

**South African Reserve Bank
Working Paper Series
WP/19/03**

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Authorised for distribution by Chris Loewald

May 2019



South African Reserve Bank

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ABSTRACT

This paper explores whether frictions in the credit market are constraining the efficient allocation of capital in South Africa. The analysis focuses on firm level data for manufacturers. The results indicate that access to finance in South Africa is, for most manufacturing firms, not a major constraint on their business. In fact, South Africa has a lower proportion of firms reporting access to finance constraints than most of its emerging market peers. However, small firms and those receiving payments largely in cash are more likely to report a financing constraint. The extent to which a firm faces financing obstacles does not correlate with variations in the firm level marginal product of capital (MPK), which suggests that credit access is not an important limitation on allocative efficiency in the manufacturing sector. Indeed, smaller firms are found to have a lower MPK, which would explain their relatively higher probability of facing a financing constraint. Furthermore, this paper provides tentative evidence that structural obstacles such as crime and regulatory challenges are constraining the productive allocation of firm capital. The use of a unique firm level dataset was important for understanding the dynamics described above. However, this data was collected in 2007, so the results should be considered tentative as some variables may have changed in the interim.

Keywords: Credit Access, Marginal Product of Capital, Allocative Efficiency

JEL Codes: O16, O40, E50

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I would like to thank an anonymous referee as well as the staff of the research department of the SARB for useful comments. All remaining errors are my own.

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1. Introduction

By observing the relatively large variation in the marginal product of capital (MPK) across firms in South Africa (SA), one can deduce that the allocation of capital is relatively inefficient. This is depicted in Figure 1's boxplot, which is based on research by Kalemli-Ozcan and Sorensen (2012). SA firms' MPK exhibit a greater interquartile and total range than that of the advanced economies in the sample and these ranges are similar to that of other African countries.

Countries with a more efficient allocation of capital will exhibit a lower variation in the firm-level MPK because an efficient economy facilitates the reallocation of capital to the most productive firms. Various frictions prevent the equalization of the MPK across firms and thus constrain allocative efficiency. These frictions may be present on the supply side, for example because less productive firms may have easier access to capital than more productive ones. Or the frictions may appear on the demand side, for example because taxes or regulations make it unattractive for highly productive firms to accumulate additional capital (imagine a productive mine faced with uncertainty about future mining policies).

Understanding the nature of the aforementioned frictions is very important because research has shown that developing countries can substantially increase their total factor productivity (TFP) just by improving the allocation of their existing capital and labour (Hsieh and Klenow, 2009).

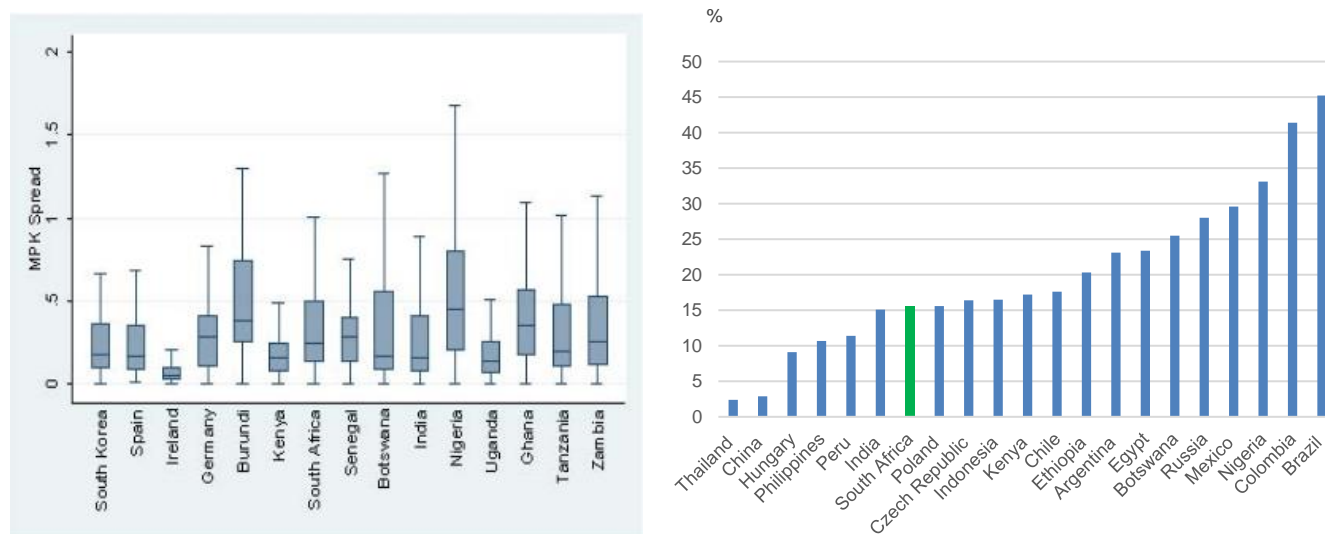
The main contribution of this paper is to explore whether one commonly cited friction - that of credit access - is an important driver of allocative inefficiency in South Africa. To answer this question, a two-step procedure is followed. First, I assess whether credit access is a significant challenge in SA, and if there are specific types of firms that are more likely to be credit constrained. Second, I analyse whether aggregate variations in access to credit can explain the somewhat inefficient allocation of capital (the wide variation in MPK). As a further cross-check I explore whether there are any specific firm types that are both credit constrained and have a relatively high MPK. This is done by exploiting a survey database covering over 600 manufacturing firms.

The results of this research indicate that access to finance constraints do not influence firm level MPK. This is unsurprising as nearly 98% of firms in the sample report having access to a bank account, indicating that South Africa has a high level of basic financial inclusion. Approximately 15% of South African firms (across all industries) indicated that access to finance is a major or severe obstacle - a level lower than most emerging market economies (see figure 2).

Meanwhile, the empirical analysis indicates that South Africa's allocative inefficiency may, at least in part, be attributed to structural constraints such as: skills shortages, the burden of regulation and crime. The descriptive statistics intuitively confirm these results. For example, when firms were asked to cite the most binding constraint on their business only 6% of those included in the sample (i.e. manufacturers) pointed to access to finance. Three other factors were more commonly cited: crime and disorder (37%), electricity supply (16%) and an inadequately educated workforce (8%). The use of a unique firm level dataset was important for understanding the dynamics described above. However, this data was collected in 2007, so the results should be considered tentative as conditions may have changed.

The paper proceeds as follows: section 2 provides a literature review, which focusses on the possible reasons why financial access constraints could be important in South Africa. The methodology and data utilised in this paper are outlined in section 3. The results of the econometric analyses are discussed in section 4. While, section 5 concludes.

Figures 1 & 2: Variation in the MPK of firms (LHS) and percent of firms identifying access to finance as a major/severe obstacle by country (RHS)*



Source: Kalemli-Ozcan and Sorensen (2012) and Enterprise Surveys (<http://www.enterprisesurveys.org>), The World Bank

*The survey years for each country vary between 2007 and 2017

2. Literature Review

The literature regarding firms' access to credit report a number of key findings. Firstly, firms with better access tend to grow faster and are able to become more diversified (Didier, Levine and Schmukler, 2015; Manova and Yu, 2012). Hausmann (2016) shows that the ability of firms to become more complex and diversified has a significant impact on the per capita income of an economy through the diffusion of know-how that this creates. Therefore, firm level financing can have important economy wide effects.

Secondly, smaller and/or younger firms tend to have a higher probability of reporting a credit constraint (Beck, Kunt, Laeven and Maksimovic, 2006). This suggests that credit access could be one of the challenges faced by new or small firms competing with incumbents. If this is the case, finance could be an important tool for stimulating a more competitive economy.

Within the literature, the concept of credit rationing may be important in the South African context. Credit rationing means that either (a) some loan applicants, despite appearing identical to others, are rejected and would be even if they were willing to pay a higher interest rate; or (b) that there are discernible groups who cannot access credit at any interest rate, but with an increased credit supply they would receive a loan (Stiglitz and Weiss, 1981).

In an adverse selection version of the Stiglitz and Weiss model, higher risk borrowers are credit rationed because limited liability rules imply that the borrower risks only his collateral, while the lender risks to entire loan value should the project fail (Calomiris and Longhofer, 2008). Whilst lenders raise the interest rate to compensate for increased risk, the higher rate also raises the probability of default, which reduces the supply of credit to risky borrowers and results in credit rationing (Calomiris and Longhofer, 2008).

This outcome is possible in South Africa given the dominance of a few large firms in certain sectors, whose credit quality is likely to be markedly different from that of smaller emergent firms. Furthermore, rationing may exist for firms owned by previously disadvantaged people as ownership patterns in the economy imply that these people are more likely to lack collateral (Ponte, Roberts and Van Sittert, 2007). In other words, banks may prefer to lend to dominant firms rather than to more-risky emergent competitors, even if the emergent firms are willing to pay higher interest rates and are equally (or more) productive. Thus, it is important to determine whether firms that lack access to finance are discernibly different in terms of productivity to those that do not. This will form the basis of section 3 and 4 of this paper.

A further strand of literature indicates that competition in the financial sector can affect firms' access to credit, in particular higher levels of competition amongst banks improves financial access (Love, and Martínez-Pería, 2014). Financial access challenges associated with competition in the financial sector may be relevant for South Africa because, as the Competition Commission of South Africa (2008) notes, banks have in the past operated as "oligopolists that maximize their profits by avoiding outright price competition". Conventional economic theory would suggest that the supply of credit is likely to be sub-optimal if the market is lacking in outright price competition. There are also substantial barriers to entry for the banking sector, including very high fixed costs. As a result, new competition in the sector has been scarce, which is evidenced by the fact that not a single new banking license was issued between 1999 and 2016 (Groenewald, 2017).

The empirical evidence regarding firms' access to credit for South Africa is mixed. Kalemli-Ozcan and Sorensen (2012) note that South Africa compares favourably with other African countries in that a much smaller share of firms' report being credit constrained. However, the headline data may be misleading as credit allocation in South Africa appears to be unevenly distributed amongst firms. Berg and Fuchs (2013), in a survey of 5 African nations, show that lending to SMEs accounts for only 8% of South African bank loans, which is less than half of the developing economy average and well below the average of the countries surveyed (12.3%).

Clearly improving access to finance for underserved firms in South Africa may be important if these firms can make a positive contribution to the productivity of the economy. However, if firms that face financial access challenges are relatively unproductive, the financier is probably making a socially optimal decision in the allocation of her scarce capital. Sections 3 and 4 will describe the approach taken to determine what types of firms are more likely to face obstacles in accessing finance and importantly, whether those firms are indeed undercapitalised relative to their MPK.

3. Methodology

3.1 Modelling Approach

This paper presents two models for the purposes of understanding credit allocation and productivity in South Africa.

The first model makes use of a probit regression with access to finance as the binary dependent variable. Five alternative measures of access to finance are utilised to ensure robustness. The first dependent variable is equal to 1 if a firm reported that credit access was a moderate, major or severe obstacle to its business and zero otherwise. The second is equal to 1 if a firm reported that credit access was a major or severe obstacle to its business. The third is equal to 1 if access to finance is rated as the firms most significant obstacle. The fourth is equal to 1 if the firm currently has access to an overdraft facility. While the fifth is equal to 1 if the firm currently has a loan or line of credit from a financial institution. The dependent variable in each case is regressed

on a number of explanatory variables that relate to the characteristics of the firm. The regression has the following form:

$$\Pr(Y_i = 1 | X) = \gamma + \beta_i X_i + \varepsilon \quad (1)$$

Where: X_i includes a number of firm characteristics such as its size, age, the gender and race of the owners, the percentage of revenues received through the formal banking sector (non-cash payments), the profit margin and level of education of management. One regression is estimated for each dependent variable. The results are displayed in table 1. Standard errors robust to autocorrelation and heteroscedasticity are reported.

The second model follows Kalemli-Ozcan and Sorensen (2012) by estimating a proxy for the MPK for each firm in the sample. This is possible due to the detailed World Bank Enterprise survey responses, which include sales and capital stock for each firm. The approach assumes a Cobb-Douglas production function of the form:

$$Y = A(L^\beta K^\alpha) \quad (2)$$

Where: β and α are output elasticities of labour and capital respectively. I assume $\alpha=0.3$ for the South African economy as per Kemp's (2011) calculations.

A firm's MPK is calculated as:

$$\alpha \left[\frac{\sigma-1}{\sigma} \right] \left(\frac{\text{Nominal Value Added}}{\text{Replacement Cost of Capital}} \right) \quad (3)$$

The variable σ denotes the elasticity of substitution among manufactured goods. I assume that $\sigma=3$, which is a conservative choice and follows Hsieh and Klenow's (2009) estimate for China and India. This value is on the low side of international estimates, which ensures that South Africa's relatively concentrated product market is accounted for in the MPK calculation.

The MPK of each firm is then regressed on a number of explanatory variables that relate to self-reported business constraints and the firm type. Two groups of regressions are estimated. The first group has the following form:

$$\text{MPK} = \Psi + \theta_i Z_i + \varepsilon \quad (4)$$

Where: MPK is the log of the marginal product of capital; Z_i includes three measures of a firm's access to finance: its self-reported view of whether access to finance is an obstacle (ranging from 0 – 4), as well as two dummy variables, one for whether the firm has access to a credit line and another for whether the firm has access to an overdraft facility. Table 2 displays the results of these regressions. These regressions are intended to determine whether access to finance is correlated with variations in firm level MPK.

The second group of regressions has the following form:

$$\text{MPK} = \varphi + \delta_i X_i + \varepsilon \quad (5)$$

Where: MPK is the log of the marginal product of capital; X_i includes the two firm characteristics that were most closely linked to the likelihood of an access to finance constraint (the firm size and share of non-cash payments); as well as self-reported measures of whether various issues including corruption, electricity, crime, access to finance, labour regulations and workforce skills are a constraint for the firm (on a scale of 0 – 4). The results are displayed in table 2 and table 3. Standard errors robust to autocorrelation and heteroscedasticity are reported.

3.2 Data

Both models exclusively use firm level data from the World Bank Enterprise Survey (2007). This is the most recent data available for South Africa. The data were cleaned by removing any firms with zero or negative values for sales, capital, employment or total wages. All firms for whom manufacturing contributes less than 50% of the revenue were excluded. This is because it is difficult to estimate or compare the MPK for a services firm. The impact of this adjustment on the sample size is a reduction from 1057 to 960. However, the final sample size contained between 630 and 701 observations for the various regressions due to missing responses for some of the independent variables utilized in the analysis.

4. Results

The results of the probit regressions (in table 1) indicate that smaller firms (in terms of sales) and those that receive a low share of revenues through the formal banking sector (non-cash payments) are more likely to be credit constrained. In some of the model variants firm age, the race of the firm owner, the education of the firm manager and the profitability of the firm are also statistically significant. However, these variables are not statistically significant across the various proxies for access to finance, so I will not dwell on them.

From the perspective of economic significance, firm size is a far more important determinant of a credit constraint than the size of the firms' non-cash payments. To interpret the results of the probit regression models I will focus on model 2 in table 1. This is the model where the dependent variable is whether self-reported access to finance is either a severe or major obstacle to the firm. This model is preferred because it has the highest pseudo-R² value. Also, I assume that there is additional information content embedded in the perceptions of firm owners with respect to their financial constraints. Indeed, when asking whether access to finance is a constraint, the World Bank survey includes both the availability and cost of finance.

In order to contextualise the results of model 2, I follow the so-called 'average marginal effect approach' in this paper. This approach simply calculates the difference in the probability of a financial constraint being reported for two average firms by adjusting one firm characteristic (independent variable) at a time (Williams, 2012). As some firm characteristics are not normally distributed, instead of holding the continuous variables at their means I hold them at their median. However, the binary independent variables are held at their means.

Figure 3 demonstrates this approach for firms with different levels of sales. A firm with average characteristics and sales at the 5th percentile of the distribution has an approximately 20% chance of reporting an access to finance constraint, while a similar firm that has sales at the 95th percentile has only a 3% probability of reporting an access to finance constraint. Thus, size (proxied by sales) is an important indicator of whether a firm will report a credit access constraint, all other things equal.

Figure 4 shows that firms which receive only 5% of their payments through the formal banking system (but have otherwise average characteristics) have a probability of reporting an access to finance constraint of approximately 18%. Meanwhile, for similar firms that receive 95% of their revenues through the banking system this probability falls to 8%. Firms themselves have limited control over the payment method for their sales, so the fact that a firm operates in a region or market which mostly uses cash may act as a natural barrier to credit access and ultimately firm growth. Thus, the result may be an indication of a self-reinforcing informality trap in South Africa. However, it may also reflect a conscious decision by firms to avoid accepting digital forms of payment, perhaps due to the cost associated with this or to avoid taxes. The World Bank Enterprise Survey was only conducted in metropolitan areas, so it was not possible to test whether firms operating in rural areas are

more likely to be credit constrained as a result of the lower levels of formality in the region (including a greater reliance on cash payments). This could be a useful area for future research.

The impact of the above factors is not linear and may depend on the interaction between factors. Figure 5 attempts to illustrate this interaction. It indicates that informality (as proxied by the proportion non-cash payments received by a firm) matters less for credit access as the firm's sales increase. Firms that receive 5% of their revenues through the banking sector and are within the smallest 5% of the sample in terms of sales, have an approximately 38% probability of reporting an access to finance constraint, which is almost double that of a firm of the same size that receives all of its revenues through the banking sector. However, as the firm size increases, the impact of the payments channel on access to finance becomes smaller. This suggests that an information asymmetry problem may exist between credit providers and borrowers, which is restraining credit access. The information asymmetry problem is likely overcome when firms receive a significant share of revenues through the banking system or when firms are sufficiently large, which in both cases provide information to credit providers and act as signalling mechanisms. Thus, banks may perceive firms about which they have less information to be "more-risky".

Nevertheless, it is worth noting that even for a manufacturing firm at the fifth percentile of the sales distribution, the probability of reporting a credit constraint is lower than the average firm in Mexico, Brazil or Russia. As Figure 2 indicates, a relatively small proportion of South African firms' report being credit constrained. So, credit access is, in general, less of a challenge for South Africa than many of its emerging market peers. Thus, if an information asymmetry problem is present in the South African credit market is likely to be relatively minor.

Table 1: Access to Finance (Probit Regression)

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Access to finance major, severe or moderate obstacle (1=yes)	Access to finance major or severe obstacle (1=yes)	Firm rates access to finance as its most significant obstacle (1=yes)	Firm currently has an overdraft (1=yes)	Firm currently has a loan or line of credit from a financial institution (1=yes)
log-sales	-0.189*** (-4.97)	-0.158*** (-3.43)	-0.113* (-1.92)	0.122*** (3.49)	0.130*** (3.62)
log- firm age	-0.115* (-1.66)	-0.149* (-1.92)	0.0440 (0.42)	0.162** (2.57)	0.0998 (1.59)
At least one Female owner dummy	0.0470 (0.33)	0.127 (0.78)	-0.0104 (-0.06)	-0.0897 (-0.68)	0.144 (1.08)
African majority shareholder dummy	0.420*** (3.25)	0.289* (1.93)	0.195 (1.03)	0.0120 (0.09)	-0.106 (-0.81)
%of revenues received through the formal banking sector (noncash payments)	-0.00575*** (-3.59)	-0.00584*** (-3.11)	-0.0104*** (-5.15)	0.00199 (1.35)	0.00328** (2.12)
Top manager has tertiary education dummy	0.0816 (0.61)	-0.194 (-1.28)	0.259 (1.37)	0.443*** (3.77)	-0.0778 (-0.62)
log-Gross profit margin proxy	0.238*** (2.78)	0.168 (1.63)	-0.0939 (-0.96)	-0.0337 (-0.51)	-0.246*** (-3.74)
Exporter dummy	-0.287 (-0.89)	-0.0130 (-0.04)	0.460 (1.37)	0.0864 (0.36)	-0.367 (-1.56)
Constant	3.110*** (5.26)	2.290*** (3.11)	0.300 (0.35)	-2.496*** (-4.50)	-3.448*** (-6.18)
N	630	630	630	630	630
pseudo R-sq	0.162	0.169	0.127	0.106	0.071

Figure 3: Probability of being credit constrained for firms with sales at the 5th, 50th and 95th percentile respectively.

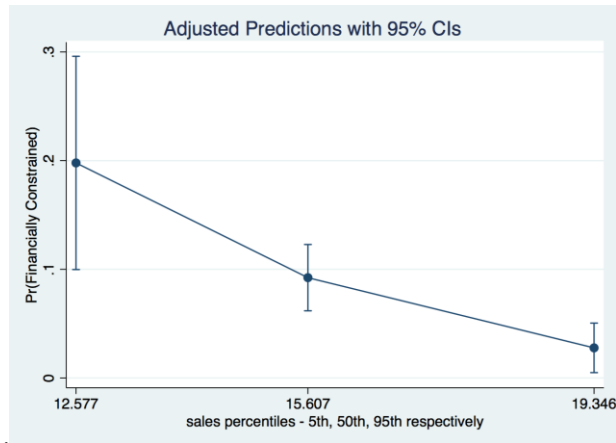


Figure 4: Probability of being credit constrained for firms with varying shares of non-cash revenues

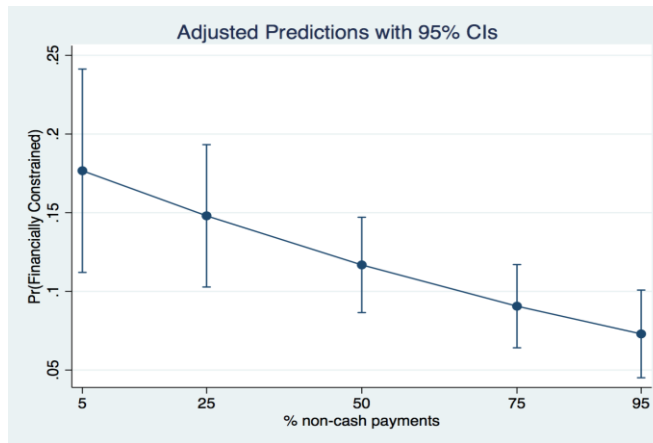
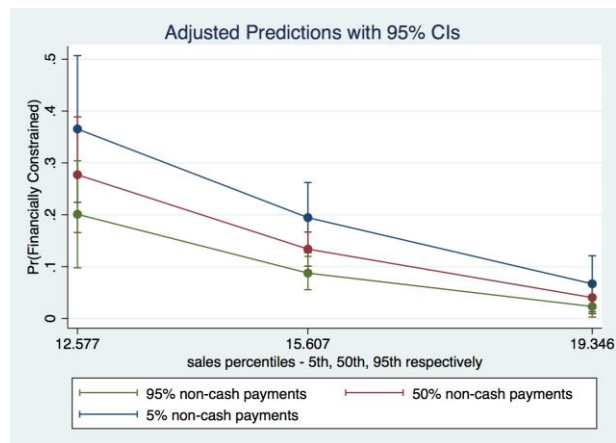


Figure 5: Probability of being credit constrained for firms with varying sales and varying shares of non-cash revenues



Source: Authors' calculations

While understanding the extent to which firms are credit constrained is interesting in and of itself, from a policy perspective it is important to understand whether allocative efficacy would be improved if the firm types mentioned above were receiving more credit. In order to do so, it is necessary to consider their marginal product of capital (MPK). In a perfectly efficient market, scarce capital should be allocated to firms with the highest MPK. Assuming that there is a declining return to capital, as firms receive more capital, their MPK will fall (Caselli and Feyrer, 2007). Therefore, an efficient allocation of capital across the economy should see the MPK equalize across firms. The second and third regression models attempt to explain whether credit constrained firms are indeed undercapitalized relative to their MPK.

Positive coefficients indicate that a firm has a higher MPK as a result of that particular independent variable, which in turn suggests that the presence of that variable is resulting in too little capital being allocated to, or taken up by, the firm (Kalemli-Ozcan and Sorensen, 2012). Similarly, a negative coefficient indicates that too much capital is being allocated to the firm as a result of the presence of that variable.

The set of regressions in table 2 (derived from equation 4) show that access to finance constraints are not correlated with firm level MPK. This finding is robust across 3 proxies for access to finance (self-reported and actual indicators). This suggests that, on average, the inefficient distribution of capital in the South African economy is not explained by challenges in accessing finance, but by other factors. This is the key finding of this paper.

In order to explore whether small firms or those utilising mainly cash based payments systems are undercapitalised, I present a further set of regressions in table 3 (derived from equation 5). I include as controls in these regressions other self-reported obstacles to doing business for firms. I believe that these controls are exogenous because it is likely that the obstacles may influence firm level MPK, it is unlikely that the firm's MPK will affect the extent to which it experiences these various factors (such as crime or regulations) as obstacles.

Three different regressions are estimated and their results displayed in table 3. Regression 1 includes only self-reported obstacles to doing business, regression 2 includes only firm characteristics (a dummy for whether the firm is in the smallest quartile of the distribution for sales and a dummy for whether the firm receives more than half of its revenue in cash), while regression 3 includes firm characteristics and obstacles to doing business.

The results of this approach are quite rich with the following salient features. First, an access to finance constraint is again found to be uncorrelated with variations in marginal product of capital.

The second finding is that the dummy for small firms' (proxied by sales) is negatively correlated with MPK. This can be interpreted as an indication that small firms are, if anything, over-capitalized. This result is unsurprising as (Ayyagari, Demirguc-Kunt and Maksimovic, 2011) show that large firms across the world tend to have higher productivity growth. Meanwhile, Van Biesebroeck (2005) shows that large firms in a sample of Sub-Saharan African countries tend to be more productive and to grow productivity faster than small firms. The implication of this finding is that attempts to grow small enterprises in South Africa should focus more on raising their productivity, rather than on providing increased access to finance. Indeed, it is likely that improved access will come naturally as productivity rises. The correlation between firm size and MPK is robust to different thresholds for firm size as indicated in figure 6 in the appendix.

Third, a positive correlation was found between the MPK and the dummy for firms that receive most of their revenues in cash, when this factor was only considered alongside firm size. However, when controlling for other firm level obstacles this correlation disappears. This result is robust to alternative thresholds for the level of noncash sales. Indeed, there is no discernible link between the level of non-cash sales and the MPK when

looking at the two variables on a scatter plot (as indicated in figure 7 in the appendix). Thus, increasing credit supply to cash-based firms would alleviate a credit constraint, but would not necessarily improve the productivity of capital. However, it is instructive to note that as an average firm increases its use of the formal banking system, it is less likely to report a credit constraint despite the fact that its productivity should not have changed. This does suggest the possibility of a minor credit market failure taking place, driven by asymmetric information between (cash-based) borrowers and lenders.

Finally, the results provide a tentative indication that structural obstacles are constraining the productive allocation of firm capital. These obstacles include crime and disorder (statistically significant across regression specifications) as well as labour force education and labour regulations (statistically significant in only one regression specification). These obstacles enter with the expected sign.

Firms that report facing challenges with crime and disorder tend to have a lower MPK. This is plausible because these firms would likely invest in crime preventing capital (such as gates and alarm systems), which do not contribute to the output of the firm. Meanwhile, firms that face labour force education challenges tend to have a higher MPK than average. I would interpret this as an indication that the most productive firms in the manufacturing sector are also those that face the highest skills requirements. This theory is supported by noting that there is a positive correlation between the skills of the firm's top manager and its MPK (as indicated in figure 8 in the appendix). Finally, firms that face labour regulation challenges tend to have a lower MPK. This would make sense if firms attempted to substitute capital for labour to avoid the labour regulations. As a result, the firm would become overcapitalised and its MPK would fall.

Table 2: Marginal product of capital regression on access to finance (OLS)

	(1)	(2)	(3)
	LogMPK	LogMPK	LogMPK
Access to finance is an obstacle (0 - 4)	0.0257 (0.54)		
Currently has an overdraft (dummy)		0.0138 (0.12)	
Currently has a credit line (dummy)			-0.147 (-1.28)
constant	-1.813*** (-27.74)	-1.801*** (-19.79)	-1.746*** (-25.27)
N	701	701	701
adj. R-sq	-0.001	-0.001	0.001

t statistics in parentheses

* p<0.10, **p<0.05, *** p<0.01

Table 3: Marginal product of capital regression on business obstacles and firm characteristics (OLS)

	(1)	(2)	(3)
	LogMPK	LogMPK	LogMPK
Access to finance is an obstacle (0 - 4)	0.00169 (0.03)		0.0635 (1.25)
Electricity supply is an obstacle (0 - 4)	0.0790* (1.78)		0.0647 (1.49)
Inadequately educated labour is an obstacle (0 - 4)	0.149** (2.39)		0.0981 (1.60)
Labour regulations are an obstacle (0 - 4)	-0.0971 (-1.57)		-0.139** (-2.22)
Corruption is an obstacle (0 - 4)	-0.00457 (-0.09)		-0.0202 (-0.41)
Crime is an obstacle (0 - 4)	-0.117** (-2.17)		-0.123** (-2.38)
Firm receives >50% revenue in cash (dummy)		0.260** (2.16)	0.193 (1.53)
Firm below 25th percentile for sales (dummy)		-0.957*** (-6.77)	-0.995*** (-6.89)
constant	-1.742*** (-14.82)	-1.673*** (-25.52)	-1.530*** (-12.63)
N	701	701	701
adj. R-sq	0.016	0.063	0.081

t statistics in parentheses

* p<0.10, **p<0.05, *** p<0.01

5. Conclusion

Three key conclusions can be drawn from this paper. First, the South African credit market is functioning relatively well at an aggregate level. A small proportion of firms report that access to finance is a major obstacle to their business (relative to other emerging markets) and there is no clear correlation between access to finance obstacles and the variation in MPK between firms.

Second, small firms are more likely to report a financing constraint, however they are also more likely to have a lower than average MPK. Thus, the credit constraint that they face appears to reflect a low level of productivity. Further research will be required to determine the exact constraints on the productivity of small firms. But this paper indicates that it will be inefficient (on average) for lenders to allocate more credit to small firms until other reforms to increase their productivity have been undertaken.

Third, self-reported firm level obstacles that reflect structural impediments in the economy (such as crime, education and regulatory policy) appear to explain a some of the variation in MPK between firms in SA. Therefore, addressing these structural challenges would likely improve the allocation of capital in the economy. It must be emphasized that the data used for this analysis are from 2007, so some factors may have changed in the interim.

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Appendix

Descriptive Statistics:

Proportion of firms in the sample with the following characteristics:

	Percentage of firms in the sample
Have a bank account	97.5%
Access to finance major or severe obstacle	13.2%
Access to finance major, severe or moderate obstacle	22.7%
Access to finance is its most significant obstacle	6.4%
Firm currently has an overdraft	56.6%
Firm currently has a loan or line of credit from a financial institution	30.7%

Key statistics for non-binary variables in the paper:

Variable	Obs	Mean	Std. Dev.	Min	Max
Log-age	960	2,448527	0,9723346	0	4,955827
Noncash payments	960	56,64156	40,72928	0	100
Log-profit margin	630	-1,73563	0,8460397	-5,703783	-0,2423264
Log-sales	960	15,76777	2,069823	9,546813	22,69735
Log-mpk	701	-1,387928	1,467645	-6,669844	5,049856

Figure 6: Scatterplot of firm sales and firm-level MPK



Figure 7: Scatterplot of cash dummy (firm's that receive >50% revenues in cash) and firm-level MPK

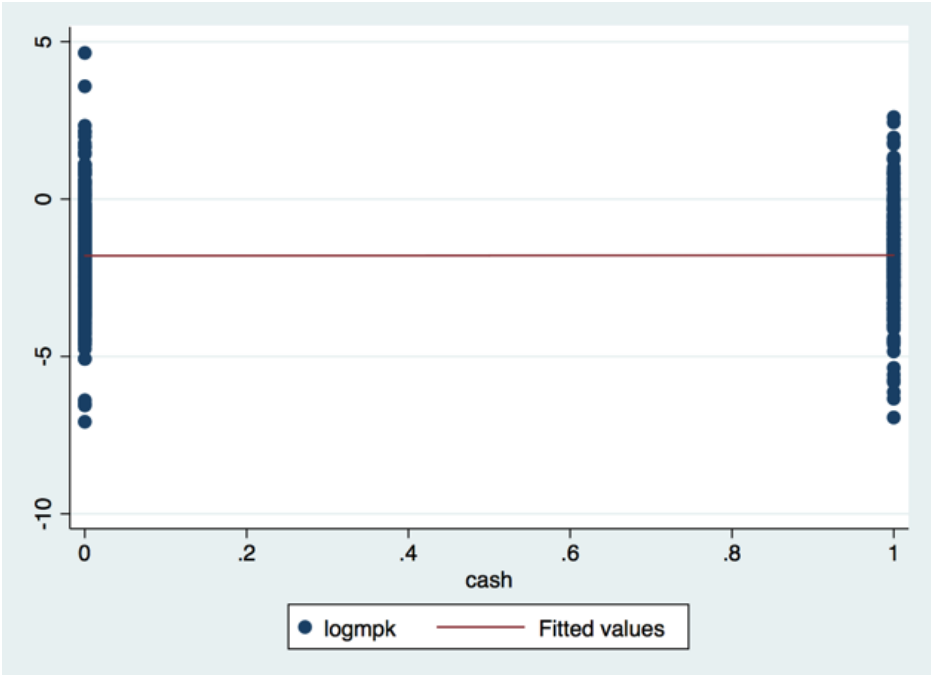


Figure 8: Scatterplot of firm-level MPK and dummy for education of firm's top manager (1 = has completed tertiary education)

