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Technology spillovers from Chinese outward direct investment: The case of Ethiopia

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ABSTRACT

The present study uses firm survey data of 1033 manufacturing firms operating in Ethiopia in 2011 to examine the impact of Chinese outbound direct investment on the productivity of domestic firms. Particularly, we attempt to answer two questions. Firstly, are Chinese-owned (henceforth foreign) firms more productive than local ones? Secondly, does the presence of foreign firms generate technology spillovers on domestic firms operating in the same industry? Our empirical results show that foreign firms are more productive and that their presence has different spillover effects on the productivity of domestic firms. In particular, we find that domestic firms with higher absorptive capacity experience positive spillovers, while those with low absorptive capacity witness negative spillover. We also find that small firms and non-exporting firms benefit more from spillovers than do other types of domestic firms. In this study, instrumental variables are used to address the potential endogeneity between foreign firm presence and domestic firm productivity.

1. Introduction

Over the past decade, though insignificant in global terms,[3] China's outward direct investment (ODI) flows to Africa have increased rapidly. The increase has generated interest and concern over the effects of China's ODI on developing Sub-Saharan host economies. Some argue that Chinese ODI provides an alternative source of capital, technology and skills and that it has been instrumental in fulfilling financial and technological gaps for Africa (Brautigam, 2009; Foster, Butterfield, Chuan, & Pushak, 2008). On the negative side, some contend that the primary objective of Chinese ODI in Africa is to find resources, and markets for their products where it drives African countries to resource-based economies and crowds-out local industries (Kaplinsky, 2008; Kaplinsky & Morris, 2009).

China's ODI in Africa has generated considerable attention for several reasons. One reason is the rapid pace at which China's ODI has risen and expanded in Africa.[4] Second, small and medium private Chinese firms have recently become prominent investors in African manufacturing sector that there are uncertainties about the impact of their activities on the African economies where the investment

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[1] Tel.: +86 13599515882.
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[3] The largest part of Chinese ODI goes to Asia, Latin America and Europe, respectively.
[4] According to the Ministry of Commerce of China (MOC), China's ODI stock in Africa rose from 900 million dollars in 2003 to nearly 16 billion dollar in 2011.

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is made.[5] The third reason relates to the way in which the Chinese are perceived to invest; there is a belief that Chinese firms behave differently from other firms, either because the Chinese state is often behind ODI or because they have a different culture and institutional structure (Buckley et al., 2007).

The purpose of this study is to examine the impact of Chinese manufacturing ODI on the productivity of the Ethiopian manufacturing sector. More specifically, we analyse two issues. The first issue is to examine whether foreign-owned firms exhibit higher levels of productivity than domestic ones. Then, we investigate whether the productivity of domestic firms is correlated with the presence of foreign firms in the same industry.[6] Identifying such effects would be consistent with the existence of intra-industry or horizontal technology transfer spillovers. We further explore whether productivity gains stemming from horizontal spillovers vary with domestic firms' characteristics.

The study focuses on Ethiopia for two reasons. First, Ethiopia has received a substantial amount of Chinese ODI in manufacturing, and is ranked among the top four recipient countries in Africa.[7] And over the past few years, China has emerged as the largest source of FDI in Ethiopia in terms of number of investment projects, with over 970 projects as of end-2012 (Ethiopian Investment Agency [EIA] data).

Second, to the best of our knowledge, no attempt has so far been made to systematically investigate the impact of Chinese manufacturing FDI on developing Sub-Saharan host economies.[8] Using a more disaggregated dataset for Chinese FDI in manufacturing, this empirical study is, to our knowledge, the first to present a detailed analysis of the impact of Chinese FDI on a host country in Sub-Saharan economies.

The analysis is based on 1033 manufacturing firms operating in Ethiopia in 2011. The data come from the survey of large and medium scale manufacturing industries conducted by the Ethiopian Central Statistical Agency (CSA), Ministry of Finance and Economic Development (2012). The survey data covers firms in the formal manufacturing sector, which employ 10 persons and more and use power driven machinery. The dataset contains detailed information on the basic information of the establishment, ownership structure, foreign equity participation, output, assets, employment, wages, input costs, location and other information.

The findings can be summarized as follows. We find that foreign-owned firms are significantly more productive than their local counterparts, suggesting that there are direct benefits from Chinese FDI. With regard to spillover effects, we find that Chinese FDI has different spillover effects on domestic firms dependent upon their characteristics. More specifically, our empirical results reveal that: (i) domestic firms with high absorptive capacity (smaller technology gap with foreign firms) experience positive spillovers, while those with low absorptive capacity witness negative spillovers; (ii) small firms and non-exporting firms benefit more from spillovers than do other types of domestic firms; and (iii) skilled labour of domestic firms does not enhance their capacity to attract FDI spillovers.

The remainder of the paper is organized as follows. Section 2 presents a brief overview of Chinese ODI flows to Ethiopia. Section 3 explains the theoretical framework for the role of foreign ownership on the productivity and technology spillovers. Section 4 introduces the econometric model, data and variable definitions. In Section 5 we present our regression results, while Section 6 concludes.

2. Overview of Chinese ODI flows to Ethiopia

China's ODI flows to the African continent have grown rapidly over the past decade and Ethiopia is a good example of this trend. Fig. 1 shows the trends in China's ODI flows to Ethiopia from 2004 to 2010, using the Ministry of Commerce of China (MOC) 2010 Statistical Bulletin of China's Outward Foreign Direct Investment. China's ODI flows to Ethiopia rose from virtually zero in 2004, reaching 24 million dollars in 2006 to a peak of 73.4 million dollars in 2009 before it had declined to 58.5 million dollars in 2010. According to MOC data, the stock of ODI from China to Ethiopia in 2010 was 368 million dollars.

The official statistics reported by MOC (Fig. 1) seem to understate the true investment volume of Chinese ODI in Ethiopia. According to the EIA figures, the accumulated stock of Chinese ODI in Ethiopia stood at nearly two billion dollars at the end of 2010.[9] As shown in Table 1, the amount of annual ODI flows from China to Ethiopia has been increasing rapidly, albeit from a low base: from 181.71 million dollars between 2002 and 2004, to 414.29 million dollars during the period 2005–2007 and rose further to over one billion dollars between 2008 and 2010. Similarly, the total number Chinese investment projects in Ethiopia reached 944 projects in 2010, a whopping 782.24% increase from the period 2002–2004. According to EIA data, out of the 944 investment projects, 632 projects (66%) are engaged in the manufacturing sector.

Fig. 2 looks at China's ODI flows as a share of total FDI inflows for the past decade. There is a visible trend exhibiting that Chinese ODI has been growing very fast, and that it is taking over the principal position in new FDI attracted to the country. In terms of the number of investment projects, China's contribution rose from 11% in the period of 2000–2005, reaching 29% in 2007 to a peak of 32% in 2008. During the period 2006–2011, China took the top place contributing 25% of the total FDI attracted to Ethiopia.

[5] According to Shen (2013) estimates, small and medium private Chinese enterprises, predominantly concentrated in manufacturing and service industries, accounted for 55% of all Chinese investment projects in Africa by the end of 2011.

[6] In our case, sectors are defined at a more aggregate level, hence some intra-industry spillovers may, in reality, capture vertical spillovers (see Table 2).

[7] According to Shen (2013) estimates, based on data from MOC and African host governments, Nigeria, South Africa, Zambia, Ethiopia and Ghana (in that order) are the top five Chinese ODI recipient countries in Sub-Saharan Africa.

[8] We use "ODI" and "FDI" interchangeably.

[9] It is fair to argue that the EIA data captures Chinese ODI in Ethiopia more comprehensively and accurately than the official data reported by MOC, simply because the EIA data covers all ODI projects, large or small, with the latter less likely to be captured or registered by MOC data.