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Spillovers from agglomerations and inward FDI
A Multilevel Analysis on Sub Saharan African firms

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Abstract

This paper adopts multilevel analysis to study the agglomeration-performance nexus for domestic firms in Sub-Saharan Africa. We show that contextual factors can explain up to 30% of the variance in firms' productivity, more than half of which depends on the geographic location. Our results show also that African firms' productivity is positively correlated to the size of the agglomeration when they locate in larger cities specialized in different sectors, while the relation turns negative when they face direct competition from firms in the same industry. These effects are similar in the services and the manufacturing industries, even if in the latter positive spillovers are found to be conditional to the presence of backward and forward linkages with nearby firms. Finally, we are able to show that these effects are also confirmed when domestic firms locate close to foreign multinationals, especially those coming from the South.

Keywords: Agglomeration economies; Firms' heterogeneity; Sub-Saharan Africa; FDI spillovers
JEL Classification: D22; F23; O14.

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Introduction

Economic activities tend to be unevenly concentrated across space, this being an underlying feature in the process of economic development of nations (World Bank, 2009; Fujita and Thisse, 2013). Compared to advanced economies, in fact, developing countries share some features, such as unbalanced government spending, variance in the economic structure and, generally, high transaction costs, that make geographic polarization more likely to occur (Farole, 2013).

In some circumstances, clustering of economic activities can be viewed as a source of competitive advantage for economic agents, including in particular firms. Since the seminal contribution by Alfred Marshall (1920), a large strand of literature has demonstrated the advantages of clustering to local firms due to the existence of different forms of externalities, such as localization and urbanization economies. More recently, attention is being given to the role of large cities as engines of economic growth and as sources of external economies due to their productivity advantages (Combes et al., 2012; Duranton, 2015; Gill and Goh, 2010), factors that go together with the rising interest in urbanization in developing countries (World Bank, 2009).

This paper tests the existence of such external economies by analysing the agglomeration-productivity nexus for a large sample of domestic firms based in Sub-Saharan Africa (SSA). Our contribution to the existing literature goes in different directions.

First of all, this paper brings new evidence on the relation between agglomeration economies and domestic firms' performance in the context of less developed countries, which so far have received little attention due to the lack of data. Taking advantage of a new and rich database produced by UNIDO, the African Investor Survey (UNIDO, 2012), we can extend the analysis of the agglomeration effects on a rich sample of domestic firms from 19 SSA countries.

Second, the richness of the data allows us to expand on the existing literature, which has mainly focussed on the performance of manufacturing firms within agglomerations (Ellison et al., 2010), by including also firms in service sectors, which are very likely to benefit from the spatial concentration of economic activities (Gill and Goh, 2010).

Third, we are also able to distinguish an additional source of agglomeration economies, i.e. the agglomeration with Multinational Enterprises (MNEs), and therefore to test empirically the extent of their spillover effects on domestic firms. This contributes to the large strand of literature on the externalities from FDI in developing countries (Görg and Greenaway, 2004; Crespo and Fontoura, 2007). Further to this, we are able to analyse potential differences related to the origin of the foreign investors, i.e. by distinguishing whether there is any difference in agglomerating with Northern or Southern MNEs.

Finally, our contribution to the study of the nexus between agglomeration economies and productivity is also methodological. Following recent developments in urban economics and organizational studies (van Oort et al.,

2012; Alcacer et al., 2013), we adopt multilevel analysis to better account for firms' heterogeneity and to model the influence of the context in which firms operate on their performance.

Our findings provide empirical support to two major hypotheses. The first is that the context in which firms are embedded, including their geographic area and the sectorial specialization, has an important influence on a firm's performance. We show that, taken together, such contextual factors can explain up to 30% of the variance in productivity, more than half of which depends on the geographic location. The second hypothesis is that agglomeration economies can result in a mix of positive and negative externalities to African domestic firms. We find robust evidence that firms' performance is positively related to the existence of agglomerations, especially those with a larger variety of economic activities. Conversely, we provide evidence of a negative relation for firms located close to their main competitors, especially in more concentrated industries. Such results are confirmed when the analysis is run on firms belonging to the service and to the manufacturing sectors separately. In the case of manufacturing firms, however, we find that positive spillovers from agglomeration are more likely to materialize in presence of linkages (backward and forward) with other firms. We confirm therefore the view that linkages act as mediating factors, in line with what has been recently suggested in the literature (Morrisey, 2012).

Our results also suggest that agglomeration with foreign companies is generally correlated with domestic firms' performance. Interestingly, the competitive effects are magnified in the case of agglomeration with Southern MNEs. Given that Southern MNEs are likely to provide goods and services that are more accessible to other developing countries (Lipsey and Sjöholm, 2011), this contributes to put them in direct competition with domestic firms producing in the same sector.

The rest of the paper is organized as follows. Section 2 reviews the literature on agglomeration economies and their impact on local firms. Section 3 introduces the data, together with some descriptive statistics, and presents the methodology adopted, based on the multilevel analysis. Section 4 discusses the results and Section 5 concludes, drawing some policy implications.

2. Agglomerations and spillovers

The process through which firms tend to concentrate geographically, giving rise to agglomeration economies and externalities, has received substantial attention in the economic literature given its potential implications for local development, industrial policies and firms' performance (Fujita and Thisse, 2013).

The early contribution by Alfred Marshall (1920) emphasized that concentrations of firms in a similar industry give rise to so-called localization economies[1] that are likely to accrue due to the reduced costs of transportation or

[1] A substantive evidence has been produced in support of this view, showing that collective efficiency and better performance are more likely to be achieved when such agglomerations are organized in some structured form involving cooperation among sectorally specialized firms and related institutions, such as in the Italian experience with industrial districts (Becattini, 1990).

to the availability of a pool of specialized workers, buyers and suppliers, in turn translating into lower transaction costs. In addition, proximity is likely to foster the circulation of knowledge spillovers, as also suggested by Romer (1990), including new ideas, technologies and business practices. But localization economies are clearly a close proxy for competition, and therefore their overall impact on a firm's performance is ambiguous (Henderson, 2003) since it depends on the nature of the sector and on the degree of market concentration (Porter, 1990).

Localization economies as originally described by Marshall are external to the firms, but internal to the industry in which they operate, and can be related to specialization. Conversely, urbanization economies are independent of the industry and affect all firms located within a given geographic area, based on the principle that it is the diversity of the industries and the actors that stimulates the circulation of knowledge across firms (Jacobs, 1969). In addition to the agglomeration economies described by Marshall, the location of firms within more diversified and denser areas creates greater scope for interacting with diverse actors, such as customers, knowledge-intensive services or related institutions (Anderson and Loof, 2009). Spatial agglomerations are also more likely to result in pecuniary externalities, for instance by sharing the costs of infrastructure or through forward and backward linkages (Fafchamps and Hamine, 2004).

Looking at the determinants of co-agglomeration choices of US manufacturers, Ellison et al. (2010) have shown that they are most likely to be motivated by the reduced costs of dealing with customers and clients, followed by the opportunity to match with a pool of workers with common skills, and, lastly, by the transfer of ideas. Based on a revised measure of co-agglomeration and on data on Vietnamese firms, Howard et al. (2012) show that technological and knowledge spillovers have a stronger role in a developing country context, especially in high-tech industries. In addition, both studies show also that the relevance of natural advantages of locations, driven by the comparative advantage of access to inputs, cannot be ignored when explaining agglomeration forces.

Whether localization or urbanization economies prevail has an important implication on the developmental potential of the geographic location where they are based, in most cases corresponding to urban areas. Based on an extensive review of the existing evidence, Gill and Goh (2010) conclude that medium-sized cities help domestic firms to exploit localization economies, and this applies mainly to manufacturing industries, while urbanization economies are more likely to be found in larger cities, and in turn foster the proliferation of services. More generally, it has been found that industries based on standardized activities are more likely to take advantage from localization economies and tend to be localized in smaller areas compared to productions at the beginning of their life-cycle, who take advantage of larger agglomerations (Henderson, 2003). However, such redistribution has not yet taken place in developing countries, where larger cities tend to concentrate both mature and innovative productions, thus raising the risks of polarization (Duranton, 2015). Externalities from agglomerations often activate a cumulative process, making certain locations

more attractive because of their higher productivity. This can happen as a consequence of two main mechanisms. The first is firms' selection, due to higher market competition, which pushes less productive firms out of the market. The second is the agglomeration advantage, which allows surviving firms to enjoy a productivity advantage from co-location. Recent work by Combes et al. (2012) based on French firms demonstrates that – due to firm heterogeneity – the agglomeration advantages distribute unevenly across firms, with those more productive being able to reap stronger benefits.

An additional source of externalities from agglomeration comes from the location choice of foreign MNEs. There is a large amount of research emphasizing the potential spillovers of FDI through a range of different channels including the creation of forward and backward linkages; the existence of competitive and demonstration effects; the possibility for domestic firms to hire more experienced and skilled workforce; and, more generally, through the transfer of (pecuniary and non-pecuniary) externalities to local firms (Görg and Greenaway, 2004). Foreign companies bring in advanced production technology and management capabilities, which are potential sources of technological spillovers (Crespo and Fontoura, 2007; Narula and Driffield, 2012). It has been shown that spillover effects from MNEs, either intra- or inter-industry, are more likely to materialize when firms are geographically closer (Farole and Winkler, 2013).

3. Empirical Analysis, data and methodology

3.1 Empirical Framework

At a more general level, we are interested in understanding the determinants of firm's productivity in the context of African economies. Low levels of productivity represent a binding constraint to the growth potential of firms in the region. Causes of such low productivity range from the poor business environment, to low access to credit or to the structural characteristics of the firms, usually small and with limited international exposure (Clarke, 2012; Iacovone et al., 2014).

Recent attempts to estimate the determinants of firms' performance in Africa have mainly focussed on their heterogeneous characteristics (Van Biesebroeck, 2005), internationalization practices (Clarke, 2012; Foster-McGregor et al., 2014) or on the extent to which they are able to exploit local linkages (Görg and Seric, 2015). In line with these studies and with the literature on heterogeneous firms (Melitz, 2003), our benchmark model is based on the following general functional relation linking a firm's performance (Y) to agglomeration forces (N), after controlling for a vector of firm-specific factors (Z):

$$Y_{i,j} = f\left(N_{j,c}; Z_i\right) \quad (1)$$

Where *i* represents the domestic firm, *j* its industry and *c* the city.[2] We will base our analysis on an absolute measure of agglomeration, which can be generalized as follows:

$$N_{x,c}^{o} = \sum_{x} n \qquad (2)$$

Where the subscript *x* represents the generic industry of the agglomeration, while the superscript *o* refers to the origin of the other firms in the agglomeration (domestic or foreign). This choice is motivated by previous literature, which has adopted the total number of firms in the same region (Siba et al., 2012; Chhair and Newman, 2014) and in the same sector (Henderson, 2003; Fafchamps and Hamine, 2004) as proxies of externalities and competition, respectively. Looking at the number of firms, rather than at the total number of employees, seems a coherent decision in the context of SSA countries, characterized by a large number of Small and Medium Enterprises (SMEs) and by a prevalence of unskilled labour. In addition, as externalities are unobservable, it can be argued that it is the firm, whose strategic decisions give rise to some kind of spillover, that proxy them at best (Henderson, 2003; Siba et al., 2012)[3]. In the remaining of the analysis we will nonetheless adopt alternative measures, taking into account the number of employees as well, to correct for the differences in firms' size.

Based on the conceptual discussion made in section 2, we will test the effects of being part of an agglomeration on firms' performance exploiting the boundaries of *N*. In doing this, we will focus on the two main mechanisms through which agglomeration impacts on firms' performance. The first is competition, which is likely to be significant for firms producing similar types of goods ($x=j$). Competition has an ambiguous impact on firms' performance. On the one hand, competitive pressure in the same market can push firms to organise production more efficiently in order to compete (Porter, 1990). On the other, competition can give rise to negative externalities, potentially leading to reduction in margins and exit from the market. The second effect is the "pure" spillover. Spillovers may assume a variety of forms, including knowledge, technology, workers, and are likely to materialize either when the firms operate in similar ($x=j$) or in different sectors ($x \neq j$).

We expect spillover effects to have a stronger impact in our sample given that some studies have highlighted that there is a larger potential in developing countries, where firms operate still far from the technology frontier (Siba et al., 2012). However, as recently argued by Fafchamps and Söderbom (2014) in a study on the diffusion of business practices among African firms, we should also be aware that geographic proximity per se does not automatically translate into

[2] We refer to the city as our geographic unit, and not to the district or other smaller units, because of the lack of information on the full address for a large number of firms in the survey. In addition, for a number of the remaining cases, even in presence of the full address, we were not able to successfully geocode firms, due to a scarce coverage of existing specialized softwares for remote areas in SSA.

[3] An additional concern of using the total number of workers as a proxy for agglomeration is endogeneity, as an increase in productivity might induce firms to expand and hire more workers.

greater spillovers, and that other factors should be taken into account in the analysis.

Table 1 provides a description of the different measures of agglomeration that, based on (2), will be tested in the empirical analysis, detailing the expected impact on firms' performance.

Table 1. Main measures of agglomeration

Measure	Description	Expected effect
N_c	Total n. of firms located in the same city[a]	+
$N_{j,c}$	Total n. of firms in the same city and in the same industry*	+/-
$N_{p,c}$	Total n. of firms in the same city and producing the same product[a,b]	+/-
$N_{x,c}$	Total n. of firms in the same city and in a different industry	+
$N_{j,c}^{d}$	Total n. of domestic firms in the same city and in the same industry	+/-
$N_{x,c}^{d}$	Total n. of domestic firms in the same city and in a different industry	+
$N_{j,c}^{f}$	Total n. of MNEs in the same city and in the same industry	+/-
$N_{x,c}^{f}$	Total n. of MNEs in the same city and in a different industry	+

[a]The total number does not include the firm itself
[b]This measure at the product level can be only computed for manufacturing firms.

Most of the empirical work on the impact of agglomerations on firm performance focuses on the learning mechanism and emphasizes the role of spillovers. Existing evidence, mostly on developed countries, tend to support the view that agglomerations work as a shifter in firm's production function, this being in most cases independent on the sector (Henderson, 2003; Anderson and Loof, 2009). Evidence from developing countries is nonetheless becoming more consistent, and is generally reporting similar results (Farole, 2013). Due to poor availability of data, work on agglomerations of firms in Africa has been limited to anecdotic evidence or few case studies, initially focussing on the role of industrial clusters (McCormick, 1999; Yoshimo, 2012)[4], but it is now growing thanks to greater availability of firm-level information.

Relevant benchmarks for this study are some recent works looking at agglomeration externalities in the forms of competition and spillover on the productivity of developing country firms. Two works on firms from Cambodia (Chhair and Newman, 2014) and Vietnam (Howard et al., 2014), for instance, tend to support the view that firms within clusters enjoy a premium in terms of productivity *vis à vis* non-clustered firms, but also that this happens through a variety of different mechanisms and tend to be stronger for some firms.

[4] The most comprehensive work so far is a recent report by the World Bank (Yoshimo, 2012), which is based on the analysis of five country case studies and seems to find support for the existence of Marshallian economies. The analysis finds a positive correlation between location within selected industry-specific clusters and a range of indicators of firms' performance, pointing this advantage to be a consequence of a better accumulation of capital within the boundaries of the clusters.

Fafchamps and Hamine (2004) analyse firms from Morocco and find empirical support for the returns from localization externalities hypothesis, results being robust to the adoption of different measures of agglomeration. However, they show also that the net impact of competition can be negative. Siba et al. (2012) analysis based on Ethiopian firms shows instead that the competitive effects from the agglomeration of specialized producers translates into an increase of productivity, but a reduction of prices. In line with the previous study, they show also that the competitive effects of agglomerations on profit margins might overcome the advantages found in terms of technical efficiency, concluding that firms might not be well motivated to join clusters endogenously.

3.2 Empirical specification: the multilevel approach

Based on the discussion made in the previous section, we derive our baseline empirical specification:

$$Y_{i,j} = \beta_1 N^o_{x,c} + \beta_2 Size_i + \beta_3 Age_i + \beta_4 Fam_i + \beta_5 R\&D_i + \beta_6 Exp_i + \beta_7 Skill_i + \gamma_k + \delta_j + \varepsilon_{i,j} \quad (3)$$

Where our dependent variable is labour productivity, measured as the ratio of total sales over the number of employees. Using a revenue-based measure of productivity raises some important issues, as it captures both differences in productivity and in mark-ups across firms.[5]

The vector of variables Z in equation (1) includes a number of controls to account for firms' heterogeneity. These are standard variables such as the age (*Age*) and the size (*Size*) of the firm; both expected to be positively correlated with productivity (Melitz, 2003), and the family ownership (*Fam*), which usually has a negative impact on firms' performance. In addition, we account for the innovation effort (*R&D*) and the internationalization status (*Exp*), both of which have been previously identified as significant predictors of performance, including in the African context (Görg and Seric, 2015; Foster-McGregor et al., 2014). We also test whether the skill intensity of workers in a firm influences its level of productivity (*Skill*). Finally, the specification includes both country (γ_k) and sector (δ_j) fixed effects. Variables' description and their summary statistics are reported in Table A1 in the appendix.

A well-known issue when estimating (3) by means of a standard OLS is potential endogeneity. This is due to the self-selection of more productive firms into larger and better performing agglomerations. An additional (and related) issue, still partially unexplored in the literature on the agglomeration-performance nexus, is that most analyses do not properly take into account the typically complex structure of the data, which tries to observe the effect of the context (the macro dimension) in which firms operate on the individual firms' performance (the micro dimension).

[5] The drawback of using such aggregate measures is that they do not allow to determine if the competitive effect from agglomeration hits the technical efficiency or pushes prices downward.

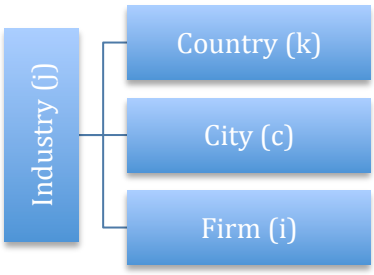
Recent advances in urban economics and organizational studies have documented the advantages of adopting multilevel analysis to best take into account firms' heterogeneity and to model the influence of the context on firms' performance (van Oort et al., 2012; Alcacer et al., 2013).

Multilevel analysis models the micro and the macro dimensions of the data simultaneously. While clustering the error term assumes homogeneous correlation structures for all the groups and fixed effects estimators allows for unique variability within groups, a multilevel approach controls for the larger complexity given by the hierarchical structure in the data. This, in turn, translates in the adoption of a maximum likelihood estimator leading to more efficient estimates of the coefficients and their standard errors (Snijders and Bosker, 1999; Maas and Hox, 2004). Looking specifically at the features of our data, the adoption of multilevel analysis has at least two main advantages. The first is that it is possible to model the impact of the context on outcomes. In our specific case, this allows to understand why firms within agglomerations are more likely to perform similarly. It will also allow to identify how much of the variance in firms' productivity can be explained by between-firm or between-agglomeration variance. Second, they account more properly for unobserved heterogeneity thanks to the inclusion of random (together with fixed) coefficients (Alcacer et al., 2013).

Methodologically, the rationale for adopting a multilevel model is due to the unrealistic assumption that in a generic form like (3) the deviation $\varepsilon_{i,j}$ from $Y_{i,j}$ is uncorrelated within subjects (Rabe-Hesketh and Skrondal, 2012). Multilevel models address such dependency by splitting the residual into two uncorrelated components, including a permanent component ζ_i, which measures the random deviation of subject i's mean from β, and an idiosyncratic component, which is specific to each subject across all the dimensions j. But multilevel models can accommodate more complex structures too, including with more than two levels (by adding up a random coefficient for each level) as well as cases in which subjects are nested in non-hierarchical structures, i.e. they are cross-classified by two or more factors (Rabe-Hesketh and Skrondal, 2012).

In light of this, and given the peculiar nature of our data, we model them according to a structure in which the firms are nested into a hierarchical structure including at the top the country of origin and the city, both likely to affect the performance, especially when they correspond with the spatial boundaries of agglomerations (Figure 1). We also add an additional non-hierarchical dimension, the industry, which is not nested in the structure, but across it, given that the measures of agglomerations are sector specific and that firms belonging to a given industry can be nested within the same country/city.

Figure 1. Structure of the data



Our final specification is the following:

$$Y_{i,j,c,k} = \underbrace{\beta_1 N^o_{x,c} + \beta_2 Size_i + \beta_3 Age_i + \beta_4 Fam_i + \beta_5 R\&D_i + \beta_6 Exp_i + \beta_7 Skill_i + \delta_j}_{Fixed-part} + \underbrace{\zeta_{i,j(c,k)} + \zeta_{i,c} + \zeta_{i,k} + \varepsilon_{i,j,c,k}}_{Random-part} \quad (4)$$

Where the first part of the equation reports the fixed part of the model with the predictors. We still include industry dummies (δ_j) in the model to control for unobservables, such as a potential size effect of larger industries on firms' productivity. The second part of the equation reports the random coefficients, both *iid* distributed with mean zero and constant variance.

An important feature of multilevel models is that – even in the absence of explanatory variables at higher levels of aggregation – they still perform better than a standard model, which violates the assumption of independence of all observations when data are nested (Rabe-Hesketh and Skrondal, 2012). It is possible to estimate such dependence by specifying an empty model from which the variances of the lower and of the higher-level error terms are then retrieved. The Variance Partition Coefficient (VPC) is then computed according to the following formula (for example for the city):

$$VPC = \frac{\sigma^2_{i,c}}{(\sigma^2_{i,j(c,k)} + \sigma^2_{i,c} + \sigma^2_{i,k})} \quad (5)$$

Where the numerator includes the level-specific variance, and the denominator is the total one. Given the above, table 2 reports the results obtained by running an empty model to retrieve the VPCs for the four levels considered. These results show that – other things equal – the heterogeneity in characteristics of the firms explain the largest part (around 69%) of their performance. Strikingly, such results tell also that there is a large share of the variance of firms' productivity that is affected by the context in which they operate, calling for a stronger focus on their behaviour. Between industries variance accounts for 14%, while the location of the firm contributes together (accounting for both the country and the city) to explain 17.4% of the variation in firms' performance.

Table 2. VPCs at the different levels and their contribution to total variance

Source	Share
Between firm variance	68.7%
Between industry variance	13.9%
Between city variance	6.7%
Between country variance	10.7%
Total	100%

3.3 Data and descriptive statistics

We use original firm-level data collected through the UNIDO Africa Investor Survey 2010 across 19 Sub-Saharan Africa countries[6]. We use both the Foreign- and Domestic Investor Survey data, which contain a rich set of information on a large sample of foreign- and domestic-owned firms. The collection of the dataset followed a rigorous survey methodology in terms of stratified sampling (on three dimensions: sector, size and ownership) and interview techniques (face-to-face interviews with top-level managers of foreign- and domestic-owned firms). The sample was constructed in order to be representative of public and private for profit firms with 10 or more employees[7].

The Africa Investor Survey provides specific information on agglomeration and inter-firm linkages in the host country. Specifically, the survey features detailed information on firms' location, industry and product classification as well forward and backward linkages, among others.

There is one disadvantage, however. Currently, the data are only available for a cross section in 2010. Hence, while we can use the data to unearth and describe some hitherto unknown relationships, we are careful to avoid interpreting these as causal effects. Nevertheless, we feel that the relationships are sufficiently interesting and, importantly, policy relevant to justify our analysis.

Moving to the construction of the agglomeration variables, some descriptive statistics show that the cities with the larger concentration of firms are the main capital cities in the countries, including in particular Kampala[8], Nairobi, Addis Ababa, Dakar (Figure A1 in the appendix). When it comes to the presence of foreign companies, Kampala keeps its leadership in absolute terms, followed by Accra. Interestingly enough, for some of these big cities (including, once again, Kampala, but also Nairobi, Antananarivo and Douala) the foreign presence is relevant also in relative terms, due to the small size of the formal domestic sector (Figure A2 in the appendix). Still, looking at the group of foreign investors, in many of the bigger cities the presence of Southern MNEs is already substantial (Figure A3 in the appendix). And, as documented by the cases of Kampala and Dar-es-Salam (Table A2 in the appendix) – the cities hosting the largest shares of

[6] Burkina Faso, Burundi, Cameroon, Cape Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda, Zambia.

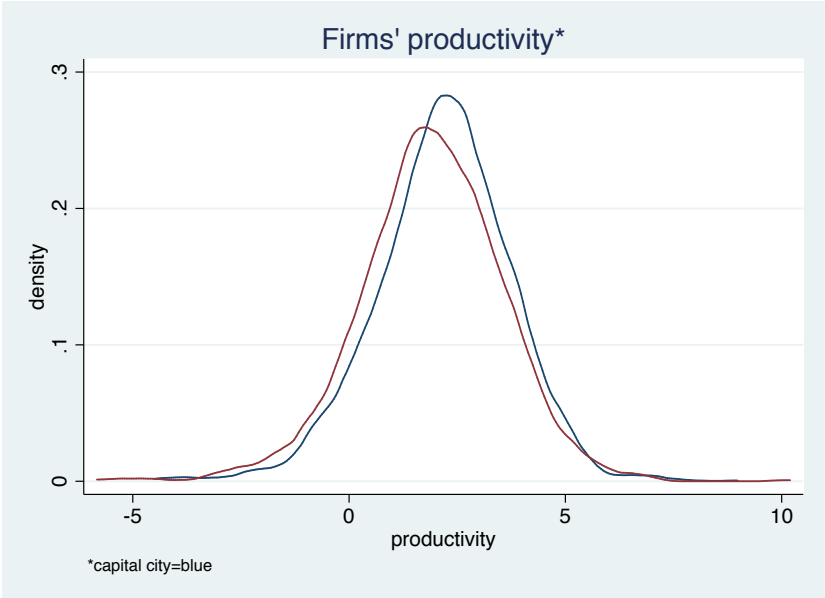
[7] An oversampling of relatively large firms (> 100 employees) has been adopted.

[8] The case of Kampala, surprisingly resulting the largest agglomeration in the sample, but not being the bigger city, is due to the higher response rates recorded in Uganda, as compared to the other countries in the sample (UNIDO, 2012).

southern investors – they do not only include the largest emerging economies like India and China, but also regional investors – especially from South Africa and Kenya, a common neighbour – seeking local opportunities in nearby countries.

Finally, it is useful for the remainder of our analysis to consider whether firms in larger cities enjoy some kind of productivity advantage, as suggested by existing literature (Combes et al., 2012; Duranton, 2015). In figure 2 we plot the density distribution of firm's productivity, simply distinguishing if they are located in capital cities or elsewhere. In our sample of SSA countries, capital cities are in most cases the most populated in the country, and the ones hosting the larger agglomerations (see also figure A1). The graph shows that the distribution of firms in the capital cities is shifted rightward and indicates that more productive firms are indeed located in larger cities.

Figure 2. Distribution of domestic firms' productivity by location



Source: Authors' elaboration

4. Results

4.1 Benchmark specification

Table 3 reports results of our main specifications on the impact of agglomerations on productivity. In the first two columns, results have been obtained through a standard OLS regression with robust standard errors[9]. The following columns report instead results based on the multilevel model, on which we will base our comments. Overall, the sign, magnitude and significance of the coefficients are quite robust to the different methodologies adopted, but – as expected – there is an improvement in the standard errors when moving to the multilevel model.

[9] Due to the different unit of measures of the independent variables, for a better comparison of the coefficients, the same results of columns I-II reporting the standaridized coefficients are presented in Table A3 in the appendix.

Table 3. Main Results

	(1) OLS	(2) OLS	(3) Multilevel	(4) Multilevel	(5) Multilevel	(6) Multilevel
Size	0.181***	0.182***	0.172***	0.173***	0.173***	0.174***
	(0.034)	(0.034)	(0.046)	(0.046)	(0.046)	(0.046)
Age	0.139***	0.134***	0.142***	0.141***	0.141***	0.143***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Exp	0.501***	0.496***	0.482***	0.482***	0.482***	0.480***
	(0.072)	(0.072)	(0.071)	(0.071)	(0.071)	(0.071)
Family	-0.232***	-0.227***	-0.231***	-0.230***	-0.228***	-0.230***
	(0.053)	(0.053)	(0.074)	(0.073)	(0.073)	(0.074)
skill	0.007***	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
R&D	0.031	0.037	0.029	0.031	0.028	0.024
	(0.064)	(0.064)	(0.065)	(0.064)	(0.065)	(0.064)
N_c	0.000**		0.001***			
	(0.000)		(0.000)			
$N_{j,c}$		-0.007**		-0.004		
		(0.003)		(0.004)		
$N_{x,c}$		0.001***		0.001**	-0.000	0.000
		(0.000)		(0.000)	(0.000)	(0.000)
Div_c					0.010**	
					(0.005)	
$C_{i,j}$						-0.252**
						(0.109)
Constant	1.810***	1.788***	1.048***	1.043***	0.931***	1.240***
	(0.248)	(0.247)	(0.233)	(0.229)	(0.239)	(0.251)
Observations	3,281	3,281	3,281	3,281	3,281	3,281
R-squared	0.274	0.276				
Country effects	Yes	Yes				
Industry effects	Yes	Yes	Yes	Yes	Yes	Yes

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

As far as the control variables are concerned, results are pretty much in line with a priori expectations. Larger firms are more productive than smaller ones, and the same is true for firms with longer experience. Another stylized fact from the literature, i.e. that family-owned firms experience low levels of productivity, is strongly supported by our data. Still, we confirm that the nexus internationalization-productivity holds true also in the context of SSA countries, showing that being an exporter guarantees a productivity premium to the firm. This is not surprising, as previous research using the same data has found similar results, and indeed the magnitude of the coefficient is in line with such work (Foster-McGregor et al., 2014). Also the coefficient measuring the skill ratio, a proxy for human capital endowments, reports the expected sign, again in line with previous research. Lastly, we don't find robust results on the nexus between productivity and innovation, contrary to existing literature pointing to a consistent positive relation between the two variables (Grossman and Helpman, 1991). The coefficient of the variable representing the R&D effort, though positive, is not significant in any specification, consistently with what has been found in other research using the same data (Görg and Seric, 2015). Looking back at the data, this can be due to the fact that – even if a good number of firms report positive expenditures on R&D – expenditure levels are extremely low (on

average $ 90,000) and homogeneously distributed among the firms, so that no significant differences emerge from the analysis.

Moving now to our variables of interest, results seem to support the view that the context explains differences in productivity between firms (see Table 3) and that being located into a large agglomeration can translate into positive externalities. As indicated by the description of the data, larger agglomerations are most likely to be settled in larger and more productive cities, which in our sample often correspond to the administrative capital. In light of this, we can try to read this first result as the confirmation of the more general view that firms benefit from the proximity to large markets (Krugman, 1991). This is also consistent with the evidence that firms and workers based in larger cities enjoy a productivity premium (Combes et al., 2012; Duranton, 2015). As discussed in section 3, however, such results need to be interpreted with caution due to the potential reverse causality of the agglomeration variables. This being said, this first result clearly deserves further investigation.

More interesting results come when we distinguish between competitive and spillover effects (column 4). Specifically, we find quite robust evidence that urbanization economies, i.e. the agglomeration with other firms belonging to different sectors, are responsible for the positive sign found in column (3). In order to understand whether this effect can be attributed to the scale of the agglomeration and/or if there is also a composition effect, we try to account for sectorial variety, by adding a new variable (Div_c) counting the number of two-digit industries for each city included in the sample.

As expected, diversification has a positive and significant coefficient, indicating that the larger the variety of economic activities performed within the boundaries of the city, the higher is the productivity of local firms. And, considering the fact that the coefficient representing the overall size of the agglomeration now loses its' significance, this seems to reinforce the view that urbanization economies have a stronger influence on firms' performance compared to the size effect.

Conversely, at a first sight, we find no significant evidence on localization economies and the competition effect, measured by the total number of firms in the same industry.[10] The sign of the latter coefficient is negative, which may reflect that in unsophisticated markets like in SSA countries, the competition effect works mostly in the direction of reducing margins rather than driving firms towards higher efficiency. As suggested by Duranton (2015), this can be even more the case in larger cities in developing countries, where competition is tough, there is a large degree of heterogeneity and reallocation of factors from less to more productive firms are less likely to happen, contrary to what ha been observed in advanced countries (Combes et al., 2012).

[10] This result is somewhat in contrast with previous findings on Ethiopian firms (Siba et al., 2012). Besides the differences in the samples analysed, one reason is that the authors are able to distinguish between a positive impact due to competition on production efficiency and a negative one, on prices.

In order to better understand the nature of the competitive effect, we estimate an additional specification that includes a measure of industry concentration at the city level:

$$C_{i,j,c} = \sum_{i,j,c}(\frac{L_{i,j,c}}{L_{j,c}})^2 \quad (6)$$

Where $C_{i,j,c}$ is measured as a Herfindal index, taking the value of 0 if all the firms in the sector share the same size (in terms of number of employees) and 1 if all of them are concentrated in just one firm. Contrary to the Schumpeterian view that industries with a monopolistic competition and market concentration are those with higher externalities, we show that, still, positive externalities might arise from competition, as in Siba et al. (2012). More specifically, we are able to add that this happens only in those industries where markets are closer to perfect competition.[11]

4.2 Does it matter where your neighbour comes from?

Having controlled for the overall relation between agglomerations and firms' performance according to the two main mechanisms analysed, in what follows we take advantage of the richness of our data and try to distinguish whether these relations are likely to be influenced by the presence of foreign MNEs. In less developed countries, agglomerations provide some incentives for MNEs to invest and can substitute for inefficient policies (Yehoue, 2005). In turn, as discussed in section 2, the externalities stemming from agglomeration with MNEs can be significantly higher, especially for firms far from the frontier, even if this is highly dependent on several factors including the motivations of the investors (Aitken and Harrison, 1999) or the absorptive capacities of domestic firms (Morrisey, 2012). A recent empirical analysis on SSA firms seems to support this view, since it shows that firms within agglomerations are more likely to maximize the spillover potential from FDI (Farole and Winkler, 2013).

In Table 4, therefore, we will report the estimation results of (4) distinguishing whether the sources of competition and spillovers arise from agglomerations made up by other domestic firms ($N^d_{x,c}$) or from foreign-owned companies ($N^f_{x,c}$).

[11] Based on the distribution of the variable $C_{i,j,c,}$ in our sample, a lower market concentration is generally found in less sophisticated industries such as food processing; publishing; construction and retail trade.

Table 4. Results disaggregated by domestic and foreign ownership

	(1)	(2)	(3)	(4)	(5)
Size	0.173***	0.172***	0.171***	0.172***	0.172***
	(0.046)	(0.045)	(0.045)	(0.046)	(0.045)
Age	0.141***	0.142***	0.140***	0.140***	0.142***
	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
Exp	0.481***	0.484***	0.481***	0.479***	0.485***
	(0.070)	(0.073)	(0.074)	(0.073)	(0.073)
Family	-0.229***	-0.232***	-0.231***	-0.234***	-0.232***
	(0.073)	(0.074)	(0.073)	(0.074)	(0.074)
skill	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
R&D	0.031	0.030	0.032	0.031	0.027
	(0.064)	(0.065)	(0.064)	(0.065)	(0.065)
$N^d_{j,c}$	-0.004		-0.005		
	(0.005)		(0.004)		
$N^d_{x,c}$	0.001*		-0.001		
	(0.001)		(0.002)		
$N^f_{j,c}$		-0.007	-0.005		
		(0.008)	(0.008)		
$N^f_{x,c}$		0.002***	0.003*		
		(0.001)	(0.002)		
$N^f_{j,c}$*(north)*				0.001	
				(0.009)	
$N^f_{x,c}$*(north)*				0.002***	
				(0.001)	
$N^f_{j,c}$*(south)*					-0.024***
					(0.008)
$N^f_{x,c}$*(south)*					0.003***
					(0.001)
Constant	1.045***	1.057***	1.085***	1.074***	1.052***
	(0.229)	(0.235)	(0.226)	(0.238)	(0.237)
Observations	3,281	3,281	3,281	3,281	3,281
Industry dummies	Yes	Yes	Yes	Yes	Yes

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

Since the results of the control variables remain robust, we focus on the subset of variables of interest. Surprisingly, at a first glance, we do not find big differences in the signs and the significance of the coefficients compared to the results of the general model in Table 3. Once again, the size of the agglomeration is positively correlated to the productivity of domestic firms, independently on whether the other firms are domestically or foreign owned. Similarly, the coefficient representing the competitive effect of agglomeration continues to be non-significant for both the groups of firms, but keeps suggesting that the likely relation is in any case negative. This said, it is nonetheless useful to observe that the magnitude of the two coefficients is higher in the case of foreign-owned companies. As might be expected, the marginal effect of adding one more unit to the agglomeration is correlated to domestic firms' performance differently according to the origin of the new firm. More specifically, the entry in a city of an additional MNE in a different (or in the same) industry is correlated with an increase (decrease) in productivity of 0.2% (0.7%), while the same effect related to the entrance of an additional domestic firm is 0.1% (0.4%).

This last result does not come at a surprise when looking at the positive spillover, given that the stock of knowledge flows and other skills brought in by foreign firms are realistically meant to be higher in view of their unique set of competitive advantages (Crespo and Fontoura, 2007).[12]

What is a bit more surprising to see is that – though not significant – the extent of the competition effect looks stronger when compared to agglomerations with other domestic firms. Indeed, following what has just been said, one would have expected that, due to the higher technology gap, the extent to which domestic firms compete with foreign multinationals should be marginal, at least compared to direct competition with other domestic firms. Also the results of the survey seem to suggest something along these lines. When domestic firms were asked to report on the main source of competition, 67.6% of them affirmed that this is another local company, while only a 16.5% has indicated a foreign company (the remaining mentioned imports).

This said, it should be noted that MNEs investing in SSA countries in recent years have increasingly become a more heterogeneous group. This reflects the rising share of South-South FDI, with MNEs from emerging markets like China, India, South Africa or other East Asian countries entering the continent with a variety of motivations and new approaches. It has been argued that, compared to North-South FDI, South-South FDI potentially brings more positive effects to host economies (Amighini and Sanfilippo, 2014). This is due, for instance, to the fact that lower institutional distance fosters business integration, as shown by a recent work looking at the determinants of backward linkages between MNEs and domestic firms in SSA (Perez-Vilar and Seric, 2014). Southern MNEs are likely to provide goods and services that are more accessible to other developing countries (Lipsey and Sjöholm, 2011), and this is perhaps a feature that can put them in direct competition with domestic firms.

In light of the above discussion, we exploit the richness of our database and further disaggregate results of column (2) to check the effect of agglomeration with Northern (column 4) and Southern MNEs (column 5), respectively. On the whole, our results seem to suggest that the presence of Southern MNEs is detrimental to domestic firms' performance, considering the high magnitude of the competition effect as compared to the slightly positive one of the total agglomeration. Still, however, this interpretation needs to be taken with caution considering the characteristics of the data. As a matter of fact, this could be also interpreted as the tendency of Southern MNEs to invest in cities where domestic competitors have lower productivity, so to better exploit their competitive advantages.

On the other hand, we do not find evidence of a competitive effect from advanced countries' MNEs. In this case, in fact, this could either mean that domestic firms

[12] On the other hand, the positive and statistically significant relation between agglomeration with foreign MNEs and domestic firms' performance could be explained by the localization choices of the former, more likely to be attracted by more productive cities and industries.

do not compete in the same segments than western MNEs, as well as that the latter are most attracted by higher productive locations.

4.3 A sector-based analysis

As a final step of our empirical analysis, we are also interested in understanding whether the impact observed in the previous sections can be generalized, or if domestic firms are affected differently according to their main sector. In fact, most of the literature on agglomeration economies has focused so far on the manufacturing sector only, leaving aside the services, despite they are even more spatially concentrated than manufacturing[13] (Gill and Goh, 2010).

Table 5 reports the results for firms in the manufacturing sector only. Overall, they are somewhat in line with the previous, but statistically weaker, since most of the variables measuring agglomerations lose their significance. This notwithstanding, we are still able to add some relevant insights on this group of firms too. The first is that for manufacturing firms we are able to compute a further, and more disaggregated, level of agglomeration that is constructed as the number of firms producing the same product ($N_{p,c}$)[14]. This additional information allows to provide a better specification for the competitive effect, compared to one including all firms operating within the same 2-digit industry. As a matter of fact, when we introduce this new variable in the model, we find evidence of a strong and significant negative effect on productivity. This means that competition among firms specialized in the production of the same product lines can be seen as a driver of low performance, suggesting that price competition and the reduction of margins might prevail over the expected increase in efficiency when firms find themselves to share a very specific market with a large number of competitors.

[13] This, according to Gill and Goh (2010: 246) is due to two main reasons. The first is that service firms need less land per employees. The second is that, by nature, service firms need to locate close to other firms, both producers and other complementary services, which are often among their major customers.

[14] This is possible because most of the manufacturing firms have carefully described their main product in response to a specific question of the survey. For each product indicated, we have then attributed a common label, referring to the 6-digit classification of the Harmonised System to make them comparable over firms.

Table 5. Results for the manufacturing sector

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size	0.344***	0.330***	0.329***	0.344***	0.344***	0.329***	0.342***	0.328***
	(0.052)	(0.059)	(0.058)	(0.052)	(0.052)	(0.049)	(0.051)	(0.049)
Age	0.101***	0.078**	0.078**	0.101***	0.103***	0.119***	0.102***	0.118***
	(0.029)	(0.030)	(0.031)	(0.030)	(0.029)	(0.032)	(0.029)	(0.032)
Exp	0.389***	0.521***	0.518***	0.388***	0.389***	0.340***	0.376***	0.333***
	(0.089)	(0.097)	(0.096)	(0.089)	(0.088)	(0.101)	(0.092)	(0.103)
Family	-0.180*	-0.196**	-0.196**	-0.179*	-0.183**	-0.191**	-0.184*	-0.194**
	(0.093)	(0.079)	(0.078)	(0.093)	(0.093)	(0.084)	(0.094)	(0.085)
skill	0.007***	0.005**	0.005**	0.007***	0.007***	0.008***	0.007***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
R&D	-0.005	0.015	0.014	-0.006	-0.007	-0.011	-0.016	-0.011
	(0.066)	(0.078)	(0.078)	(0.066)	(0.066)	(0.077)	(0.066)	(0.076)
$N_{j,c}$	-0.003							
	(0.004)							
$N_{x,c}$	0.001	0.001*	0.001					
	(0.000)	(0.000)	(0.000)					
$N_{p,c}$		-0.023**	-0.023*					
		(0.012)	(0.012)					
$N_{(j-p),c}$			0.004					
			(0.005)					
$N^d_{j,c}$				-0.003				
				(0.005)				
$N^d_{x,c}$				0.001				
				(0.001)				
$N^f_{j,c}$					-0.005			
					(0.008)			
$N^f_{x,c}$					0.001			
					(0.001)			
N^d_c*backward						0.000*		0.000
						(0.000)		(0.000)
N^d_c*foward						-0.000**		-0.000**
						(0.000)		(0.000)
N^f_c*backward							0.000	-0.000
							(0.000)	(0.000)
N^f_c*forward							0.001**	0.000***
							(0.000)	(0.000)
Constant	0.529**	0.647**	0.698***	0.551**	0.562**	0.631***	0.643**	0.642***
	(0.245)	(0.288)	(0.264)	(0.240)	(0.267)	(0.243)	(0.254)	(0.240)
Obs	1,624	1,212	1,212	1,624	1,624	1,414	1,624	1,414
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

But this is not the only interesting finding for the group of manufacturing firms. Indeed, one can realistically assume that spillovers or other external economies arising from agglomerations with other companies, especially foreign, are more difficult to materialize in productive activities, given that labour mobility is limited as it is the flow of tacit knowledge (to not talk about the low absorptive capacities of domestic firms in SSA). This is especially true in the context of our survey, where about two thirds of domestic manufacturers are involved in low-technology activities.

In light of this, and along the lines of Morrisey (2012), we try to look at whether such spillovers are more likely to arise in presence of linkages between firms. This is due to the fact that linkages are most frequent in the manufacturing, and can eventually give rise to positive spillovers due to the improvements in standards and production or to the adoption of more sophisticated inputs (Morrisey, 2012). And a recent work based on the African Investor Survey has in fact suggested that linkages (with foreign companies) seem to be relevant vehicles of learning and, in fact, they are found to significantly improve manufacturing firms' performance (Görg and Seric, 2015). In light of the above discussion, we add a new control by interacting the variables representing agglomerations with a dummy equal to 1 if the domestic manufacturer has direct linkages with at least one other company based in the same area. More specifically, we distinguish between *backward linkages*, i.e. whether domestic firms supply inputs to other (domestic or foreign) firms, and forward linkages, i.e. whether domestic firms buy inputs from other (domestic or foreign) firms.

Results, reported in columns 6-8 of Table 5, seem to support the view of linkages as mediating factors to activate spillovers in the manufacturing sector (Morrisey, 2012). We find that firms' productivity is significantly – though weakly – correlated with agglomeration with other domestic firms conditional to the existence of backward linkages. No significant effects are recorded for backward linkages with foreign companies. These results do not come as a surprise if we refer to the original data. Backward linkages with foreign firms are less frequent than they are with domestic firms (on average, each local producer has around 53 domestic buyers and only 4.3 foreign). In addition, domestic firms can specialize in the supply of more standardized productions for foreign companies, while their supply is more strategic to other domestic firms. Again, if we look at the data from the questionnaire, in 62% of the cases the domestic buyers provides support deemed useful to "upgrade the efficiency of (the) production process" against the 17% of cases for foreign buyers.

Conversely, we find that the agglomeration with foreign firms is positively correlated with productivity in case of forward linkages, while the opposite happens for domestic firms. These results are quite tricky to be interpreted together. The opposite sign of the coefficient of forward linkages, in particular, seems to suggest that there is an intrinsic difference in the quality of the inputs sourced, and that buying intermediate or final inputs from MNEs taking advantage of their proximity favours the transfer of knowledge and the learning process. The latter result is in line with the findings by Görg and Seric (2013), who also showed that sourcing superior inputs from foreign companies allows domestic firms to produce in a more efficient way.

Moving now to the analysis of the service sector (Table A4 in the appendix), results seem to reflect more closely those reported in tables 3 and 4, except for the lack of significance of the coefficient representing firms' size. We find in particular that service firms tend to benefit from urbanization economies, especially when they locate close to foreign companies. This result is not surprising, considering that services are more likely to be concentrated in urban areas. In addition, we find that positive spillovers arise when service firms

agglomerate with other firms producing knowledge intensive services ($N_{kis,c}$). On the other hand, we show also that domestic service firms' performance is negatively correlated with the presence of southern multinationals. This negative relation can be due to an inherent advantage of EMNEs in the provision of services more targeted to the local needs, thanks to cultural and geographical proximity on the one hand, and the exploitation of scale economies on the other.

4.4 Robustness checks

In what follows, we test the stability of our previous results against the adoption of different indicators to measure both firms' performance and agglomeration forces.

As discussed in section 3.1, previous literature has often used the number of employees as a proxy for agglomeration, given that the mobility of workers across firms and the exchange of information between individuals, both formally and informally, could favour the transmission of spillovers (Fafchamps and Hamnie, 2004; Fujita and Thesse, 2013). In light of this, we run our main specifications replacing the set of agglomeration measures and using the total number of workers rather than the number of firms (Table A5, columns I-II, in the Appendix). Given the high degree of correlation between the two measures, it is not surprising to find out that the coefficients tend to report the same signs. Thus, we can confirm that the larger the agglomeration the higher a firm productivity and, again, that this is especially true when other economic activities are not concentrated in the same industry. The only noticeable difference with results in table 3 is that the coefficient of the competition effect (i.e. the number of employees in the same industry) is positive (though not statistically significant), this possibly being linked to the fact that competition is mostly determined by the number of competitors, rather than on the overall size of the industry.

Moving to our dependent variable, we try to adopt an alternative measure of firm efficiency. Specifically, we construct a simple estimation of total factor productivity using a constant return to scale Cobb–Douglas production function:

$$TFP_i = Y_i/(K_i^{\alpha} L_i^{1-\alpha}) \qquad (7)$$

Where Y, the output, is measured by sales on turnover, L is the total number of employees and K fixed assets, assuming a share of 2/3 for the former and 1/3 for the latter.

Also in this case, running our model with the same set of dependent variables do not affect the results, showing similar correlations between agglomeration forces and firms' total factor productivity as well (Table A5, columns III-IV).

5. Conclusions

The idea that the development of African economies depends also on the performance of the domestic private sector is an old one. So far, however, only few evidence has been produced to show which factors do contribute to enhance the performance of domestic firms. Still, such existing evidence looks mostly at internal factors to the firm, and little attention has been given to the context in which they operate. This paper contributes to the existing literature by discussing the implications of sectorial and geographic agglomerations on firms' performance. This is done by exploring a large source of information at the firm level, the Africa Investor Survey, combined with an innovative methodology, the multilevel analysis, which allows to better understand how the external context in which a firm is embedded contributes to explain its performance.

One major contribution of this paper is to show that, taken together, the geographic context and the industrial specialization contribute to explain around 30% of the variance in domestic firms' productivity, with the location (country and city) accounting for more than half of this value. In addition, our paper provides a number of findings related to the agglomeration-performance nexus. We show that domestic SSA firms can take advantage from the so-called urbanization economies, i.e. the location in bigger and more diversified agglomerations. On the other hand, our analysis shows some forms of competitive effect arising from industry concentration, which is negatively correlated with firms' productivity.

Our results suggest some important implications for improving private sector performance in the context of SSA. The first is that the location of a firm has an influence on its performance and that the distribution of economic activities across well-defined geographic boundaries can contribute to the diffusion of externalities. Our results are consistent with existing evidence on the role of large cities as hubs of economic development and productivity, given their potential to provide domestic firms with both economies of scale due to larger localized market and other positive externalities due to the presence of urbanization economies (Jacobs, 1969; Duranton, 2015). We find that this is especially true when the variety of economic activities is higher, as it can most likely to be associated with the exchange of information and pecuniary externalities. This is not a trivial argument in the case of many SSA countries, where the lack of economic diversification is often mentioned as one of the causes of economic backwardness.

However, as noted in previous research by Fafchamps and Söderbom (2014), proximity alone does not guarantee the transmission of spillovers. We find that this is especially true for local manufacturers, and show that such spillovers can be better absorbed in presence of direct linkages with other firms.

Competition represents the other side of the coin. Many scholars, supported by the experience of industrial districts in some developed countries, view competition as a key driver of firms' performance (Porter, 1990). The context of SSA is clearly different, and in fact we find contrasting results. More specifically, we show evidence that an increase in the number of firms in the same industry

(and/or producing the same product) is negatively correlated to productivity, and this is especially true when there are few bigger firms concentrating the market. Also, competition seems to be stronger when the presence of MNEs from other Southern countries is high, due to the fact that they share with domestic firms more similar production capacities.

Despite the evidence provided is strong enough to support our main arguments, this paper does not come without limitations, calling for additional research on the topic. Due to the cross sectional nature of the data, and the potential endogeneity of the agglomeration variables, we cannot exclude, for instance, that an additional explanation for the productivity-agglomeration nexus is that larger cities do attract more productive firms. This is especially true for Northern MNEs, who can find more opportunities to invest in larger and more diversified urban hubs. For the same reason, it can also be assumed that the negative relation between a larger presence of Southern MNEs and domestic firms' performance might be due by their decision to invest in lower productive contexts, just to exploit their competitive advantage. Further research, exploring more in details the direction of causality between agglomeration and firms performance is therefore needed, as soon as panel data information will become available.

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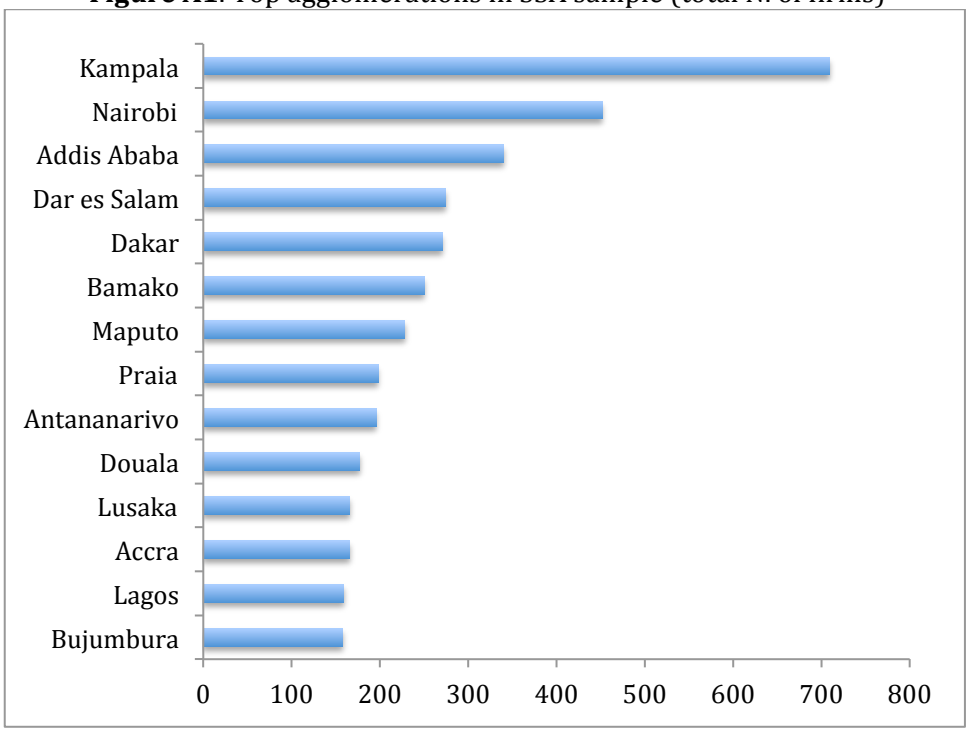
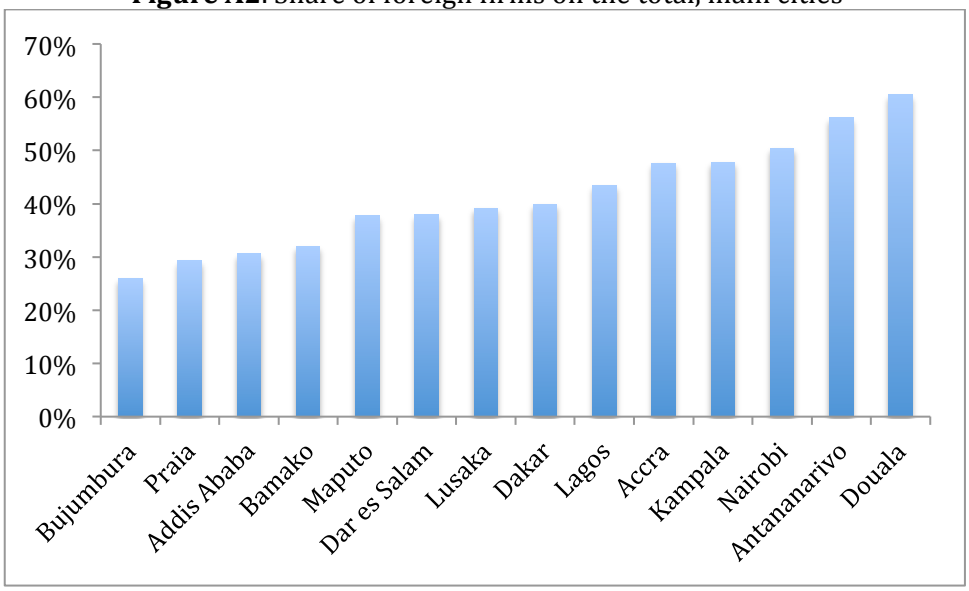
Appendix

Figure A1. Top agglomerations in SSA sample (total N. of firms)



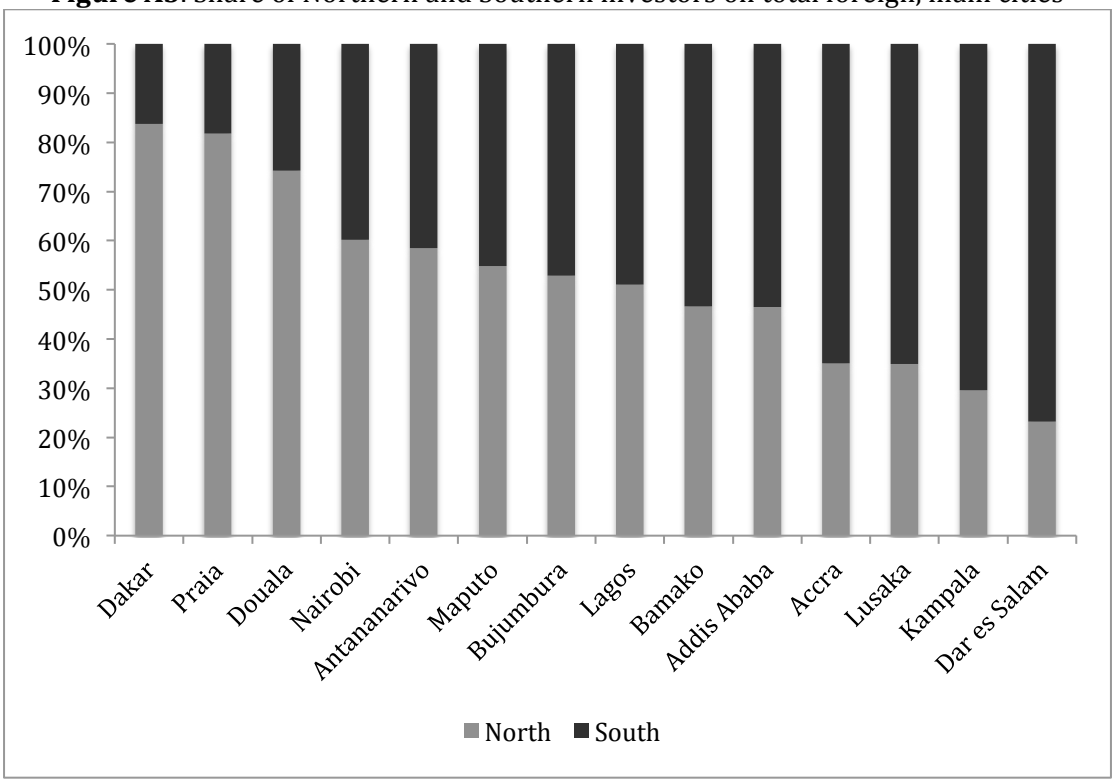
Source: Authors' elaboration on African Investor Survey.

Figure A2. Share of foreign firms on the total, main cities



Source: Authors' elaboration on African Investor Survey.

Figure A3. Share of Northern and Southern investors on total foreign, main cities



Source: Authors' elaboration on African Investor Survey.

Table A1. Descriptive statistics

Variable	Description	Obs	Mean	Std. Dev.	Min	Max
LP	Labor productivity, log	3612	2.07	1.60	-5.83	10.20
Size	Size classes (Small=1, Medium=2, Large=3)	3825	1.73	0.86	1	3
Age	Age, log	3826	2.64	0.78	0	5.09
Exp	Dummy, 1 if exporting	3426	0.18	0.38	0	1
Family	Dummy, 1 if family owned	3865	0.40	0.49	0	1
Skill	Share of skilled workers on total	3723	23.00	21.63	0	100
R&D	Dummy, 1 if R&D expenditures>0	3865	0.64	0.48	0	1
N_c	Firms in the same city	3865	215.19	200.00	0	709
$N_{j,c}$	Firms in the same city and industry	3865	11.48	13.40	0	60
$N_{x,c}$	Firms in the same city and different industry	3865	203.71	191.34	0	709

Table A2. Top 10 foreign investors by nationality, share on total foreign firms

KAMPALA		DAR-ER-SALAAM	
Origin	**Share**	**Origin**	**Share**
India	24%	India	24%
Kenya	23%	Kenya	14%
UK	11%	South Africa	14%
China	5%	China	8%
South Africa	5%	UK	7%
USA	4%	Pakistan	4%
Canada	2%	Japan	3%
Denmark	2%	Lebanon	3%
Netherlands	2%	Germany	2%
Germany	2%	Netherlands	2%

Source: Authors' elaboration on African Investor Survey.

Table A3. Results, standardized coefficients

	(1)	(2)
Size	0.099***	0.099***
	(0.034)	(0.034)
Age	0.068***	0.066***
	(0.034)	(0.034)
Exp	0.120***	0.119***
	(0.072)	(0.072)
Family	-0.072***	-0.071***
	(0.053)	(0.053)
skill	0.097***	0.096***
	(0.001)	(0.001)
R&D	0.009	0.012
	(0.064)	(0.064)
N_c	0.061**	
	(0.000)	
$N_{j,c}$		-0.062**
		(0.003)
$N_{x,c}$		0.109***
		(0.000)
Div_c		
$C_{i,j}$		
Observations	3,281	3,281
R-squared	0.274	0.276
Country effects	Yes	Yes
Industry effects	Yes	Yes

Note: Coefficients are the regression coefficients obtained by first standardizing all variables to have a mean of 0 and a standard deviation of 1.
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A4. Results for the service sector

	(1)	(2)	(3)	(4)	(5)	(6)
Size	0.016	0.016	0.018	0.014	0.016	0.013
	(0.061)	(0.060)	(0.061)	(0.060)	(0.059)	(0.060)
Age	0.184**	0.185**	0.186**	0.182**	0.188**	0.189**
	(0.078)	(0.077)	(0.078)	(0.077)	(0.077)	(0.076)
Exp	0.676***	0.677***	0.680***	0.673***	0.660***	0.672***
	(0.143)	(0.145)	(0.144)	(0.143)	(0.138)	(0.142)
Family	-0.250***	-0.251***	-0.249***	-0.251***	-0.259***	-0.249***
	(0.086)	(0.086)	(0.086)	(0.086)	(0.086)	(0.086)
skill	0.007***	0.007***	0.007***	0.007***	0.006***	0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
R&D	0.107	0.104	0.106	0.106	0.097	0.097
	(0.150)	(0.151)	(0.148)	(0.151)	(0.150)	(0.152)
$N_{j,c}$	-0.005	-0.005				
	(0.009)	(0.010)				
$N_{x,c}$	0.001*					
	(0.001)					
$N_{kis,c}$		0.002*				
		(0.001)				
$N^d_{j,c}$			0.000			
			(0.015)			
$N^d_{x,c}$			0.001			
			(0.001)			
$N^f_{j,c}$				-0.019		
				(0.014)		
$N^f_{x,c}$				0.002***		
				(0.001)		
$N^f_{j,c}$*(north)*					-0.011	
					(0.027)	
$N^f_{x,c}$*(north)*					0.004***	
					(0.001)	
$N^f_{j,c}$*(south)*						-0.037***
						(0.009)
$N^f_{x,c}$*(south)*						0.005***
						(0.001)
Constant	0.951***	0.960***	0.955***	0.953***	0.977***	0.983***
	(0.316)	(0.320)	(0.317)	(0.315)	(0.320)	(0.322)
Obs	1,530	1,530	1,530	1,530	1,530	1,530
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

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

Table A5. Results, robustness checks

	(I) lab_prod	(II) lab_prod	(III) tfp	(IV) tfp
Size	0.171***	0.174***	0.135***	0.135***
	(0.046)	(0.045)	(0.045)	(0.045)
Age	0.141***	0.142***	0.090**	0.089**
	(0.034)	(0.034)	(0.035)	(0.035)
Exp	0.481***	0.484***	0.336***	0.336***
	(0.072)	(0.072)	(0.066)	(0.065)
Family	-0.230***	-0.232***	-0.115**	-0.115**
	(0.074)	(0.074)	(0.051)	(0.051)
skill	0.007***	0.007***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
R&D	0.029	0.029	0.021	0.022
	(0.065)	(0.065)	(0.064)	(0.063)
$L_{x,c}$		0.005**		
		(0.002)		
$L_{j,c}$		-0.017		
		(0.012)		
L_c	0.004**			
	(0.001)			
N_c			0.000*	
			(0.000)	
$N_{j,c}$				-0.003
				(0.004)
$N_{x,c}$				0.001**
				(0.000)
Constant	1.061***	1.060***	6.011***	6.007***
	(0.234)	(0.231)	(0.273)	(0.268)
Obs.	3,281	3,281	3,257	3,257
Industry Effects	Yes	Yes	Yes	Yes

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

Note: The variables "L" represents the total number of employees, and are expressed in thousands.