Access to finance and firm productivity in the presence of binding fiscal constraints

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Abstract

We examine two key questions in this paper: does access to finance have an association with firm level productivity? And does the fiscal environment have an effect on the relation between access to finance and firm productivity? Our answers are that restrictions to access to finance leads to lower firm productivity and the fiscal policy environment can affect the relation between access to finance and firm productivity. Firm-level total factor productivity is from a Cobb-Douglas production function, which we regress on firm characteristics and fiscal policy indicators. With controls for country and year fixed effects, we find that firms reporting access to finance as a severe obstacle have lower productivity, and productivity declines with age. In restricting the sample to African countries, the fiscal policy effect is not observed directly while it is evident in the global sample but rather through severity of access to credit. Macro-level analysis shows a negative domestic credit to GDP relation with aggregate total factor productivity growth but the value of manufactured exports has a positive relation with aggregate total factor productivity. African countries need to do more to make fiscal policy an enabling mechanism for economic growth.

Keywords: access to finance, total factor productivity, fiscal policy

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1 Motivation

We examine two key questions in this paper. First, we investigate the implications of fiscal indiscipline or otherwise on firm productivity in Africa. Fiscal policy can boost growth by altering work and investment incentives, promoting human capital accumulation, and enhancing total factor productivity at the micro-level (IMF, 2015). Many factors have been studied in explaining total factor productivity in Africa or its sub-regions but the role of fiscal policy in explaining firm productivity remains understudied. Yet fiscal policy is considered a binding constraint in Africa. Fiscal indiscipline is known to crow-out the private sector and seriously undermines private sector leadership in ensuring all inclusive, broad based growth in Africa. Baier and Glomm (2001), and de Hek (2006) document the effect of fiscal policy where public investment increases total factor productivity and ultimately long-term growth.

Our second question is how does access to finance improve the productivity of business in Africa? In relation to previous studies on this issue, we also ask whether ownership structure and size mitigate finance effect on productivity. Unlike the study of Butler and Cornaggia (2015), we use country level data from the World Banks Enterprise Survey to study the issue. An advantage of this approach is that effects of country level factors can be considered to identify the contribution of finance to economic growth, particularly in African countries.

2 Related literature

Our literature (both theoretical and empirical) takes two stages. We first reviewed literature on the access to finance-productivity nexus and followed that with effect of fiscal policy on total productivity factor.

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2.1   Access to finance and firm productivity

Schumpeter (1911) provided a framework finance-growth nexus through financial intermediation (savings mobilization, risk management, project evaluation, monitoring of managers and transactions facilitation) are highly essential for innovation and economic development. Building on that King and Levine (1993) found that various indices of financial development are strongly and positively correlated with real per capita GDP growth of about 80 countries between the periods 1960-1989. Finance, therefore, affects growth through improvements on productivity (Chen and Guariglia, 2011). Beck, Demirguc-Kunt and Maksimovic (2005) asserts in a survey that financial constraint had the highest toll on firm's productivity growth among a host of other constraint that includes corruption and legal factors that these firms face. World Bank (2008) and International Finance Cooperation (2013) reports indicates that most firms are significantly constrained by lack of access to finance, especially in Sub-Saharan Africa. Goedhuys et al. (2006) provides empirical evidence that firms' with greater access to finance have higher TFP than those without largely because firms' with high level of productivity are entitled to more funds or productive projects are not being undertaken because of financial constraints. Krishnan et al. (2014) document that increased access to bank financing plays a positive role in affecting the productivity of smaller and financially constrained firms. Similarly, Robb and Robinson (2014) had similar line of thought as they found increased access to bank finance to be noted to play a very critical role in firms' productivity especially for small and start-up firms who need bank finance to operate. Levine and Warusawitharana (2012) found debt finance to be associated with higher total factor productivity in four European countries Spain, France, Italy and United Kingdom). Du and Girma (2012) observed in a large survey of Chinese firms that access to domestic bank loans was positively related to productivity of much bigger firms and firms with foreign investment whilst self-raised finance was instrumental to the growth of smaller firms, medium firms and domestically private-owned firms

2.2   Fiscal policy and firm productivity

In this section of the paper, we discuss fiscal policy and its binding constraints from both theoretical and empirical perspectives. The theoretical arguments are centred on the New

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Consensus Macroeconomics (NCM) which has been topical in the literature in recent times; mainly due to the attention given to it by both academics and practitioners (see Arestis and Sawyer 2008). Devotees of the NCM hold the classical view that the stabilization role to be played by government to create an enabling business environment for the private sector to operate in cannot be effectively done through the use of fiscal policy. To them, fiscal policy is just one ineffective tool to achieving stabilization policies (Arestis, 2012). Despite the contribution of fiscal policy in the post 2008/2009 economic crisis, cogent arguments are made in support of the fiscal policy ineffectiveness assertion. One of such reasons is the famous assumptions of crowding-out of private activity by government deficits and the Ricardian Equivalence Hypothesis sometimes referred to as the neo-Ricardian hypothesis (NRH) (Arestis, 2012). The hypothesis posits that households are forward looking and so in cases of government budgets constraints, same are captured into household consumption decision making. Consequently, attempts by government to use spending increases and tax cuts to stimulate aggregate demand are rendered ineffective. To add to the justifications of the NCM and the NRH is a theoretical proposition of government financing decision irrelevance which posits that government financing decision, be it taxes or debt does not matter. The argument is that regardless of how it is financed, a fiscal expansion "today" prompts expectations of future fiscal contraction "tomorrow". Private investments are adjusted by this expectation and subsequently, the effect of the fiscal expansion is brought to nil. It is important to note that the NCM and the NRH rest on some assumptions. These include but not limited to perfect foresight, perfect capital markets and the absence of liquidity constraints.

The theoretical debate would be unbalanced if the other side of fiscal policy is not looked at. Some researchers such as Blinder (2006) have made serious attacks at the assumptions of the NRH, the very fundamentals of the hypothesis. The various assumptions of the NCM and NRH have been referred to as unrealistic and that doing away with such unrealistic assumptions will lead us into the realization of the effectiveness of government fiscal policy in macroeconomics. Botman and Kumar (2006) chronicles that in reality, households have liquidity constraints even in the most developed financial markets. Empirical evidence shows that about a third of households in the developed

countries do not have enough access to the financial markets and so are constraint liquidity-wise. Fiscal policy, therefore, may yield results in such environment not to even talk of the less developed countries with weak financial markets. *Fiscal policy, then, can have positive effects on productivity growth through enhancing firms' ability to finance 'innovative investment' (Arestis, 2012).*

Literature on the impact of fiscal policy on firm level productivity is in dearth. We are therefore forced to consider as part of our scope, the impact of fiscal policy on growth while believing that aggregate growth is the byproduct of individual firm productivity (using output approach of national income). Kneller and Misch (2014) admits that though there are several papers that account for the effect of fiscal policy (government spending in particular) on growth at macro level, complementary evidence at micro-level (firm level) is uncommon. This, of course, does not refute the debate that it is the changes at micro level that account for macro level growth. The need for firm level evidence is premised on the fact that macro-level data is likely to be driven by subsets of the various firms and the estimates may be biased by those subsets. This prevents us from obtaining a comprehensive understanding of the transmission mechanism through which aggregate output is affected by government fiscal policy (Schwellnus and Arnold, 2008).

The empirical contribution of government fiscal policy to firm productivity and growth has featured briefly in the literature. Abdon, Estrada, Lee, and Park (2014) document that government spending in areas such as energy sector, road network, and infrastructure have the potential of affecting the productivity of all firms and industries, and the entire economy. Again, government fiscal policy aimed at the educational sector helps to provide firms and industries the human capital resource needed to increase their productivity. Excessive taxing, however, may hinder firm productivity. Increasing corporate taxes is akin to increasing the cost of production and hence impacting negatively on the level of productivity of these firms and industries.

Kneller and Misch (2014) used a unique data set from South Africa to estimate the impact of public spending on firm productivity. The paper found that changes in fiscal

policy matter for firm productivity. The study also found that the effect on firm productivity depends on the specific change and some firm characteristics as well. In their enquiry into cost of government and firm value, Firth, Gong and Shan (2013), find that excessive government expenditure is associated with lower firm value, lower stock and financial performance, and lower labor productivity. Governments that consistently run budget deficits are likely to among others collect more fees from companies to finance its activities. It is important to provide developing country evidence in the literature in that, the effects of government fiscal policy on firm productivity and other characteristics differ from one country to the other. Glaeser (2012) for instance document that government institutions and their policies differ across the world and their impact on firms cannot be homogenous throughout the world. Finding of this study, therefore, come in handy to enrich the debate on fiscal policy –firm productivity nexus.

3 Data

Our firm level data is from the World Bank's Enterprise Survey datasets. We use data on all surveys from 2006 to 2015. In particular, our work is based on the standardized panel datasets. Some countries have one survey conducted while other countries have about three surveys in the period. Take Ghana, for example, the first survey was in 2007, and the second in 2013. In essence, the firm level data is not truly panel in the traditional sense. To explore the effects of fiscal outcomes, we use fiscal variables from the World Development Indicators. The time span for the fiscal outcomes for each fiscal year is matched to the corresponding survey year in the Enterprise Survey datasets. In the macro-level analysis in Section 6, we use aggregate total factor productivity growth rate estimates from the Conference Board.

4 Econometric framework

4.1   Primary framework

In this section, we present the econometric framework of our empirical results. In general, we estimate varying forms of the following model:

$$PROD_{itj} = a_{ijt} + + \omega FINACC_{itj} + \beta FISC_{jt} + \sum_{k=1}^{K} \delta_k X_{k,ijt} + \mu_{ijt}$$

where $PROD$ is firm level total factor productivity (TFP), $FINACC$ is access to finance, and X is a vector of control variables. We present results for two alternate measures of productivity in our analysis: TFP based on sales or TFP based on total value added. For access to finance we use four proxies. The proportion of fixed assets of a firm financed by external finance or the proportion of working capital financed from external sources are the two quantitative measures used in our analysis. Qualitative measures are taken from responses questions on access to finance. We take as an indicator of access to finance if a firm's response to the question:

"To what extent is access to finance an obstacle to the current operations of this establishment."

Responses are coded from zero to four (most severe). We define a dummy variable that equals one if the response is four (most severe) and zero otherwise. The alternate qualitative measure is response to the question:

"... which of the elements of the business environment included in the list, if any, currently represents the biggest obstacle faced by this establishment?"

If the answer to this question is finance we code it as one and zero otherwise. These qualitative measures are provides an indication of the ease of access to finance. Firms reporting access to finance as the biggest obstacle of their establishment should have lower TFP relative to firms that do not report same. We argue that if access to finance contributes to firm productivity, then restrictions on access to finance would have negative effects on total factor productivity.

4.2   Estimating productivity

Our measure of firm-level productivity is firm-level total factor productivity (TFP). We estimate TFP from a Cobb-Douglas production function similar to Saliola and Serker (2010) who also use the Enterprise Survey dataset. We use a log-linear Cobb-Douglas production function as in Krishnan, Nandy and Puri (2014), specified below:

$$Y_{itj'} = \alpha_{it,j} + \beta \ln K_{i,j} + \gamma L_{it,j} + \sigma M_{it,j} + \varepsilon_{itj}$$

where Y is output, K is capital, L is labour and M is material input. Like Saliola and Serker (2010) we use sales as our measure of output. Value added — the difference between sales and cost of raw materials — is used as an alternate measure of output. Equation (1) is estimated country-by-country using pooled OLS regressions. We control for sector dummies in the pooled regressions. For each country, we require 100 observations for the productivity estimates.

Our control variables include firm size, an indicator variable for whether or not a firm is audited, the number of hours of power outage in the past twelve months. We also include an indicator for exporter status. A firm is an exporter if more than 10% of its sales are export sales. We also control for age of a firm, which we measure in years from the date of establishment of the entity to the date of the survey . To account for the effect of competition on productivity we include the cost mark-up taking into account evidence in Ospina and Schiffbauer (2010) of a significant positive relation between competition and firm productivity. Cost mark-up is the ratio of sales to cost of raw materials. In the global dataset, we winsorize this variable by the top and bottom one percent.

5 Empirical results

This section presents our empirical results. We first present our results for the universe of firms in the Enterprise Survey data set.

5.1   Determinants of firm level productivity

In this section, we present results from estimating our primary model for the universe of firms and countries in the Enterprise Survey dataset. Table 1 presents the results. The estimates in Table 1 are with year and country fixed effects. We control for year fixed effects to mitigate the effects of year-specific factors that are not measured because the surveys are at different points in time. Controlling for country fixed-effects is essential because different country do have similar infrastructure, legislations, and support for the manufacturing industry.

For each of $pdtvty$ — TFP based on sales – and $vapdtvty$ — TFP based on value added — we provide estimates based on one of our proxies for access to finance. Columns (1) and (2) provide results for when finance is reported as the biggest obstacle to the establishment. As expected, the coefficient on this variable is negative and statistically significant. Our results suggests that firms reporting access to finance as their establishment's biggest obstacle have lower productivity compared to firm to do face such a condition.

In Columns (3) and (4), we observe a similar negative and statistically significant coefficient estimate for $finaccobs$, for case of the severity of access to finance. In sum, our qualitative measures show that access to finance to thus have a relation with firm productivity. The quantitative measures do not, however, show any statistically significant relation between access to finance and firm productivity. We explain this results as indicative of the qualitative responses encompassing the cost effects of external finance on the establishment, which is not embodied in the measurement of the quantitative variables. The quantitative measures is only capturing the proportion of external finance used, but the cost of the funding and restrictions imposed by financiers could neutralize the effect of external finance on productivity.

Of the control variables in the results in Table 1, $size$ has a significant positive relation that is consistent across the varying estimations. Larger firms are more productive. Size confers a number of advantages in access to resources and technology, and this could explain the positive $size$ effect. Firm age, however, shows a consistent negative coefficient in all models. As firms grow old they become more complex and bureaucratic and, perhaps, leads to less room for growth. This could explain the negative age effect on firm productivity observed in Table 1.

Firms that are audited also have relative higher TFP compared to firms that are not given the positive coefficient on the $audit$ dummy. Audits are a means of monitoring managerial performance and for driving prudence in resource use, which could be the

reason for the positive association between a firm's productivity and being audited. As expected competition is associated with higher TFP, which is consistent with Ospina and Schiffbauer's (2010) results.

5.2   Fiscal outcomes, access to finance and firm productivity

In this section, we introduce country level fiscal policy outcomes to establish the influence of fiscal space on the relation between firm productivity and access to finance. The results are presented in Table 2. To obtain the impact of fiscal policy outcomes on access to finance association with firm productivity we interact our dummies for the qualitative measures with the fiscal policy measure. Similar interactions are done for the quantitative measures of access to finance as well. Central government debt to gross domestic product (GDP), $cgovdbtgdp$, is our primary fiscal policy outcome for the results in Table 2.

As observed in Table 1, in Columns (1) and (2) of Table 2, we find that $finaccobs$ has a negative coefficient and the interaction term, $finaccobs \times cgovdbtgdp$ is positive. The coefficient on the $cgovdbtgdp$ is also positive and statistically significant in all the models. With $finbigobs$ proxy, we do not find a statistically significant results. Likewise the quantitative measures of access to finance. Our view of this results is that increasing central government debt level relative to GDP affects the productivity of firms with severe access to finance conditions. We find this plausible for the following reasons. If central government borrowing goes into government consumption, then the effects of government on output is actually a reflection of firm level productivity gains as a result of firms taking advantage of the increased government spending. In sum, we conclude that central government has an effect on the relation between access to finance and firm productivity. Firm size, age, and competition continue to have the similar statistical significance and coefficient signs as reported in Table 1. $audit$, however, loses statistical significance in Table 2.

5.3   The African Evidence: access to finance and firm productivity

In this section, we present results specific to African countries. We estimate the similar models as in the last two sections. Our objective in this analysis is to tease out the African peculiarities in the relation between access to finance and firm productivity when considered in the light of fiscal policy outcomes. Our results are presented in Tables 3, 4, and 5. Table 3 reports firm-level results on the association between access to finance and firm TFP when our sample is restricted to only African countries. Results are all based estimates with controls for country and year fixed effects. Similar to the results in Table 1 and 2, $pdtvty$ and $vapdtvty$ are TFP measured based on sales and value added. With respect to our key variables of interest, $finaccobs$ and $finbigobs$ we observe a negative and statistically significant association with TFP if we measure TFP as $vapdtvty$. While we could claim that the results are consistent with the global evidence, the insignificance of the $pdtvty$ of the results weakens our generalization of the results.

Variables such as $size,$ and $winsemarkup$ have similar results to those observed in Tables 1 and 2. Thus, firm size and competition lead to significant gains in firm productivity.

Tables 4 and 5 presents results on access to finance association with productivity with conditioning on fiscal policy outcomes in the African sample. In Table 4 our measure of fiscal policy outcome is central government debt to GDP ratio. Only firm size and our proxy for competition, $winsedmarkup$ have statistically significant coefficient estimates. Our proxies for access to finance, $finaccobs$ and $finbigobs,$ to continue to have the expected signs but are not statistically significant. Adjusted R^2 values of the results in Table 4 are somewhat lower than those in Table 3, suggesting that the macro-level debt to GDP ratio might not contribute much to firm level TFP in Africa. In Table

5, we use fiscal balance, that is, the difference between government revenue and government expenditure, as the fiscal policy outcome variable. In Table 5, firm size, firm age, and competition show similar signs and statistical significance as in the global sample results. $Finaccobs$ has a marginally significant coefficient in column (2) but the interactions of $fisbal$ and $finbigobs$ or $finaccobs$ in the rest of the columns do not show any statistical significance. We note also that the adjusted R^2 values in these results are also less than those in Table 3.

6 Country level productivity and access to finance

In this section, we present results of an extension of our results to country level. We consider the relation between aggregate TFP growth and measures of credit to the private sector, with conditioning on fiscal policy outcomes: fiscal balance, balance surplus to GDP, and central government debt to GDP. We present out results in Table 5. In Table 5, the models are estimated with two-way fixed effects for country and year. The measures of private sector access to credit are domestic credit (lending by banks) to GDP and private sector credit to GDP. We control for foreign direct investment inflows, remittances to GDP ratio, and the value of manufacturing exports.

Our two measures of private sector credit both have negative and statistically significant coefficients. This presents a puzzle. Why does increasing private sector credit to GDP ratio not lead to growth in aggregate TFP?

As expected countries that export high-valued manufactured items tend to have higher productivity as shown by the statistically significant coefficient for $valmanexpo$. We can attribute the source of the productivity gains to efforts to meet higher standards in producing manufactured products for exports. Also, export markets are competitive and thus, a competition argument can also be made for the reasons for aggregate productivity growth for countries that export manufactured items.

7 Concluding remarks

In this study, we present results on the relation between access to finance and firm level productivity. We measure firm productivity with total factor productivity, TFP, estimated from Cobb-Douglas production function. We extend our analysis to consider the effect of fiscal policy environment on the relation between access to finance and firm productivity. Our innovation relative to studies such as Butler and Cornaggia (2015) and Krishnan, et al. (2015) is that we use a global sample and also consider the effect of fiscal policies. Our results offer a number of insights. We find that large firms are more productive, productivity declines with age, and competition leads to higher productivity. These results are consistently observed with and without the consideration of the effects of fiscal policy outcomes' effect on the relation between access to finance and fiscal policy. We observe these results for both the universe of firms and countries in the Enterprise Survey datasets and when the sample is restricted to African countries.

On the relation between access to finance and firm level productivity, our results from the universe of firms in our sample show that when access to finance is a significant constraint, firms have a lower productivity relative to firm that do not have such constraints. In the African sample, the negative effect of restricted access to finance on firm productivity is observed when productivity is measured based on value added. We believe these results to a large extent supports the argument that access to finance enhances firm productivity as reported in Bulter and Cornaggia (2015) and Krishnan, et al. (2015).

Butler and Cornaggia's (2015) results buttress the role of finance in economic growth. Our results on fiscal policy outcome effect on the relation between access to finance and firm productivity goes a step further to emphasize the role of the macroeconomic environment. In the global sample, we find that government debt to GDP ratio can boost access to finance effect on firm productivity. We attribute this to effects of expansionary fiscal policy on productivity such as government borrowing programmes aimed at boosting aggregate consumption. The caveat is that this effect would be absent when fiscal policy in terms of government borrowing and spending is not efficient. Our results

on African countries seems to support this view. We do not observe the fiscal policy effect on access to finance relation with firm productivity in the African sample.

While consistent story in the firm level results is that access to finance boosts firm productivity, replicating the results using aggregate level measures presents a puzzle. When regress aggregate TFP growth rate on domestic credit to GDP, or private sector credit to GDP, we observe a negative effect. In the macro-analysis, we do not find a conditioning effect of fiscal policy measures except when using cash surplus or deficit to GDP. For that, we observe a marginally significant negative conditional effect. Our macro-level analysis also reveals countries that export manufactured products of a higher value are more productive.

The lessons for African countries are that fiscal management is not helping firm level productivity and that doing more to add value to exports would lift productivity and hence economic growth general. Also while a number of African countries are setting up schemes to boost firms access to finance, such schemes might yield much results if fiscal management is not complementing[3].

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[3] For example Ghana has the Export Development and Agricultural Investment Fund.

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Table 1 Access to finance and firm productivity --- global evidence

	(1) pdtvty	(2) vapdtvty	(3) pdtvty	(4) vapdtvty	(5) pdtvty	(6) vapdtvty	(7) pdtvty	(8) vapdtvty
finbigobs	-0.0313***	-0.0693***						
	(-2.68)	(-4.36)						
lnage	-0.0184***	-0.0270***	-0.0183***	-0.0268***	-0.0184***	-0.0269***	-0.0183***	-0.0269***
	(-3.37)	(-3.71)	(-3.36)	(-3.68)	(-3.37)	(-3.70)	(-3.36)	(-3.69)
size	0.0586***	0.0724***	0.0588***	0.0728***	0.0595***	0.0746***	0.0595***	0.0743***
	(13.73)	(12.51)	(13.78)	(12.61)	(13.94)	(12.87)	(13.99)	(12.84)
lnpowout	-0.0011	-0.0088*	-0.0007	-0.0080	-0.0012	-0.0089*	-0.0011	-0.0088*
	(-0.26)	(-1.66)	(-0.17)	(-1.51)	(-0.27)	(-1.68)	(-0.26)	(-1.65)
audit	0.0338***	0.0268*	0.0340***	0.0272*	0.0347***	0.0290**	0.0348***	0.0290**
	(3.15)	(1.89)	(3.16)	(1.91)	(3.23)	(2.04)	(3.24)	(2.04)
exporter	-0.0017	0.0118	-0.0017	0.0118	-0.0014	0.0126	-0.0012	0.0129
	(-0.14)	(0.71)	(-0.14)	(0.71)	(-0.11)	(0.76)	(-0.10)	(0.78)
listed	-0.0522	-0.0668	-0.0524	-0.0674	-0.0526	-0.0679	-0.0526	-0.0676
	(-1.56)	(-1.44)	(-1.56)	(-1.45)	(-1.57)	(-1.47)	(-1.57)	(-1.46)
winsedmarkup	0.2352***	0.2832***	0.2351***	0.2830***	0.2353***	0.2832***	0.2353***	0.2834***
	(34.72)	(38.90)	(34.73)	(38.90)	(34.71)	(38.87)	(34.68)	(38.85)
finaccobs			-0.0359***	-0.0719***				
			(-2.77)	(-4.15)				
extfafin					-0.0000	-0.0003		
					(-0.20)	(-0.99)		
extwcfin							-0.0001	-0.0002
							(-0.31)	(-0.71)
_cons	-0.6070***	-0.7624***	-0.6050***	-0.7598***	-0.6138***	-0.7798***	-0.6131***	-0.7759***
	(-10.93)	(-11.98)	(-10.88)	(-11.94)	(-11.05)	(-12.21)	(-11.05)	(-12.16)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	11490	11490	11490	11490	11490	11490	11490	11490
Adjusted R-square	0.55	0.50	0.55	0.50	0.55	0.50	0.55	0.50
F-statistic	116.26	126.79	116.75	127.12	116.26	126.06	116.27	126.24

Table 2 Access to finance, fiscal policy and firm productivity --- global evidence

	(1) pdtvty	(2) vapdtvty	(3) pdtvty	(4) vapdtvty	(5) pdtvty	(6) vapdtvty	(7) pdtvty	(8) vapdtvty
lnage	-0.0341**	-0.0479**	-0.0320*	-0.0453**	-0.0340*	-0.0475**	-0.0331*	-0.0460**
	(-2.15)	(-2.58)	(-2.04)	(-2.42)	(-2.08)	(-2.43)	(-2.11)	(-2.43)
size	0.1334**	0.1581***	0.1349**	0.1591***	0.1346**	0.1604***	0.1349**	0.1605***
	(2.73)	(3.10)	(2.75)	(3.11)	(2.78)	(3.18)	(2.76)	(3.14)
lnpowout	0.0129	0.0159	0.0140*	0.0160	0.0132	0.0161	0.0129	0.0157
	(1.61)	(1.28)	(1.88)	(1.36)	(1.67)	(1.33)	(1.58)	(1.25)
audit	0.0284	0.0241	0.0252	0.0181	0.0263	0.0201	0.0256	0.0193
	(1.14)	(0.81)	(1.01)	(0.62)	(1.10)	(0.71)	(1.06)	(0.67)
exporter	0.0290	0.0611	0.0279	0.0587	0.0284	0.0601	0.0291	0.0608
	(0.72)	(1.35)	(0.69)	(1.28)	(0.69)	(1.32)	(0.72)	(1.32)
listed	-0.1040	-0.1050	-0.1051	-0.1030	-0.1016	-0.1005	-0.1061	-0.1079
	(-1.27)	(-0.99)	(-1.25)	(-0.94)	(-1.22)	(-0.89)	(-1.23)	(-0.96)
winsedmarkup	0.2290***	0.2881***	0.2294***	0.2886***	0.2295***	0.2887***	0.2292***	0.2885***
	(9.20)	(8.70)	(9.29)	(8.75)	(9.42)	(8.84)	(9.27)	(8.74)
finaccobs	-0.1941**	-0.4143***						
	(-2.27)	(-3.76)						
cgovdbtgdp	0.0019**	0.0024**	0.0021**	0.0029***	0.0025**	0.0033***	0.0026**	0.0034***
	(2.34)	(2.63)	(2.27)	(3.04)	(2.50)	(2.98)	(2.85)	(3.33)
finaccobs × cgovdbtgdp	0.0036**	0.0070***						
	(2.31)	(3.79)						
finbigobs			-0.0263	-0.0809				
			(-0.63)	(-1.40)				
finbigobs × cgovdbtgdp			0.0016	0.0019				
			(1.24)	(1.39)				
extwcfin					-0.0008	-0.0019		
					(-0.47)	(-1.41)		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
extwcfin × cgovdbtgdp					-0.0000	-0.0000		
					(-0.29)	(-0.06)		
extfafin							0.0004	0.0001
							(0.27)	(0.05)
extfafin × cgovdbtgdp							-0.0000	-0.0000
							(-0.63)	(-0.60)
_cons	-0.9119***	-1.1187***	-0.9354***	-1.1468***	-0.9293***	-1.1487***	-0.9388***	-1.1639***
	(-4.21)	(-4.71)	(-4.25)	(-4.73)	(-4.25)	(-4.80)	(-4.38)	(-4.95)
N	2434	2434	2434	2434	2434	2434	2434	2434
Adjusted R-square	0.52	0.47	0.52	0.47	0.52	0.47	0.51	0.47
F-statistic	146.89	43.13	80.29	111.88	72.73	49.36	87.62	66.39

Table 3 African evidence on access to finance and firm productivity

	(1) pdtvty	(2) vapdtvty	(3) pdtvty	(4) vapdtvty	(5) pdtvty	(6) vapdtvty	(7) pdtvty	(8) vapdtvty
finbigobs	-0.0285	-0.0706***						
	(-1.64)	(-3.36)						
lnage	-0.0041	-0.0125	-0.0042	-0.0128	-0.0045	-0.0134	-0.0045	-0.0134
	(-0.54)	(-1.30)	(-0.56)	(-1.34)	(-0.59)	(-1.40)	(-0.59)	(-1.39)
size	0.0606***	0.0678***	0.0606***	0.0679***	0.0608***	0.0693***	0.0613***	0.0697***
	(8.72)	(7.63)	(8.70)	(7.63)	(8.76)	(7.75)	(8.84)	(7.80)
lnpowout	0.0004	-0.0027	0.0009	-0.0013	0.0007	-0.0021	0.0006	-0.0020
	(0.05)	(-0.33)	(0.13)	(-0.16)	(0.09)	(-0.26)	(0.08)	(-0.25)
audit	0.0144	0.0080	0.0147	0.0090	0.0149	0.0114	0.0158	0.0126
	(0.86)	(0.39)	(0.88)	(0.44)	(0.90)	(0.56)	(0.94)	(0.61)
exporter	-0.0263	-0.0141	-0.0258	-0.0128	-0.0259	-0.0122	-0.0256	-0.0115
	(-1.28)	(-0.55)	(-1.26)	(-0.50)	(-1.26)	(-0.48)	(-1.26)	(-0.46)
listed	-0.0903	-0.0198	-0.0920	-0.0240	-0.0927	-0.0224	-0.0913	-0.0203
	(-0.69)	(-0.12)	(-0.71)	(-0.15)	(-0.72)	(-0.14)	(-0.70)	(-0.13)
winsedmarkup	0.2820***	0.3421***	0.2819***	0.3419***	0.2822***	0.3422***	0.2820***	0.3422***
	(18.76)	(21.71)	(18.74)	(21.67)	(18.73)	(21.64)	(18.79)	(21.70)
finaccobs			-0.0264	-0.0616***				
			(-1.56)	(-2.98)				
extfafin					0.0003	0.0001		
					(0.88)	(0.25)		
extwcfin							0.0000	-0.0003
							(0.06)	(-0.40)
_cons	-0.7497***	-0.9272***	-0.7496***	-0.9280***	-0.7534***	-0.9430***	-0.7567***	-0.9423***
	(-8.99)	(-10.15)	(-8.97)	(-10.17)	(-9.07)	(-10.31)	(-9.01)	(-10.27)
Country/Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5241	5241	5241	5241	5241	5241	5241	5241
Adjusted R-square	0.51	0.50	0.51	0.50	0.51	0.50	0.51	0.50

	43.21	49.24	44.40	49.99	42.69	48.03	43.61	48.66
F-statistic	43.21	49.24	44.40	49.99	42.69	48.03	43.61	48.66

Table 4 Debt to GDP, access to finance and firm productivity in Africa

	(1) pdtvty	(2) vapdtvty	(3) pdtvty	(4) vapdtvty	(5) pdtvty	(6) vapdtvty	(7) pdtvty	(8) vapdtvty
lnage	-0.0159	-0.0186	-0.0162	-0.0189	-0.0151	-0.0177	-0.0154	-0.0180
	(-0.95)	(-0.91)	(-0.96)	(-0.91)	(-0.90)	(-0.86)	(-0.92)	(-0.88)
size	0.2215***	0.2329***	0.2241***	0.2382***	0.2238***	0.2383***	0.2241***	0.2390***
	(12.33)	(9.47)	(12.31)	(9.37)	(12.27)	(9.36)	(12.29)	(9.39)
lnpowout	0.0073	-0.0153	0.0068	-0.0178	0.0046	-0.0187	0.0055	-0.0173
	(0.56)	(-0.93)	(0.51)	(-1.03)	(0.35)	(-1.10)	(0.41)	(-1.01)
audit	-0.0262	-0.0511	-0.0254	-0.0542	-0.0300	-0.0594*	-0.0317	-0.0594*
	(-0.88)	(-1.42)	(-0.86)	(-1.53)	(-1.03)	(-1.66)	(-1.10)	(-1.68)
exporter	0.0131	0.0054	0.0172	0.0109	0.0203	0.0148	0.0113	0.0045
	(0.21)	(0.07)	(0.27)	(0.14)	(0.32)	(0.20)	(0.18)	(0.06)
listed	-0.0745	-0.0240	-0.0801	-0.0195	-0.1015	-0.0545	-0.0636	-0.0145
	(-0.45)	(-0.13)	(-0.48)	(-0.10)	(-0.59)	(-0.28)	(-0.38)	(-0.08)
winsedmarkup	0.3615***	0.5456***	0.3536***	0.5299***	0.3554***	0.5336***	0.3572***	0.5340***
	(5.53)	(5.14)	(4.98)	(4.54)	(5.10)	(4.64)	(5.13)	(4.63)
finaccobs	-0.8041	-1.7593						
	(-1.20)	(-1.56)						
finaccobs × cgovdbtgdp	0.0134	0.0301						
	(1.15)	(1.54)						
finbigobs			0.0062	-0.0605				
			(0.14)	(-1.13)				
finbigobs × cgovdbtgdp			-0.0007	-0.0021				
			(-0.32)	(-0.79)				
extwcfin					0.0057	0.0057		
					(1.36)	(1.36)		
extwcfin × cgovdbtgdp					-0.0001	-0.0001		

					(-1.13)	(-0.81)		
extfafin							0.0001	-0.0016
							(0.02)	(-0.31)
extfafin ✕ cgovdbtgdp							0.0001	0.0001
							(0.55)	(0.85)
N	1259	1259	1259	1259	1259	1259	1259	1259
Adjusted R-square	0.44	0.48	0.43	0.47	0.44	0.47	0.44	0.47
F-statistic	35.36	29.89	33.92	29.24	34.22	30.10	35.49	30.29

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Fiscal balance, Access to finance and Firm productivity

	(1) pdtvty	(2) vapdtvty	(3) pdtvty	(4) vapdtvty	(5) pdtvty	(6) vapdtvty	(7) pdtvty	(8) vapdtvty
lnage	-0.0229***	-0.0329***	-0.0235***	-0.0332***	-0.0232***	-0.0335***	-0.0235***	-0.0343***
	(-2.92)	(-3.20)	(-2.98)	(-3.23)	(-2.95)	(-3.26)	(-2.98)	(-3.33)
size	0.0881***	0.1006***	0.0885***	0.1013***	0.0894***	0.1034***	0.0883***	0.1023***
	(11.37)	(10.06)	(11.43)	(10.11)	(11.39)	(10.23)	(11.30)	(10.16)
lnpowout	0.0108	0.0082	0.0107	0.0072	0.0106	0.0077	0.0106	0.0074
	(1.36)	(0.92)	(1.33)	(0.80)	(1.21)	(0.81)	(1.23)	(0.78)
audit	-0.0059	-0.0125	-0.0055	-0.0129	-0.0045	-0.0075	-0.0075	-0.0111
	(-0.31)	(-0.53)	(-0.29)	(-0.55)	(-0.24)	(-0.32)	(-0.41)	(-0.48)
exporter	-0.0219	-0.0046	-0.0214	-0.0045	-0.0200	-0.0009	-0.0216	-0.0030
	(-1.07)	(-0.18)	(-1.05)	(-0.18)	(-0.97)	(-0.04)	(-1.06)	(-0.12)
listed	-0.0280	0.0408	-0.0268	0.0461	-0.0236	0.0541	-0.0267	0.0511
	(-0.30)	(0.37)	(-0.29)	(0.42)	(-0.25)	(0.50)	(-0.29)	(0.48)
winsedmarkup	0.3074***	0.3841***	0.3075***	0.3842***	0.3076***	0.3826***	0.3084***	0.3835***
	(11.21)	(12.83)	(11.20)	(12.82)	(13.21)	(14.72)	(13.26)	(14.76)
finaccobs	-0.0118	-0.0491*						
	(-0.54)	(-1.86)						
finaccobs × fisbal	0.0382	-0.4039						
	(0.02)	(-0.17)						
finbigobs			0.0005	-0.0388				
			(0.03)	(-1.56)				
finbigobs × fisbal			0.0586	-0.3347				
			(0.03)	(-0.14)				
extwcfin					-0.0005	-0.0010		
					(-1.10)	(-1.58)		

extwcfin×fisbal					0.0449	0.0565		
					(1.23)	(1.44)		
extfafin							0.0004	0.0000
							(1.16)	(0.05)
extfafin×fisbal							0.0120	0.0279
							(0.70)	(1.32)
N	3715	3715	3715	3715	3715	3715	3715	3715
Adjusted R-square	0.50	0.49	0.50	0.49	0.50	0.49	0.50	0.49
F-statistic	43.64	44.12	43.81	43.63	47.22	46.33	48.69	47.14

t statistics in parentheses

$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Table 6 Macro-level access to finance and aggregate productivity

	(1) tfp	(2) tfp	(3) tfp	(4) tfp	(5) tfp	(6) tfp
domcredgdp	-0.0210***	-0.0235***	-0.0201***			
	(-3.74)	(-4.93)	(-5.56)			
fisbal	2.0440			1.2534		
	(1.52)			(1.47)		
domcredgdp × fisbal	-0.0431					
	(-0.94)					
valmanexpo	0.0395**	0.0355**	0.0173*	0.0383**	0.0339**	0.0168*
	(2.43)	(2.44)	(1.87)	(2.36)	(2.33)	(1.82)
fdiflow	1.7705	0.8965	0.8044	1.5150	0.8825	0.7969
	(0.63)	(1.39)	(1.28)	(0.54)	(1.37)	(1.26)
remitgdp	0.0296	0.0379	0.0190	0.0300	0.0385	0.0197
	(0.66)	(0.91)	(0.60)	(0.67)	(0.92)	(0.62)
csurpgdp		0.0831**			0.0735*	
		(2.07)			(1.85)	
domcredgdp × csurpgdp		-0.0007*				
		(-1.67)				
clmcgovgdp			-0.0197			-0.0202*
			(-1.63)			(-1.77)
domcredgdp × clmcgovgdp			0.0002			
			(1.56)			
prvseccred				-0.0190***	-0.0212***	-0.0196***
				(-3.39)	(-4.52)	(-5.43)
prvseccred × fisbal				-0.0249		
				(-0.55)		

	(1)	(2)	(3)	(4)	(5)	(6)
prvseccred × csurpgdp					-0.0005	
					(-1.22)	
prvseccred × clmcgovgdp						0.0002
						(1.52)
_cons	-1.2995	-0.8773	0.6538	-1.4367	-1.0125	0.5933
	(-1.18)	(-0.84)	(1.08)	(-1.31)	(-0.97)	(0.99)
Year dummies	Included,	Included,	Included,	Included,	Included,	Included,
N	992	1156	1978	992	1156	1978
Adjusted R-square	0.1110	0.1525	0.1051	0.1083	0.1490	0.1044
F-statistic	8.4043	11.3732	12.0728	8.2867	11.1794	12.0166

Table 7 Variable Definitions and Measurement

Variable	Definition	Measurement
finbigobs	Access to finance as biggest obstacle to establishment	Equals one if response to m1a is one (1), zero otherwise
lnage	Log of firm age	Age in years from date of establishment to survey year
size	Firm size	Log of number of employees
lnpowout	Log of annual hours of power outage	
audit	Dummy variable if a firm is audited	Equals one if a firm is audited
exporter	Dummy for exporting firms	Firms with more than 10% of direct and indirect export sales
listed	Dummy for listing status	Equals one if a firm listed
winsedmarkup	Mark-up (proxy for competition)	Ratio of sales to operating costs
finaccobs	Access to finance severe obstacle	Equals one if answer to k30 is four (4), zero otherwise
extfafin	Percent of fixed assets financed from external sources	
extwcfin	Percent of working capital financed from external sources	
cgovdbtgdp	Central government debt, total (% of GDP)	WDI measurement
domcredgdp	Domestic credit to private sector (% of GDP)	WDI measurement
fisbal	Fiscal balance	Government revenue less expenditure over GDP
valmanexpo	Value of manufactured exports	Value of manufactured exports as a percentage of GDP
fdiflow	Foreign direct investment inflow	FDI inflows as a percentage of GDP
remitgdp	Remittances from abroad	Personal remittances as percentage of GDP
csurpgdp	Cash surplus/deficit (% of GDP)	WDI measurement
clmcgovgdp	Claims on central government (% of GDP)	WDI measurement
prvseccred	Private sector credit	WDI measurement
tfp	Total factor productivity growth	Conference Board estimates