growth, and serving as major employers in developing economies.

[3] See, Asiedu et al. (2013), Aterido et al. (2013), Hansen and Rand (2013), Gorodnichenko et al. (2010), Gorodnichenko and Schnitzer (2013), Machokoto et al. (2023), and Machokoto and Nyantakyi (2023).

[4] Our further assessments show that the variance inflation factors (VIFs) in our models range between 1.06 to 3.47, with an average of around 1.77. These values are considerably lower than the commonly accepted threshold of 10, further suggesting that multi-collinearity is unlikely to be a significant issue.

Table 2
Alternative variable definitions, matched samples and falsification tests.

Panel A: Alternative variables							
Dependent variables	INNOV2	INNOV2	INNOV2	INNOV2	INNOV1	INNOV1	INNOV1
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
One bank	−0.6529***						
	(0.1744)						
Internal funds		−0.4718**					
		(0.1878)					
LogBanks			0.8395***				
			(0.2251)				
Borrowings				0.4948***			
				(0.1725)			
Two banks					0.6529***		
					(0.1744)		
Three banks						0.3972**	
						(0.1985)	
Credit access							0.5296***
							(0.2021)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	770	770	770	770	770	770	770
Pseudo-R^2	0.230	0.212	0.228	0.217	0.230	0.207	0.217

Panel B: Matched samples						
Dependent variables	INNOV1	INNOV1	INNOV1	INNOV1	INNOV1	INNOV1
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
One bank	−0.3441**					
	(0.1468)					
Internal funds		−0.5131***				
		(0.1549)				
LogBanks						
Borrowings			0.5041***			
			(0.1381)			
Two banks				0.3922***		
				(0.1479)		
Three banks					0.3807**	
					(0.1744)	
Credit access						0.2121
						(0.1783)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	473	412	506	486	257	260
Pseudo-R^2	0.159	0.157	0.139	0.152	0.100	0.082

Panel C: Falsification tests						
Dependent variables	INNOV1	INNOV1	INNOV1	INNOV1	INNOV1	INNOV1
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
One bank	−0.1743					
	(0.1132)					
Internal funds		−0.0478				
		(0.1144)				
LogBanks						
Borrowings			0.0326			
			(0.1106)			
Two banks				−0.0739		
				(0.1140)		
Three banks					0.0761	
					(0.1103)	
Credit access						−0.0405
						(0.1121)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
# of observations	770	770	770	770	770	770
Pseudo-R^2	0.112	0.109	0.109	0.109	0.109	0.109

***, **, * indicate significance at the one, five, and ten percent levels, respectively, based on heteroskedasticity-consistent firm-clustered standard errors.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.econlet.2024.111613.

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