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New survey evidence
from Ethiopia and
Ghana**



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ABSTRACT

WHAT ROLE FOR CHINESE FDI IN AFRICA? NEW SURVEY EVIDENCE FROM ETHIOPIA AND GHANA

Charles Ackah, Alemayehu Geda, Holger Görg and Federico Merchan*

Foreign investments bring in not only new employment but also novel technology, managerial skill and know-how, that may also dissipate into the local economy. It is not clear whether this effect differs by the nationality of source countries, in particular between Chinese and non-Chinese firms. Based on a firm level survey on Ethiopia and Ghana, we found that all types of firms are engaged in limited R&D and innovation activity and their transfer to host countries in both countries. There is little difference between Chinese and non-Chinese foreign firms in such technology and managerial skill transfer once controlling for firm size and industry characteristics in the majority of metrics (R&D activities, horizontal & vertical spillover, directly adopting techniques). However, we found for Ghana that Chinese firms have more suppliers but are less likely to transfer technology to them. Chinese firms are more likely to transfer managerial skills than non-Chinese firms in Ghana though not in Ethiopia. Also, there is little evidence that foreign firms transfer technology via horizontal or backward spillovers in either countries. Finally, Chinese firms are much more likely to receive host country policy support than other foreign firms in Ghana but not in Ethiopia.

Keywords: Foreign direct investment, China, Africa, technological transfer, Ethiopia, Ghana

JEL Classification: F2, O1, O3

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1 Introduction

Attracting foreign direct investment (FDI) is high on the policy agenda for many countries. This policy focus is generally justified by the idea that investments by foreign firms bring in not only new employment opportunities but also novel technology and know-how, that may also dissipate into the local economy and thus foster growth. This is based on theoretical models of multinationals which argue that foreign firms need some technology advantage in order to be able to compete successfully with local firms (e.g., Markusen, 2002; Helpman et al., 2004). There is plenty of evidence from various host countries in line with this theoretical idea showing that foreign firms are indeed more productive and technology intensive than local firms, and there have also been substantial efforts in the literature to make a fairly convincing case that this is a causal relationship (e.g., Girma and Görg, 2007; Arnold and Javorcik, 2009; Bertrand, 2009; Girma et al., 2015). Moreover, there is also evidence to show that the presence of foreign firms may indeed have positive growth effects on the local economy through so-called productivity spillovers (e.g., Görg and Greenaway, 2004; Smeets, 2008; Havranek and Irsova, 2011).

What has been less explored in the literature is the question as to whether the actual nationality of ownership also plays a role. Do multinationals from all countries fit this pattern, or are foreign affiliates from some countries “better” than others – in the sense of providing more technology and productivity benefits? This is an important issue since, at least in Western countries, a discussion has come up recently about multinationals from one particular home country: China. With the announcement of the Chinese Belt and Road Initiative in 2013, and China’s assumption of a stronger (and from a Western point of view more controversial) geopolitical position in recent years, there have been heated political discussions and public debates in Western countries questioning China’s political motivations for such foreign direct investments.

As of yet, however, there seems to be remarkably little evidence to substantiate the claim that China’s overseas investments are largely politically motivated and may not bring economic benefits to the host country. In this paper we set out to provide a first bit of evidence on this issue, zooming in on two African economies, Ethiopia and Ghana. We focus on the African continent, as this has also been a policy focus of Chinese investments since the beginning of the 2000s (Zhang and Tao, 2020). Within Africa, Ethiopia and Ghana are two of the most important host countries for Chinese investments, ranking fourth and sixth, respectively, in terms of the number of investments received between 2004 and 2014 (Xia and Liu, 2022).

We use information from a recently carried out company survey in the two countries, where we surveyed 111 and 406 foreign firms in Ethiopia and Ghana, respectively, in 2022. We report on characteristics related to technology use and potential contacts of foreign owned firms with the local economy. Our detailed survey evidence thus complements existing studies on productivity spillovers from FDI in African economies (e.g., Abebe et al. 2018; Abegaz and Lahiri, 2021 for Ethiopia; Görg and Strobl, 2005 and Waldkirch and Ofori, 2010 for Ghana), providing much more detail on exact channels and allowing us to distinguish nationality of ownership. It is important to point out that we are not on a quest to establish causality, this would be near impossible with the survey data at hand. Rather, we aim to provide some first stylized facts on differences and similarities between Chinese and other foreign affiliates in two African economies.

Overall, to pre-empt our findings, we find little difference between Chinese and non-Chinese foreign firms in such technology and managerial skill transfer to host country once controlling for firm size and

industry characteristic in the majority of metrics (R&D activities, horizontal & vertical spillover, directly adopting techniques etc) we used for assessment. However, we found for Ghana that Chinese firms have more suppliers but are less likely to transfer technology to them while they do make such knowhow transfer to their supplier in Ethiopia. Chinese firms are statistically more likely to try transferring managerial skills than non-Chinese firms in Ghana though this is not the case in Ethiopia. Also, there is little evidence that foreign firms (both Chinese and non-Chinese) transfer technology via horizontal or backward spillovers in either countries. Finally, Chinese firms are much more likely to receive host country policy support than other foreign firms in Ghana but not in Ethiopia.

2 Details of the survey

As there is a dearth of data providing detailed information on activities of multinationals in African economies, and nationality differences across foreign investors, we carried out company surveys in 2022 in Ethiopia and Ghana.¹

The survey successfully interviewed 406 foreign firms in Ghana. The firms were sampled from 2,758 firms that registered with the Ghana Investment Promotion Centre from 2010 to 2019. These firms were either wholly-owned Chinese firms or other foreign-owned with no Chinese stake. We supplemented the GIPC database with the Ghana Integrated Business Survey (IBES II). The IBES II survey had a total of 646 multinational companies (MNCs) located in the Greater Accra, Ashanti and Western Regions were sampled for this survey. This is in keeping with the geographical concentration of MNCs in Ghana.

All firms which had direct investment from China together with other countries were excluded to avoid contamination. There were 15 of such firms in the GIPC data. All the wholly owned Chinese firms in Ashanti and Western regions were sampled since there were fewer firms from these two regions.

Proportionate sampling was carried out with the aim of targeting a total sample of 500 firms. Firms were selected randomly from these sampling frames and were invited by telephone to join the survey by a recruitment team based at the University of Ghana. This approach helped to ensure that the survey provides a representative view of the Ghanaian economy. Once firms are part of the survey they are assigned to a trained interviewer. An appointment is booked with an interviewer via phone and an onsite interview is scheduled with the survey personnel at the site of the firm. When the interviewer contacts firms they ask to speak to the CEO or CFO; these are believed to have a very good sense of the overall direction and performance of the business.

The survey design was similar in Ethiopia, however, identifying a sample of firms to be interviewed turned out to be much more challenging. According to the Ethiopian Investment Commission (2015; 2022), the total number of foreign firms, including Chinese firms, that have invested in Ethiopia between 2001 and May 2022 is 3,061. These firms are involved in different stages (pre-implementation, implementation, and operational stages). Those in operation are 1,739 (57 percent.). All Chinese firms engaged in the country that are licensed since 2001 and engaged at different stages of investment are 1,064, with those at the operation stage being 695 (65.3 percent). In addition, since

¹ An exception is the UNIDO Africa Investor Survey 2010, which provides cross-section firm level data for 19 African countries in 2010. This data has been used in, e.g., Amendolagine et al. (2013), Boly et al. (2014) and Gold et al. (2017). The data are not comprehensive enough, however, to allow looking at Chinese vs. other home countries.

2001, there are 210 Chinese Joint Ventures with either domestic or other foreign firms, of which 128 are in operation (EIC, 2015, 2022; Yimer, 2022; Geda and Legesse, 2022).

Notwithstanding this number of Chinese firms (about 823 in operation), our fieldwork and examination informed us that registered figures in the Ethiopian investment office might not show the real number of Chinese or other foreign firms in the country. The Investment Authority does not know whether all registered firms are on the ground. Our survey team also believes that about half of the firms might have left the country (though this is just an educated guess, and we do not have concreate data).²

Eventually, the survey team covered 111 FDI firms, including 44 Chinese firms (46 when Hong Kong is included). Six of the nine principal Ethiopian shareholder-owned firms also work with Chinese Firms. This makes China-related firms 52 (i.e., 46+6=52). The remaining foreign firms surveyed are from the rest of the world.³ The data was collected in November and December 2022, with assistance from national-level relevant institutions (the Ethiopian Investment Commission and Ministry of Industry).

In both countries, the survey instrument was administered using tablets. The interviews were conducted in person by trained field enumerators who visited the firms. All interviews were face-to-face. The respondents were mostly owners, managers, and senior accountants / administrators of the businesses.

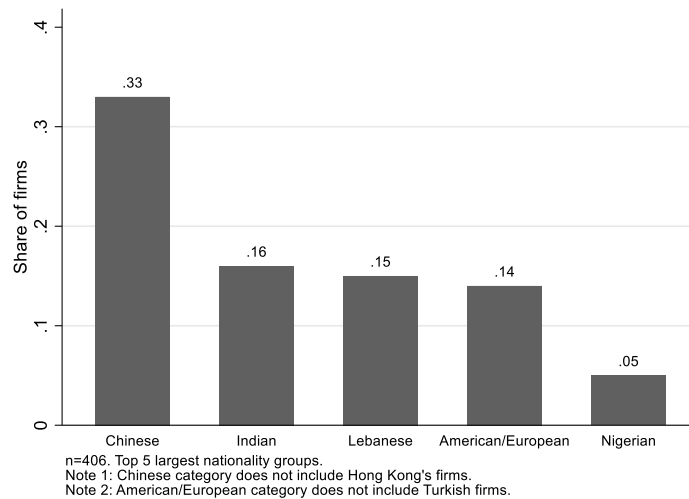
Figure 1 shows the distribution of surveyed firms across owner nationalities. Among non-Chinese firms, Indian firms are the second most important nationality group in the surveys in both countries. Since there is no single country in Europe or North America that is dominant, we group European and North American firms into one. Together they account for 14 and 6 percent of foreign firms in Ghana and Ethiopia, respectively..

Figure 1. Largest shareholder’s nationality (Ghana and Ethiopia)

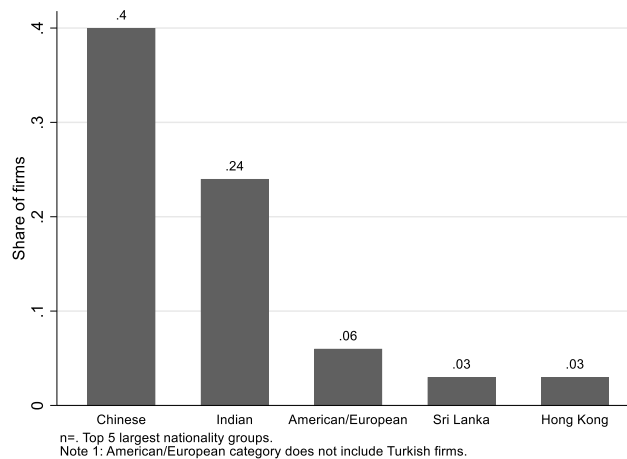
A. Ghana

² A similar problem was encountered in 2009, when Alemayehu Geda and his team carried out an earlier survey of foreign investors. In the 2009 survey, they managed to get the address of about 100 Chinese firms from the Investment Authority but found only 35 on the ground. The lack of continuous monitoring of foreign firms by the Investment Authority is a major weakness for our analysis.

³ In addition to FDI firms, 87 domestic manufacturing firms were also surveyed. This data is not used in this paper.



B. Ethiopia



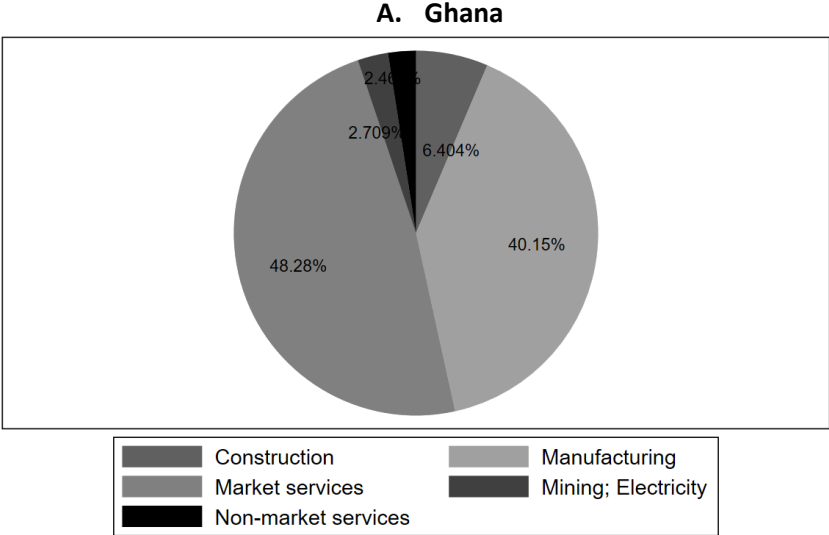
Regarding the industrial composition, Figure 2 shows that 98 percent of the Ethiopian firms belong to the manufacturing sector. By contrast, the Ghanaian industrial composition is more diverse including services, and the manufacturing sector represents only 40 percent of firms.

The overall distribution across more disaggregated sectors, and differences between Chinese and non-Chinese firms, are shown in Appendix A1. This shows for Ghana that, in terms of numbers of interviewed firms, the three most relevant subsectors are: “wholesale trade and commission trade, except of motor vehicles and motorcycles” (15 percent), “hotels and restaurants” (10 percent) and “manufacture of rubber and plastics products” (8 percent). There is one striking difference between Chinese and non-Chinese firms: 9 percent of non-chinese firms operate in the “Transport, storage and communications” sector while there are no Chinese firms in that sub-sector. Also, overall, Chinese firms are more likely to operate in the manufacturing sector than non-chinese firms (47 and 37 percent of firms, respectively).

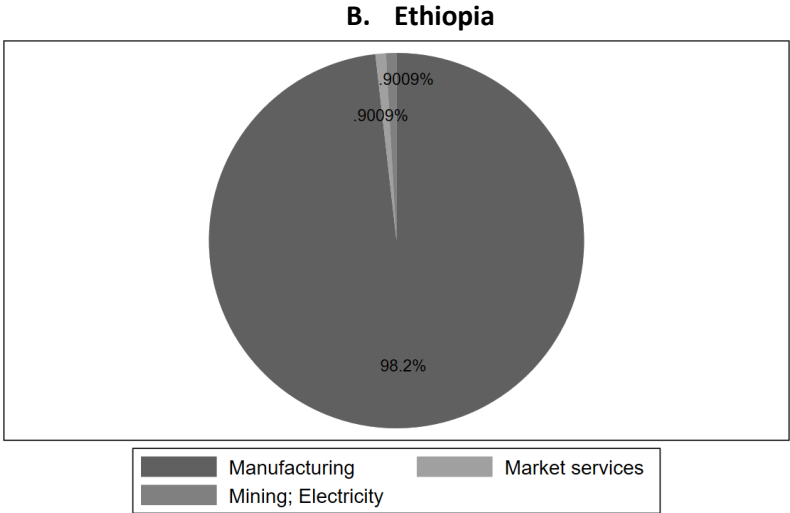
In Ethiopia, the three most relevant subsectors are: “manufacturing of wearing apparel” (35 percent), “manufacture of food products” (13 percent), and “manufacture of rubber and plastic products” (9 percent). Additionally, Chinese firms are more likely to operate in “manufacture of textiles” and

“manufacture of wearing apparel” subsectors and less likely to be in “manufacture of food products” and “manufacture of rubber and plastic products”.

Figure 2. Firms by industry, ISIC broad sector, (Ghana and Ethiopia)



n=406
 Mining; Electricity include: Mining, quarrying, electricity, gas and water supply
 Market services include: Trade, transportation, accommodation and food, and business and administrative services
 Non-market services: Public administration, community, social and other services and activities



n=111
 Mining; Electricity include: Mining, quarrying, electricity, gas and water supply
 Market services include: Trade, transportation, accommodation and food, and business and administrative services
 Non-market services: Public administration, community, social and other services and activities

Note: ISIC Broad sector definition taken from: [International Standard Industrial Classification of All Economic Activities \(ISIC\) - ILOSTAT](#)

Table 1 looks at average employment size of the surveyed firms, distinguishing Chinese and non-Chinese firms. Two points are of note: Firstly, the average firm in Ethiopia is about six times as large as the representative firm in Ghana. Secondly, Chinese firms in both countries are on average substantially smaller than non-Chinese firms.

Table 1. Descriptive statistics employment (Ghana and Ethiopia)

A. Ghana							
	Mean	Standard deviation	Median	Min	Max	N	F-test*
Chinese	46.2	91.9	17.5	3	720	135	
American/European	140.9	553.8	41.3	2	4070	55	F(2,355)=11.91,
Other	123.7	320.5	36.5	1	3500	215	Prob>F=0.000
<i>Whole sample</i>	<i>100.2</i>	<i>315.8</i>	<i>30.0</i>	<i>1</i>	<i>4070</i>	<i>405</i>	
B. Ethiopia							
	Mean	Standard deviation	Median	Min	Max	N	F-test*
Chinese	451.0	769.4	138.5	13	3516	40	
Other	761.8	1418.8	223.5	20	7242.5	59	F(2,83) = 6.45,
American/European	183.9	384.2	30.3	12.5	968	6	Prob>F=0.002
<i>Whole sample</i>	<i>610.4</i>	<i>1176.8</i>	<i>171.2</i>	<i>12.5</i>	<i>7242.5</i>	<i>105</i>	

Note: Simple average per firm. The questionnaires recollect employment information from 2018 to 2021, but only one observation per firm -simple average across years- is included. * The F-test indicates if FDI source dummies' coefficients are jointly statistically different from 0 in an employment regression controlling for industry fixed effects. That is, the next regression is estimated: $\ln L_{fi} = \beta_0 + \beta_1 \text{Chinese FDI}_{fi} + \beta_2 \text{American/European FDI}_{fi} + \delta_i + \varepsilon_{fi}$, where i denotes industry (ISIC 3 Rev – 2 digits for Ghana and ISIC 4 Rev – 2 digits for Ethiopia). Then, it is tested through an F-test that $\hat{\beta}_1 = \hat{\beta}_2 = 0$.

A criticism frequently voiced in the public debates on Chinese FDI is that Chinese firms tend to bring their own staff and only provide limited employment opportunities for the host country. In order to look into this, we report in Table 2 the breakdown of the labour force by nationality, distinguishing also between management and other workers. The table reports simple means for Chinese and non-Chinese foreign owned firms in columns (1) – (3) and (7) – (9) for Ghana and Ethiopia respectively. In column (4) to (5) and (10) to (11) we report coefficients on a Chinese ownership dummy and a dummy on American/European firms from a regression of the share of local workers on these two dummies, controlling also for (log) employment size and industry fixed effects, to allow for heterogeneity related to firm size and industry and unrelated to ownership. The results thus allow us to see whether the values are statistically significantly different for Chinese and American/European firms compared to other nationalities.

The simple averages in row 1 of Table 2 show that the share of host country national workers in Chinese firms is somewhat lower than in non-Chinese firms in Ghana, where it stands at 79 compared to 95 and 86 percent for American/European firms and firms from other countries (columns 1 to 3). The regression results, returning a positive coefficient for American/European ownership and an insignificant coefficient for the China dummy, indicate, however, that controlling for size and industry, Chinese firms do not have lower shares of national workers than other firms, except those from America/Europe. The latter have the highest share, as indicated by the positive regression coefficient.

The difference between Chinese and American/European workforce composition becomes even more pronounced when looking at management workers in row 2 of Table 2. Both from the simple means and the regression results it is clear that Chinese firms have substantially lower shares of local management than firms from other nationalities, particularly compared to American/European firms.

The picture for the local workforce looks different in Ethiopia, where we do not see any difference between Chinese and other foreign firms. Unfortunately, only few firms answered the question on management in the Ethiopian survey, hence no results are reported in row 2.

[Insert Table 2 here]

We calculate total factor productivity (TFP) as an indicator of production technology used in the foreign firms. Details for the TFP estimation can be found in Appendix A3. Table 3 reports again simple means for Chinese and non-Chinese foreign owned firms in columns (1) – (3) and (7) – (9) for Ghana and Ethiopia respectively, and regression coefficients on a China and America/Europe dummy in columns (4) to (5) respectively (10) to (11). Results indicate that there is no discernible difference in estimated TFP between Chinese and non-American/European firms in either country. Interestingly, American/European firms have higher TFP than other foreign firms in Ghana, but lower TFP than others in Ethiopia. This, however, is only true for one measure of TFP but is not robust to another measurement.

[Insert Table 3 here]

3 Stylized Facts on foreign investors in Ethiopia and Ghana

Technology and innovation

We report survey responses to technology related issues in Table 4. As above, we report for each variable simple means for Chinese, American/European and non-Chinese foreign owned firms, as well as regression coefficients on a Chinese and American/European ownership dummy from a regression controlling also for employment size and industry fixed effects.

We start off by looking at R&D activity in foreign owned firms, as R&D is an important input into the innovation process and a determinant of technology. Table 4 shows that in Ghana, only 18 percent of Chinese foreign firms have in-house R&D activities (column 1), while 28 and 30 percent of American/European and other foreign firms, respectively, do (columns 2 and 3). These shares are fairly similar in Ethiopia, where 14 percent of Chinese (column 7) and 20 respectively 31 percent of American/European and other foreign firms (columns 8 and 9) report to have carried out their own R&D. This points to a substantial difference between Chinese and non-Chinese foreign firms. However, once we control for firm employment size, and also allow for the fact that industries are different (by including industry fixed effects) in a regression analysis, we find no statistically significant difference between Chinese and non-Chinese firms (columns 3 and 6) in either country. In other words, the apparent lower R&D activity in Chinese firms in both countries can be explained by differences in firm size (Chinese firms are smaller in employment terms in both countries) and by industry characteristics, and is not due to genuine nationality differences.

A somewhat similar picture emerges when looking at an important output of the innovation process, namely patenting. In Ghana, more than 30 percent of non-Chinese foreign firms hold nationally or internationally recognised patents, while only 19 percent of Chinese firms do. In Ethiopia, only 8 percent of Chinese firms report patenting activity, while 16 percent of non-Chinese foreign firms do. However, this difference between Chinese and other investors can again all be explained by size and industry differences. The regression analysis shows that, once controlling for these two aspects, there is no significant difference in terms of patenting activity between the two nationality groupings in either country.

Another aspect of innovation activity relates to upgrading of production technology. Table 4 shows that about a quarter of both Chinese and non-Chinese firms report to have introduced new production technologies in their affiliates in Ghana. In Ethiopia, around a third of Chinese firms have done so, while 60 percent of American/European and almost half of other foreign firms claim to have introduced

new technologies or production processes. These differences, however, do again not hold in the regression analysis.

For any learning or technology transfer to take place between foreign firms and the local economy, links with domestic suppliers are important (Javorcik, 2004, 2008; Godart and Görg, 2013). An interesting pattern of Chinese firms with Ghanaian suppliers emerges from the data: Chinese firms buy from more local suppliers than non-Chinese firms, as indicated by the statistically significant and positive coefficient on the China dummy. However, when it comes to technology transfer, Chinese firms are not statistically significantly different from other non-American/European firms. However, American and European firms are much more likely to transfer technology to their suppliers: around 1 percent of Chinese firms report direct technology transfer to their suppliers, while 13 percent of American/European firms do. These differences hold in the regression analysis. This finding suggests that Chinese firms are more likely to boost the Ghanaian economy through the demand for raw materials, intermediates and finished goods from a larger quantity of suppliers than non-Chinese firms, but are, at the same time, less likely to engage in technological transfer to their suppliers in those transactions.

This pattern does not occur in Ethiopia, where we do not find any statistically significant differences between Chinese and non-Chinese foreign firms.

Considering technology transfer in a more general way, not just to suppliers but also other firms, Table 4 shows that around one-third of firms have observed local firms attempting to directly adopt production or process techniques from foreign affiliates in Ghana, while only 6 to 11 percent of firms report this 'learning by doing' transmission mechanism in Ethiopia. As there is no statistically significant difference between Chinese and non-Chinese firms in either country, there is no evidence that technological transfer through horizontal spillovers by Chinese firms is larger than technological transfer through horizontal spillovers by non-Chinese firms.

One additional potential transmission channel of foreign firm's technology to the local economy is through forward spillovers. Table 4 indicates that there is no statistical difference either in the number of customers between Chinese and non-Chinese firms or in the percentage of firms that transfer technology to those customers. However, Chinese firms are statistically significantly less likely to have an internationally recognized quality certification (e.g. ISO 9000, ISO 14000) for its main production compared to non-Chinese firms in both countries. Therefore, technology used by Chinese firms may be of lower standard than that of their non-Chinese counterparts, which may explain why there is less technology transfer to local suppliers.

[Insert Table 4 here]

Managerial skill

While we have thus far focused on production technology and processes, and the possible transfer thereof, multinationals may also benefit the local economy by bringing in new management techniques. These may then also be adopted by local firms (Markusen, 2002; Fu, 2012). In table 5, we see that a non-negligible number of firms in both countries report that they introduced new management processes in their affiliates: about 18-19 percent of Chinese multinationals compared to 20-44 percent in non-Chinese multinationals. Controlling for employment and industry heterogeneity,

however, table 3 shows that this difference in the simple means is not driven by nationality per se but by differences in these observable characteristics.

In a similar vein, we also look at respondents' answers to the question whether or not affiliates undertake R&D related to management activities and if they made an attempt to transfer managerial skills to local firms. Between 9 and 25 percent of firms in the nationality groups respond positively to this question. There appear, however, not to be any statistically significant differences between Chinese and other foreign firms.

By contrast, the regression results show that Chinese firms are statistically more likely to try transferring managerial skills than non-Chinese firms in Ghana (around 29 percent of Chinese firms report efforts at managerial skill transfer). This is not the case in Ethiopia, however, where we do not find any statistically significant differences in that regard.

[Insert Table 5 here]

Government policy

As pointed out in the Introduction, many governments actively use policy initiatives to try and attract inward FDI, or encourage outward FDI by their own firms. We now turn to this issue in this section. Table 6 shows that only a fairly small fraction of firms (between 4 – 14 percent) in the two countries report that they received policy support from their own government in terms of financial or fiscal incentives. The share is particularly small for non-Chinese firms in Ghana. In the regression analysis, we also find that Chinese firms in Ghana are more likely to receive support than other foreign firms from other countries. This is, however, not the case in Ethiopia, where we do not find any significant difference between the two nationality groupings.

Interestingly, only a small fraction of firms in Ghana also reports to have received support from the Ghanaian government, and here again we find that Chinese firms are more likely to have received such support, even when controlling for size and industry differences. In Ethiopia, a higher percentage of firms received support from the host government (61 percent for Chinese, and 40 respectively 32 for American/European and other foreign). However, there is no significant difference between Chinese and other foreign firms.

[Insert Table 6 here]

Although Chinese firms receive more support from the host government in Ghana, their Total Factor Productivity (TFP) is not statistically significantly higher than non-Chinese firms' TFP, as established in Table 3. Moreover, there is little evidence that Chinese investments are more beneficial in terms of technology transfer. Hence, our results question whether the host government support is well focused. One potential reason why higher government support for Chinese firms may not translate directly into Chinese firm's productivity and technology advantages could be that, as shown in Table 3, they are less likely to have received ISO certification, which may indicate that their technology is somewhat behind that of firms from other countries.

4 Conclusions

A significant number of foreign firms are engaged in R&D and innovation activity in Ethiopia and Ghana, but there is little difference between Chinese and non-Chinese foreign firms in terms of technological and knowhow transfer to the host country once controlling for firms' size and industry fixed effects. We only find for Ghana that Chinese firms have more suppliers, but are less likely to transfer technology to them. Also, there is little evidence that firms transfer more or less technology via horizontal or backward spillovers when affiliates are Chinese. It is, however, clear that in both countries Chinese firms are less likely than others to have ISO quality certification, which may be an indicator for lower technology being used on Chinese compared to other foreign firms.

There is also substantial inflow of managerial skill associated with the foreign firms. A significant share of firms report that they introduced new managerial processes, or conduct R&D related to management practices. In Ghana, we find that Chinese firms are more likely to transfer managerial skills than multinationals from other countries, though this is not the case in Ethiopia.

One other important aspect we look at is the composition of the workforce. Here we find for Ghana that Chinese firms have lower shares of locally hired management workers than other foreign firms. They also have a lower share of local production compared to American/European firms, but not compared to other foreign firms.

What is also striking is the difference in how firms benefit from policy. Only a fairly small share of multinationals in both countries report that they receive support from their home country (between 4 and 14 percent). In Ghana, only a similarly small share also reports that they received support from the host country (finance, fiscal benefits), while this is quite different in Ethiopia: here, almost half of all foreign firms have received some form of support from the Ethiopian government. Looking at differences between ownership nationalities, we find for Ghana (but not Ethiopia) that Chinese firms are more likely to receive support from the home and the host country. Given that there is little evidence that Chinese firms are more beneficial in terms of potential technology transfer, it is questionable whether host government support is well targeted.

In addition to the targeting problem, foreign firms (both Chinese and non-Chinese alike) in Ethiopia do encounter a number of challenges at implementation stage that are related to problems of corruption and redtape at local authorities as well as general lack of security, frequent power outage and problems of macroeconomic instability that includes shortage of foreign exchange and high inflation (Geda, 2023; Yimer, 2023, 2017; World Bank, 2012).

In Ghana, there is no direct policy to favour or disadvantage FDI from any country, including China. However, because of the persevering nature of Chinese FDI and the fact that they are mainly directed at the extractive sector, there is anecdotal evidence that the public and regulatory agencies are not too favourably disposed to Chinese FDI, especially the controversial ones. For example, there have been recent uproar and critical opprobrium generated around the involvement of Chinese investors and migrants in "galamsey" in Ghana—a local referent for illegal and unregulated artisanal gold mining in Ghana. The environmentally destructive effects of these mining activities have had a negative impacts on the politics and economics of Ghana-China relations (Aidoo, 2016; Wang, 2018).

In the qualitative interviews conducted as part of this study, the firms were asked to comment on the general business challenges that they were facing. One key difference that was observed between

Chinese-owned and non-Chinese-owned firms was the extent to which the former indicated that there were 'just too many' public regulatory agencies they must deal with and the fact that they often had to pay bribes/kickbacks even if they were abiding by all domestic regulations. They also mentioned the tough macroeconomic environment, particularly exchange rate depreciation.

".. too many agencies to deal with; almost all want bribes during monitoring" (Chinese MNC)

For the non-Chinese-owned firms, there was no indication of challenges with too many regulatory agencies.

In spite of such sentiments, China is one of the leading source of investments in many African countries. While our survey evidence does not show any strong differences in terms of technology between Chinese and non-Chinese investors, more research is needed in order to fully comprehend the implications of the rising importance of Chinese investments on the continent.

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Tables

Table 2. Nationality of labor force composition

Question	Ghana						Ethiopia					
	Chinese FDI	American/European FDI	Other firms	Chinese FDI	American/European FDI coefficient	n	Chinese FDI	American/European FDI	Other firms	Chinese FDI	American/European FDI coefficient	n
	Simple average (sd)						Simple average (sd)					
Share of local workers relative to total workers	0.79 (0.18)	0.95 (0.08)	0.86 (0.16)	-0.0426 (0.0227)	0.0806*** (0.0214)	278	0.94 (0.06)	0.98 (0.05)	0.96 (0.06)	-0.00590 (0.0164)	0.0360 (0.0222)	97
Share of local management workers relative to total management workers	0.35 (0.30)	0.74 (0.23)	0.51 (0.29)	-0.137*** (0.0428)	0.205*** (0.0491)	276	Insufficient observations					

*** p<0.01, ** p<0.05. sd: Standard deviation. Robust standard errors clustered at firm level in parenthesis. ¹ The dependent variable is the survey question and the independent variables are the Chinese FDI dummy, American/European FDI dummy, average of the log employment per firm across years, and industry fixed effects (ISIC 2 digit). Appendix A2 shows detailed regression results.

Table 3. Total factor productivity (TFP) estimation and firm age (Ghana and Ethiopia)

Question	Ghana						Ethiopia					
	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ₁	American /European FDI coefficient ¹	n	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ₁	American /European FDI coefficient ₁	n
	Simple average (sd)						Simple average (sd)					
TFP ² (based on revenue)	5.56 (0.32)	5.74 (0.35)	5.69 (0.48)	-0.0686 (0.0584)	0.106 (0.0758)	242	2.15 (0.52)	2.08 (0.08)	2.18 (0.26)	0.0644 (0.127)	-0.00335 (0.0660)	65
TFP ² (based on value added)	10.28 (0.96)	10.98 (1.16)	10.64 (1.19)	-0.0112 (0.150)	0.488** (0.196)	241	9.73 (0.86)	9.17 (0.17)	9.99 (0.99)	-0.0901 (0.238)	-0.526** (0.226)	63

*** p<0.01, ** p<0.05. sd: Standard deviation. Robust standard errors clustered at firm level in parenthesis. ¹ The dependent variable is the survey question and the independent variables are the Chinese FDI dummy, American/European FDI dummy, average of the log employment per firm across years, and industry fixed effects (ISIC 2 digit). Appendix A2 shows detailed regression results. ² TFP calculation based on Levinsohn & Petrin (2003) methodology and *prodest* Stata command (Mollisi & Rovigatti, 2018), see appendix A3.

Table 4. Chinese FDI, technology and innovation (Ghana and Ethiopia)

Question	Ghana						Ethiopia					
	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ₁	American/ European FDI coefficient ₁	n	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ₁	American/ European FDI coefficient ₁	n
	Simple average (sd)						Simple average (sd)					
Does the firm undertake in-house (and in-country) Research and Development (R&D) activities? (1=Yes, 0=No)	0.18 (0.38)	0.28 (0.45)	0.3 (0.46)	-0.0394 (0.0533)	-0.0381 (0.0707)	391	0.14 (0.35)	0.2 (0.45)	0.32 (0.47)	-0.174 (0.0970)	-0.329 (0.288)	97
Does the firm hold any (inter)nationally recognized patents? (1=Yes, 0=No)	0.19 (0.39)	0.39 (0.49)	0.31 (0.46)	-0.0466 (0.0485)	0.0763 (0.0721)	391	0.08 (0.28)	0 (0.00)	0.16 (0.37)	-0.0849 (0.0751)	-0.136 (0.0849)	97
Has the firm in this country introduced new production processes/new technology during the past two years? ²	0.24 (0.43)	0.26 (0.44)	0.25 (0.44)	0.00995 (0.0550)	0.0206 (0.0696)	391	0.31 (0.47)	0.6 (0.55)	0.43 (0.50)	-0.113 (0.122)	0.116 (0.223)	97
What is the approximate number of suppliers of raw materials, intermediates and finished goods?	6.08 (10.39)	7.22 (10.45)	5 (7.31)	2.395** (1.164)	2.238 (1.746)	391	6.93 (9.92)	15.5 (23.04)	5.15 (4.16)	-0.686 (2.178)	6.786 (9.138)	44
Have your relations with any of your domestic suppliers ever involved a direct technology transfer from your company to these suppliers? (1=Yes, 0=No)	0.01 (0.09)	0.13 (0.34)	0.03 (0.17)	-0.0110 (0.0180)	0.109** (0.0456)	391	0.08 (0.28)	0 (0.00)	0.05 (0.23)	0.0421 (0.0558)	-0.0638 (0.0466)	97
Have you observed domestic firms trying to directly adopt production techniques/processes from your enterprise? (1=Yes, 0=No)	0.34 (0.47)	0.22 (0.42)	0.32 (0.47)	0.0235 (0.0588)	-0.0908 (0.0685)	391	0.06 (0.23)	0 (0.00)	0.11 (0.31)	-0.0553 (0.0539)	-0.179 (0.0932)	97
What is the approximate number of customer firms?	42.89 (45.18)	33.2 (51.33)	43.47 (56.08)	2.730 (5.944)	-9.855 (8.501)	391	25.72 (43.32)	34.4 (41.31)	84.11 (284.66)	-52.95 (35.32)	-81.94 (89.25)	97
Have your relations with any of your domestic customers ever required a direct technology transfer from your company to these customers? (1=Yes, 0=No)	0.12 (0.33)	0.15 (0.36)	0.13 (0.33)	0.00498 (0.0394)	0.00178 (0.0494)	391	0.11 (0.32)	0.4 (0.55)	0.13 (0.33)	-0.0685 (0.0772)	0.175 (0.202)	97
Does the firm have an internationally recognized quality certification for its main production (e.g. ISO 9000, ISO 14000, etc)? (1=Yes, 0=No)	0.24 (0.43)	0.59 (0.50)	0.46 (0.50)	-0.184*** (0.0555)	0.124 (0.0775)	391	0.17 (0.38)	0.2 (0.45)	0.52 (0.50)	-0.379*** (0.112)	-0.104 (0.238)	97

*** p<0.01, ** p<0.05. sd: Standard deviation. Robust standard errors clustered at firm level in parenthesis. ¹The dependent variable is the survey question and the independent variables are the Chinese FDI dummy, American/European FDI dummy, average of the log employment per firm across years, and industry fixed effects (ISIC 2 digit).²Please note that the term “new” means here: new to the firm – it does not necessarily have to be new to the market or country. Appendix A2 shows detailed regression results.

Table 5. Chinese FDI impact on managerial skill (Ghana and Ethiopia)

Question	Ghana						Ethiopia					
	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ¹	American /European FDI coefficient ¹	n	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ¹	American /European FDI coefficient ¹	n
	Simple average (sd)						Simple average (sd)					
Has the firm in this country introduced new management processes during the past two years?	0.18 (0.38)	0.44 (0.50)	0.24 (0.43)	0.0347 (0.0618)	0.175 (0.0902)	278	0.19 (0.40)	0.2 (0.45)	0.27 (0.45)	-0.0641 (0.101)	0.0132 (0.137)	97
Does the firm undertake in-house (and in-country) Research and Development (R&D) activities related to management?	0.1 (0.30)	0.25 (0.44)	0.2 (0.40)	-0.0408 (0.0524)	0.0131 (0.0767)	278	0.17 (0.38)	0 (0.00)	0.09 (0.29)	0.144 (0.0844)	-0.0845 (0.0953)	97
Has the firm made any attempt at managerial skill transfer to locals (in this country) the past two years?	0.29 (0.46)	0.42 (0.50)	0.31 (0.46)	0.149** (0.0680)	0.105 (0.0897)	278	0.28 (0.45)	0.4 (0.55)	0.48 (0.50)	-0.177 (0.100)	0.224 (0.131)	97

*** p<0.01, ** p<0.05. sd: Standard deviation. Robust standard errors clustered at firm level in parenthesis. ¹The dependent variable is the survey question and the independent variables are the Chinese FDI dummy, American/European FDI dummy, average of the log employment per firm across years, and industry fixed effects (ISIC 2 digit). Appendix A2 shows detailed regression results.

Table 6. Chinese FDI impact on government support and TFP (Ghana and Ethiopia)

Question	Ghana						Ethiopia					
	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ¹	American /European FDI coefficient ¹	n	Chinese FDI	American /European FDI	Other firms	Chinese FDI coefficient ¹	American /European FDI coefficient ¹	n
	Simple average (sd)						Simple average (sd)					
Do you get support from your own government?	0.09 (0.29)	0 (0.00)	0.04 (0.20)	0.0952** (0.0431)	-0.0273 (0.0216)	278	0.14 (0.35)	0.2 (0.45)	0.09 (0.29)	0.0351 (0.0906)	0.135 (0.170)	97
Do you get support from the host Ghana/Ethiopia government?	0.09 (0.29)	0.06 (0.23)	0.03 (0.18)	0.0874** (0.0352)	0.00252 (0.0555)	278	0.61 (0.49)	0.4 (0.55)	0.32 (0.47)	0.235 (0.121)	0.133 (0.250)	97

*** p<0.01, ** p<0.05. sd: Standard deviation. Robust standard errors clustered at firm level in parenthesis. ¹The dependent variable is the survey question and the independent variables are the Chinese FDI dummy, American/European FDI dummy, average of the log employment per firm across years, and industry fixed effects (ISIC 2 digit). Appendix A2 shows detailed regression results.

A. Appendix

Appendix A1:

Total firms by disaggregated industry, Ghana, ISIC Rev 3

ISIC Rev 3	No. Chinese firms	% of Chinese firms	No. Non-Chinese firms	% of non-Chinese firms	No. Total firms	% of total firms
C. Mining and quarrying	4	2.96%	5	1.85%	9	2.22%
11 – Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying	0	0.00%	1	0.37%	1	0.25%
12 – Mining of uranium and thorium ores	1	0.74%	1	0.37%	2	0.49%
14 – Other mining and quarrying	3	2.22%	3	1.11%	6	1.48%
D. Manufacturing	63	46.67%	100	36.90%	163	40.15%
15 – Manufacture of food products and beverages	6	4.44%	26	9.59%	32	7.88%
17 – Manufacture of textiles	2	1.48%	1	0.37%	3	0.74%
18 – Manufacture of wearing apparel; dressing and dyeing of fur	2	1.48%	0	0.00%	2	0.49%
19 – Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	1	0.74%	0	0.00%	1	0.25%
20 – Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	3	2.22%	1	0.37%	4	0.99%
21 – Manufacture of paper and paper products	0	0.00%	5	1.85%	5	1.23%
22 – Publishing, printing and reproduction of recorded media	4	2.96%	0	0.00%	4	0.99%
23 – Manufacture of coke, refined petroleum products and nuclear fuel	0	0.00%	1	0.37%	1	0.25%
24 – Manufacture of chemicals and chemical products	4	2.96%	14	5.17%	18	4.43%
25 – Manufacture of rubber and plastics products	12	8.89%	21	7.75%	33	8.13%
26 – Manufacture of other non-metallic mineral products	6	4.44%	7	2.58%	13	3.20%
27 – Manufacture of basic metals	7	5.19%	5	1.85%	12	2.96%
28 – Manufacture of fabricated metal products, except machinery and equipment	8	5.93%	1	0.37%	9	2.22%
29 – Manufacture of machinery and equipment n.e.c.	3	2.22%	4	1.48%	7	1.72%
31 – Manufacture of electrical machinery and apparatus n.e.c.	1	0.74%	3	1.11%	4	0.99%
32 – Manufacture of radio, television and communication equipment and apparatus	2	1.48%	1	0.37%	3	0.74%
33 – Manufacture of medical, precision and optical instruments, watches and clocks	0	0.00%	1	0.37%	1	0.25%
34 – Manufacture of motor vehicles, trailers and semi-trailers	1	0.74%	0	0.00%	1	0.25%
36 – Manufacture of furniture; manufacturing n.e.c.	1	0.74%	5	1.85%	6	1.48%
37 – Recycling	0	0.00%	4	1.48%	4	0.99%
E. Electricity, gas and water supply	2	1.48%	0	0.00%	2	0.49%

40 – Electricity, gas, steam and hot water supply	1	0.74%	0	0.00%	1	0.25%
41 – Collection, purification and distribution of water	1	0.74%	0	0.00%	1	0.25%
F. Construction	5	3.70%	21	7.75%	26	6.40%
45 – Construction	5	3.70%	21	7.75%	26	6.40%
G. Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	41	30.37%	66	24.35%	107	26.35%
50 – Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	8	5.93%	10	3.69%	18	4.43%
51 – Wholesale trade and commission trade, except of motor vehicles and motorcycles	19	14.07%	42	15.50%	61	15.02%
52 – Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	14	10.37%	14	5.17%	28	6.90%
H. Hotel and restaurants	16	11.85%	25	9.23%	41	10.10%
55 – Hotels and restaurants	16	11.85%	25	9.23%	41	10.10%
I. Transport, storage and communications	0	0.00%	25	9.23%	25	6.16%
61 – Water transport	0	0.00%	3	1.11%	3	0.74%
62 – Air transport	0	0.00%	6	2.21%	6	1.48%
63 – Supporting and auxiliary transport activities; activities of travel agencies	0	0.00%	7	2.58%	7	1.72%
64 – Post and telecommunications	0	0.00%	9	3.32%	9	2.22%
J. Financial intermediation	0	0.00%	2	0.74%	2	0.49%
66 – Insurance and pension funding, except compulsory social security	0	0.00%	1	0.37%	1	0.25%
67 – Activities auxiliary to financial intermediation	0	0.00%	1	0.37%	1	0.25%
K. Real estate, renting and business activities	3	2.22%	18	6.64%	21	5.17%
70 – Real estate activities	0	0.00%	2	0.74%	2	0.49%
71 – Renting of machinery and equipment without operator and of personal and household goods	1	0.74%	2	0.74%	3	0.74%
72 – Computer and related activities	0	0.00%	3	1.11%	3	0.74%
73 – Research and development	0	0.00%	1	0.37%	1	0.25%
74 – Other business activities	2	1.48%	10	3.69%	12	2.96%
L. Public administration and defence; compulsory social security	0	0.00%	1	0.37%	1	0.25%
75 – Public administration and defence; compulsory social security	0	0.00%	1	0.37%	1	0.25%
M. Education	0	0.00%	3	1.11%	3	0.74%
80 – Education	0	0.00%	3	1.11%	3	0.74%
N. Health and social work	0	0.00%	1	0.37%	1	0.25%
85 – Health and social work	0	0.00%	1	0.37%	1	0.25%
O. Other community, social and personal service activities	1	0.74%	4	1.48%	5	1.23%
90 – Sewage and refuse disposal, sanitation and similar activities	0	0.00%	1	0.37%	1	0.25%
91 – Activities of membership organizations n.e.c.	0	0.00%	1	0.37%	1	0.25%
92 – Recreational, cultural and sporting activities	1	0.74%	2	0.74%	3	0.74%
Total firms	135	100.00%	271	100.00%	406	100.00%

Note: ISIC definition taken from: [International Standard Industrial Classification of All Economic Activities \(ISIC\) – ILOSTAT](#)

Total firms by disaggregated industry, Ethiopia, ISIC Rev 4

ISIC Rev 4	No. Chinese firms	% of Chinese firms	No. Non-Chinese firms	% of non-Chinese firms	No. Total firms	% of total firms
C. Manufacturing	43	97.7%	66	98.5%	109	98.2%
10 – Manufacture of food products	3	6.8%	12	17.9%	15	13.5%
11 – Manufacture of beverages	1	2.3%	1	1.5%	2	1.8%
13 – Manufacture of textiles	6	13.6%	3	4.5%	9	8.1%
14 – Manufacture of wearing apparel	17	38.6%	22	32.8%	39	35.1%
15 – Manufacture of leather and related products	1	2.3%	2	3.0%	3	2.7%
16 – Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1	2.3%	0	0.0%	1	0.9%
17 – Manufacture of paper and paper products	1	2.3%	1	1.5%	2	1.8%
20 – Manufacture of chemicals and chemical products	2	4.5%	5	7.5%	7	6.3%
22 – Manufacture of rubber and plastics products	1	2.3%	9	13.4%	10	9.0%
23 – Manufacture of other non-metallic mineral products	0	0.0%	3	4.5%	3	2.7%
24 – Manufacture of basic metals	5	11.4%	4	6.0%	9	8.1%
25 – Manufacture of fabricated metal products, except machinery and equipment	0	0.0%	1	1.5%	1	0.9%
26 – Manufacture of computer, electronic and optical products	0	0.0%	1	1.5%	1	0.9%
27 – Manufacture of electrical equipment	1	2.3%	1	1.5%	2	1.8%
28 – Manufacture of machinery and equipment n.e.c.	1	2.3%	0	0.0%	1	0.9%
30 – Manufacture of other transport equipment	1	2.3%	0	0.0%	1	0.9%
31 – Manufacture of furniture	2	4.5%	0	0.0%	2	1.8%
33 – Repair and installation of machinery and equipment	0	0.0%	1	1.5%	1	0.9%
E. Water supply; sewerage, waste management and remediation activities	0	0.0%	1	1.5%	1	0.9%
36 – Water collection, treatment and supply	0	0.0%	1	1.5%	1	0.9%
N. Administrative and support service activities	1	2.3%	0	0.0%	1	0.9%
81 – Services to buildings and landscape activities	1	2.3%	0	0.0%	1	0.9%
Total firms	44	100.0%	67	100.0%	111	100.0%

A.2 Regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Does the firm undertake in-house (and in-country) Research and Development (R&D) activities? (1=Yes, 0=No)		Does the firm hold any (inter)nationally recognized patents? (1=Yes, 0=No)		Has the firm in this country introduced new production processes/new technology during the past two years? (Please note that the term "new" means here: new to the firm - it does not necessarily have to be new to the market or country)		What is the approximate number of suppliers of raw materials, intermediates and finished goods?		Have your relations with any of your domestic suppliers ever involved a direct technology transfer from your company to these suppliers?	
VARIABLES	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia
Chinese FDI (1=Yes, 0=No)	-0.0394 (0.0533)	-0.174* (0.0970)	-0.0466 (0.0485)	-0.0849 (0.0751)	0.00995 (0.0550)	-0.113 (0.122)	2.395** (1.164)	-0.686 (2.178)	-0.0110 (0.0180)	0.0421 (0.0558)
European/American FDI (1=Yes, 0=No)	-0.0381 (0.0707)	-0.329 (0.288)	0.0763 (0.0721)	-0.136 (0.0849)	0.0206 (0.0696)	0.116 (0.223)	2.238 (1.746)	6.786 (9.138)	0.109** (0.0456)	-0.0638 (0.0466)
ln (L avg)	0.0629*** (0.0185)	-0.0265 (0.0378)	0.0824*** (0.0175)	0.0425 (0.0291)	0.0456** (0.0199)	0.0405 (0.0494)	1.247*** (0.378)	-1.030 (1.141)	0.00390 (0.00606)	0.00231 (0.0207)
Constant	0.0575 (0.0737)	0.471** (0.227)	3.63e-05 (0.0668)	-0.0651 (0.164)	0.0849 (0.0796)	0.211 (0.292)	0.261 (1.287)	11.38* (6.382)	0.0111 (0.0194)	0.0372 (0.108)
Observations	391	97	391	97	391	97	391	44	391	97
Industry fixed effects 2 digit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg Dep Var - Chinese	0.18	0.14	0.19	0.08	0.24	0.31	6.08	6.93	0.01	0.08
Sd Dep Var - Chinese	0.38	0.35	0.39	0.28	0.43	0.47	10.39	9.92	0.09	0.28
Avg Dep Var - European/American FDI	0.28	0.2	0.39	0	0.26	0.6	7.22	15.5	0.13	0
Sd Dep Var - European/American FDI	0.45	0.45	0.49	0	0.44	0.55	10.45	23.04	0.34	0
Avg Dep Var – Non-Chinese, non-European/American FDI	0.3	0.32	0.31	0.16	0.25	0.43	5	5.15	0.03	0.05
Sd Dep Var – Non-Chinese, non-European/American FDI	0.46	0.47	0.46	0.37	0.44	0.5	7.31	4.16	0.17	0.23

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered at firm level in parenthesis.

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Have you observed domestic firms trying to directly adopt production techniques/processes from your enterprise?		What is the approximate number of customer firms?		Have your relations with any of your domestic customers ever required a direct technology transfer from your company to these customers? (1=Yes, 0=No)		Does the firm have an internationally recognized quality certification for its main production (e.g. ISO 9000, ISO 14000, etc)? (1=Yes, 0=No)		Has the firm in this country introduced new management processes during the past two years?	
VARIABLES	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia
Chinese FDI (1=Yes, 0=No)	0.0235 (0.0588)	-0.0553 (0.0539)	2.730 (5.944)	-52.95 (35.32)	0.00498 (0.0394)	-0.0685 (0.0772)	-0.184*** (0.0555)	-0.379*** (0.112)	0.0347 (0.0618)	-0.0641 (0.101)
European/American FDI (1=Yes, 0=No)	-0.0908 (0.0685)	-0.179* (0.0932)	-9.855 (8.501)	-81.94 (89.25)	0.00178 (0.0494)	0.175 (0.202)	0.124 (0.0775)	-0.104 (0.238)	0.175* (0.0902)	0.0132 (0.137)
ln (L avg)	0.0662*** (0.0196)	-0.0346* (0.0202)	5.079** (2.401)	8.508 (14.21)	0.00569 (0.0134)	-0.0322 (0.0298)	0.0831*** (0.0189)	0.135*** (0.0471)	0.0348 (0.0237)	0.0745* (0.0418)
Constant	0.0886 (0.0781)	0.298** (0.138)	24.81*** (9.026)	38.21 (72.92)	0.106** (0.0517)	0.323* (0.185)	0.163** (0.0785)	-0.203 (0.282)	0.0959 (0.0921)	-0.139 (0.238)
Observations	391	97	391	97	391	97	391	97	278	97
Industry fixed effects 2 digit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg Dep Var - Chinese	0.34	0.06	42.89	25.72	0.12	0.11	0.24	0.17	0.18	0.19
Sd Dep Var - Chinese	0.47	0.23	45.18	43.32	0.33	0.32	0.43	0.38	0.38	0.4
Avg Dep Var - European/American FDI	0.22	0	33.2	34.4	0.15	0.4	0.59	0.2	0.44	0.2
Sd Dep Var - European/American FDI	0.42	0	51.33	41.31	0.36	0.55	0.5	0.45	0.5	0.45
Avg Dep Var – Non-Chinese, non-European/American FDI	0.32	0.11	43.47	84.11	0.13	0.13	0.46	0.52	0.24	0.27
Sd Dep Var – Non-Chinese, non-European/American FDI	0.47	0.31	56.08	284.66	0.33	0.33	0.5	0.5	0.43	0.45

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered at firm level in parenthesis.

	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
	Does the firm undertake in-house (and in-country) Research and Development (R&D) activities related to management?		Has the firm made any attempt at managerial skill transfer to locals (in this country) the past two years?		Do you get support from your own government?		Do you get support from the Ghana government?		TFP (based on revenue)	
VARIABLES	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia
Chinese FDI (1=Yes, 0=No)	-0.0408 (0.0524)	0.144* (0.0844)	0.149** (0.0680)	-0.177* (0.100)	0.0952** (0.0431)	0.0351 (0.0906)	0.0874** (0.0352)	0.235* (0.121)	-0.0686 (0.0584)	0.0644 (0.127)
European/American FDI (1=Yes, 0=No)	0.0131 (0.0767)	-0.0845 (0.0953)	0.105 (0.0897)	0.224* (0.131)	-0.0273 (0.0216)	0.135 (0.170)	0.00252 (0.0555)	0.133 (0.250)	0.106 (0.0758)	-0.00335 (0.0660)
ln (L avg)	0.0515** (0.0208)	0.0490 (0.0367)	0.129*** (0.0199)	0.144*** (0.0381)	0.0310** (0.0129)	0.0392 (0.0381)	0.0293* (0.0153)	-0.0203 (0.0504)	0.0447* (0.0238)	0.112** (0.0463)
Constant	0.0125 (0.0787)	-0.198 (0.211)	-0.186** (0.0776)	-0.316 (0.227)	-0.0825* (0.0493)	-0.116 (0.221)	-0.0745 (0.0568)	0.447 (0.290)	5.497*** (0.103)	1.539*** (0.256)
Observations	278	97	278	97	278	97	278	97	242	65
Industry fixed effects 2 digit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg Dep Var - Chinese	0.1	0.17	0.29	0.28	0.09	0.14	0.09	0.61	5.56	2.15
Sd Dep Var - Chinese	0.3	0.38	0.46	0.45	0.29	0.35	0.29	0.49	.32	.52
Avg Dep Var - European/American FDI	0.25	0	0.42	0.4	0	0.2	0.06	0.4	5.74	2.08
Sd Dep Var - European/American FDI	0.44	0	0.5	0.55	0	0.45	0.23	0.55	.35	.08
Avg Dep Var – Non-Chinese, non-European/American FDI	0.2	0.09	0.31	0.48	0.04	0.09	0.03	0.32	5.69	2.18
Sd Dep Var – Non-Chinese, non-European/American FDI	0.4	0.29	0.46	0.5	0.2	0.29	0.18	0.47	.48	.26

p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered at firm level in parenthesis.

	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)
	TFP (based on value added)		Number of years the firm has been established abroad (age)		Number of years the firm has been established in the host country (age)		Share of local workers		Share of management workers		Share of local management workers	
VARIABLES	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia	Ghana	Ethiopia
Chinese FDI (1=Yes, 0=No)	-0.0112 (0.150)	-0.0901 (0.238)	-25.60** (11.44)	-16.06** (7.211)	-5.793*** (1.189)	-4.116*** (1.183)	-0.0426* (0.0227)	-0.00590 (0.0164)	-0.0411* (0.0244)		-0.137*** (0.0428)	
European/American FDI (1=Yes, 0=No)	0.488** (0.196)	-0.526** (0.226)	-1.494 (13.43)	3.678 (22.56)	0.896 (2.225)	-3.047 (2.834)	0.0806*** (0.0214)	0.0360 (0.0222)	-0.0588* (0.0319)		0.205*** (0.0491)	
ln (L avg)	0.432*** (0.0533)	0.352*** (0.0961)	4.865** (2.429)	0.744 (2.563)	2.123*** (0.517)	0.794 (0.549)	0.0622*** (0.0106)	0.0204*** (0.00694)	-0.0725*** (0.00966)		0.0758*** (0.0165)	
Constant	8.901*** (0.220)	8.028*** (0.556)	27.76** (12.28)	32.60* (16.73)	9.479*** (1.969)	5.323* (3.028)	0.642*** (0.0455)	0.841*** (0.0439)	0.523*** (0.0420)		0.250*** (0.0677)	
Observations	241	63	81	44	391	97	278	97	278		276	
Industry fixed effects 2 digit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avg Dep Var - Chinese	10.28	9.73	22.1	18.91	10.05	5.47	0.79	0.94	0.28		0.35	
Sd Dep Var - Chinese	.96	.86	12.2	10.3	6	2.91	0.18	0.06	0.19		0.3	
Avg Dep Var - European/American FDI	10.98	9.17	41.25	42	17.07	6	0.95	0.98	0.23		0.74	
Sd Dep Var - European/American FDI	1.16	.17	47.42	46.78	14.42	5.83	0.08	0.05	0.23		0.23	
Avg Dep Var – Non-Chinese, non-European/American FDI	10.64	9.99	45.68	37.53	17.55	9.61	0.86	0.96	0.25		0.51	
Sd Dep Var – Non-Chinese, non-European/American FDI	1.19	.99	38.96	28.9	12.64	8.04	0.16	0.06	0.2		0.29	

p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered at firm level in parenthesis.

A.3 TFP calculation

VARIABLES	Ethiopia		Ghana	
	(1) Ln revenue	(2) Ln value added	(1) Ln revenue	(2) Ln value added
In L	0.239*** (0.0390)	0.385*** (0.0628)	0.479*** (0.0792)	0.581*** (0.119)
In fixed assets	0.0935 (0.168)	0.0892 (0.291)	0.125 (0.102)	0.0602 (0.177)
In sales cost	0.703*** (0.117)		0.418*** (0.0906)	
Observations	216	196	942	934
Number of groups	73	71	253	251

Standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Note 1: TFP calculation based on Levinsohn and Petrin (2003) methodology and *prodest* Stata command (Mollisi and Rovigatti, 2017). *Free variable* is operating expenses, *state variable* is property plant and equipment, and *proxy variable* is sales cost.

Note 2: The original revenue and value-added variables for Ghana were deflated based on industrial producer price index disaggregated at ISIC 2 digit obtained from the Ghana government statistical services (2018 = 1) and divided by the nominal exchange rate with United States. I assume that the value was expressed in nominal local currency (*cedi*).

Note 3: The original revenue and value-added variables for Ethiopia were deflated based on consumer price index (2018 = 1) and divided by the nominal exchange rate with United States. I assume that the value was expressed in nominal local currency (*birr*). As far as I know, there is no public dataset for Ethiopian producer price index for the 2018-2021 period.

A.4 Questionnaires panel data questions (2018-2021) - Assumptions

Ghana questionnaire		Ethiopian questionnaire	
Question		Question	Equation included in the questionnaire
21	Total revenue	a Total revenue	b+e
		b Total revenue from sales of manufactured goods	
22	Total revenue from exports	c Revenue from exports	
23	Total value of production/services	d Value of production/manufactured output	(h+i+k+l)
		e Value of additional income	
24	Total indirect costs (intermediates - including rental, water, fuel, electricity etc.)	h Total indirect cost (intermediates)	
25	Total value of raw materials used	i Value of raw materials used	
		j Total value added	(a+e-h-i)
		k Total wage bill, including allowances	
		l Other labor costs (social and health insurance, etc)	
26	Total gross profit	m Total gross profit	j-k-l
		n Value of your allowable depreciation	
		o Total interest payments (only formal)	
27	Total fees and taxes	p Total fees and taxes (only formal)	
31	Total physical assets end-year	q Total physical assets end-year (market price)	
28	Land value end-year	r Land value end-year	
29	Buildings end-year	s Buildings end-year	
30	Machinery/Equipment end-year	t Machinery/equipment end-year	
32	Total financial assets end-year	u Total financial assets end-year (market price)	
33	Total outstanding debt end-year	v Total outstanding debt end-year	

Assumption 1 (Total revenue): The Ethiopian questionnaire clarifies that total revenue (a) does not include revenue from exports ($a=b+e$). However, 66 observations (24 percent of 275) report exactly the same value for total revenue (a) and total revenue from exports (c), which is consistent with an unrealistic pattern of firms that distribute their production 50/50 across the local and international market. I think those observations refer firms that export all their production, $a=b+e$ in the Ethiopian questionnaire is a mistake and total revenue (a) contains total exports from exports (c), as in Ghana.

In addition, it would not make sense that value added ($j=a+e-h-i$) and gross profit ($m=j-k-l$) would not include revenue from exports. Also, $a>c$.

Assumption 2 (Value added): Value added was created for Ghana based on Ethiopian equation (Value added = 21-24-25).

Assumption 3 (Sales cost): Ghana: 24+25, Ethiopia: h+i

Assumption 4 (fixed assets): Sum of Land value, Buildings and Machinery/Equipment.