On the Determinants of Investment in Sub-Saharan African Manufacturing Firms

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Abstract

Investment is a crucial factor determining economic performance at the firm as well as the country level. In this paper I identify the determinants of the decision to invest in new plant and equipment as well as the determinants of the level of such investment for a sample of firms in 19 sub-Saharan African countries. In particular, I concentrate on the role of property rights, external finance, trade status and firm ownership on investment. Results indicate that internationally trading firms, foreign owned firms and firms with better access to sources of external finance tend to be more likely to invest and to invest more, with little role for indicators of property rights in influencing investment decisions found.

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1. Introduction

Recent theories of economic growth suggest an important role for investment or capital accumulation in affecting productivity or economic growth at the country level (for example Romer, 1986). Empirical evidence also suggests that investment is closely linked to economic growth and differences in income levels, and that investment is one of the few robust determinants of economic growth (Sala-i-Martin et al, 2004). Investment in equipment in particular has been found to be an important determinant of a country's growth rate (De Long and Summers, 1992), particularly in developing countries. De Long and Summers (1992) argue that there must be strong externalities associated with equipment investment, which raise total factor productivity and output growth. Such externalities may arise due to learning-by-doing on new machines or through technology transfer. While investment has been found to be of crucial importance at the country level most investment, in plant and equipment in particular, is undertaken at the firm-level. A firm's decisions regarding investment are a major factor in the success or failure of its operations. Investment decisions are likely to impact upon the markets in which firms operate, firms' growth trajectories and future profits.

A small number of papers have addressed the determinants of investment at the firm-level, often focussing on the importance of property rights, profits and external finance for investment. Property rights are considered to be a fundamental requirement for investment, with firms unwilling to invest if they don't expect to keep the fruits of their investment. At the country-level a number of studies have found that weak property rights are associated with slower economic growth (see for example Knack and Keefer, 1995), while Besley (1995), Johnson et al (2002) and Cull and Xu (2005) find a positive impact of property rights on investment at the firm-level. Further evidence at the country-level indicates that a well functioning financial system also

contributes to growth (see for example Rajan and Zingales, 1998; Levine et al, 2000).[1] The most common reason advanced for low levels of investment, particularly among small firms, is that they are financially constrained. Firm-level studies in both developed and developing countries by Demirguc-Kunt and Maksimovic (1998) find some evidence of a role for external finance in the performance of firms. A well functioning financial system can also lessen the importance of retained profits as a source of funds for investment, with the use of own finance to fund investment being linked to the existence of financial constraints and capital market segmentation.

Johnson et al (2002) examine whether weak property rights and limited access to external finance are major constraints on investment for five post-communist countries. They consider whether indicators of property rights and external finance have explanatory power with respect to the decision to reinvest profits, finding that weak property rights discourage firms from reinvesting their profits, even when bank loans are available. Measures of access to external finance are not significantly associated with reinvestment rates.

Demirguc-Kunt and Maksimovic (1998) find that access to external finance contributed to the sales growth of firms in 20 industrialized and ten developing countries, none of which was in transition from a planned to a market economy. In addition, reliance on long-term finance was greater in countries with efficient legal systems, an active stock market, and a large banking sector, none of which was characteristic of the economies in transition. The results of Demirguc-Kunt and Maksimovic (1998), viewed in combination with those of Johnson et al (2002), suggest that economies in the early stages of transition might be the rare current example in which the security of property rights matters much more for investment than access to external finance. Cull and Xu (2005) also consider the role of property rights and access to finance as

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[1] Johnson et al (2002) argue that it is hard to separate the effects of property rights from external financing with country-level data because external financing is strongly influenced by the security of property rights.

determinants of firm reinvestment in China. They find results that are consistent with both Johnson et al (2002) and Demirguc-Kunt and Maksimovic (1998) with both property rights and access to external finance found to be important determinants of reinvestment.

This paper builds upon the small existing literature examining the determinants of investment at the firm-level by reporting results on the determinants of investment using data from UNIDO's most recent African Investor Survey (AIS). This survey was conducted in 19 sub-Saharan African countries during the period 2010-2011 and covers over 6,000 firms (for more information see UNIDO, 2011).[2] While the survey is conducted for both manufacturing and service industries, the following analysis concentrates on manufacturing firms only, further restricting the sample to privately-owned and foreign-owned firms only at various points. Using this data the characteristics of investing firms are identified as well as external factors (or perceptions of external factors) that significantly influence the decision to invest and the value of any such investment. In terms of firm characteristics standard variables such as firm size and age are considered as factors influencing the decision to invest, but also a firm's trade status and ownership structure. In particular, the issue of whether firms that either export their products or import inputs behave differently with respect to their investment decisions is examined. A firm's trade status has been found to be correlated with a number of performance indicators, including Total Factor Productivity (TFP) and labour productivity, wages and measures of investment and capital per worker (Wagner, 2007). Given these existing results the paper examines whether a firms' trade status has explanatory power for investment.

In the analysis the ownership status of firms is also distinguished. Initially, this is done by accounting for whether firms are foreign-owned or government-owned to examine whether such firms are more likely to engage in new investment due for example to additional sources of

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[2] The 19 SSA countries considered are: Burkina Faso, Burundi, Cameroon, Cape Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda and Zambia.

finance (e.g. from the parent firm or government sources). The subsamples of foreign-owned and privately-owned firms are also considered separately to examine whether the determinants of investment differ between these firm types. In terms of the indicators of the external environment, measures of property rights and external finance are included, while for the sub-sample of foreign-owned firms it is also possible to include additional external factors relating to the general business environment and to incentives received by foreign-owned firms. The results indicate that trade status, foreign ownership and sources of external finance are all important in the decision to invest and the extent of new investment, though little evidence of an effect due to property rights is found.

The remainder of the paper is as follows: Section 2 discusses the empirical specifications of our models of the investment decision and the level of any such investment; Section 3 describes the data and discusses some descriptive statistics; Section 4 discusses the results; Section 5 concludes.

2. Empirical Setup and Estimation Method

The AIS asks a number of questions related to a firm's past investment and future investment plans. For the analysis two pieces of information are of interest, namely: (i) When was the last major new investment undertaken in this company?[3]; and (ii) What was the value of this investment? Given information on these two pieces of information I consider factors influencing both the decision to invest and the value of any such investment. To address the first issue the paper concentrates on those firms that have invested in the past three years and estimates a

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[3] The definition of investment in this case is fairly broad including investment in fixed assets, financial reserves, working capital, training and acquisition of other companies. In the sample of 1,218 investing firms however, 84% (or 1024 firms) of them invested in fixed assets. Results using data on just those firms that invested in fixed assets are qualitatively similar to those reported and are available upon request. I continue to use the full sample of investing firms in the analysis however, because it is not possible to split up the values of investment by type in the dataset.

Probit model[4] of the decision to invest. To consider the second issue standard linear regression methods are used to consider the relationship between the logged values of investment and a set of investment determinants. In both models I consider a similar set of explanatory variables with the initial model being written as:

$$INVEST_{ijk} = \beta_1'FIRMCHAR_{ijk} + \beta_2'OWNERSHIP_{ijk} + \beta_3'TRADE\ STATUS_{ijk}$$

$$+ \beta_4'EXTERNAL_{ijk} + \varepsilon_{ijk}$$

where $INVEST$ is the dependent variable, $FIRMCHAR$ are a set of additional firm characteristics included in the model, $OWNERSHIP$ refers to indicators of the ownership structure of the firm, $TRADE\ STATUS$ refers to measures of the firm's trade status, $EXTERNAL$ are a set of indicators of the external environment or perceptions thereof, ε is an error term and subscripts i, j and k refer to firm, industry and country respectively. In addition, in various specifications I also include country and sector dummies.[5]

Our dependent variable $INVEST$ is either a binary variable taking the value one if the firm has undertaken any investment in the past three years or the logged value of that investment. Since I consider the logged value of investment in the case of the investment level equation attention is restricted to those observations for which investment was positive. In further robustness tests I move beyond the OLS estimator and report results using quantile regression (QR) methods, and the median estimator in particular. One benefit of QR is that it allows one to consider the determinants of investment at different points on the conditional growth distribution, but it also helps deal with the issue of outliers and extreme values which may heavily influence the results from OLS regressions and which are likely to be a concern in firm-level data.

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[4] Results using a Linear Probability Model and a Logit model are qualitatively similar and are available upon request.
[5] In the analysis there are 19 country and 23 sector dummies. These dummies are included to account for unmodelled heterogeneity across countries and industries, and in all cases are jointly significant. According to the World Development Indicators database, the ratio of gross capital formation to GDP varies significantly across countries ranging from 17.5% for Cameroon to 37.8% for Cape Verde for the period 2009-2011, suggesting significant differences in investment across countries.

The description of the explanatory variables can be split into a discussion of firm characteristics and a discussion of external factors that are hypothesised to influence the decision to invest. In terms of firm characteristics a measure of firm age (age) and a measure of firm size or scale ($scale$), defined as the ratio of the firm's output to average industry output, are included.[6] Age is included since one may expect that older firms require less investment since any investment to exploit economies of scale is likely to have already been undertaken (Cull and Xu, 2005). It may also be however, that older firms are more likely to invest in order to upgrade their technology, though Cull and Xu (2005) argue that this may be difficult and hence unlikely for older firms. Alternatively, older firms may have accumulated profits or well developed lines of finance which make it easier to finance investment. Cull and Xu (2005) argue that large firms are likely to have different investment needs to smaller ones and therefore it is necessary to control for firm size.

Additional firm characteristics related to its trading and ownership status are also included. To examine whether a firm's trade status is a relevant characteristic of investing firms three indicators of trade status are included. These are dummy variables taking the value one if the firm is an exporter only ($exporter$), importer only ($importer$) and two-way trader ($twoway$) respectively. In addition to considering the distinction between trading and non-trading firms in additional specifications I also consider whether there are differences in the propensity to invest between local ($local$), regional ($regional$) and global ($global$) market-seeking firms by including dummies for the latter two types of firm. A firm is defined as local market-seeking if less than 10% of the firms' income comes from exporting, a firm is defined as regional market-seeking if more than 10% of its income comes from exports and more than 50% of its exports are to sub-Saharan African countries, while a firm is global market-seeking if exports account for

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[6] A scale variable of this form is used rather than measures such as firm employment, since one may expect that employment is an endogenous variable, being affected by the level of investment. I thank an anonymous referee for making this point.

more than 10% of income and more than 50% of exports are to countries outside sub-Saharan Africa.

Cull and Xu (2005) argue that direct state ownership is often associated with the pursuit of political objectives at the expense of other stakeholders in the firm, and that in such cases the control rights of the manager and other owners are often weakened to achieve social objectives or to provide private benefits to politicians and bureaucrats. Cull and Xu (2005) further argue that ownership structure is itself a measure of the security of property rights, with a higher share of private ownership indicating that the owner or manager of a firm can have greater confidence in being shielded from government interference, and therefore a higher expected return on investment. A firm's ownership structure is captured by a number of variables. Initially the share of private ownership (*ownership*) of firms is included as an explanatory variable.[7] In addition to these general measures of private ownership, a further distinction between the share of family ownership (*family*) and the share of other private ownership (*other*) is made. Additional aspects of firm ownership are also accounted for. This is done in two ways. In a first step, dummy variables are included in the regression model to take account of whether the firm is foreign-owned[8] (*foreign*) and whether it is wholly government owned (*govown*). In a second step the model is estimated separately for the samples of foreign firms only and privately owned firms only.[9]

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[7] Questions in the survey ask for details of the current ownership and in particular the share of ownership of individuals, publicly listed / limited company, private limited company, government institution and local-based equity fund. When considering foreign-owned firms these groups are further split between domestic and foreign ownership. The variable I use is the share of ownership not in the hands of government institutions.

[8] Consistent with much of the recent literature on foreign ownership and performance (much of which is reviewed by Görg and Greenaway, 2004) a foreign firm is defined as one in which at least 10% of its equity is owned by non-residents.

[9] Cull and Xu (2005) define privately-owned firms as those that have private ownership of more than 50%. This is the approach I adopt here.

The external factors affecting the decision to invest concentrate on the importance of property rights and external finance, factors that have been considered in previous research. The survey doesn't directly ask firms their opinions on the extent of property rights or whether they have to make payments to government officials. As such, I am forced to rely on indirect measures of property rights, and of contract enforcement in particular. Following Cull and Xu (2005) a dummy variable taking the value one if the firm has signed a formal contract with a client (*contract*) is included.[10] Given that firms are only likely to sign a contract if they expect it to have some chance of being protected in case of dispute it is expected that firms that have long-term contracts are likely to have greater faith in the contract enforcement system. As mentioned above, the indicator of the share of private ownership is further included as an additional indicator of property rights.

The survey asks firms for the shares of different sources of finance in both working capital and fixed assets during the last three years.[11] I concentrate on the sources of finance for fixed assets and define two variables capturing external finance. The first is a dummy variable taking the value one if a firm has received finance from banks within and/or outside the country of interest (*bank*), while the second is a dummy taking the value one if a firm has received finance from other sources of external finance (*external*) in the past three years, which in the case of foreign-owned firms also includes the share of finance obtained from the parent company.

When considering the subset of foreign-owned firms only it is possible to include additional variables capturing external factors. In particular, it is possible to include information on the perceptions of firms with respect to political and economic stability, and the transparency of

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[10] In particular, the question asks whether firms have long-term agreements with suppliers or raw materials, components or finished goods, and if so how many.

[11] The options listed are internal funds/retained earnings, borrowed from banks within the country, borrowed from banks outside of the country, borrowed from family/friends/individual lenders, borrowed from non-bank financial institutions, purchases on credit from suppliers and advances from customers, issued new equity shares or new debt, other, and in the case of foreign firms from the parent company.

business regulations and the legal framework. The survey asks foreign firms to state how important each of these factors were to the decision to invest in a country and how these factors have changed in the last three years. The importance of political (*politstab*) and economic (*econstab*) stability and the transparency of business regulations (*trans*) are captured by including variables taking on values one to five, with one indicating that a particular factor was not important to the initial decision to invest and five indicating that it was crucial. [12] Concentrating on foreign owned firms only also provides insights into the factors that encourage such firms to invest in African countries. When considering this sub-sample of firms I further include indicators of whether the firm receives tax exemptions (*taxexempt*) and capital grants (*capgrant*).[13]

The model of the decision to invest is estimated using a Probit model with and without sector and country dummies. The model explaining the level of (logged) investment is initially estimated using standard Ordinary Least Squares (OLS) methods, again with and without the inclusion of sector and country dummies. One problem with estimating the model using OLS relates to the issue of outliers. To test the robustness of our results to such outliers results from QR models are also reported.

QR seek to model the conditional quantile functions, in which the quantiles of the conditional distribution of the dependent variable are expressed as functions of observed covariates (for more information see Buchinsky (1998) and Koenker and Hallock (2001)). The main advantage of QR is that potentially different solutions at distinct quantiles may be interpreted as differences in the response of the dependent variable to changes in the regressors at various points on the

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[12] Using information on the change in these perceptions over the last three years leads to similar results. In the analysis, the results when using the change are not reported as the data say nothing about the perception of the overall level of stability and transparency.

[13] Foreign-owned firms are asked which incentives they receive (i.e. capital grants, tax exemptions, grants for hiring, training for employees, infrastructure, and other) and the value of the incentive in the last year.

conditional distribution of the dependent variable. In terms of modelling investment QR allow one to estimate different coefficients on the covariates for under- and over-achievers (i.e. countries that invest more or less than would be expected given values of the other explanatory variables). A further important benefit in this context is that QR is also robust with regard to outlying observations in the dependent variable. The QR objective function is a weighted sum of absolute deviations, which gives a robust measure of location, so that the estimated coefficient vector is not sensitive to outlier observations on the dependent variable. In a sample of heterogeneous firms values of some variables are likely to be far away from others. These outliers could be due to reporting errors or to idiosyncratic events and can have a large influence on the coefficients when estimating the regression model by OLS. By using QR which is robust to outlying observations it is possible to examine the sensitivity of the results to outliers. In addition, median regression or the Least Absolute Deviations (LAD) model, which is the quantile estimator at the median of the distribution, can be more efficient than mean regression estimators in the presence of heteroscedasticity, while when the error term is non-normal, QR estimators may be more efficient than least squares estimators. In the results section below I report results from the median regression model alongside the OLS results.

3. Data

The data are drawn from UNIDO's 2011 AIS which was conducted over the period 2010-2011 and which surveys over 6,000 manufacturing and services firms in 19 sub-Saharan African countries. In this paper I use data on the sub-sample of manufacturing firms, which ensures that our dataset is consistent with previous research. The final usable sample covers a maximum of 2,778 firms in 19 countries.

Table 1 below provides simple frequency descriptive statistics for the binary variables. The table indicates that just under half (44%) of firms undertook investment in the previous three years.

Only a small number of the firms are exporters only (8%) with a larger percentage being importers only (34%) and simultaneous importers and exporters (24%), meaning that more than half of firms engage in some form of international trade. The vast majority of firms (78%) are local market seekers, meaning that they either do not export or have a small share of sales accounted for by exports, with just 10 and 11% of firms being regional or global market-seekers respectively. Around one third of firms are classed as foreign owned, while only a very small percentage (2.5%) are classed as government owned. In terms of firm size, the majority of firms would be classed as either medium-sized (between 10 and 50 employees) or large (more than 50 employees), while a majority (72%) are also more than ten years old. Somewhat less than half (43%) of firms have had recent access to finance from banks, with a smaller percentage (27%) having access to other sources of external finance. The vast majority of firms (90%) however, in the sample have a long-term contract with a client. The lack of variation in this variable leads to difficulties in finding a significant relationship between new investment and this measure of property rights. Finally, only a relatively small number of foreign-owned firms receive incentives in the form of capital grants (59 out of 893 or 6.6%) and tax exemptions (271 or 30%).

Table 2 reports descriptive statistics (mean, standard deviation, mean and maximum) for those variables in our model that are roughly continuous. The mean value of the log of planned new investment is 11.87, which translates to an average investment level of around 143,000 US dollars.[14] The mean share of private ownership is found to be high at 92 %, with this share split between family (41%) and other private (51%) ownership. Averages of the political rights variables are all between 3 and 4, implying that on average these indicators were important or very important for the initial investment.[15]

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[14] All data are transferred into dollars using average exchange rates over the previous three years (i.e. 2009-2011).

[15] Note however that comparing the average values of these indicators across countries to aggregate indicators of political rights (such as the Economic Freedom of the World Index for 2010, http://www.freetheworld.com/datasets_efw.html) gives correlations that are small and positive in the case of economic stability and negative in the other two cases.

Table 1: Frequency Table

	Frequency	Share (%)
Total number of firms	2,778	100
Investment:		
- *invest*	1,218	43.84
Trade Status:		
- *exporter*	227	8.17
- *importer*	955	34.38
- *twoway*	661	23.79
- *local*	2,173	78.22
- *regional*	264	9.50
- *global*	305	10.98
Ownership:		
- *govown*	70	2.52
- *foreign*	893	32.15
Firm Size (Employees)		
- *Small* (< 10)	228	8.22
- *Medium* $(10 - 50)$	1,308	47.17
- *Large* (> 50)	1,237	44.61
Firm Age (Years)		
- *Young* (< 10)	766	27.57
- *Old* (> 10)	2,012	72.43
Access to finance:		
- *bank*	1,182	42.55
- *external*	742	26.71
Property Rights:		
- *contract*	2,496	89.85
Incentives:		
- *taxexempt*	271	9.76
- *capgrant*	59	2.12

Table 2: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Investment:				
- *invest*	11.87	2.37	4.77	25.38
Control Variables:				
- *scale*	0.951	2.136	0	36.875
- *age*	19.689	15.879	1	163
Private Ownership Share				
- *ownership*	0.924	0.216	0	1
- *family*	0.413	0.477	0	1
- *other*	0.511	0.477	0	1
Political Rights:				
- *politstab*	3.905	0.893	1	5
- *econstab*	3.878	0.839	1	5
- *trans*	3.625	0.817	1	5

Finally, Table 3 reports information on the frequency and mean value of investment by firm type. Considering differences in investment patterns by trade status it can be seen that between 37 and 48% of trading firms invest, with this number being lowest for exporters (37.9%) and

highest for simultaneous exporters and importers (48.0%). Distinguishing firms by local, regional and global market seeking type shows that the shares of firms investing are fairly similar at around 44%. The average value of investment however differs across firm types being largest for simultaneous exporters and importers, and regional market seekers and lowest for importers and local market-seekers. Characterising firms by their ownership indicates that around 41 and 44% of government- and foreign-owned firms have invested in the past three years respectively. The average share of investment by government-owned firms was relatively high at a value of around 900,000 US dollars, with that for foreign-owned firms also being above the overall average at 328,000 US dollars. Small firms (38%) are found to be less likely to invest than medium (45%) and large (44%) firms, with the average value of investment by small firms being unsurprisingly smaller than that for medium and large firms. The table further reveals that young firms are significantly more likely to invest than older firms (54.1 versus 40.0%), though they tend invest to less than older firms (97,000 versus 175,000 US dollars).

Table 3: Frequency and Mean Level of Investment by Firm Type

Firm Type	Total number of firms	Number of investing firms	% of investing firms	Average Value of Logged Investment
Trade Status:				
- *exporter*	227	86	37.89	12.22
- *importer*	955	452	47.33	12.08
- *twoway*	661	317	47.96	12.89
- *local*	2,173	959	44.13	11.64
- *regional*	264	116	43.94	13.02
- *global*	305	132	43.28	12.49
Ownership:				
- *govown*	70	29	41.43	13.71
- *foreign*	893	393	44.01	12.70
Firm Size (Employees)				
- *Small* (< 10)	228	87	38.16	9.39
- *Medium* $(10 - 50)$	1,308	587	44.88	11.09
- *Large* (> 50)	1,242	544	43.80	13.11
Firm Age (Years)				
- *Young* (< 10)	766	414	54.05	11.48
- *Old* (> 10)	2,012	804	39.96	12.07

4. Results

4.1. The Determinants of the Decision to Invest

This subsection reports results from estimating a Probit model of the decision to invest. Two sets of results are reported. Table 4 reports marginal effects[16] for the full sample of firms that includes both domestic and foreign-owned firms and private and government owned firms, while Table 5 reports results for foreign-owned firms only where additional potential determinants of investment are included.[17]

The results in Table 4 indicate that a small number of variables have a significant relationship with the probability of investing. Age is found to significantly impact upon the probability of investing, with an additional year found to decrease the probability of investment by around 0.5%. Consistent with the descriptive statistics reported in Table 3 therefore, the results indicate that older firms are less likely to invest. The scale variable is also consistently significant, with the positive coefficients indicating that an increase in the ratio of output to average industry output by one unit increases the probability of investing by around 1.1%. The two other variables that are found to be significant relate to a firm's trade status with importers found to be between 7 and 9% more likely to invest than non-importers and two-way traders between 11 and 14% more likely to invest. No significant effects of the other determinants of investment, such as those related to property rights and sources of finance, are found to be significant.

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[16] For brevity only the marginal effects are reported in the main text. Estimated coefficients are available from the author upon request.

[17] Results when considering the sub-sample of privately owned firms only are very similar to those from the full sample. This is unsurprising since only 69 of the approximately 2,800 observations are defined as being government-owned. For this reason the marginal effects of these results are not discussed or reported in the main text, but they are available from the author upon request.

Table 4: Marginal Effects of the Decision to Invest – All Firms

VARIABLES	(1) invest	(2) invest	(3) invest	(4) invest
scale	0.0119**	0.0111**	0.0116**	0.0111**
	(0.00562)	(0.00538)	(0.00560)	(0.00537)
age	-0.00498***	-0.00491***	-0.00502***	-0.00494***
	(0.000681)	(0.000710)	(0.000682)	(0.000711)
exporter	-0.00183	-0.00214		
	(0.0384)	(0.0400)		
regional			-0.0421	-0.0328
			(0.0382)	(0.0397)
global			-0.0490	-0.0369
			(0.0365)	(0.0400)
importer	0.0862***	0.0797***	0.0800***	0.0756***
	(0.0236)	(0.0258)	(0.0227)	(0.0248)
twoway	0.114***	0.112***	0.137***	0.128***
	(0.0282)	(0.0309)	(0.0306)	(0.0319)
foreign	-0.0350	-0.0309	-0.0283	-0.0269
	(0.0246)	(0.0261)	(0.0249)	(0.0263)
govown	0.0648	0.0264	0.0669	0.0288
	(0.0794)	(0.0817)	(0.0796)	(0.0819)
contract	0.00891	0.0280	0.00348	0.0254
	(0.0324)	(0.0335)	(0.0329)	(0.0337)
family	0.0127	-0.0226	0.0111	-0.0235
	(0.0605)	(0.0625)	(0.0605)	(0.0625)
other	0.0290	0.0142	0.0292	0.0142
	(0.0593)	(0.0608)	(0.0594)	(0.0608)
bank	0.0110	0.0198	0.0120	0.0204
	(0.0197)	(0.0207)	(0.0197)	(0.0207)
external	0.00637	0.000659	0.00682	0.00130
	(0.0217)	(0.0228)	(0.0217)	(0.0228)
Sector dummies	No	Yes	No	Yes
Country dummies	No	Yes	No	Yes
Wald χ^2	81.24***	181.57***	82.98***	182.70***
Psuedo R^2	0.0234	0.0499	0.0240	0.0502
Observations	2,778	2,777	2,778	2,777

Robust standard errors in parentheses

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

Table 5 reports results for the sample of foreign-owned firms only.[18] The first four columns report results from the same specification as that in Table 4 – with the exception of the foreign dummy obviously – while the latter four include additional potential investment determinants related to the investment climate. The results are quite similar to those for the full sample of firms and indicate that firm age lowers the probability of a firm undertaking investment, while importers and two-way traders have a higher probability of undertaking investment. The scale

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[18] Note that it is not possible to include the variable contract in these models since all foreign owned firms have a contract with a supplier.

variable is positive when significant, but is usually insignificant, while the coefficient on global market seekers is significantly negative in one case. Coefficients on these variables are generally similar to those for the full sample of firms reported in Table 4. Once again none of the additional variables are significant in the first four columns of Table 5, but there are some significant coefficients in the final four columns. In particular, foreign firms benefiting from capital grants are between 12 and 14% more likely to have undertaken investment, while firms that find the transparency of business regulation to be more important are also more likely to undertake investment, at least when country and industry fixed effects are included.

The results thus indicate that few of our variables are important for the decision to undertake investment. Younger firms, larger firms and trading firms (and importers in particular) are more likely to undertake investment however. The use of capital grants by government also seem to play an important role in encouraging investment activities by foreign-owned firms, while transparency of business regulations and the legal framework are an institutional factor that also encourages investment. While many of our variables are not found to be important for the decision to invest they may be relevant when considering the level of investment that takes place. This is addressed in the following section.

Table 5: Marginal Effects of the Decision to Invest – Foreign Firms Only

VARIABLES	(1) invest	(2) invest	(3) invest	(4) invest	(5) invest	(6) invest	(7) invest	(8) invest
scale	0.0128*	0.0117	0.0121*	0.0113	-0.0143	0.0118	-0.00467	0.0156
	(0.00720)	(0.00715)	(0.00728)	(0.00718)	(0.0166)	(0.0198)	(0.0173)	(0.0199)
age	-0.00428***	-0.00493***	-0.00448***	-0.00500***	-0.00257*	-0.00348**	-0.00285**	-0.00349**
	(0.00114)	(0.00125)	(0.00116)	(0.00126)	(0.00134)	(0.00151)	(0.00137)	(0.00152)
exporter	-0.0588	-0.0658			0.0836	0.124		
	(0.0685)	(0.0705)			(0.0872)	(0.0895)		
regional			-0.0523	-0.0394			-0.00897	0.0532
			(0.0547)	(0.0578)			(0.0679)	(0.0720)
global			-0.0899*	-0.0476			-0.102	-0.0394
			(0.0523)	(0.0611)			(0.0679)	(0.0759)
importer	0.112**	0.121**	0.112**	0.134***	0.178***	0.186***	0.120**	0.141**
	(0.0530)	(0.0567)	(0.0471)	(0.0510)	(0.0651)	(0.0706)	(0.0573)	(0.0635)
twoway	0.123**	0.128**	0.177***	0.173***	0.198***	0.217***	0.178***	0.155**
	(0.0527)	(0.0568)	(0.0477)	(0.0498)	(0.0680)	(0.0703)	(0.0592)	(0.0617)
capgrant					0.129*	0.137*	0.125*	0.139*
					(0.0676)	(0.0719)	(0.0686)	(0.0730)
taxexempt					0.0500	0.0535	0.0621	0.0655
					(0.0426)	(0.0479)	(0.0431)	(0.0485)
family	0.0692	0.00323	0.0687	0.00447	0.135	0.0530	0.149*	0.0650
	(0.0705)	(0.0757)	(0.0705)	(0.0756)	(0.0842)	(0.0914)	(0.0849)	(0.0921)
other	0.00996	-0.00317	0.0134	-0.00196	0.0410	-0.00215	0.0589	0.0113
	(0.0670)	(0.0711)	(0.0671)	(0.0711)	(0.0807)	(0.0872)	(0.0814)	(0.0878)
politstab					-0.0114	-0.0188	-0.0156	-0.0214
					(0.0273)	(0.0285)	(0.0271)	(0.0284)
econstab					0.0127	0.0321	0.0161	0.0328
					(0.0309)	(0.0322)	(0.0305)	(0.0322)
trans					0.0322	0.0499*	0.0340	0.0515*
					(0.0282)	(0.0297)	(0.0283)	(0.0300)
bank	0.0170	0.0282	0.0161	0.0263	-0.0502	-0.0303	-0.0478	-0.0223
	(0.0351)	(0.0377)	(0.0350)	(0.0376)	(0.0414)	(0.0451)	(0.0413)	(0.0449)
external	0.0160	-0.00523	0.0172	-0.00456	0.0109	-0.0247	0.0111	-0.0233
	(0.0378)	(0.0392)	(0.0379)	(0.0394)	(0.0451)	(0.0490)	(0.0451)	(0.0490)
Sector dummies	No	Yes	No	Yes	No	Yes	No	Yes
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes
Wald χ^2	33.98***	77.17***	35.34***	77.38***	40.09***	90.91***	40.39***	89.74***
Psuedo R^2	0.0302	0.0690	0.0321	0.0689	0.0466	0.109	0.0483	0.109
Observations	893	890	893	890	649	644	649	644

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

4.2. The Determinants of the Value of Investment

Table 6 reports results when considering the logged level of investment for the full sample of countries, with the first four columns reporting results from OLS regressions and the final four reporting results when using QR at the median.[19] Table 6 reports a number of significant variables, with the results from OLS and QR being qualitatively similar. Firm age and firm scale are both found to have a positive and significant relationship with investment, with a one unit increase in the scale variable increasing investment by around 30% (somewhat higher when considering the QR results) and a one year increase in age increasing investment by around 1%.

Coefficients on the trade status variables (i.e. exporter, importer and two-way trader) also tend to be positive and significant, with the coefficients being largest for two-way traders. Coefficients on the local and regional market seekers variables are generally positive, but not always significant. Foreign and government owned firms are also found to invest more than domestically and privately owned firms respectively, with foreign owned firms found to invest around 80% more than domestically owned firms and government owned firms investing nearly double that of private firms (when country and industry fixed effects are included). No effect of the contract variable is found, though as mentioned above this may reflect the lack of variation in this variable. There is some evidence of a positive effect of other non-family private ownership on investment, with limited evidence of a positive effect of family ownership in the QR results. Finally, the results provide evidence indicating that access to external finance – both from banks and other external sources – increases the level of investment. While access to external finance doesn't appear to affect the decision to invest, it does seem to impact upon the overall level of any investment therefore.

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[19] Results for the sub-sample of privately owned firms are again very similar to those reported for the full sample. For reasons of brevity these results are not discussed, but are available from the author upon request.

Table 7 reports results for the sub-sample of foreign-owned firms only, with the first four columns again reporting OLS results and the latter four the results when estimating the model using QR at the median. For reasons of brevity the results when including the additional indicators of property rights and business transparency are reported only. Few of the variables in Table 7 are found to be significant, which is likely to reflect the relatively small sample of observations available on foreign-owned firms that invested in the last three years along with the lack of variation in many of the explanatory variables for this sub-sample of firms.[20] In terms of significant coefficients the results again show a positive effect of firm size, with the coefficient on age also being positive when significant. Coefficients on the trade variables are also positive when significant, but are usually insignificant, particularly when fixed effects are included. The results further indicate a positive effect of other (non-family) ownership, while there is some evidence of a positive impact of political stability and business transparency, though these latter significant coefficients disappear when fixed effects are included. The availability of bank finance is again found to have a positive association with investment.

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[20] While Table 3 indicates that 393 foreign firms had positive investment, the actual maximum number of observations we can use is 294. This is largely because of missing information on whether the firm received capital grants or tax exemptions.

Table 6: Results for the Value of Investment – All Firms

VARIABLES	(1) invest	(2) invest	(3) invest	(4) invest	(5) invest	(6) invest	(7) invest	(8) invest
scale	0.295***	0.315***	0.300***	0.325***	0.332***	0.380***	0.335***	0.409***
	(0.0420)	(0.0425)	(0.0428)	(0.0437)	(0.0447)	(0.0401)	(0.0477)	(0.0342)
age	0.0164***	0.00766*	0.0175***	0.00856**	0.0145***	0.00914*	0.0161***	0.0115***
	(0.00448)	(0.00406)	(0.00461)	(0.00416)	(0.00420)	(0.00484)	(0.00540)	(0.00369)
exporter	0.979***	1.198***			0.864***	0.937***		
	(0.332)	(0.282)			(0.290)	(0.231)		
regional			0.482**	0.371			0.307	0.434*
			(0.234)	(0.234)			(0.291)	(0.252)
global			0.261	0.455*			0.0725	0.377
			(0.258)	(0.240)			(0.249)	(0.258)
importer	1.020***	1.037***	0.860***	0.853***	1.040***	1.185***	0.804***	1.114***
	(0.141)	(0.130)	(0.141)	(0.129)	(0.183)	(0.143)	(0.210)	(0.143)
twoway	1.278***	1.420***	0.867***	0.921***	1.412***	1.489***	0.962***	1.030***
	(0.161)	(0.163)	(0.202)	(0.198)	(0.244)	(0.193)	(0.273)	(0.241)
foreign	0.622***	0.815***	0.643***	0.805***	0.549***	0.739***	0.643***	0.664***
	(0.139)	(0.132)	(0.141)	(0.136)	(0.139)	(0.138)	(0.132)	(0.142)
govown	1.425***	1.904***	1.400***	1.817***	1.572***	1.823***	1.517***	1.847***
	(0.450)	(0.400)	(0.464)	(0.415)	(0.336)	(0.507)	(0.392)	(0.559)
contract	0.0372	-0.0731	0.0194	-0.0748	0.0492	0.151	0.0675	0.172
	(0.209)	(0.192)	(0.208)	(0.188)	(0.199)	(0.232)	(0.290)	(0.251)
family	-0.477	0.416	-0.505	0.363	0.0435	0.707*	-0.000275	0.663*
	(0.389)	(0.346)	(0.404)	(0.358)	(0.321)	(0.410)	(0.292)	(0.376)
other	0.138	0.783**	0.140	0.755**	0.537*	1.028**	0.548	1.030***
	(0.391)	(0.339)	(0.408)	(0.352)	(0.275)	(0.412)	(0.335)	(0.341)
bank	0.667***	0.460***	0.696***	0.508***	0.745***	0.470***	0.657***	0.473***
	(0.115)	(0.108)	(0.115)	(0.109)	(0.130)	(0.107)	(0.177)	(0.124)
external	0.188	0.363***	0.215*	0.382***	0.121	0.321**	0.118	0.366*
	(0.129)	(0.128)	(0.129)	(0.130)	(0.164)	(0.134)	(0.235)	(0.211)
Sector dummies	No	Yes	No	Yes	No	Yes	No	Yes
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,218	1,218	1,218	1,218	1,218	1,218	1,218	1,218
R-squared	0.297	0.464	0.290	0.454	0.171	0.285	0.169	0.282
F-test	37.03***	19.42***	32.43***	18.27***	N/A	N/A	N/A	N/A

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Results for the Value of Investment – Foreign Firms

VARIABLES	(1) invest	(2) invest	(3) invest	(4) invest	(5) invest	(6) invest	(7) invest	(8) invest
scale	0.177***	0.244***	0.186***	0.248***	0.210***	0.297***	0.202***	0.290***
	(0.0553)	(0.0643)	(0.0542)	(0.0626)	(0.0568)	(0.0802)	(0.0454)	(0.0933)
age	0.0198*	-0.00223	0.0221*	-0.00153	0.0311**	0.0131	0.0311**	0.0115
	(0.0111)	(0.00918)	(0.0120)	(0.00915)	(0.0130)	(0.0150)	(0.0153)	(0.0109)
exporter	1.506*	0.702			0.818	0.621		
	(0.828)	(0.718)			(0.638)	(0.829)		
regional			0.315	-0.491			0.494	0.0684
			(0.399)	(0.448)			(0.463)	(0.678)
global			0.497	-0.409			0.0561	-0.223
			(0.490)	(0.469)			(0.560)	(0.501)
importer	0.620	0.505	0.103	0.0358	0.713**	1.009	0.508	0.607
	(0.378)	(0.422)	(0.407)	(0.387)	(0.293)	(0.674)	(0.399)	(0.647)
twoway	0.862**	0.701	0.0372	0.514	0.905***	0.837	0.437	0.570
	(0.390)	(0.438)	(0.521)	(0.384)	(0.348)	(0.632)	(0.435)	(0.458)
capgrant	-0.222	-0.366	-0.185	-0.389	-0.0529	-0.290	-0.124	-0.149
	(0.386)	(0.324)	(0.391)	(0.333)	(0.524)	(0.530)	(0.398)	(0.675)
taxexempt	0.318	0.146	0.333	0.251	0.268	0.325	0.249	0.337
	(0.264)	(0.249)	(0.267)	(0.254)	(0.231)	(0.329)	(0.298)	(0.285)
family	-0.328	0.675	-0.336	0.790	0.194	0.915	0.255	1.124*
	(0.493)	(0.522)	(0.508)	(0.544)	(0.631)	(0.691)	(0.714)	(0.647)
other	0.124	1.083**	0.0564	1.130**	0.571	1.678**	0.692	1.857***
	(0.504)	(0.478)	(0.542)	(0.499)	(0.507)	(0.667)	(0.672)	(0.544)
politstab	0.292*	0.0939	0.309*	0.0755	0.138	0.197	0.0891	0.180
	(0.155)	(0.153)	(0.158)	(0.151)	(0.289)	(0.220)	(0.254)	(0.166)
econstab	-0.269	0.0373	-0.296	0.0371	0.0336	0.100	0.0268	0.127
	(0.197)	(0.192)	(0.202)	(0.188)	(0.318)	(0.209)	(0.219)	(0.239)
trans	0.264	0.113	0.294*	0.136	0.212	-0.147	0.232	-0.0889
	(0.175)	(0.169)	(0.170)	(0.158)	(0.187)	(0.195)	(0.221)	(0.186)
bank	0.511*	0.582**	0.596**	0.635**	0.463*	0.491	0.533*	0.606**
	(0.284)	(0.262)	(0.263)	(0.250)	(0.253)	(0.338)	(0.316)	(0.262)
external	0.187	0.313	0.188	0.325	0.359	0.345	0.377	0.425
	(0.263)	(0.267)	(0.264)	(0.266)	(0.414)	(0.313)	(0.367)	(0.524)
Sector dummies	No	Yes	No	Yes	No	Yes	No	Yes
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes
Observations	294	294	294	294	294	294	294	294
R-squared	0.199	0.496	0.186	0.496	0.127	0.303	0.125	0.302
F-test	5.17***	4.56***	4.22***	4.46***	N/A	N/A	N/A	N/A

Robust standard errors in parentheses, *** $p<0.01$, ** $p<0.05$, * $p<0.1$

5. Conclusions

Investment is an important factor determining economic performance at the country- and firm-level. This paper considers the characteristics of recently investing firms and identifies important external determinants of both the decision to invest and the value of any such investment for a sample of manufacturing firms in 19 sub-Saharan African countries. The major firm characteristics considered are a firm's size, age, trade status and ownership, with indicators of property rights and access to external finance being the major external factors.

When considering the decision to invest the results indicate that firm size is positively associated with the decision to invest, while firms that trade internationally, receive capital grants and indicated that business transparency was important for their initial investment are also more likely to invest. Older firms, however, are less likely to invest. The results from the models of the level of investment result in many more factors being found to be important. Firm size and firm age are found to positively impact upon the level of investment, while firms that trade internationally, that are foreign-owned and that are government-owned also invest more. Firms with a higher share of non-family ownership are also found to invest more heavily, while access to external sources of finance is also positively associated with the level of investment.

This latter result provides some support for earlier results such as Demirguc-Kunt and Maksimovic (1998) and Cull and Xu (2005) indicating the importance of external finance for investment. While firms are still as likely to invest without access to external finance, the amount of any such investment depends positively upon their access to external finance. The results on indicators of property rights are found to be much weaker however, despite some limited evidence of an effect of business transparency and to a lesser extent political rights. This may be because firms don't see these as relevant to the investment decision, or because political rights are only important for a subset of investment decisions. In particular, it may be expected that

political rights are important for relatively high technology and innovative investment that may provide a great deal of the competitive advantage of a firm, but may be less important for less technologically intensive investment. Unfortunately, the survey data don't allow us to make this distinction. An alternative and more likely reason for the weak results on indicators of property rights is due to the indirect proxies for political rights used and the lack of variation in these variables. As mentioned in the text, the vast majority of firms in the sample have formal contracts with clients, making it less likely to find a significant effect of this variable. As also mentioned above, other indicators of political rights, such as the indicators for political stability, economic stability and business transparency, tend not to be positively or highly correlated with country-level indicators of economic and political freedoms, which may suggest that these variables are measured with significant error. Moreover, these variables are only indirect proxies for property rights, and are based upon firms' preferences at the time of their initial investment. Given the potential importance of property rights, and of corruption in particular, as measured by extra legal payments or the efficiency with which courts deal with issues of property enforcement for example, future African firm-level surveys should pay more attention to the measurement of such rights, which would then allow a more accurate assessment of the impact of such factors on investment and other aspects of firm behaviour in SSA.

Despite reservations about the indicators of property rights, the results above have a number of interesting implications for investment and investment policy in SSA. To the extent that governments in SSA are interested in encouraging investment at the firm-level, the above results suggest a number of potential policy responses. Firstly, the results indicate that larger firms and firms that engage in international trade are both more likely to invest and in general invest more than smaller and non-internationally trading firms. Policies aimed at encouraging and helping firms to trade, such as export processing zones, export credit schemes and so on, may therefore be useful in encouraging investment by firms. Related to this, the results suggest that foreign-

owned firms invest more heavily than their domestic counterparts, so policies aimed at encouraging inward FDI could be expected to impact upon investment rates, as well as potentially affecting the economy through other spillover effects. UNIDO (2011) discusses factors influencing the quality of inward FDI in SSA and the importance of investment promotion agencies in encouraging inward FDI flows. Capital grants were also found to increase the propensity to invest, implying that this direct form of intervention could be a useful means of encouraging investment. The extent to which such grants can be supported in the majority of fiscally constrained SSA countries would need to be considered however. Improved transparency of business and legal regulations is another factor that could influence the propensity to invest. Finally, facilitating external finance for investment projects would seem to be a crucial aspect for the value of firms' investment. Here financial sector reforms and deregulation of the banking industry may be a useful step, as could the encouragement of foreign bank entry. In an African context, results for Nigeria (Zhao and Murinde, 2011) suggest that bank deregulation can reduce excessive risk taking and encourage increased efficiency, while Mwenda and Mutoti (2011) find that banking efficiency was a significant determinant of economic growth in Zambia. Hassan et al (2012) find in the case of MENA countries that foreign bank entry can increase the efficiency of the banking sector and lead to a better allocation of capital.

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