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Foreign direct investment, employment and wages in sub-Saharan Africa

INCLUSIVE AND SUSTAINABLE INDUSTRIAL DEVELOPMENT

Foreign direct investment, employment and wages in sub-Saharan Africa

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Abstract: Job creation is one of the key challenges developing countries face. This paper analyses the relationship between foreign ownership and employment using an original firm-level dataset that covers 19 sub-Saharan African countries. Our results show that although foreign firms are generally larger, the jobs they generate are relatively less skill intensive compared to those generated by domestic firms. We find substantial differences between Northern and Southern foreign investors both in terms of skill intensity and wage premium compared to domestic firms. We also find that, *ceteris paribus*, Chinese firms employ more workers (mostly blue collar) and pay lower wages for both skilled and unskilled workers compared to both domestic firms and other foreign investors.

Keywords: Foreign direct investments, employment, skill intensity, wage premium, Africa

1   Introduction

The attraction of foreign investors is a fundamental goal for policymakers all over the globe, and even more so in poor countries, where lack of capital is one of the key constraints to economic prosperity. One of the possible consequences of inward foreign direct investment (FDI) for developing countries—which is of particular interest to governments—is the extent to which these investments create new and qualified jobs in the industrial or "modern" sector (jobs for which workers often receive higher wages than those paid by domestic firms). When the available resources to attract foreign direct investment are scarce, it is essential for a (potential) host country to prioritize those firms that are more likely to produce the largest increase in employment.

Despite its high empirical and policy relevance, the contribution of FDI to employment in developing countries has not been extensively researched. The aim of this paper is to provide a cross-country perspective in developing African countries of the relationship between foreign ownership and employment in host countries based on a firm-level analysis. We focus in particular on the heterogeneous labour-market demand of multinational enterprises (MNEs), controlling for their characteristics including their country of origin.

To answer our research question, we use original firm-level data collected through the UNIDO Africa Investor Survey 2010 across 19 countries (Burkina Faso, Burundi, Cameroon, Cabo Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda and Zambia). The database contains a rich set of information on a large sample of domestic and foreign firms (investor characteristics, linkages with global and local markets, interactions with IPAs of the host country, organizational structure, main factors driving location decision, etc.).

Our analysis consists of several parts. We first estimate a labour demand function to investigate differences between domestic and foreign firms. We are particularly interested in shedding some light on various labour demand characteristics of investors from developed countries (North MNEs) and those from other developing countries (South MNEs). In a second step, we analyse the determinants of firms' skill intensity and test whether foreign investors demand more (or less) skilled workers compared to domestic firms. Finally, we study the relationship between foreign ownership and wages.

The paper is organized as follows. Section 2 provides a background to our research question and discusses the findings of related studies. In Section 3 we present the data and the methodology used. Estimation results are presented and discussed in Section 4. Section 5 concludes.

2   Background and related empirical literature

Data on employment in sub-Saharan Africa show that there is an urgent need for job creation, in particular, for "good" jobs. Despite the fact that sub-Saharan Africa has recorded its best growth performance since the immediate post-independence years, only few African workers find jobs in manufacturing, and among these, only a tiny fraction is employed in modern, formal firms with adequate technology. The extent of informality is a peculiar feature of African labour markets (Roubaud and Torelli, 2013).

In addition, the labour force is growing rapidly: around 21 million people in sub-Saharan African countries will enter the working age population in 2015, up from 15 million in 2000 (Lam and Leibbrandt, 2013). Given the weakness of these economies' structural transformation, many young Africans will find themselves unemployed or, more likely, underemployed in informal jobs with low productivity and pay.

To address the challenge this situation creates, sub-Saharan African governments need to increase employment in the formal sectors. One way (albeit not the only one) to accomplish this goal is to encourage the entrance of foreign firms.[1] Inward foreign direct investments can foster the structural transformation of developing countries' economies by not only creating new jobs (direct employment is particularly relevant in greenfield investments), but "good" jobs from the perspective of host countries and workers (Javorcik, 2013). The existing literature emphasizes several channels through which these positive effects can be potentially achieved. First, there is fairly robust evidence about the existence of productivity advantages of foreign-owned firms over domestically-owned enterprises (Conyon et al., 2002; Girma and Görg, 2007; Arnold and Javorcik, 2009). This means that jobs created as a result of FDI inflows tend to enhance the aggregate productivity of the labour force in the host country. Secondly, (positive) externalities can be associated with multinational enterprise employment. The movement of labour is typically one important channel of knowledge spillovers from foreign MNEs to local firms, as workers trained by multinationals are often hired by domestic firms or start own entrepreneurial businesses (Görg and Strobl, 2005; Balsvik, 2011). Hence, employment in MNEs generally fosters technological transfer to the host economy. Thirdly, generating additional incomes and

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[1] Governments in developing economies may consider attracting FDI as a priority for other reasons as well. For example, this emphasis may be justified with the expected knowledge regarding the externalities to be generated by foreign affiliates. In fact, empirical evidence casts doubt on the existence of spillovers from FDI in developing and transition countries (Görg and Greenway, 2004). Morrissey (2012) emphasizes the limited impact of FDI in Africa in terms of creation of linkages and spillovers to the domestic economy. Amendolagine et al. (2013) find evidence of weak linkages between foreign affiliates and domestic firms in sub-Saharan African countries which, to a large extent, can be explained by features such as the relatively recent "time of entry" as well as the sectoral composition and motivation of foreign investors (market-oriented companies are more likely to source inputs from local suppliers).

thereby increasing aggregate demand, FDI inflows also have an indirect effect on domestic employment (Lall, 2004). This effect is reinforced by the fact that there is evidence that foreign affiliates are likely to pay higher wages in developing countries (te Velde and Morrisey, 2003; Strobl and Thornton, 2004; Lipsey and Sjöholm, 2004, 2006).[2]

All these positive employment effects of FDI have to be compared with possible negative effects such as the crowding-out of non-competitive domestic firms (implying job losses), labour-saving technologies introduced by multinational firms, and a reduction in employment associated with FDI operating through mergers and acquisitions (even if the potentially greater efficiency induced by the takeover could result in more jobs in the long run).

The overall employment impact of FDI inflows is, therefore, uncertain, and for this reason it is important to empirically investigate the factors that shape MNEs' labour demand in developing countries.

The empirical literature on the contribution of FDI to employment growth in developing countries is thus far very limited. Several papers analyse the impact of foreign acquisitions on employment in developed countries: most of the existing evidence suggests that firm-level employment levels remain unchanged or increase following foreign acquisition (see, for example, Girma (2005) for the UK; Bandick and Karpaty (2007) for Sweden; Balsvik and Haller (2010) for Norway). The study of Lipsey et al. (2010) is among the very few which explore the relationship between foreign ownership and employment in less developed countries. The authors find that foreign-owned manufacturing plants in Indonesia grew more rapidly than plants that remained domestically-owned based on data from a large panel of plants between 1975 and 2005. Barthel et al. (2011) show that foreign firms in Ghana are larger, on average, in terms of workers employed (and provide for more formal training programmes for workers) than domestic firms.[3]

A growing body of empirical literature on the relationship between foreign ownership and wages has become available. Until recently, there was consensus that foreign firms pay higher wages than their domestic counterparts, particularly in developing countries (te Velde and Morrisey, 2003; Strobl and Thornton, 2004; Lipsey and Sjöholm, 2004). For example, Lipsey and Sjöholm (2006) find that even after controlling for firm-fixed effects, foreign takeovers in

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[2] Foreign-owned firms in high-income countries also pay higher wages, on average, than domestically-owned ones (Aitken et al., 1996).
[3] The contribution of Kumar Bhaumik et al. (2007) is partly related to this strand of literature. The paper, using a data set of 293 MNEs operating in four developing countries (Egypt, India, South Africa and Viet Nam), examines the determinants of MNEs' employment growth.

Indonesia raised production workers' wages by 17 percent and non-production workers' wages by 33 percent. Lipsey and Sjöholm (2004) for Indonesia, and Morrissey and Te Velde (2003) for sub-Saharan African countries (Cameroon, Ghana, Kenya, Zambia and Zimbabwe), find that the foreign wage premium persists after taking into account differences in the workforce composition. They show that this wage differential is attributable to foreign ownership status rather than to observable firm characteristics.

However, with the increasing availability of linked employer-employee data, this consensus has been challenged at least for developed countries. Heyman et al. (2007) show that foreign takeovers in Sweden reduced individual wages relative to their counterparts in domestic firms, while Andrews et al. (2010) for Germany, Malchow-Moller et al. (2013) for Denmark and Huttunen (2007) for Finland find small positive effects.

Rigorous empirical evaluations of the impact of FDI on employment are needed to provide a solid foundation for policymaking. This paper contributes to the understanding of the relationship between foreign ownership and employment at the firm-level providing a cross-country perspective in the context of sub-Saharan Africa countries.[4]

3   Data description and methodology

To examine the main differences in terms of labour demand and wages between foreign and domestic firms – and among different foreign investors – we use original firm-level data collected through the UNIDO Africa Investor Survey 2010 (henceforth AIS 2010) across 19 different sub-Saharan African countries. The database contains a wealth of information on a large sample of domestic and foreign firms (investor characteristics, linkages with global and local markets, organizational structure, labour force characteristics, main factors driving location decision, etc.). The collection of the dataset followed a rigorous survey methodology in terms of stratified sampling (on three dimensions, namely sector, size and ownership), and interview techniques (face-to-face interviews with top-level managers of foreign- and domestically-owned firms). The sample was constructed in such a way to be representative of public and private for profit firms with 10 or more employees operating in all industries, including construction and services.[5]

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[4] To our knowledge, the only study that addresses a similar issue in the African context is a recent working paper by Forster-McGregor et al. (2013). The authors document a positive wage premium for foreign investors compared to domestic ones but do not address the issue of heterogeneous wage policy of investors from different countries. Differently from their paper, we also investigate the skill composition of labour demand.

[5] An oversampling of relatively large firms (> 100 employees) has been adopted. We refer readers interested in the methodological details related to the design and implementation of the survey conducted by UNIDO to the Annexes

Before conducting regression analyses, we provide some comparisons based on the raw data. Table 1 and Table 2 give an overview of the composition of domestic and foreign firms by country and industry. With regard to the destination countries, we find the largest number of foreign investors in Uganda, Kenya and Ghana.[6] At industry level, the presence of foreign firms is higher in heavy industries (domestic firms are primarily concentrated in light manufacturing) and in services. This sectoral composition is in line with the hypothesis that inward foreign direct investment can promote the structural transformation of developing countries' economies by creating new jobs in modern sectors.

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contained in the Africa Investor Report 2011 available online at:
http://www.unido.org/fileadmin/user_media/Publications/Pub_free/AIS_Report_A4.pdf.
[6] Around 50 percent of the foreign investors were from high-income countries (Europe and North America), while 23 percent were from Asia (mainly China and India). African countries (excluding South Africa) represent about 15 percent.

Table 1 Foreign and domestic firms by country of destination

	Foreign Investors	Domestic firms
Uganda	16.90%	9.94%
Kenya	12.11%	7.91%
Ghana	7.54%	5.89%
Tanzania	6.45%	7.42%
Nigeria	6.20%	10.92%
Cameroon	5.54%	3.35%
Ethiopia	5.54%	10.65%
Mozambique	5.41%	4.66%
Madagascar	5.12%	2.66%
Senegal	4.58%	4.42%
Capo Verde	4.33%	6.98%
Zambia	4.25%	5.30%
Mali	3.79%	5.05%
Lesotho	3.16%	2.52%
Rwanda	3.04%	2.83%
Malawi	2.00%	1.98%
Burundi	1.92%	3.20%
Burkina Faso	1.21%	2.30%
Niger	0.92%	2.03%
Total	100.00%	100.00%

Table 2 Foreign and domestic firms by sector

	Foreign Investors	Domestic firms
Agriculture, forestry and fishing	5.05%	2.75%
Mining and quarrying	2.30%	0.89%
Food, beverages and tobacco	10.40%	11.95%
Textile, garnments and leather	6.82%	6.39%
Wood and wood products, furniture	3.76%	5.81%
Paper and publishing, printing	3.50%	6.85%
Coke and refined petroleum, chemicals, plastics, rubber and non-metallic mineral products	15.01%	10.32%
Basic metals and fabricated metal products	6.82%	6.24%
Electro-mechanical machinery and equipment	3.28%	2.34%
Motor vehicles, trailers and other transport equipment	0.84%	0.66%
Recycling and other manufacturing	0.58%	0.36%
Public utilities	6.42%	7.74%
Retail and motor vehicles sales and repair	8.81%	10.62%
Wholesale	7.44%	5.88%
Hotel and restaurant and other tourism services	5.62%	7.36%
Transport and storage	3.28%	3.36%
Other services	10.09%	10.47%
Total	100.00%	100.00%

Table 3 provides some comparisons between domestic firms and multinational enterprises. MNEs are larger in terms of turnover, are more capital intensive and more productive and pay higher wages. On the contrary, the composition of the workforce is similar between the two groups in terms of female and part-time employment, while the share of foreign workers is, unsurprisingly, higher in MNEs.

Table 3 MNEs and domestc firms: A comparison

	MNEs		Domestic firms		
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*t test*
Sales (*100000$)	908.70	26117.75	82.98	1294.42	0.0488
Capital-labour ratio (*10000$)	69.38	2585.64	6.15	90.80	0.1409
Labour productivity (*10000$)	8.11	12.43	4.62	8.38	0.0000
Export intensity	0.17	0.31	0.06	0.19	0.0000
Employment	203.00	668.60	95.11	275.24	0.0000
Average wages (*1000$)	14.31	185.16	6.70	66.72	0.0229
Blue collar workers	0.59	0.28	0.59	0.28	0.9359
Female employment	0.26	0.21	0.26	0.22	0.5259
Foreign employment	0.09	0.13	0.02	0.06	0.0000
Part-time employment	0.02	0.08	0.03	0.09	0.0009

Notes: "Labour productivity" is defined as sales per employee; "Average wages" are defined as total labour costs divided by the number of employees; "Export intensity" is defined as the ratio of exports over sales.

We begin our econometric analysis by investigating whether there is any significant difference between domestic firms and multinational enterprises in terms of employment level. Using a CES (constant elasticity of substitution) production function, labour demand can be expressed as a function of wages, interest rates and output using the following linear model (Hamermesh, 1993):

$$l_{i,t} = c_1 + \eta_{LL} w_{i,t} + \eta_{LK} i_{i,t} + \eta y_{i,t} + \varepsilon_{i,t} \tag{1}$$

where η_{LL} and η_{LK} denote the constant-output labour demand elasticities with regard to wages and interest rates, w_{it} refers to firm-level wages, i_{it} to firm-level interest rates and y_{it} to firm-specific output.

The empirical model derived from Equation (1) is specified as:[7]

$$\ln l_{i,j,c} = \beta_0 + \beta_w \ln w_{i,j,c} + \beta_k \ln i_{i,j,c} + \beta_y \ln y_{i,j,c} + \beta_{mne} mne_{i,j,c} + \beta_z z_{i,j,c} + \beta_I I_i + \beta_C C_i + \varepsilon_{i,j,c} \tag{2}$$

where l is the log of the number of workers of firm i operating in industry j in country c; w measures the log of the average wage paid by the firm; i measures the log of the interest rate paid by the firm on long-term credit; y measures the log of the firm's real output; mne is a dummy variable equal to 1 for foreign multinational enterprises and zero otherwise; z is a vector of further control variables which seek to capture additional factors affecting firms' employment level; specifically, we control for firm age, export status and—obviously only for MNEs—

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[7] Our baseline model is specified similarly to Barba Navaretti et al. (2003).

investors' origin country. We expect that firms' age is positively related to their size and that exporters—as emphasized by Bernard and Jensen (1995) and subsequent empirical studies—are larger than non-exporters. C and I are dummy variables for the industry and for the sub-Saharan African country in which firm i operates; ε is an error term. The firms' employment level is clearly also shaped by the economic conditions prevailing in the countries in which they operate. To better disentangle this aspect in some of our estimates, we include host-country level controls as a proxy for economic opportunities (population, GDP, GDP growth rate, business environment quality), institutional quality (corruption) and labour market regulations (firing costs and minimum wage) instead of dummy variables for the countries in which firms operate.

Table 9 contains a description and some summary statistics of all the variables used in the empirical analysis. We estimate the model by ordinary least squares (OLS) and by a fully robust MM estimator, a method designed to deal with outliers (Verardi and Croux, 2009; Verardi and Wagner, 2012).[8]

As highlighted by Javorcik (2013), another interesting question for policymakers in developing countries is: are jobs created by multinational enterprises good jobs? To answer this question, we analyse two aspects. We start by looking at the labour force's skill intensity and whether foreign firms' skill intensity differs from that of domestic firms. The empirical model is specified as follows:

$$white\_collar_{i,j,c} = \beta_0 + \beta_w \ln w_{i,j,c}^{white\_collar} + \beta_k \ln i_{i,j,c} + \beta_y \ln y_{i,j,c} + \beta_{mne} mne_{i,j,c} + \beta_x x_{i,j,c} + \beta_I I_i + \beta_C C_i + \varepsilon_{i,j,c}$$

(3)

where white_collar is the share of white collar workers in the firm's total workforce and w^{white_collar} is the log of the share of white collar workers' wage in the firm's total average wage; other variables are defined in the same way as in Equation (2). Vector x includes firm level characteristics that according to existing literature might have a role in shaping the demand for skilled and qualified workers: firms' age, export status and labour productivity. We also include a dummy variable that is equal to 1 when firms offer multiple products (multiproduct_firm); we expect these firms to have a relatively higher share of white collar workers given their relatively more complex operations. We also test the effect of two important characteristics of foreign firms on skill intensity. The first control (stand-alone investor) is a dummy equal to 1 if the firm

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[8] In labour economics, it is common to estimate dynamic labour demands. We cannot use a similar approach, since we lack a panel dimension. We therefore use cross-sectional data for a single year.

is not part of a multinational group. These firms often have less sophisticated governance and managerial structures and require, ceteris paribus, fewer white collar workers. Finally, we include a control for the existence of local partnerships. We do not have a strong a priori expectation of the effect of this variable on firms' skill ratio: MNEs might be induced into a local partnership when they do not possess sufficient knowledge about the local context to conduct business in the host country; however, a local partnership might also be the result of policy requirements.

Operationally, we quantify the effect of all mentioned factors on skill intensity by estimating a Tobit model, given that the dependent variable assumes values between 0 and 1.[9]

In the third and last step of our analysis, we ask whether foreign-owned firms pay a higher price for labour given their characteristics. The basic regression equation for foreign wage premium is as follows:

$$\ln w_{i,j,c} = \beta_0 + \beta_{mne} mne_{i,j,c} + \beta_x x_{i,j,c} + \beta_z z_{i,j,c} + \beta_I I_i + \beta_C C_i + \varepsilon_{i,j,c} \tag{4}$$

where w is a firm's average wage (in logarithm); mne is a dummy variable equal to 1 for foreign multinational enterprises and zero otherwise; x is a vector of worker controls aggregated at the firm level (the percentage of women, blue collar and foreign workers); z is a vector of further control variables that seek to capture factors affecting firms' wage level (firm sales, firm age, export status); C and I are dummy variables for the industry and the sub-Saharan African country in which firm i operates; ε is an error term. β_{mne} is the parameter of interest, indicating the average wage difference between domestic and foreign firms.

Even in this case we estimate the model by ordinary least squares (OLS) and by a fully robust MM estimator.

4   Empirical results

In the first step of our analysis, we analyse the determinants of firm-level labour demand of both domestic firms and MNEs operating in sub-Saharan Africa. Results, which are reported in Table 4, confirm that MNEs are relatively larger in terms of employment compared to domestic firms, even after including a large set of control variables in the estimates. More specifically, in our baseline regressions, which include sectoral and destination country fixed effects (Columns 1

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[9] We run additional estimates (unreported) to deal with outliers. In this case the outliers are identified using the bacon command in Stata12.

and 2), we find that foreign investors are, on average, between 10 and 14 percent larger in terms of number of employees according to the estimation method used.[10]

The estimates, as expected, suggest that factors' costs affect labour demand. A 1 percent change in the cost of labour decreases labour demand by approximately 0.3 percent, while the effect of a rise in the cost of capital on labour demand is less pronounced. With regard to export status, we find that exporting firms are between 17 percent and 19 percent larger than non-exporters; this result confirms that sub-Saharan African countries have a comparative advantage in labour-intensive products. Model 2 tests for a heterogeneous effect of factors' costs on labour demand in domestic and foreign firms. Interestingly, we find that MNEs are considerably more sensitive to unit labour costs compared to domestic firms; this result might be related to a relatively higher ability of global firms to shift workers across multiple locations (hence, labour demand is more elastic to wage levels).

In the light of the growing phenomenon of South-South FDI flows, particularly from China and India towards African countries (Morrisey, 2010; Amighini et al., 2011), we distinguish between South and North MNEs. We find that MNEs originating from other developing countries (South MNEs) are, *ceteris paribus*, larger in terms of number of employees – on average, 14.2 percent larger than domestic firms compared to 10.6 percent North MNEs (Model 3 in Table 4). We further distinguish MNEs in accordance with their area of origin (Model 4). Interestingly, Chinese firms are associated with the largest labour demand followed by investors from South Africa and the MENA region. Note that these differences are not driven by the sectoral specializations of firms originating from different countries, since estimates include sectoral (and host country) dummies.

The macroeconomic environment within which firms operate might have a strong effect on the size of firms' labour demand. In the last two Columns of Table 4, we report the estimation results obtained from a specification that includes a set of host country characteristics.

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[10] In Column 2 we report the results of the regressions fitted using the MM estimator developed by Verardi and Croux (2009). Moreover, an outlier detection procedure has been used and alternative regressions which exclude the identified outliers—available upon request from the authors—indicate that the results shown in the paper are robust.

Table 4 Firms' labour demand: MNEs vs domestic firms in sub-Saharan Africa

Dependent variable: number of workers (ln)	Mod. 1	Mod. 1 - MM robust estimate	Mod. 2	Mod. 3	Mod. 4	Mod. 5	Mod. 6
Unit labour cost (ln)	-0.290***	-0.329***	-0.268***	-0.290***	-0.287***	-0.302***	-0.295***
	(0.018)	(0.025)	(0.019)	(0.018)	(0.018)	(0.017)	(0.019)
Long term interest rate (ln)	-0.079**	-0.073*	-0.070*	-0.081**	-0.083***	-0.070**	-0.071**
	(0.032)	(0.038)	(0.036)	(0.032)	(0.032)	(0.028)	(0.029)
Firm sales (y; ln)	0.462***	0.503***	0.461***	0.463***	0.462***	0.466***	0.454***
	(0.011)	(0.015)	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
Firm age $_{t-1}$	0.010***	0.008***	0.010***	0.010***	0.010***	0.010***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Export status $_{t-1}$	0.194***	0.168***	0.191***	0.198***	0.200***	0.195***	0.191***
	(0.037)	(0.038)	(0.037)	(0.037)	(0.037)	(0.036)	(0.037)
MNE	0.140***	0.109***	0.673**			0.147***	0.132***
	(0.029)	(0.030)	(0.277)			(0.029)	(0.030)
MNE * Unit labour cost			-0.058**				
			(0.028)				
MNE * Long term interest rate			-0.025				
			(0.057)				
North MNE				0.106***			
				(0.036)			
South MNE				0.142***			
				(0.036)			
China					0.420***		
					(0.106)		
India					0.061		
					(0.061)		
South Africa					0.292***		
					(0.088)		
SSA					-0.015		
					(0.060)		
MENA					0.264***		
					(0.081)		
Other Asia					0.039		
					(0.102)		
EU					0.104***		
					(0.038)		
North America					0.085		
					(0.103)		
Population (ln)						0.152***	0.100
						(0.031)	(0.095)
GDP ppp (ln)						-0.077**	-0.047
						(0.034)	(0.061)
GDP growth rate						0.019***	-0.001
						(0.006)	(0.016)
Corruption							-0.007**
							(0.003)
Business environment quality 2							-0.093**
							(0.042)
Firing costs							-0.084*
							(0.047)
Minimum wage (ln)							-0.012*
							(0.007)
Constant	-0.683***	-0.933***	-0.875***	-0.693***	-0.681***	-1.143***	-0.043
	(0.206)	(0.253)	(0.218)	(0.206)	(0.208)	(0.196)	(0.533)
Observations	4,525	4,525	4,525	4,525	4,525	4,525	4,104
R-squared	0.631	-	0.632	0.631	0.633	0.623	0.601
Sectoral dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes	No	No

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

Firm's labour demand is positively affected by the size of the host country's population and by its past growth performance, while we find a negative correlation between labour demand and size of the economy as proxied by the national GDP.

We also find evidence of a negative effect of corruption on number of employees. This result goes against the 'grease the wheels' hypothesis and may instead indicate a 'sand the wheels' effect of corruption.[11] On the contrary, a better business environment in the host country is associated with lower labour demand. Note that our proxy for business environment quality is based on the CPIA measure of enforcement of property rights and rule-based governance ratings. The recent work of Amendolagine et al. (2013), which uses the same database this paper draws on to investigate MNEs' demand for intermediate inputs in sub-Saharan African countries, suggests one possible interpretation of this finding. In their work, the authors find a negative effect of a weak business environment on local linkages generated by MNEs in Africa and explain this result by asserting that the 'boundaries' of firms tend to be more extensive in countries with a relative weak enforcement of property rights and, more generally, of business contracts (Antras, 2005) in order to internalize possible transaction costs. The same argument might explain the negative relation between quality of the business environment and labour demand, i.e. in weak institutional environments, the boundary of firms—and hence their size in terms of labour—tends to be large. We also find (weak) evidence that higher firing and hiring costs (i.e. minimum wages) are associated with lower labour demand.

Interestingly, our results are not consistent with the presumption that MNEs are relatively skill-intensive compared to domestic firms; in fact, foreign ownership is associated with a lower skill ratio (Models 1 and 2 in Table 5).[12] This result is in line with Lipsey and Sjöholm (2010) who examine changes in employment in Indonesian firms following foreign acquisitions and find that the acquisitions resulted in an increase in blue collar workers and a decrease in white collar workers. The findings reported in Model 3 reveal that the negative effect of foreign ownership is attributable to investors originating from other developing countries, while North MNEs do not significantly differ from domestic firms.

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[11] Mauro (1995) argues that corruption reduces investment across developing countries, thereby negatively affecting growth. This negative impact is confirmed by Wei (2000) with reference to foreign direct investment.

[12] Traditional trade theory suggests that FDI in developing countries with abundant low-skilled workers flow mainly to low-skill sectors such as garments and simple assembly operations. New trade models based on Heckscher-Ohlin consider cases in which transnational corporations transfer activities abroad, which are less skill-intensive compared to the home average but more skill-intensive compared to the host country average (Feenstra and Hanson, 1995). In addition, new trade models have been developed in which transnational corporations locate abroad because of firm-specific assets (typically based on intangible assets) and are assumed to be more skill-intensive than local firms (Markusen and Venables, 1997).

Foreign firms differ from domestic firms in terms of skill intensity also across sectors. In Model 4 we interact the *MNE* dummy with sectoral dummies: the results show that foreign firms in manufacturing (both in light and heavy industries) and in construction have a significantly lower skilled labour force.[13] No significant differences are found for firms operating in the primary/resource sector – which is relatively important in Sub-Saharan Africa – and in the service sector.

When the analysis is restricted to MNEs (Models 5 and 6), our results confirm that investors from the South, in particular Chinese and other sub-Saharan African investors, tend to require less skill-intensive workers. Stand-alone investors, i.e. foreign-owned firms that do not belong to a group, have a relatively lower skilled workforce. Moreover, we find that the presence of a local partnership is associated with a higher skilled workforce.

In our analysis, we control for the relative cost of skilled workers (skilled/unskilled wage ratio) and for the cost of capital (long-term interest rate). Both controls display negative coefficients. Not surprisingly, the larger the firm in terms of sales, the lower the skill ratio. More established and productive firms tend to have a higher skilled workforce. In line with this result is the positive and statistically significant coefficient of the dummy variable for multi-product firms; in fact, higher productive complexity requires a higher share of white collar workers. We do not find strong evidence of differences between exporters and non-exporters. Among the host country level covariates included in the analysis, it is interesting to note that a 10 percent change in GDP per capita is associated with an approximately 0.5 percent decrease in the skill ratio of the workforce. A good business environment—measured using an index of regulatory environment quality—leads to a relatively higher demand for skilled workers. We also find evidence that a higher minimum wage is associated with a lower skilled workforce for both domestic and foreign firms.

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[13] We are grateful to two anonymous referees for suggesting to investigate sectoral heterogeneity.

Table 5 Do MNEs demand more skilled workers?

Dependent variable: skill ratio (white collars over total employees)	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod. 5	Mod. 6
Skilled wage premium (ln)	-0.022***	-0.021***	-0.021***	-0.014**	-0.037***	-0.038***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)	(0.008)
Long term interest rate (ln)	-0.009	-0.011	-0.011	-0.018**	-0.008	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.012)	(0.013)
Firm sales (y; ln)	-0.017***	-0.016***	-0.016***	-0.012***	-0.016***	-0.016***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Firm age $_{t-1}$	0.001**	0.001**	0.001**	0.001**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Export status $_{t-1}$	-0.002	0.001	0.000	-0.018*	-0.011	-0.009
	(0.009)	(0.009)	(0.009)	(0.010)	(0.012)	(0.013)
Labour productivity $_{t-1}$ (ln)	0.033***	0.032***	0.032***	0.031***	0.034***	0.034***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)
Multiproduct_firm	0.018**	0.021***	0.020***	0.014*	0.040***	0.039***
	(0.007)	(0.008)	(0.008)	(0.008)	(0.011)	(0.011)
Stand-alone investor					-0.029***	-0.031***
					(0.011)	(0.011)
Local Partnership					0.036***	0.037***
					(0.013)	(0.012)
MNE	-0.015**	-0.018**				
	(0.008)	(0.008)				
North MNEs			-0.011			
			(0.010)			
South MNEs			-0.026***		-0.018	
			(0.009)		(0.011)	
Population (ln)		-0.009	-0.009	-0.013		
		(0.009)	(0.009)	(0.010)		
GDP per capita (ln)		-0.046***	-0.046***	-0.040***		
		(0.012)	(0.012)	(0.012)		
GDP growth rate		-0.024***	-0.023***	-0.025***		
		(0.003)	(0.003)	(0.004)		
Business environment quality 1		0.048***	0.049***	0.057***		
		(0.011)	(0.011)	(0.011)		
Firing costs		-0.009	-0.009	-0.022		
		(0.014)	(0.014)	(0.014)		
Minimum wage (ln)		-0.015***	-0.015***	-0.015***		
		(0.002)	(0.002)	(0.002)		
Primary				0.003		
				(0.023)		
Manufacturing - heavy industries				-0.017		
				(0.012)		
Construction				0.089***		
				(0.018)		
Services				0.045***		
				(0.012)		
MNE * Primary				-0.038		
				(0.030)		
MNE * Light manufacturing				-0.045***		
				(0.014)		
MNE * Manufacturing - heavy industries				-0.040***		
				(0.014)		
MNE * Construction				-0.080***		
				(0.027)		
MNE * Services				0.008		
				(0.015)		
China						-0.034*
						(0.020)
India						-0.003
						(0.015)
South Africa						-0.033
						(0.022)
SSA						-0.032*
						(0.017)
MENA						-0.004
						(0.022)
Other Asia						0.006
						(0.028)
Constant	0.365***	0.742***	0.735***	0.728***	0.309***	0.316***
	(0.058)	(0.102)	(0.102)	(0.103)	(0.089)	(0.089)
Observations	3,554	3,290	3,290	3,338	1,343	1,343
Sectors dummies	Yes	Yes	Yes	No	Yes	Yes
Country dummies	Yes	No	No	No	Yes	Yes
Only MNEs	No	No	No	No	Yes	Yes

Tobit estimates - Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

In sum, we can conclude that foreign firms in sub-Saharan Africa do not generate a significantly higher relative demand for skilled workers and, on the contrary, MNEs from the South demand, *ceteris paribus*, lower skilled workers, even compared with domestic enterprises.

Table 6 presents the estimation results of Equation (4) where the dependent variable is the average wage rate paid by the firm. The estimated coefficient of the variable MNE shows that foreign-owned firms pay a higher price for labour given the characteristics of the firms. Our results provide strong support for more generous wage policies offered by foreign firms, as they pay 15.7 percent more than domestic firms, on average, all else being equal. This result is in line with a substantial body of academic work which indicates that foreign firms pay higher wages than domestic firms in several developing countries (Aitken et al., 1996; te Velde and Morrisey, 2003; Lipsey and Sjöholm, 2004; Chen et al., 2005).

We further explore foreign firms' wage premium by distinguishing investors' country of origin, in particular "North" versus "South" origin. We find that MNEs from the North are associated with a higher wage than domestic firms, between 20 percent and 25 percent according to the empirical specification, while we do not find robust evidence of a wage premium for South-South FDI (Model 2 in Table 6). When considering the nation/geographical area of origin, it is interesting to note that, *ceteris paribus*, Chinese investors pay lower average wages than domestic ones (-46.5 percent, Model 3) and European and US firms (-61.7 percent, Model 4). To our knowledge, this is the first cross-country empirical study that highlights this characteristic of Chinese investment in Africa, which has already been observed in anecdotal evidence or case studies. Investors from other African countries or from the Middle East are associated with higher wages compared to domestic firms.

Looking at the other control variables, our results are mostly in line with those of existing empirical literature. The share of foreign workers (mostly expatriates) is positively correlated with average wage level: a 1 percent wage increase is associated with a higher wage premium of 0.3 percent (Model 2). Larger firms and/or those with a higher share of skilled labour have a higher average wage.

Table 6 Do MNEs pay higher wages than domestic firms in sub-Saharan Africa

Dependent variable: average wages	Mod. 1	Mod. 2	Mod. 2 - MM robust estimate	Mod. 3	Mod. 4
Firm sales (y; ln)	0.231***	0.232***	0.197***	0.230***	0.181***
	(0.011)	(0.011)	(0.008)	(0.011)	(0.022)
Firm age$_{t-1}$	0.002	0.001	0.003***	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Skill ratio	0.830***	0.823***	0.926***	0.814***	0.856***
	(0.067)	(0.067)	(0.055)	(0.067)	(0.118)
Foreign workers (share)	0.198	0.238	0.334**	0.310*	0.469*
	(0.180)	(0.181)	(0.138)	(0.184)	(0.240)
Female workers (share)	0.085	0.086	-0.054	0.103	0.032
	(0.091)	(0.091)	(0.070)	(0.091)	(0.152)
Export status$_{t-1}$	-0.238***	-0.245***	-0.144**	-0.223***	
	(0.081)	(0.080)	(0.057)	(0.080)	
MNE	0.157***				
	(0.038)				
North MNEs		0.257***	0.206***		
		(0.044)	(0.035)		
South MNEs		0.081*	0.053		
		(0.046)	(0.035)		
China				-0.465***	-0.617***
				(0.126)	(0.131)
India				0.111	-0.015
				(0.077)	(0.086)
South Africa				0.143*	0.058
				(0.086)	(0.091)
SSA				0.109*	-0.081
				(0.066)	(0.071)
MENA				0.245**	-0.080
				(0.106)	(0.112)
Other Asia				0.085	-0.094
				(0.187)	(0.187)
EU				0.255***	
				(0.046)	
North America				0.283***	
				(0.088)	
Other				0.513***	0.291*
				(0.151)	(0.160)
Horizontal FDI					-0.016
					(0.055)
Stand-alone investor					-0.095*
					(0.055)
Local Partnership					0.033
					(0.061)
Constant	4.091***	4.097***	4.789***	4.096***	4.877***
	(0.269)	(0.273)	(0.200)	(0.272)	(0.582)
Observations	4,501	4,501	4,501	4,501	1,887
R-squared	0.343	0.346	-	0.351	0.330
Sectors dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Only MNEs	No	No	No	No	Yes

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

One result worth highlighting is the negative exporters' wage premiums; we find that, *ceteris paribus*, exporting firms pay wages that are between 14 percent and 24 percent lower than those of non-exporting firms. Shank et al. (2007) have recently challenged conventional wisdom (see Bernard and Jensen, 1995 and subsequent literature) of higher wages being paid by exporting companies, using German employer-employee linked data. Fafchamps (2009), who uses data on Moroccon firms, finds no evidence of exporters' wage premiums for educated workers. Fu and Wu (2013) find a negative exporters' wage premium in Guandong province.[14]

Is the foreign wage premium different for skilled and unskilled workers? Estimates presented in Tables 7 and 8 suggest that MNEs pay significantly higher wages for skilled workers (on average, 18 percent more after controlling for a large set of firm characteristics), while the wage premium shrinks to 8.2 percent for unskilled workers. A considerable difference emerges when considering the investors' origin. MNEs from the North are associated with larger wage premiums compared to MNEs from the South. Specifically, Chinese firms investing in sub-Saharan Africa are associated with a negative wage premium for skilled workers: -21.3 percent compared to domestic firms and -40 percent compared to firms from the EU and USA. For unskilled workers, the wage gap is persistently negative but on a smaller scare, namely -10 percent compared to domestic firms and -14 percent compared to those from the EU and USA. Note also that investors of Indian origin and those from other sub-Saharan African countries pay higher wages to skilled workers, but not to unskilled ones.

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[14] Note that our results explicitly take into account the fact that exporters in sub-Saharan Africa tend to be larger firms, less skill-intensive and operate in industries with lower productivity.

Table 7 Do MNEs pay higher wages than domestic firms in sub-Saharan Africa?

Dependent variable: skilled workers average wage	Mod. 1	Mod. 2	Mod. 3	Mod. 4
Firm sales (y; ln)	0.145***	0.147***	0.145***	0.106***
	(0.007)	(0.007)	(0.007)	(0.012)
Firm age$_{-1}$	0.003***	0.003***	0.003***	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Skill ratio	0.105*	0.101*	0.099*	0.020
	(0.059)	(0.059)	(0.059)	(0.098)
Foreign workers (share)	0.361**	0.427***	0.472***	0.327*
	(0.149)	(0.149)	(0.152)	(0.180)
Female workers (share)	0.051	0.052	0.054	-0.122
	(0.072)	(0.072)	(0.072)	(0.113)
Export status$_{-1}$	-0.010	-0.009	0.003	
	(0.056)	(0.056)	(0.055)	
MNE	0.184***			
	(0.032)			
North MNE		0.214***		
		(0.039)		
South MNE		0.122***		
		(0.036)		
China			-0.213***	-0.404***
			(0.082)	(0.089)
India			0.158***	-0.062
			(0.054)	(0.060)
South Africa			0.328***	0.161**
			(0.066)	(0.074)
SSA			0.124**	-0.120*
			(0.058)	(0.064)
MENA			0.103	-0.100
			(0.078)	(0.095)
Other Asia			0.121	-0.122
			(0.103)	(0.103)
EU			0.193***	
			(0.039)	
North America			0.342***	
			(0.114)	
Other			0.580***	0.347
			(0.210)	(0.221)
Horizontal FDI				0.059
				(0.041)
Stand-alone investor				-0.190***
				(0.044)
Local partnership				-0.027
				(0.050)
Constant	3.570***	3.566***	3.592***	4.484***
	(0.179)	(0.180)	(0.180)	(0.273)
Observations	4,333	4,333	4,333	1,833
R-squared	0.352	0.352	0.357	0.293
Sectors dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Only MNEs	No	No	No	Yes

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

Table 8 Do MNEs pay higher wages than domestic firms in sub-Saharan Africa?

Dependent variable: unskilled workers average wage	Mod. 1	Mod. 2	Mod. 3	Mod. 4
Firm sales (y; ln)	0.083***	0.084***	0.083***	0.069***
	(0.006)	(0.006)	(0.006)	(0.010)
Firm age$_{t-1}$	0.002**	0.001**	0.001**	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Skill ratio	0.212***	0.205***	0.204***	0.374***
	(0.052)	(0.052)	(0.053)	(0.087)
Foreign workers (share)	0.163	0.235	0.276*	0.356*
	(0.164)	(0.165)	(0.167)	(0.191)
Female workers (share)	-0.195***	-0.196***	-0.193***	-0.346***
	(0.050)	(0.050)	(0.051)	(0.081)
Export status$_{t-1}$	-0.046	-0.050	-0.047	
	(0.043)	(0.043)	(0.043)	
MNE	0.082***			
	(0.024)			
North MNE		0.134***		
		(0.028)		
South MNE		0.021		
		(0.028)		
China			-0.099*	-0.140*
			(0.058)	(0.074)
India			0.015	-0.059
			(0.043)	(0.045)
South Africa			0.186***	0.109*
			(0.061)	(0.066)
SSA			0.001	-0.096*
			(0.048)	(0.050)
MENA			0.039	-0.061
			(0.063)	(0.062)
Other Asia			-0.014	-0.080
			(0.067)	(0.065)
EU			0.122***	
			(0.029)	
North America			0.196**	
			(0.077)	
Other			0.195*	0.100
			(0.109)	(0.115)
Horizontal FDI				-0.038
				(0.033)
Stand-alone investor				-0.102***
				(0.033)
Local partnership				-0.010
				(0.036)
Constant	3.438***	3.440***	3.458***	3.749***
	(0.121)	(0.124)	(0.123)	(0.198)
Observations	3,676	3,676	3,676	1,548
R-squared	0.383	0.385	0.388	0.397
Sectors dummies	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes
Only MNEs	No	No	No	Yes

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

5 Conclusions

This paper has analysed the relationship between foreign ownership and employment at the firm level providing a cross-country perspective in the context of sub-Saharan Africa. This research topic has high policy relevance, since the data on employment in sub-Saharan Africa show that there is an urgent need for job creation, in particular 'good' jobs. Indeed, the generation of 'good' jobs and economic development are closely connected.

Our results suggest that foreign-owned firms create more jobs than domestic ones, even if the employment generated is relatively less skill-intensive. They also confirm the existence of a foreign wage premium in developing countries, since MNEs adopt generous wage policies. Moreover, we find that nationality of ownership does matter for labour demand and wage premium. Indeed, there are substantial differences between investors from developed countries and those from other developing countries both in terms of skill intensity of the employment generated and of wage premium. In particular, MNEs from the South are associated with lower skilled employment; while MNEs from the North are connected with larger wage premiums.

Notably, we find that, *ceteris paribus*, Chinese firms employ more workers (mostly blue collar workers) and pay lower wages for both skilled and unskilled workers compared to both domestic firms and other foreign investors.

Table 9 Variable definitions and descriptive statistics

Variable name	Description	Data source	Mean	Std. Dev.
Number of workers (ln)	Number of employees (ln)	AIS 2010 - UNIDO	3.74	1.39
Skill ratio	Share of white collars in total firm-level workforce	AIS 2010 - UNIDO	0.41	0.28
Foreign workers (share)	Share of foreign workers in total firm-level workforce	AIS 2010 - UNIDO	0.05	0.10
Female workers (share)	Share of female workers in total firm-level workforce	AIS 2010 - UNIDO	0.26	0.22
Unit labour cost (ln)	Average labour costs computed as total wage bill divided by the number of workers	AIS 2010 - UNIDO	7.89	1.31
Skilled workers average wages	Average monthly wage of technical/supervisory/managerial workers (ln)	AIS 2010 - UNIDO	6.05	1.02
Unskilled workers average wages	Average monthly wage of production and manual workers (ln)	AIS 2010 - UNIDO	4.91	0.73
Skilled wage premium (ln)	Relative wages of skilled workers (skilled/unskilled average wage ratio; ln)	AIS 2010 - UNIDO	1.07	0.65
Long term interest rate (ln)	Interest rate paid on long-term credits (ln)	AIS 2010 - UNIDO	2.61	0.48
Firm sales (y; ln)	Total annual sales in the last financial year (ln)	AIS 2010 - UNIDO	13.78	2.25
Firm age $_{t-1}$	Number of years since the company started operations	AIS 2010 - UNIDO	16.28	15.19
Export status $_{t-1}$	Variable equal to 1 if the firm is an exporter at time t-1 and 0 otherwise	AIS 2010 - UNIDO	0.22	0.41
Labour productivity $_{t-1}$ (ln)	Labour productivity measured as total annual sales in the previous financial year per employee (ln)	AIS 2010 - UNIDO	9.90	1.67
Multiproduct_firm	Variable equal to 1 if the firm is producing multiple products and 0 otherwise	AIS 2010 - UNIDO	0.66	0.47
Horizontal FDI	Variable equal to 1 if the host-country market is a very important or crucial localization factor for the foreign investor and 0 otherwise	AIS 2010 - UNIDO	0.57	0.49
Stand-alone investor	Variable equal to 1 if the foreign investor is not part of a family or business group and 0 otherwise	AIS 2010 - UNIDO	0.44	0.49
Local Partnership	Variable equal to 1 if the foreign investor has a local partnership / joint-venture and 0 otherwise	AIS 2010 - UNIDO	0.23	0.43
MNE	Variable equal to 1 if the firm is owned by a foreign investor 0 otherwise	AIS 2010 - UNIDO	0.37	0.48
North MNE	Variable equal to 1 if the foreign investor source country is a developed country 0 otherwise	AIS 2010 - UNIDO	0.17	0.38
South MNE	Variable equal to 1 if the foreign investor source country is an emerging/developing country 0 otherwise	AIS 2010 - UNIDO	0.19	0.39
China	Variable equal to 1 if the foreign investor source country is China 0 otherwise	AIS 2010 - UNIDO	0.07	0.25
India	Variable equal to 1 if the foreign investor source country is India 0 otherwise	AIS 2010 - UNIDO	0.13	0.33
South Africa	Variable equal to 1 if the foreign investor source country is South Africa 0 otherwise	AIS 2010 - UNIDO	0.07	0.25
SSA	Variable equal to 1 if the foreign investor source country is another sub-Saharan African country 0 otherwise	AIS 2010 - UNIDO	0.15	0.35
MENA	Variable equal to 1 if the foreign investor source country belongs to Middle-East and North Africa 0 otherwise	AIS 2010 - UNIDO	0.07	0.26
Other Asia	Variable equal to 1 if the foreign investor source country is another Asian country 0 otherwise	AIS 2010 - UNIDO	0.03	0.17
EU	Variable equal to 1 if the foreign investor source country is from the EU 0 otherwise	AIS 2010 - UNIDO	0.38	0.48
North America	Variable equal to 1 if the foreign investor source country is North America 0 otherwise	AIS 2010 - UNIDO	0.05	0.22
Population (ln)	Population in 2008; ln	World Development Indicators - World Bank	10.03	1.30
GDP ppp (ln)	GDP in 2008 (PPP; ln)	World Development Indicators - World Bank	10.27	1.25
GDP growth rate	Growth rate of GDP in the past five years	World Development Indicators - World Bank	6.71	2.12
Corruption	Firms are expected to give gifts in meeting with tax officials (% of firms)	World Development Indicators - World Bank	15.73	9.71
Business Environment quality 1	CPIA Business regulatory environment rating (1: low; 6: high)	World Development Indicators - World Bank	3.52	0.41
Business Environment quality 2	CPIA Property-rights and rule-based governance rating (1: low; 6: high)	World Development Indicators - World Bank	3.16	0.46
Firing costs	Firing costs - weeks of salary paid by the employer after 1 year of job (2010)	World Bank - IFI, Doing Business Database	1.87	0.34
Minimum wage (ln)	Minimum wage in US $ per year (2005; ln)	World Bank - IFI, Doing Business Database	4.06	3.31
Primary	Dummy variable equal 1 for firm operating in the agriculture, farming and mining sector	AIS 2010 - UNIDO	0.05	0.21
Light manufacturing	Dummy variable equal 1 for firm operating in the following sectors: food, beverages and tobacco; textiles, garnments, leather; wood, wood-products and furniture; paper, publishing and printing	AIS 2010 - UNIDO	0.27	0.44
Manufacturing - heavy industries	Dummy variable equal 1 for firm operating in the following sectors: coke, refined petroleum, chemicals, plastics; basic metals and fabricated metal products; electro-mechanical machinery and equipment; motor vehicles, trailers and other transport equipment	AIS 2010 - UNIDO	0.21	0.41
Construction	Dummy variable equal 1 for firm operating in the construction sector	AIS 2010 - UNIDO	0.07	0.26
Services	Dummy variable equal 1 for firm operating in the service sector	AIS 2010 - UNIDO	0.35	0.47

WDI retreived at http://data.worldbank.org/data-catalog/world-development-indicators)

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