WP/14/15

IMF Working Paper

The Quest for Non-Resource-Based FDI: Do Taxes Matter?

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INTERNATIONAL MONETARY FUND

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IMF Working Paper

Fiscal Affairs Department

The Quest for Non-Resource-Based FDI: Do Taxes Matter?

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January 2014

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Abstract

Using manufacturing and services firm-level data for 30 sub-Saharan African (SSA) countries, this paper shows that taxation is not a significant driver for the location of foreign firms in SSA, while other investment climate factors, such as infrastructure, human capital, and insitutions, are. By analyzing disaggregate FDI data, the paper establishes that, while there is considerable contrast in behavior between vertical FDI (foreign firms producing for export) and horizontal FDI (foreign firms producing for local markets), taxation is not a key determinant for either type of FDI. Horizontal FDI is attracted to areas with higher trade regulations, highlighting interest in protected markets. Furthermore, horizontal FDI is affected more by financing and human capital constraints, and less by infrastructure and institutional constraints, than is vertical FDI.

JEL Classification Numbers: F21, F23, O14, O55.

Keywords: Investment climate, taxation, Non-resource-based FDI, horizontal FDI, vertical FDI, firm-level data, sub-Saharan Africa.

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[1] Without implications in remaining errors or omissions, comments by Julio Escolano, Martine Guerguil, Michael Keen, and Montfort Mlachila were instrumental in improving the paper.

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I. INTRODUCTION

With limited and hardly predictable public flows to lower-income countries, understanding the main drivers of private capital flows, particularly foreign direct investment (FDI), is critical. Indeed, FDI is also recognized to have beneficial effects on local firms and the economy at large by facilitating technological and managerial knowledge transfers, developing international import and export networks, and creating job opportunities (Javorcik, 2004; Liu, 2008; Kinda, 2012).

Tax incentives have been used in many countries in their strategies for attracting FDI. One method has been to grant corporate income tax (CIT) holidays for a number of years to firms that locate in designated regions. Each of these countries has been trying to achieve a variety of objectives by granting tax incentives. These objectives include creating jobs, promoting specific sectors of activity, addressing regional development disparities, or stimulating investment. Some developing countries tend to use tax incentives to address non-tax-related economic considerations that could have a bearing on foreign investors' decisions to locate to certain countries. Since the first best option for addressing limitations in the tax system, such as a relatively high CIT rate, is to lower the rate, non-tax-related limitations should be addressed through appropriate macroeconomic or structural policies. For instance, making adequate investments would be the first best option for addressing a poor infrastructure that increases the cost of doing business.

Evidence regarding the impact of taxes on FDI in developing economies is limited and inconclusive. Most of the studies largely focus on advanced and emerging economies due to lack of data. This paper contributes to the literature by using firm-level data to provide the first empirical analysis assessing how taxation matters compared to other investment climate factors in attracting FDI beyond natural resource sectors in Africa. The paper also assesses how different ownership structures could affect the responsiveness of FDI to taxes and other investment climate variables. It also distinguishes horizontal FDI—the establishment of foreign firms producing for local markets—from vertical ones—the local establishment of exporting foreign firms—to analyze the relative impact of taxes and business environment on each specific type of FDI.

The results show that taxes, as perceived by firms, are not significant drivers of foreign firms' decision to locate to SSA countries, while other factors of the business environment, such as infrastructure, human capital, and institutions, are. A domestically developed financial sector is important for attracting foreign firms in general, but this is less often the case when foreign companies own 50 percent or more of those firms. This could suggest that firms that have the majority of their capital owned by foreign companies have better access to foreign financing (through their parent companies, for instance) and therefore, do not rely as heavily on domestic financing as firms that are mostly domestically owned. Differentiating horizontal from vertical FDI confirms that taxation is not a critical factor for location, and highlights interesting heterogeneity for other business environment factors. Horizontal FDI is more influenced by financing and human capital constraints and less affected by infrastructure and institutional constraints than is vertical FDI. Horizontal FDI is also attracted to areas with higher trade regulations, underlying interest in protected markets. The analysis makes it possible to focus on the specific reforms that could have the greatest

impact on attracting specific types of FDI without undermining budget revenues and introducing distortive tax facilities.

The rest of the paper is structured as follows: Section II discusses the relationship between tax incentives and FDI. Section III reviews other investment climate factors that usually affect FDI, focusing on studies using firm-level data. Section IV presents the data and descriptive statistics. Section V describes the empirical strategy, Section VI analyzes the aggregate FDI model, and Section VII examines vertical and horizontal FDI. The last section concludes.

II. TAX INCENTIVES AND FDI

Tax facilities tend to distort the investment playing field and do not necessarily tackle the roots of the attractiveness issues in many developing countries. Tax incentives are often granted to foreign firms with the belief that future revenues and other positive spillovers from FDI may outweigh the present revenue forgone. Granting tax exemptions become especially costly in the long run because the perceived need for them tends to be self-perpetuating.

While the empirical evidence usually highlights the negative impact of taxes on FDI in advanced economies (Mooij and Ederveen, 2008), the limited and inconclusive research on developing economies suggests that tax incentives are generally not cost effective (Zee, Stotsky, and Ley, 2002), and are less critical for FDI (Chai and Goyal, 2008).2 Klemm and van Parys (2012) show that tax measures have encouraged FDI in lower-income countries, and van Parys and James (2010) also find that taxation has some positive impact in the Caribbean. Keen and Mansour (2009) find a positive correlation between CIT rate reductions and FDI in sub-Saharan Africa, but differences across country groups have played a major role. Considering only non-resource-rich countries, the authors do not provide evidence that the major reduction in average CIT, from about 45 percent in 1980, to 34 percent in 2005, has affected FDI. Business surveys also highlight that while taxation matters for foreign investors, a business-friendly investment climate that includes adequate investment, a rule of law, availability of a qualified labor force, and financing opportunities, is even more important (World Bank, 2005).

III. OTHER INVESTMENT CLIMATE FACTORS AND FDI

This section briefly summarizes a few studies that use firm-level data to highlight the roles of infrastructure, financial development, institutions, and human capital in attracting FDI to developing countries, particularly to low-income ones.[3]

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[2] Mooij and Ederveen (2008) find that taxes have a negative impact on FDI in most of the empirical studies they surveyed in their meta-analysis.

[3] Most of the studies on FDI location using firm-level data in developed and emerging economies focus on variables such as factor cost differences, wages, trade costs, market size, or taxation. However, in developing countries, particularly in low-income ones, other factors such as infrastructure, financing, institutions, and human capital are more crucial.

Infrastructure availability is one of the key elements needed to run an efficient business. By improving market access, and thus increasing the real size of the available market (including through export facilitation), good infrastructure is vital for firms, particularly foreign firms attracted by large markets. A reliable provision for electricity is also crucial to attracting foreign firms. For instance, using the level of electricity generation per capita as a proxy for infrastructure, Urata and Kawai (2000) find that infrastructure is an important determinant of the establishment of Japanese small and medium enterprises (SMEs) in developing countries. Dollar et al. (2006) show that a better investment climate, which includes the existence of sound infrastructure, encourages FDI.

Financial development is also important for FDI. While foreign firms may have access to external financing, for them, the importance of domestic financial services is three-fold. Like local firms, foreign ones can use financial services for overdraft facilities, loans, or payments to suppliers of intermediate goods. Foreign firms can also use local financing as a hedge against exchange rate risks. More generally, financial development is an engine of economic growth, providing better business opportunities. Jensink and Thomas (2002) show that South Africa attracts more FDI than the other countries in the region because of its better-developed financial market. Using a sample of 77 developing countries, Kinda (2010) shows that foreign firms do not tend to locate in areas where firms have to rely more on informal financing.

Institutions play a critical role in attracting FDI to developing countries because they affect the spectrum of country risk. Secure property rights, sound contract enforcement, political stability, and lack of corruption allow markets to function properly, thereby attracting foreign firms. Good governance could also positively impact the quality of tax administration and does not impede business activity. Urata and Kawai (2000) show that better institutions (measured by the weighted average of five indicators) increase the probability for a developing country to host a Japanese foreign firm, whereas the result is not significant for developed countries.[4] Using the data for 6,288 affiliates of U.S. multinational enterprises (MNEs) located in the different regions of China from 1993 to 2001, Du et al. (2008) also find that regions with better institutions attract more affiliates.

Human capital development is also an important driver of FDI. The availability of skilled workers is expected to affect developing countries' attractiveness to foreign capital positively. However, the impact of human capital on FDI could vary depending on foreign firms' activities. Indeed, MNEs could look for lower-skilled, cheaper labor than in their home countries.[5] Yeaple (2003) finds that U.S. MNEs that invest in skilled labor-abundant countries are skill-intensive industries, while non-skill-intensive U.S. MNEs invest more in countries with a lower-skilled labor force. Urata and Kawai (2000) indicate that skilled labor positively affects FDI in developed countries, but the effect is not significant for developing countries. This suggests that Japanese SMEs that invest in developing countries look for lower-skilled, lower-wage labor.

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[4] The five indicators are government repudiation of contracts, risk of expropriation, corruption, law and order tradition, and bureaucratic quality.

[5] This is the case for most of the call centers, which look for relatively cheap skilled labor forces.

IV. Data and Descriptive Statistics

The data are drawn from enterprise surveys conducted by the World Bank.[6] The surveys collect data on production variables, firms' characteristics, and quantitative and qualitative (perception-based) indicators of the investment climate. Firms' characteristic variables include information on the share of foreign ownership in firm capital, though information such as that concerning the volume of foreign investment is unavailable. The survey for each country was carried out between 2000 and 2006. This paper considers 30 sub-Saharan African countries and 7,615 firms, including 1,425 foreign firms.

While a large part of FDI to SSA is directed to natural resource exploitation, foreign investors are also present in a wide range of sectors of the economy (Table 1).[7] High value sectors such as nonmetallic and plastic materials, as well as chemicals and pharmaceuticals, demonstrate the highest participation of foreign investors. In these sectors, which require large amounts of investment during setup and operations, around one quarter of the firms is partly or fully owned by foreign investors. Foreign participation is also significant (above 15 percent) in other sectors such as textiles, construction, retail and wholesale trade, agroindustry, and garments.

Table 1. Share of Foreign Firms by Sector, Size, and Export Status (In Percent)

Sector of activity		Firm size: Three categories based on the number of employees			By export status	
	All firms	Small (<20)	Medium (20-99)	Large (>=100)	Nonexporter	Exporter
Non-metallic and plastic mat.	26.3	14.8	25.2	34.9	23.1	36.8
Chemicals and phar.	23.9	20.9	20.9	33.1	22.1	27.6
Textile	23.1	5.8	13.4	38.0	20.1	26.9
Construction	21.7	14.5	23.7	37.1	19.6	44.3
Retail and wholesale trade	21.4	19.2	35.7	30.0	20.8	55.0
Agroindustry	18.2	8.4	19.2	32.0	15.1	31.4
Garments	17.7	9.1	13.7	42.1	9.4	45.1
Metal and machinery	14.5	6.0	18.0	26.3	11.2	29.5
Services (excl. retail)	14.0	12.0	19.1	42.3	13.5	38.8
Leather	10.3	7.1	5.2	22.1	3.1	18.1
Wood and furniture	9.2	4.3	12.5	27.5	7.2	23.8

[6] Enterprise surveys are harmonized surveys of large and random samples of firms.

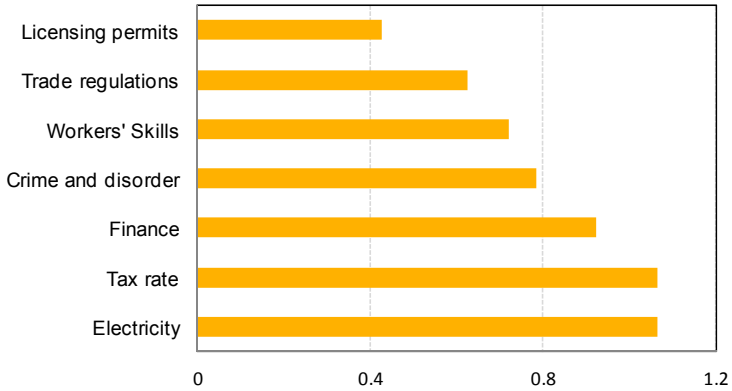
[7] The sectors included in this analysis are textiles, leather, garments, agroindustry (including food and beverage), metal and machinery (including automobiles), electronics, chemicals and pharmaceuticals, wood and furniture (including paper), nonmetallic and plastic materials, retail and wholesale trade, and services (excluding retail).

On average, foreign firms are larger and export more than local ones do.[8] This is consistent with the theory of vertical FDI, which states that firms break down their production processes in order to gain advantages from low production costs in different locations, and then export or re-export their productions.

We identify many constraints that foreign and local firms in SSA countries face when investing, operating, or expanding their businesses. Based on different firms' perceived criteria, electricity shortages, high tax rates, and financing constraints rank as the most important investment climate constraints for local and foreign firms (Figure 1). Social instability and the unavailability of skilled workers rank respectively as the fourth and fifth largest constraints.

Focusing on the main three investment climate constraints (infrastructure shortage, high taxation, and financing constraints) reveals that higher constraints tend to discourage FDI. We use more objective variables to approximate infrastructure and financial development variables.[9] Infrastructure constraints are approximated by telecommunication problems, captured by firms' difficulties in accessing e-mail and the Internet in their interactions with clients and suppliers. The share of informal sources of financing (money lenders, family, and friends) in firms' working capital (accounts receivable, inventory, and cash) captures financing constraints. Based on these more objective variables, Figures 2 and 3 demonstrate that foreign firms tend to avoid locating where telecommunication problems are higher, and where firms rely more on informal sources of financing. Figure 4 also shows that foreign firms have a slightly higher inclination to locate where taxes are low. The three main investment climate constraints seem to matter individually regarding foreign firms' location. Is this still the case when they are considered simultaneously?

Figure 1. Ranking of Investment Climate Constraints
(0: No Constraint to 4: Major Constraint)



[8] Exporter firms are defined as those exporting at least 10 percent of their sales. Higher thresholds are used for robustness checks.

[9] After controlling for country and sector fixed-effects, Gelb et al. (2007) show that firms' perceptions significantly correlate with the objective variables of enterprise surveys and the external measures of the investment climate *(Doing Business)*.

Figure 2. Telecom Problems and Presence of Foreign Firms

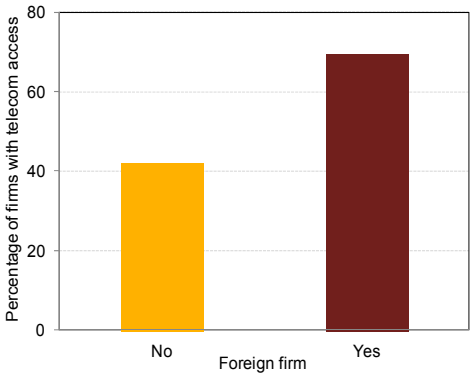


Figure 3. Informal Finance and Presence of Foreign Firms

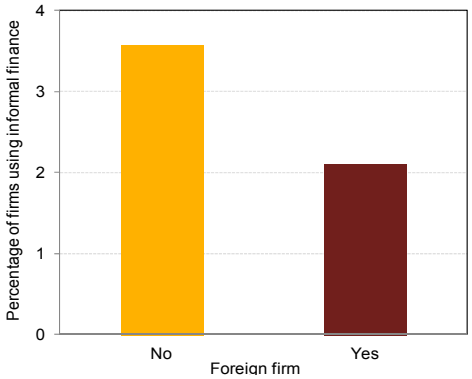
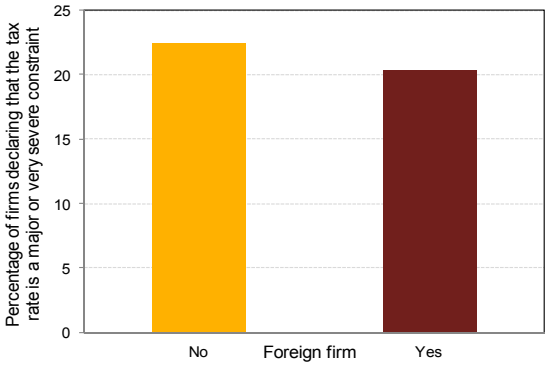


Figure 4. Tax Rate Constraint and Presence of Foreign Firms



V. EMPIRICAL STRATEGY

The classic approach in FDI location studies is based on the different possible locations for each MNE's affiliates. In this approach, the dependent variable takes the value of one if an MNE chooses a country as the location of its affiliate, and zero for alternative locations. Alternative locations are often restricted to a group of countries due to data availability or the purpose of the study. However, the exclusion of some alternative locations can lead to potential bias.

This study innovates by considering the entire sample of firms in one country and estimating the probability of each firm's being foreign, given the characteristics of the different regions in the country. The paper thus analyzes the stock of foreign firms in a location and relates this measure to the local investment climate, which is also a stock variable. Specifically, the paper investigates the effect of investment climate variables on the investment decisions of foreign firms. We expect that countries—and regions within a country—with better investment climates attract a greater number of foreign firms.

The empirical equation can be written as:

$$FDI_{ijk} = \beta_1 X_{ijk} + \beta_2 Z_{ijk} + \beta_3 V_i + \beta_4 U_j + \varepsilon_{ijk} \quad (1)$$

- FDI_{ijk}, the dependent variable, indicates whether firm k in country i and sector j is foreign owned or local. It takes the value of one if at least 10 percent of the firm's capital is foreign and zero otherwise.

- X_{ijk} is a matrix including the tax variable as well as other variables that captures structural constraints (physical and financial infrastructure constraints, lack of skilled labor, and low quality of institutions). The tax variable captures a firm's judgment of the tax rate as a constraint for doing business. In addition to the more objective variables (telecommunication problems and informal financing), physical and financial infrastructure constraints are also captured by a firm's own assessment of its constraints in transport, electricity, and access to finance. Firms' judgments also capture the institutional and human capital constraints they face.[10]

- Z_{ijk} is a matrix of other determinants of firm location (agglomeration effects, trade regulations, or factors such as the size or age of the affiliate in the host market).[11] Table A1 gives the names and definitions of all variables.

- V_i and U_j represent fixed effects for each country and sector, respectively. By including these fixed effects, we explain regional variations.

To address collinearity issues, the paper first uses aggregated indices to capture the different components of the investment climate, and then relies on a single variable per investment climate component. Enterprise surveys include many variables explaining a single aspect of the investment climate. For instance, variables related to financing constraints include access to finances as collateral requirements, and access to finances as the share of a firm's informally-sourced working capital. The simultaneous introduction of these variables in a single regression leads to a collinearity issue. One solution is the generation of aggregated indices or the use of a single variable per investment climate aspect. The paper first uses principal component analysis (PCA) and standardization methods to generate aggregated indices, and subsequently relies on a single variable per investment climate aspect.[12]

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[10] Each explanatory variable has been chosen for its economic relevance, but also according to its number of nonmissing values.

[11] Firms are classified into three categories depending on the number of permanent and temporary workers: small-sized firms (0–19 employees), medium-sized firms (20–99 employees), and large-sized firms (100 employees or more).

[12] The standardization method is similar to PCA but gives the same weight to all of the index's components. The physical infrastructure index includes firms' perceptions of transport and electricity problems, as well as telecommunication opportunities (captured by firms' access to the internet in their interaction with clients and suppliers). The financial development index includes firms' perceptions of their difficulties in accessing finances, and the share of firms' financing from informal sources (such as money lenders, family, and friends) in their working capital.

Utilizing firm-level data could also lead to endogeneity issues stemming from measurement errors and reverse causality. Indeed, more productive or efficient firms (the majority of foreign firms) could have a reduced sense of investment climate constraints compared to less productive ones (the majority of local firms) because they develop appropriate responses to said constraints. For instance, the most efficient firms could address unreliable source of electricity by acquiring high-cost power generating units. As a consequence, an identical investment climate could be differently assessed depending on a firm's performance, resources, and response to constraints.

To address the potential endogeneity issue, we define instruments that are the sector-region averages for each potentially endogenous variable. We also consider the sector-region average relating to whether or not firms' annual financial statements are reviewed by external auditors as additional instruments for financial infrastructure.[13] Aterido et al. (2007); Honorati and Mengistae (2007); and Chaffai, Kinda, and Plane (2012) have used similar instrumentation procedures. Since only 19 percent of the firms in the sample are foreign-owned, location averages are dominated by local firms, particularly small local firms, and are thus partly exogenous by definition (Dollar et al., 2005; Lall and Mengistae, 2005; Kinda, Plane, and Veganzones-Varoudakis, 2011; Kinda 2012).[14]

Including the agglomeration variable also helps to reduce potential endogeneity. The agglomeration variable is defined as the number of foreign firms by region in a specific sector, and captures the average attractiveness of each region. Including this variable helps to control for the direct effect of the regional investment climate on FDI. As a consequence, the impact on FDI of the location average of the investment climate variables should occur mainly through the firm-level information. This reduces the endogeneity stemming from the identifying exclusion restriction. The next section presents a set of instrument validity tests.

Estimation methods include instrumental variable fixed-effect logit (IV FE logit) and linear probability models. The IV FE logit estimations imply two-stage procedures leading to consistent parameters, but incorrect estimated variances. Through resampling based on the sample data, we approximate standard errors with the bootstrap method and obtain proper standard errors that are presented in the paper Particular attention is given to the linear probability model (Two-Stage Least Squares: 2SLS), which provides a good approximation of the logit specification and allows a better handling of the unobservable heterogeneity and weak instrument diagnostics.

The estimations are first based on aggregate FDI, which is then disaggregated into vertical and horizontal FDI.

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[13] We secured a sufficiently large number of firms for each region in each sector.

[14] Local firms, mainly small local ones, are less able to select their locations based on the business environment.

VI. AGGREGATE FDI MODEL

A. Base Model Results

The impact of taxes, as well as physical and financial variables, on the probability of receiving FDI is estimated in three steps. Along with the taxation variable, we first estimate the impact of the index of physical and financial infrastructures, which includes objective and subjective information based on firms' perceptions, on the probability of receiving FDI (Table 2, column 1). Then, we consider the physical infrastructure index separately from the financial infrastructure index (Table 2, column 2). Finally, we use a single objective variable for each type of infrastructure (Table 2, column 3). The base model only controls for age, size, and agglomeration.

The results show that, while taxation does not significantly impact FDI, marginal increases in infrastructure and financing constraints reduce the probability of receiving FDI. These results are robust to the use of aggregated indices and individual objective variables, as well as different estimation methods (2SLS and IV FE logit). The availability of roads and transport facilities, reliable sources of electricity and well-functioning telecommunication systems allow and encourage economic activities, thereby attracting foreign firms. Financing opportunities for firms and consumers in local credit markets also encourage foreign firms' activities during setting up, operation, or expansion. These factors are crucial for foreign firms' locations and do not seem to be compensated by favorable taxation.[15]

Regarding control variables, the results indicate that, on average, larger firms are more likely to be foreign. The agglomeration effect, which captures the positive or negative externalities of foreign firms in a specific region and sector, has no effect on foreign firms location.[16]

B. Analysis Across Ownership Degree: From Joint Venture to Full Foreign Ownership

Before analyzing the heterogeneity in foreign firms' ownership structure, we control for the impact of additional structural factors: institutions, human capital, and trade regulations. We consider each firm's perception of crime, theft, and disorder as a proxy for institutional quality, and its perception of the availability of skilled workers as a proxy for human capital. Firms' assessments of customs and trade regulations also serve as a proxy for trade regulation. These variables are instrumented by their sector-region averages to address potential endogeneity issues, as explained in Section V. The results show that the lack of skilled workers and institutional problems reduce FDI, while trade regulations encourage FDI (Table 3, column 1).

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[15] A growing test for weak instruments in the literature may be determined by comparing Cragg-Donald statistics to the critical values computed by Stock and Yogo (2004. In this paper, Cragg-Donald statistics are far higher than the Stock and Yogo critical values, indicating the absence of the weak instruments problem. In addition, overidentification tests (Hansen J statistics) do not reject the instruments' exogeneity in most cases.

[16] Nonlinearity tests of the agglomeration effect are not significant.

Table 2. Basic Model with Tax and Infrastructure Variables

	Dependent variable: FDI					
	(1)		(2)		(3)	
	2SLS	IV FE Logit	2SLS	IV FE Logit	2SLS	IV FE Logit
Age	-0.001	-0.005	-0.001	-0.005	-0.001	-0.003
	(1.02)	(2.12)**	(1.01)	(2.12)**	(0.69)	(1.41)
Size (20–99 employees)	0.067	0.069	0.059	0.445	0.029	0.171
	(4.42)***	(5.25)***	(3.60)***	(4.82)***	(1.36)	(1.96)**
Size (>=100 employees)	0.219	0.214	0.208	1.175	0.16	0.764
	(8.44)***	(9.48)***	(8.03)***	(8.96)***	(5.49)***	(5.50)***
Agglomeration	-0.000	-0.001	0.000	-0.001	0.000	-0.001
	(0.44)	(0.38)	(0.59)	(0.55)	(0.49)	(0.42)
Tax problems	0.011	0.012	0.019	0.127	-0.008	-0.055
	(0.82)	(0.83)	(1.3)	(1.11)	(0.49)	(0.42)
Infrastructure problems	-0.042	-0.043				
	(7.77)***	(12.04)***				
Physical Infr. problems			-0.06	-0.432		
			(5.15)***	(6.38)***		
Financial Infr. problems			-0.033	-0.269		
			(4.50)***	(6.47)***		
Telecom problems					-0.345	-2.807
					(6.38)***	(13.8)***
Informal finance					-0.799	-5.437
					(1.92)*	(1.81)*
Constant		-1.323		-1.254		2.827
		(3.22)***		(3.01)***		(3.49)***
Observations	7,386	7,434	7,386	7,434	7,074	7,245
% of correct predictions		70		70		68
Instrument tests						
Hansen *J*-stattistic	1.54		0.15			5.97
p-value	0.21		0.7			0.02
Weak instrument test	290.77					
Critical value	13.43					

Clustered z statistics at country-level are in parentheses.

For logit regression, bootstrapped (with 100 replications) z statistics clustered at country level in

Coefficients reported for logit regression are marginal effects.

Critical values (Stock and Yogo) are not available for more than three endogenous regressors.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3. Model with Different Joint Venture Structures and Full foreign Ownership

	Dependent variable: FDI									
FDI Threshold:	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Tax problem	-0.009	-0.005	-0.01	-0.008	-0.013	-0.011	-0.015	-0.017	-0.018	-0.018
	(0.45)	(0.29)	(0.54)	(0.42)	(0.73)	(0.64)	(0.84)	(0.93)	(1.04)	(1.17)
Telecom problem	-0.372	-0.368	-0.353	-0.341	-0.33	-0.279	-0.259	-0.238	-0.232	-0.213
	(6.86)***	(6.91)**	(6.84)**	(6.86)**	(7.44)**	(5.30)**	(5.08)**	(4.74)**	(4.93)**	(4.81)**
Informal finance	-0.824	-0.842	-0.793	-0.775	-0.528	-0.54	-0.318	-0.394	-0.399	-0.287
	(1.76)*	(1.72)	(1.77)	(1.70)	(1.11)	(1.18)	(0.69)	(0.93)	(1.00)	(0.76)
S. labor problem	-0.038	-0.041	-0.042	-0.041	-0.045	-0.045	-0.05	-0.039	-0.045	-0.042
	(1.91)*	(2.05)*	(2.16)*	(2.07)*	(2.55)*	(3.62)**	(5.01)**	(3.38)**	(3.49)**	(3.39)**
C. and disorder	-0.041	-0.035	-0.036	-0.031	-0.035	-0.029	-0.029	-0.025	-0.024	-0.022
	(1.73)*	(1.59)	(1.68)	(1.47)	(1.74)	(1.55)	(1.79)	(1.59)	(1.78)	(1.84)
Trade regulation	0.05	0.045	0.051	0.046	0.05	0.05	0.047	0.042	0.041	0.035
	(2.61)***	(2.50)*	(2.66)**	(2.50)*	(3.07)**	(2.94)**	(2.73)**	(2.41)*	(2.62)**	(2.58)**
Age	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.76)	(1.06)	(1.09)	(1.17)	(1.34)	(1.29)	(1.27)	(1.33)	(1.22)	(1.47)
Size (20–99)	0.021	0.019	0.017	0.017	0.013	0.012	0.011	0.013	0.006	0.006
	(0.84)	(0.77)	(0.66)	(0.72)	(0.60)	(0.54)	(0.54)	(0.60)	(0.31)	(0.32)
Size (>=100)	0.139	0.134	0.123	0.118	0.112	0.118	0.109	0.093	0.079	0.059
	(4.40)***	(4.04)**	(3.91)**	(3.67)**	(3.59)**	(3.56)**	(3.60)**	(3.17)**	(2.66)**	(2.07)*
Agglomeration	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	(0.16)	(0.10)	(0.01)	(0.15)	(0.18)	(0.09)	(0.16)	(0.24)	(0.45)	(0.22)
Observations	6122	6122	6122	6122	6122	6122	6122	6122	6122	6122
No. of countries	26	26	26	26	26	26	26	26	26	26
Hansen *J*-statistic	3.6	3.3	3.0	2.5	1.5	2.0	1.8	1.8	1.6	1.1
p-value	0.06	0.07	0.09	0.11	0.22	0.16	0.18	0.18	0.21	0.28

Clustered z statistics at country level are in parentheses.
Stock and Yogo critical values are not available for more than three endogenous regressors.
* significant at 10%; ** significant at 5%; *** significant at 1%.

This section focuses on assessing how a given investment climate could differently attract a foreign firm, depending on the size of foreign ownership in its capital. In other words, is the investment climate similarly going to affect both a foreign firm with a majority of foreign capital (more than 50 percent), and one with a minority of foreign capitalSo far, the paper has considered a single traditional definition of FDI (firms with at least 10 percent foreign capital), assuming that the determinants of FDI are comparable, regardless of foreign capital magnitude. In addition to this traditional definition of FDI, this section tests the robustness of the results by using nine alternative thresholds (from 20 to 100 percent foreign capital) to define FDI.

The hypothesis is that the impact of the investment climate varies with the degree of foreign ownership. Indeed, foreign firms may prefer a joint venture with local partners in order to reduce risks when investing in foreign countries (Smarzynska and Wei, 2000). For instance, foreign firms may look for local partners in joint ventures when they plan to invest in countries with important infrastructure constraints or political instability. Likewise, foreign firms' investments through joint ventures could aim to reduce the cost of acquiring information on the local market (particularly for new firms), as local partners are expected to have more and better information on the host country.

The results confirm that, regardless of their ownership structures, taxation is not a significant factor for foreign firms' locations. However, when foreign capital represents less than 50 percent of a firm's capital, the main aspects of the investment climate (infrastructure, finance, human capital, and institutions) are of greater importance for FDI.

A recipient country's degree of financial development matters less for the establishment of a foreign firm with a foreign capital of 50 percent or more. This result could imply that financial development is important for fully local firms, and foreign firms that are in joint ventures with local partners, when the foreign partners own less than 50 percent of the capital. It suggests that because of better access to external financing (including through parent companies), firms with mostly foreign capital do not rely as heavily as others on the domestic financial system for their financing needs, and are thus less discouraged by financing constraints in the host country when deciding on their locations.

VII. HORIZONTAL AND VERTICAL FDI MODEL

Studies generally analyze the determinants of aggregate FDI, but these determinants can vary according to the type of FDI (vertical or horizontal). Disaggregating firms between exporters and nonexporters further helps to analyze the results in the previous section, which showed that foreign firms usually look for areas with low competition by locating where customs and trade regulations are higher. Indeed, this disaggregation allows testing for the difference between

local market-oriented FDI (horizontal FDI) and export-oriented FDI (vertical FDI), and assesses how taxation and the investment climate affects each form of FDI differently.[17]

Horizontal FDI often occurs when gains in trade costs and strategic advantages (intangible assets) offset the cost of setting up a new plant. Vertical FDI refers to the local establishment of exporting foreign firms. It mainly occurs when firms can break down their production processes into different parts and various locations, mainly according to the factor costs in said locations. Recent moves in service activities, such as call centers to low-cost locations in Africa, illustrate this trend.

Horizontal FDI is thus more attracted to larger markets, while vertical FDI is more attracted to areas with low-cost production factors. This paper uses the share of exports in firms' sales to differentiate exporting firms from nonexporting. The results confirm that taxation does not significantly impact either type of FDI (Table 4). However, the five main FDI determinants (physical infrastructure, financing constraints, customs and trade regulations, human capital, and institutional quality) affect vertical and horizontal FDI differently.

First, physical infrastructure is important for attracting foreign firms, but it is even more important for exporting foreign firms (vertical FDI). Regardless of whether they export or sell their production locally, foreign firms are attracted to areas with solid infrastructures. However, foreign firms exporting their products are statistically more affected by telecommunication problems than those supplying local markets. This result illustrates that infrastructure problems, with the typical example of telecommunication limitations, are more serious obstacles for firms supplying their foreign customers. Indeed, telecommunication problems could impede interactions between firms and their suppliers, particularly their foreign customers.

Second, financing constraints only significantly affect foreign firms selling their productions locally (horizontal FDI). Financing constraints are not main drivers of exporting foreign firms. Indeed, exporter and nonexporter foreign firms may suffer from financing constraints during their production processes, while nonexporter firms are also impacted by the broader financial underdevelopment of the economy that affects their clients.[18] The fact that foreign firms exporting their products are less affected by financing constraints in the host countries is also consistent with their higher share of foreign capital. As established in Section V, developed local financial services are not significant drivers of companies with largely foreign capital.

Third, customs and trade regulations increase horizontal FDI but not vertical FDI. Areas with higher customs and trade regulations attract foreign firms producing for local markets,

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[17] The breakdown of exporter versus nonexporter firms does not allow a complete separation of vertical and horizontal FDI. One strength of this paper is its ability to address this issue, though some aspects of the breakdown (direction of affiliate sales) should also be considered. If the exports of an affiliate are mainly for the home country, this type of FDI can be classified as vertical. The data does not allow for this distinction.

[18] This interpretation mainly supposes that financing constraints in an exporter firm's destination country are less than those in the home country, which is not necessarily the case.

confirming their interest in protected markets. The horizontal FDI theory supports this result. Since horizontal FDI aims to supply the local market, the theory suggests that trade barriers could represent indirect protections for firms located in the country, giving them price advantages. However, foreign firms exporting their products are not impacted by customs and trade regulations. As these firms export their products, trade protection and regulations serve more as constraints than advantages for their activities.[19]

Table 4. Vertical and Horizontal FDI

	Dependent variable: FDI					
Threshold for exporter vs. nonexporter	10%		20%		30%	
	Nonexporter	Exporter	Nonexporter	Exporter	Nonexporter	Exporter
	(1)	(2)	(3)	(4)	(5)	(6)
Telecom problems	-0.309	-1.159	-0.314	-1.416	-0.319	-0.996
	(6.03)***	(5.20)**	(6.44)**	(3.34)**	(6.53)**	(3.56)**
Informal finance	-0.989	-6.021	-0.904	15.066	-0.897	-1.577
	(2.31)**	(0.81)	(2.11)*	(0.44)	(2.01)*	(0.06)
Skilled labor problems	-0.039	-0.061	-0.048	-0.030	-0.051	0.048
	(2.18)**	(0.85)	(3.02)**	(0.28)	(3.24)**	(0.31)
Crime and disorder	-0.008	-0.147	-0.007	-0.201	-0.018	-0.149
	(0.43)	(2.28)*	(0.36)	(2.07)*	(0.85)	(2.69)**
Trade regulation	0.037	0.079	0.036	0.162	0.037	0.131
	(2.45)**	(1.44)	(2.57)*	(1.28)	(2.60)**	(1.22)
Tax rate problem	-0.007	0.010	-0.003	-0.021	-0.003	-0.027
	(0.36)	(0.20)	(0.14)	(0.26)	(0.15)	(0.26)
Age	0.000	-0.002	0.000	-0.002	0.000	-0.003
	(0.04)	(1.09)	(0.02)	(0.77)	(0.07)	(1.62)
Size (20–99)	0.029	-0.122	0.030	-0.206	0.028	-0.148
	(1.13)	(1.57)	(1.18)	(1.62)	(1.12)	(1.38)
Size (>=100)	0.108	-0.005	0.122	-0.040	0.126	-0.015
	(3.06)***	(0.05)	(3.61)**	(0.26)	(3.93)**	(0.11)
Agglomeration	0.000	0.001	0.000	0.002	0.000	0.001
	(0.31)	(0.90)	(0.38)	(1.31)	(0.37)	(0.99)
Observations	5189	933	5413	709	5555	566
No. of countries	26	26	26	26	26	26
Hansen *J*-statistic	2.5	2.0	2.6	1.1	3.0	0.7
p-value	0.11	0.15	0.11	0.31	0.08	0.39

Clustered z statistics at country level are in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

[19] Carr et al. (2001) and Yeaple (2003) find that FDI (measured by foreign subsidiaries sales) increases with higher trade costs in the case of horizontal FDI. However, Hanson et al. (2001) show that trade costs discourage vertical FDI by increasing the global production costs.

With respect to other investment climate factors, human capital constraints (shortage of skilled workers) affect nonexporting foreign firms than exporting ones. This result could suggest that exporting foreign firms import or train their labor forces. Consequently, they suffer less from skilled worker shortages in the local markets. Exporting foreign firms deal with international standards for quality and product delivery and could therefore suffer more from institutional weaknesses in the host country than nonexporting firms.

The results are similar even when exporter firms are defined as firms exporting at least 10 percent, 20 percent, or 30 percent of their products.

VIII. CONCLUSION

Using firm-level data for 30 SSA countries, this paper shows that taxation does not significantly affect foreign firms' locations, while the other main aspects of investment climate (infrastructure, finance, human capital, and institutions) do. The results also show that the importance of financial development depends on the share of foreign ownership in firms' capital. Firms largely foreign-owned do not rely heavily on domestic financial systems for their financing needs, and are thus less discouraged by financing constraints in their host countries when deciding on location.

A breakdown analysis between exporter and nonexporter foreign firms (vertical and horizontal FDI) reveals that taxation is not a key driver for either type of FDI. Foreign firms producing for local markets are attracted to areas with higher customs and trade regulations, highlighting their interest in protected markets, as suggested by the horizontal FDI theory. However, foreign firms exporting their products are not impacted by customs and trade regulations. In addition, compared to nonexporting foreign firms, exporting foreign firms are less affected by financing and skilled labor constraints than they are by infrastructure and institutional weaknesses in the host country.

When designing policies to attract foreign investments in non-resource-rich sectors, SSA countries should pay more attention to their investment climates (infrastructure, institutions, and human capital) and avoid using costly tax incentives, which tend to erode their revenue bases while their effectiveness remains doubtful.

Appendix

Table A.1. List of Variables

Variable	Definitions
FDI	Dummy equals 1 if at least 10% of firm capital is foreign
Age	Firm age (in years)
Size	Firm Size: 3 categories based on permanent and temporary workers
Agglomeration	Number of foreign firms in same sector and same region
Tax problem	Business constraint: tax rate
Telecom problems 1	Constraint: access to e-mail for business with clients and suppliers (dummy variable)
Telecom problems 2	Constraint: access to website for business with clients and suppliers (dummy variable)
Electricity problems	Business constraint: electricity
Transport problems	Business constraint: transport
Informal finance problems	Informal sources of financing in a firm's working capital (%)
Access to finance problems	Business constraint: access to finance (collateral requirement)
External auditor	Annual financial statement reviewed by external auditor (dummy variable)
Skilled labor problems	Business constraint: skills of available workers
Crime and disorder	Business constraint: crime, theft, and disorder
Custom and trade	Business constraint: customs and trade regulations

Table A.2. Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
FDI	0.21	0.41	0	1
Age	14.94	15.26	0	167
Number of permanent workers	88.53	440.84	0	18753
Agglomeration	40.66	30.70	0	119
Tax problem	1.05	1.44	0	4
Telecom problems 1	0.48	0.50	0	1
Telecom problems 2	0.22	0.41	0	1
Electricity problems	1.09	1.33	0	4
Transport problems	0.61	1.10	0	4
Informal finance problems	0.60	4.98	0	100
Access to finance problems	0.89	1.36	0	4
External auditor	0.54	0.50	0	1
Skilled labor problems	0.74	1.21	0	4
Crime and disorder	0.83	1.28	0	4
Custom and trade	0.67	1.20	0	4

Table A.3. Correlation of Physical and Financial Infrastructure Variables

	Access to Finance problem	Informal finance problem	Electricity problem	Transport problem	Telecom problem 1	Telecom problem 2
Access to finance p.	1.000					
Informal finance p.	0.002	1.000				
Electricity p.	0.493*	-0.031*	1.000			
Transport p.	0.520*	-0.040*	0.547*	1.000		
Telecom p. 1	0.074*	0.001	0.061*	0.153*	1.000	
Telecom p. 2	0.067*	-0.018	0.062*	0.147*	0.451*	1.00

* significant at 1%; p. indicates problem.

Table A.4. Principal Components Analysis for Physical and Financial Infrastructure

Principal components	Eigenvalues	Difference	Proportion of variance	Cumulative Variance
1	2.15	0.77	0.36	0.36
2	1.38	0.39	0.23	0.59
3	0.99	0.44	0.16	0.75
4	0.55	0.03	0.09	0.84
5	0.52	0.11	0.09	0.93
6	0.41	.	0.07	1.00

	Eigenvectors					
Variable	1	2	3	4	5	6
Access to finance problems	0.52	0.23	0.05	-0.02	-0.80	-0.17
Informal finance problems	-0.07	0.10	0.99	0.02	0.04	0.04
Electricity problems	0.54	0.24	0.02	0.04	0.54	-0.60
Transport problems	0.57	0.12	-0.01	0.00	0.24	0.78
Telecom problems 1	-0.24	0.65	-0.10	0.71	-0.01	0.09
Telecom problems 2	-0.23	0.66	-0.07	-0.71	0.04	0.05

Physical and Financial Infrastructure index =
*(0.36/0.59)*Component 1 + ((0.59 -0.36)/0.59)*Component 2*

Table A.5. Principal Components Analysis for Physical Infrastructure

Principal components	Eigenvalues	Difference	Proportion of variance	Cumulative Variance
1	1.72	0.42	0.43	0.43
2	1.30	0.75	0.33	0.76
3	0.55	0.12	0.14	0.89
4	0.43	.	0.11	1.00

Variable	1	2	3	4
Electricity problems	0.53	0.49	0.02	-0.69
Transport problems	0.59	0.37	-0.01	0.72
Telecom problems 1	-0.43	0.55	0.71	0.08
Telecom problems 2	-0.43	0.56	-0.71	0.05

Physical Infrastructure index =
*(0.43/0.76)*Component 1 + ((0.76-0.43)/0.76)*Component 2*

Table A.6. Principal Components Analysis for Financial Infrastructure

Principal components	Eigenvalues	Difference	Proportion of variance	Cumulative Variance
1	1.02	0.03	0.51	0.51
2	0.98	.	0.49	1.00

Variable	1	2
Access to finance problems	-0.71	0.71
Informal finance problems	0.71	0.71

Financial Infrastructure index = Component 1

Table A.7. Country List

Angola	Eritrea	Malawi	Senegal
Benin	Ethiopia	Mali	South Africa
Botswana	Gambia	Mauritania	Swaziland
Burkina Faso	Guinea	Mauritius	Tanzania
Burundi	Guinea Bissau	Mozambique	Uganda
Cameroon	Kenya	Namibia	Zambia
Cape Verde	Lesotho	Niger	
Congo, Dem. Rep.	Madagascar	Rwanda	

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