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Why is China Investing in Africa? Evidence from the Firm Level

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Why is China Investing in Africa? Evidence from the Firm Level

Abstract

China's increased trade with and investment in Africa have boosted the continent's economic growth but have also generated considerable controversy. In this paper we investigate China's outward direct investment ODI in Africa using macro and micro data. The aggregate data on China's ODI in African countries reveal that China's share of the stock of foreign investment is small, though growing rapidly. China's attraction to resource-rich countries is no different from Western investment. China's overall ODI is uncorrelated with a measure of rule of law, whereas Western investment favors the better governance environments. As a result, Chinese investment in strong and weak governance environments is about the same, but its *share of foreign investment* is higher in the weak governance states. The micro data that we use is MOFCOM's database on all registered Chinese firms investing in Africa between 1998 and 2012. We use key words in project descriptions to code the investments into 25 sectors. This database captures the small and medium private firms investing in Africa. Contrary to common perceptions, there are few projects in natural resource sectors. Most projects are in services, with a significant number in manufacturing as well. In our country-sector-level regressions based on firms' transaction-level data, we find that Chinese ODI, both horizontal and vertical, is profit-driven, just like investors from other countries. In particular, our regressions show that Chinese ODI is relatively more concentrated in skill-intensive sectors in skill-abundant countries, but in capital-intensive sectors in capital-scarce countries. These patterns are mostly observed in politically unstable countries, suggesting stronger incentives to seek profits in tougher environments. The predominance of Chinese ODI in services appears to be widespread across host countries, independent of host countries' market size and trade costs, but is negatively correlated with their skill abundance.

JEL-Codes: F100, F200, F600.

Keywords: outward direct investment, FDI, China, Africa.

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1. Introduction

Since 2000 China has emerged as Africa's largest trading partner. Chinese direct investment in and lending to African countries have grown rapidly as well. At the same time growth has accelerated on the continent. According to the Penn World Tables, the per capita growth rate of the average African economy surged from 0.6% per annum in the 1990s to 2.8% in the 2000s. African countries have strengthened their institutions and macroeconomic policies, and that is one factor in the growth acceleration. But demand from China for the continents' main exports – oil, iron, copper, zinc, and other primary products – led to better terms of trade and higher export volumes, other important factors in the growth accelerations (International Monetary Fund 2015).

In the Pew Global Attitudes survey for 2015, African respondents had a significantly more positive view of China (70% with a favorable view) than respondents in other regions such as Europe (41%), Asia (57%), or Latin America (57%) (Wike 2015). This likely reflects the positive impact of China's engagement on African growth. At the same time, China's involvement in Africa is not without controversy, as conveyed by some typical headlines from the Western press: "Into Africa: China's Wild Rush"; "China in Africa: Investment or Exploitation?"; "Clinton warns against 'new colonialism' in Africa."[2]

In this paper we investigate one aspect of China's engagement in Africa, its outward direct investment (ODI). We start, in Section 2, with aggregate data on Chinese direct investment across 49 African countries and compare its allocation to that of total foreign direct investment (FDI). This

[2] French, Howard. May 17, 2014. Into Africa China's Wild Rush http://www.nytimes.com/2014/05/17/opinion/into-africa-chinas-wild-rush.html; China in Africa: investment or exploitation? May 04, 2014 http://www.aljazeera.com/programmes/insidestory/2014/05/china-africa-investment-exploitation-201454154158396626.html; Clinton warns against "new colonialism" in Africa. June 11, 2011 http://www.reuters.com/article/us-clinton-africa-idUSTRE75A0RI20110611.

review provides some background for the subsequent analysis using firms' transaction-level data. In Section 3 we introduce a simple conceptual framework to guide our transaction-level empirical analysis on the pattern of Chinese FDI in Africa. The framework features a multi-sector, multi-country world economy, with capital and labor as the main factors of production. Countries differ in factor endowment, political stability and rule of law, while sectors differ in factor intensity. Both labor and capital are imperfectly mobile across countries, with the former being significantly less so. Investors from China choose in which country and sector to invest to maximize profits. Both vertical and horizontal FDI are considered in the framework. Basic economic logic predicts that Chinese FDI in Africa is more prevalent in skill-intensive sectors in skill-abundant countries, while it is more prevalent in capital-intensive sectors in capital-scarce counties. This relationship should be stronger in riskier economies, such as those politically unstable countries.

In Section 4 we introduce the transaction-level data from the Chinese Ministry of Commerce (MOFCOM). Certain Chinese enterprises making direct investments abroad have to register with the Ministry of Commerce.[3] The resulting database provides the investing company's location in China and line of business. It also includes the country to which the investment is flowing, and a description in Chinese of the investment project. However, *it does not include the amount of investment.* The investment to Africa over the period 1998 – 2012 includes about 2000 Chinese firms investing in 49 African countries. Based on the investing firms' names in the database, the typical entry is more representative of a private firm that is much smaller than the big state-owned enterprises involved in

[3] Although our data set does not cover the universe of China's ODI transactions, it is representative of the medium-large sized private-firms' ODI. Prior to October 6, 2014, any overseas investment project worth more than $100 million was required to be approved by MOFCOM. Overseas investment in energy and mining, and projects between $10 million and $100 million were also required to seek approval from provincial commerce departments. Overseas investment companies in industries covered by China's export restriction policies or projects affecting more than one foreign country's interests are still subject to MOFCOM's approval (MOFCOM Order [2014] No. 3 (Sept. 6, 2014)). See Section 4 for more details.

the mega-deals involved in natural resource extraction. These data provide insight into what the Chinese private sector is doing in Africa. Based on the descriptions of the overseas investment, we categorize the projects into 25 industries covering all sectors of the economy (primary, secondary, and tertiary). The allocation of the projects across countries and across sectors provides a snapshot of Chinese private investment in Africa.

Section 5 then investigates the allocation of projects more rigorously. In particular we ask whether factor endowments and other country characteristics influence the number and types of investment projects from Chinese investors. If Chinese investment is similar to other profit-oriented investment, then the number and nature of projects should be related to the factor endowment, market size, and other characteristics of the recipient countries.

Section 6 briefly summarizes the main findings: A first important point is that at end-2012 China's share of the stock of FDI in Africa was on the order of 3%. While its investment may be growing rapidly, it is still a small player, and the vast majority of FDI in Africa comes from Western sources. Based on the aggregate data, Chinese investment and Western investment are similar in that they are attracted to larger markets and to countries with natural resource wealth. Controlling for those factors, Western investment tends to stay away from countries with poor governance in terms of property rights and rule of law. Chinese investment, on the other hand, is indifferent to those governance measures, with the result that the countries where China's investment share is large tend to be ones with weak governance. The aggregate data are heavily influenced by large state-to-state resource deals, and that is one justification for turning then to the firm-level data.

The firm-level data are more reflective of what medium-sized private firms are doing in Africa. Our analysis shows that, while Chinese ODI is less prevalent in skill-intensive sectors, it is more prevalent in the more skill-abundant countries, suggesting that Chinese investors aim to exploit the

local comparative advantage. Chinese ODI is more concentrated in capital-intensive sectors in the more capital-scarce countries, suggesting its importance as a source of external financing to the continent. These patterns are mostly observed in politically unstable countries, implying firms' stronger incentives to seek profits in tougher environments. We also find that Chinese ODI on the continent appears to be market-seeking, as illustrated by a positive correlation between host countries' market size and the incidence of ODI. Such positive correlation is strengthened when host countries' costs of international trade increase. Finally, our results show that the prevalence of Chinese ODI in services is widespread across African countries, independent of most countries' economic fundamentals, but is negatively correlated with the host countries' skill abundance.

Our paper is related to various strands of literature. First, it relates to an extensive literature on the determinants of FDI.[4] In particular, our empirical model is the closest to Maskus and Webster (1995) and Yeaple (2003), who also focus on host countries' comparative advantage due to factor endowment differences as a key determinant of (vertical) FDI. Our paper also contributes to the studies on horizontal FDI or market seeking as an important determinant of FDI (e.g., Brainard, 1997; and Blonigen, Davies, and Head, 2003, among others).

More specifically, our paper relates to the growing literature on the patterns and determinants of Chinese ODI. Most of the studies in the latter literature were descriptive in nature, sometimes based on case studies or data on a select set of firms (e.g., Cai, 1999; Wu and Chen, 2001; Deng 2003; Kaplinsky and Morris, 2009). An early paper in this literature by Cai (1999) proposes that Chinese

[4] This literature includes the classical theory of multinational enterprises (MNEs) about how firms use their capabilities and resources to generate competitive advantage over indigenous firms in host countries (Caves 1971, Hymer 1976, Kindleberger 1969). Given the focus of our paper on factor endowment differences across countries, it is particularly related to Maskus and Webster (1995), who show that the factor intensity of multinational affiliates in Korea and the United Kingdom are consistent with the comparative advantage of the countries. For the same reason, it is related to Yeaple (2003), who show that the patterns of US outward direct investment across sectors and countries can be explained by the so-called chain of comparative advantage (identified from the interaction between countries' skill abundance and sectors' skill intensity). See Blonigen (2005) for an extensive literature review on the determinants for both vertical and horizontal FDI.

firms invest overseas to seek markets, natural resources, technology, managerial skills, and financial capital. Deng (2003) identifies two additional motives: strategic assets (e.g., brands, marketing networks) and diversification. An influential study by Morck, Yeung and Zhao (2008) postulates that perhaps because Chinese firms are better at dealing with governments and operating in a country with inefficient domestic institutions, they can perform better than other foreign firms in environments with weak domestic institutions.[5] The focus of our paper is about both economic and institutional determinants of Chinese ODI in Africa. While China was itself a low-cost production base, we show that Chinese ODI in Africa is shaped by firms' profit maximization by choosing locations of investments based on the local comparative advantage of the host countries. We also find that such motivation is particularly strong in politically unstable environment.

More recent studies focus on the empirical examination of the determinants of Chinese ODI. Most of these studies rely on aggregate data for analysis (Buckley et al. 2007; Cheng and Ma, 2007; and Cheung and Qian, 2007).[6] There are a few notable exceptions that use micro-level data. Luo et al. (2011) show empirically that ODI by private Chinese firms had been prompted to exploit firm-specific advantages as well as to tackle market imperfections due to the weak domestic institutions in China. Cui et al. (2012), Chen and Young (2010), and Xiao et al. (2013) study the implications of Chinese government's involvement in outward investments and reach mixed conclusions regarding the performance of the investment. Other studies on Chinese overseas merger and acquisition

[5] Darby, Desbordes, and Wooton (2013) how theoretically that investors from countries with weak domestic institutions are less likely to be deterred from investing in countries with equally poor institutions, compared to advanced economies' investors.

[6] Using aggregate data, Buckley et al. 2007 find Chinese ODI to be positively correlated with the levels of political stability in and cultural proximity to host countries. It is also positively related to host countries' natural resource endowment in recent years. Cheng and Ma (2007) and Cheung and Qian (2007) show that China's investment was motivated by both market seeking and resource seeking.

activities support the resource-seeking and technology-seeking motives (Antkiewicz and Whalley 2007, Rui and Yip 2008).[7]

Our work also contributes to a small but growing literature on the economic effects of Chinese FDI and other kinds of economic engagements in Africa (Brautigam, 2003; Lederman, Mengistae and Xu, 2003; Morris and Einhorn, 2008; Rui, 2010; Rotunno, Vezina, and Wang, 2012; Shen, 2013; Harrison, Lin and Zhu, 2014).[8] The findings have been mixed. Our paper complements this literature by showing that China's and possibly other countries' investments in African nations are a function of host countries' factor endowment, institutions, and political stability. Thus, the effects of FDI will naturally vary across countries.

2. Allocation of Chinese ODI and total FDI across African countries

China's official statistics on the country's aggregate outward direct investment (ODI) in Africa reveal a number of paradoxes.[9] Simply put, China's investment in Africa is both big and small. It is small in the sense that China is a latecomer to Africa and accounts for only a very small share of the total stock of foreign investment on the continent. At end-2011, that total stock was $629 billion, of which the Chinese share was 3.2%. China's investment in Africa has been growing rapidly and its

[7] Recent studies show that in addition to facilitating foreign sales, firms undertake ODI to acquire resources, assets and technology to develop their competitive advantage (e.g., Makino, Lau, and Yeh, 2002; Mathews 2006). Makino, Lau, and Yeh (2002) focus on asset seeking versus market seeking as the main motivations for Taiwanese ODI.

[8] By comparing Nigeria, a country that is closed to China's economic engagement with Mauritius, a country that is relatively more open to it, Brautigam (2003) reported that the Chinese business network developed in the latter is related to export-oriented industrialization. Rui (2010) uses Chinese National Oil Corporation's investment in Sudan as a specific example to illustrate how the quality of domestic institutions is relevant for the country to realize the benefits of inward FDI from China. Harrison, Lin and Zhu (2014) offer empirical evidence about how foreign ownership is an important factor explaining African firms' performance. Lederman, Mengistae and Xu (2013) also offer micro and macro evidence of the benefits of FDI in Africa. There is also a growing literature about the effects of trade and industrialization of the content (e.g., Morris and Einhorn, 2008 and Rotunno, Vezina, and Wang, 2012).

[9] When interpreting the patterns of China's ODI based on China's official data, readers should be reminded that a potentially large number of Chinese investors might register their overseas businesses in Hong Kong or other tax havens, hiding the final destinations of their investments. This is presumably more important for the larger investments. Our focus on the small and medium private investors implies that this issue is lesser a problem for us. Notice that this reality due to firms' incentives to register businesses in tax haven is not specific to China.

share will rise over time, but slowly, starting from a low base. China's investment in Africa is big in a relative sense, however. The world as a whole has six times as much direct investment in the U.S. as in Africa, reflecting the fact that most FDI goes to advanced economies. China's pattern of investment is different, however. As of end-2013, China had more ODI in Africa ($26 billion) than in the U.S. ($22 billion). So, China's *relative* focus on Africa is large, though it is still a small player in investment overall.

What about the allocation of China's investment among African countries? Is it similar to or different from the pattern seen from existing, mostly Western investors? To answer this question we use the data on the stock of Chinese ODI in 49 African countries at end-2012 from the Ministry of Commerce.[10] A useful point of departure is the allocation of the overall stock of FDI among those 49 countries. Those data are available at end-2011.[11] Globally, the allocation of FDI can be explained quite well by a parsimonious set of variables that measure (1) market size (total PPP GDP); (2) natural resource rents as a share of the economy; and (3) governance. For governance we consider two distinct measures, from the World Governance Indicators:

- Rule of law "captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence";

- Political Stability and Absence of Violence/Terrorism "measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means,

[10] Ministry of Commerce of China, 2012 Statistical Bulletin of China's Outward Foreign Direct Investment.
[11] The stocks of FDI end-2011 are from the updated online database originally published as Lane and Milesi-Ferretti (2007).

including politically-motivated violence and terrorism."

Column 1 in Table 1 shows that the allocation of FDI across 49 African countries follows the global pattern. FDI is attracted to larger markets with an elasticity of 0.74. Other things equal, resource rich countries receive more FDI. The standard deviation across African countries of the resource rents variable is 17.6, so that the coefficient indicates that one standard deviation richer in resource wealth attracts 49% more FDI. Finally, FDI prefers an environment of good property rights and rule of law. Across African countries the standard deviation of the rule of law index is 0.49, so one standard deviation better on rule of law attracts 31% more investment. Figure 1, a partial scatter plot of the log of total FDI and the rule of law index, shows this strong relationship.

How does the allocation of Chinese ODI compare? Column 2 in Table 1 shows that Chinese ODI is positively correlated with market size and natural resource wealth, with coefficients similar to those in the equation for overall FDI. However, Chinese ODI has a modest, negative correlation with the Rule of Law index (column 3). While property rights/rule of law may not matter, Chinese ODI is positively correlated with the index of political stability (column 4). Also, population seems to matter as a measure of economic size, not just total GDP (column 5). Comparing the FDI equation in column 1 and the Chinese ODI allocation in column 5: China has a modestly stronger attraction to natural resources and in terms of governance favors political stability over property rights/rule of law.[12]

The partial scatter of the log of Chinese ODI and the political stability index is shown in Figure 2. This relationship makes sense given that some significant part of the volume of Chinese investment in

[12] Our aggregate results are largely consistent with the findings by Buckley et al. (2007). Regarding rule of law, our findings resonate well with Wang, Xu, and Zhu (2012), who similarly find that rule of law is not related to the allocation of inward FDI *within* China.

Africa is tied up in state-to-state resource deals. In DR Congo, for example, the Sicomines iron mine involves the Chinese state-owned enterprises China Railway Engineering Corporation and Sinohydro and the private company Zhejiang Huayou Cobalt, in partnership with Congolese state-owned companies. Other high-profile deals include CNPC's gas investment in Mozambique, Chinalco's mining investment in Guinea, and Sinopec's oil and gas acquisition in Angola. In the data on the stock of Chinese investment in different African countries, these large natural resource deals play an important role. Given the state-to-state nature of these deals, it makes sense that China is more concerned with the political stability of the government than with the environment of rule of law in the domestic economy. Political stability and rule of law are fairly highly correlated (0.59 across African countries). Still, there are countries that are rated to be significantly better on political stability than on rule of law. Some examples are Angola, Eritrea, Madagascar, Zambia, and Zimbabwe – all of which have significant Chinese investment relative to their total FDI. Dollar (2015) finds that these relationships exist globally: total FDI is strongly attracted to good property rights and rule of law, whereas Chinese ODI is attracted to politically stable environments, without reference to the rule of law. So, the relationship is not special to Africa but says something about Chinese ODI in general.

Since Chinese investment is indifferent to the property rights/rule of law environment, there are similar amounts of Chinese investment in good governance countries and poor governance countries. For example, if we divide the 49 African countries into three groups based on the Rule of Law index in 2012, the stock of Chinese ODI is nearly the same in the good governance countries, as in the poor governance ones (Figure 3). For the stock of FDI, on the other hand, nearly 60% is in the good governance environments, compared to 25% in the poor governance environments (Figure 4). These patterns together mean that the countries in which China's *share of inward investment* is large tend to be ones with poor governance. Still, note that it is only a minority of Chinese investment that is in

those environments.

3. Conceptual Framework

This section discusses the conceptual framework for our empirical analysis using firm-level data. The objective is to provide some guidance to interpret our empirical results. Readers who are interested in formal models about the determinants of FDI are referred to Carr, Markusen and Maskus (2001), Bergstrand and Egger (2007), and Yeaple (2013). Consider a multi-sector multi-country global economy. Sectors differ in skill and capital intensities, while countries vary in their factor endowment, quality of domestic institutions, as well as political stability. Consider an investor (a firm) from the source country, deciding in which country and sector to invest.[13] The investors' motives for FDI can be for selling goods and services in the host country, including trade intermediation from the home country (horizontal FDI), or to exploit the lower costs of production compared to home (vertical FDI).

Consider vertical FDI first. We expect to see in the data that relatively more FDI in sectors where the returns to investment are higher. In a multi-factor, multi-country and multi-sector world with imperfectly mobile labor, the return to investment will be higher in skill-intensive sectors in a skill-abundant host country, where the cost of skilled labor is relatively lower, compared to a skill-scarce host country (Yeaple, 2003). We would expect the same positive effect from the interaction between a country's capital abundance and sectors' capital intensity. However, given the significantly higher mobility of capital, it is possible that in host countries where capital is scarce and thus the rental cost

[13] In our simple framework that focuses on the effects of country and sector characteristics on FDI flows rather than the ownership structure, the distinction between greenfield and merger and acquisition is unimportant.

of capital is high, we would observe more FDI flows from China to capital-intensive sectors. Let us summarize the predictions about vertical FDI by the following hypothesis.

Hypothesis 1: *Chinese FDI in Africa is more prevalent in skill-intensive sectors in skill-abundant countries, while it is more prevalent in capital-intensive sectors in capital-scarce counties.*

How about host countries' political stability and rule of law (which proxies for a wide range of domestic institutions)? Political instability increases the riskiness of any investment. All else equal, we should expect a negative effect of political instability on the level of FDI. This intuitive conjecture was already empirically verified in Section 2 using cross-country data. Conditional on investment, a firm would choose the projects with the highest expected returns to compensate for the higher levels of risks in a politically unstable environment. Such incentives imply a higher degree of specialization based on the host country's comparative advantage. The same could be said about the effects of rule of law, if it proxies for the (inverse) likelihood of expropriation of capital by the government. We summarize the second hypothesis of our conceptual framework.

Hypothesis 2: *The relationship stated in Hypothesis 1 is stronger in riskier environments, as proxied by host countries' political stability or rule of law.*

Finally, let us turn to horizontal FDI (or market seeking). We expect to see in the data more Chinese FDI in countries with a larger market. This positive relationship should be stronger when the cost of exports from China to the destination country is higher (Brainard, 1997). Along the sector dimension, one would expect to observe more FDI in trade-related services sectors, more so if the trade cost is high or if the market size is large.

Hypothesis 3: *Horizontal FDI is more prevalent in countries with a larger market size, especially if the cost of exports from China is higher.*

In Section 5, we will empirically examine all these three hypotheses using our transaction-level ODI data.

4. Data

Before getting to the empirical analysis, let us discuss our data sources, in particular, the transaction-level data on Chinese ODI.

a. Transaction-level ODI data

The main data for our empirical analysis are Chinese ODI transaction-level data, obtained from the Ministry of Commerce (MOFCOM). The data set includes deals that were approved by the ministry between January 1, 1998 and December 31, 2012.[14] For each ODI deal, the data set reports the name of the investing firm, the firm's sector of business, the province of origin, the description of the deal transactions and projects, and the recipient country of the ODI flow. There is, however, no information on the amount of the deal or the name of the target for mergers and acquisitions. Furthermore, according to Shen (2013), one of the first papers to use this firm level data set of Chinese ODI, a large majority of the firms in the database are private firms, especially since 2000. This fact that we are capturing more private firms' investments into Africa combined with the lack of

[14] As mentioned in the introduction, any overseas investment project worth more than $100 million was required to be approved by MOFCOM before October 6, 2014. Overseas investment in energy and mining, and projects between $10 million and $100 million were required to seek approval from provincial commerce departments. Overseas investment companies in industries covered by China's export restriction policies or projects affecting more than one foreign country's interests are still subject to MOFCOM's approval (MOFCOM Order [2014] No. 3 (Sept. 6, 2014), http://www.mofcom.gov.cn/article/b/c/201409/20140900723361.shtml). Apart from the MOFCOM, the National Development and Reform Commission (NDRC), China's top economic planner, has the power to approve or veto an overseas investment project. Starting in October 2014, Chinese companies planning to invest less than $1 billion overseas will only need to register with authorities instead of seeking approvals from the NDRC. Any overseas investment project larger than $1 billion must be approved by the NDRC and investment above $2 billion must be approved by the State Council.

deal values in our dataset might thus not provide us with a comprehensive picture of all Chinese ODI. At the same time, however, the deal specifics on destination and sector in the data give us a more systematic way to analyze the sectoral pattern of ODI from China to Africa.

The raw data contains 2,005 deals at the firm level, covering 49 countries on the African continent.[15] The top five destination countries for Chinese ODI are: Nigeria, South Africa, Zambia, Ethiopia, and Egypt, with Nigeria taking the clear lead, representing 12% of all deals. Figure 5 depicts the geographical distribution of the number of deals by country. Deals tend be more concentrated in the East and South African regions, whereas Central and West Africa, with the exception of Nigeria, have relatively fewer deals. In East Africa, countries such as Ethiopia, and to some extent Kenya and Tanzania are relatively resource poor compared to some of the Southern African countries such as Zambia, Angola, and South Africa. Some of the reasons why East Africa stands out as a popular destination for these private Chinese investments are its relatively more developed infrastructure, including ports, and its relative closeness to China. The East Africa Community (EAC), in particular, forms a customs and single market trading union that has invested heavily in infrastructure investments, mostly with loans from the Chinese government, such as the Standard Gauge Rail project originating in Kenya as well as the Karuma Hydroelectric power project in Uganda. These projects will enhance the connectivity between these countries and supply reliable energy in the future years to come, thus, making the region an attractive destination.

Within each transaction, we use the description of the transactions to categorize the types of projects the Chinese investing firm is conducting in the destination countries. By using key words in the deal descriptions provided in the data, we categorize projects into different industries. Since most of the deals involve multiple projects, sometimes in different industries, we obtain a sample of

[15] Chen and Tang (2014) provide a detailed description of the distribution of Chinese ODI outside Africa, and study the causes and consequences of ODI at the firm level.

3,989 projects. In the first round, key words in the descriptions of the projects were matched up with MOFCOM's industry classifications. Then we use concordances between MOFCOM's industry classifications to the 34 UN industry classifications to transform to industries of the latter.[16] For the remainder of the analysis, we use the project-based sample that we categorize into different industries based on the United Nations 34 sector industry classification, which we then further condense into 13 manufacturing sectors, 7 service sectors, 2 agriculture sectors, and 2 mining sectors. Table 2 presents the country breakdown in terms of number of Chinese investing firms and the number of projects that we identified based on the firm-level deals. Table 3 presents the sectoral distribution in terms of number of projects.

We find that about 72 percent of the projects are in service sectors, while 15 percent of the projects are in manufacturing sectors, with the remaining portion almost evenly split between agriculture and natural resources. The two sectors that received the most Chinese ODI in terms of the number of projects are business service (1053 projects) and import and export (539 projects). Thus, against popular perception, most of the Chinese *private* ODI projects are not engaging in natural resource related sectors, but rather, are involved in service sectors. For instance, in oil-rich Nigeria, about two-thirds of the projects are actually in service sectors. In Figure 6, we divide the countries in terms of the resource intensities of their exports. Following the IMF's categorization for oil exporters, non-oil resource intensive countries, and the rest of African economies, we can see that regardless of the degree of raw material export intensity of the country, the majority of Chinese ODI projects tend to be in the service sector.

b. Country-level Data

[16] We first use the concordance provided by MOFCOM to match multiple MOFCOM industry codes to single Harmonized System (HS) 2-digit codes. We then use the concordance from the United Nations (UN) to match multiple HS2 codes to single UN industry section codes (Source: http://unstats.un.org/unsd/tradekb/Knowledgebase/HS-Classification-by-Section).

We construct the measures of a country's GDP, population and capital abundance using data from the Penn World Tables for 2011. Capital abundance is defined as the amount of capital endowment per worker. We measure a country's human capital abundance as the fraction of high-school graduates in the workforce, using data from Barro and Lee (2010). Countries' Political Stability and Rule of Law indices, for 2012, are obtained from World Governance Indicators, as described in Section 2. The international trade cost data for 38 African nations are obtained from the World Bank's Trade Costs Dataset, for the period of 2000-2010.[17]

c. Sector-level Data

The main sector-level measures are various factor intensities. We follow Romalis (2004) to define these measures as follows:

- Labor intensity = the ratio of total wage bill to total value added of the sector.
- Capital intensity = 1-labor intensity.
- Skill intensity = the share of non-production workers in the employment of the sector, multiplied by its labor intensity.
- Material intensity = (output-value-added)/output

To construct these measures, we use three data sources and adjust the definition of the variable slightly to accommodate data limitation. The three databases were for the U.S., China, and a wide range of African nations, respectively:

- Database 1 (US-based): National Bureau of Economic Research and the U.S. Census Bureau's Center for Economic Studies (CES) (2000-2010).

[17] The estimated trade cost for each importing country is the corresponding country fixed effect from estimating a gravity equation of bilateral trade flows between all country pairs in the world. For details, see http://data.worldbank.org/data-catalog/trade-costs-dataset

- Database 2 (China-based): China's National Bureau of Statistics (NBS) industrial firm surveys (2003-2005).
- Database 3 (Africa-based): United Nations Industrial Development Organization (UNIDO) Industrial Statistics Data for African nations (2000-2010).

These data sets were chosen to address concerns that a constant measure of factor intensity measure from any country cannot represent other countries' factor intensity, as the underlying production technology and factor prices are different across countries. The idea of using the US industrial firms' data to construct factor intensity measures for other countries is originally proposed by Rajan and Zingales (1998). The rationale is that even though the factor usage in the same sector may differ across countries, as long as the ranking of sectors in factor intensity is preserved across countries, the regression results based on one country's factor intensity data are still informative. However, if there is factor intensity reversal due to substantial differences in factor endowments across countries, the inferences could be misleading. To address this potential issue, we use two more sets of factor intensity measures, based on data for Chinese and African sectors respectively. The benefit of using Chinese industrial firms' data to construct these measures is that it better reflects the technologies of Chinese firms (investors), which are arguably closer to the technology frontier of most African nations, compared to the US. Such approach is conceptually more appropriate if one were to consider the set of choices Chinese investors would face when making decisions to invest abroad. Another benefit is that for three years, the Chinese firm survey data provide for each firm the breakdown of employment by education level. We use the share of high-school graduates in a sector's total employment as a more direct measure of skill intensity, instead of the share of non-production workers.

Finally, the use of the UNIDO data for the available African nations to construct the sector measures appears to be the most appropriate. Two caveats are in order. First, measurement error

aside, there are frequent missing data at that level country-sector level. Thus, we need to use the average of the factor intensities of the same sector across African countries.[18] Second, the UNIDO data set does not provide information for the construction of skill intensity of a sector, so only the part of Hypotheses 1 and 2 on capital intensity will be tested when the African-based factor intensity measures are used. The three measures of factor intensity are highly correlated (See Table A2 in the appendix)

Notice that these factor intensity measures are only available for manufacturing sectors.[19] As such, our baseline analysis focuses on explaining the distribution of Chinese manufacturing ODI in Africa. Despite the prevalence of Chinese ODI deals in services in Africa, such analysis is still important as it can provide insights for understanding the low level of industrialization on the continent. That said, we will include observations for service FDI in the empirical analysis of horizontal FDI. We will also provide some cross-country evidence about Chinese ODI in services on the continent towards the end of the paper.

5. Empirical Analysis on the Sectoral Distribution of Chinese Investments in Africa

a. Regression Specifications

We use firms' transaction-level data to construct the dependent variables in our regressions. The goal is to study the distribution of Chinese ODI in Africa, based on various country and sector characteristics, as spelled out in the three hypotheses stated in Section 3. To examine Hypotheses 1 and 2, we first estimate the following two specifications:

[18] Data from 22 African countries are used to construct the capital intensity measures. They are Algeria, Botswana, Cote d'Ivoire, Cameroon, Eritrea, Ethiopia, Gabon, Ghana, Kenya, Madagascar, Malawi, Mauritius, Niger, Nigeria, Rwanda, Senegal, South Africa, Suriname, Swaziland, Tanzania, The Gambia, and Tunisia.

[19] Even when balance-sheet data for service firms are available for some countries, it is challenging to apply the same methodology to measure factor intensity of a service sector, which was developed conceptually to study manufacturing firms.

$$ODI_dum_{cs} = [f_c + f_s] + \beta_k \, ln(K_c/L_c) \times k_s + \beta_h \, ln(H_c/L_c) \times h_s + \varepsilon_{cs}; \quad (1)$$

$$Count_{cs} = [f_c + f_s] + \gamma_k \, ln(K_c/L_c) \times k_s + \gamma_h \, ln(H_c/L_c) \times h_s + \varepsilon_{cs}, \quad (2)$$

where *c*, *s*, and *t* stand for host country in Africa, sector, and year, respectively.

Without information on the value of each ODI deal, we explore the determinants of the investment pattern by using two dependent variables. In Specification (1), a dummy variable ODI_dum_{cs} is used as the dependent variable to indicate whether there was any ODI within a country-sector during the sample period (the extensive margin). In Specification (2), the count of ODI deals $Count_{cs}$ at the sector-country level is used as the dependent variable, which approximately captures the intensive margin of China's ODI. Notice that $Count_{cs}$ contains many zeros.

In all regressions, we always include country and sector fixed effects (f_c and f_s) to control for any unobservable country (e.g., the stage of development) and sector (e.g., unobserved policies in China that promote ODI from certain sectors) determinants of Chinese ODI. As such, country and sector standalone variables cannot be separately included in the regressions as they will be automatically absorbed by fixed effects. The identification thus comes from the interaction terms that vary across country-sector pairs. Specifically, we include two endowment-intensity interactions, one for capital and one for human capital. $ln(K_c/L_c)$ is country c's capital endowment while k_s is sector s's capital intensity. Similarly, $ln(H_c/L_c)$ and h_s are country c's human capital endowment and sector s's skill intensity, respectively. According to Hypothesis 1, $\beta_k < 0$, $\beta_h > 0$, $\gamma_k > 0$, and $\gamma_h < 0$ in Specifications (1) and (2).

Towards the end of the paper, we report empirical results about the relevance of market seeking (horizontal FDI) in shaping the pattern of Chinese ODI across African nations, according to Hypothesis 3. While we will use the same Specifications (1) and (2) for the analysis, instead of using the factor endowment interaction terms as the main regressors of interest, we use instead the log(GDP) and the

estimated international trade costs, as well as their interactions. Since these variables vary only across countries but not sectors, only sector but not country fixed effects will be included. Finally, we will also perform some cross-country regression analyses to shed light on the determinants of the large number of Chinese FDI deals in services in Africa. Since the factor proportions theory and the relevant sector-level characteristics cannot be directly applied to studying services, we collapse the sector dimension and use the fraction of Chinese ODI deals in service sectors in the country as the dependent variable. We explore several country-level characteristics, in particular market size and international trade costs, as the regressors of interest.

b. Estimation Results

In Table 4, we report results of estimating Specifications (1) and (2). Standard errors are clustered at the sector level.[20] In columns (1)-(3), we use the ODI dummy as the dependent variable and estimate Specification (1) using a linear probability model.[21] Columns (1), (2) and (3) use factor intensity measures constructed using data from the US, China, and select African nations, respectively (as described in Section 3). We find a positive coefficient on the interaction between a country's skill endowment and a sector's skill intensity in columns (1) and (2), after controlling for country and sector fixed effects. However, they are not statistically significant.

In columns (2) and (3) when China-based and Africa-based factor intensity measures are used, we find a negative and statistically significant coefficient on the interaction between a country's capital endowment and a sector's capital intensity. Specifically, based on the coefficient of -0.15 in column (3), a country with capital abundance in the 25th percentile of Africa (Togo), compared to one in the

[20] The main results are robust to clustering standard errors at the country level. They are available upon request.
[21] A Probit model is vulnerable to the well-known incidental variable problem when an exhaustive set of fixed effects is included.

75th percentile (Cameroon), is 3% more likely to receive ODI from China in the "machinery, mechanical, and electrical equipment sector (a sector ranked 75th percentile in the capital intensity distribution), compared to chemical products (a sector ranked 25th percentile).[22] This result is consistent with the idea that Chinese ODI serves as a source of external financing to the continent, especially in the capital-scarce host countries. To the extent that capital is more mobile than labor, the opposite signs found on the two factor interaction terms actually offer a coherent support for the main hypothesis of this paper -- Chinese investors are largely profit-driven and are responsive to market conditions, just like investors from other countries.

In columns (4) to (6), we use the number of ODI deals at the sector-country level as the dependent variable, based on Specification (2). We use a negative binomial regression model to address the issues related to the prevalence of zeros and the overly dispersed count data. We continue to find a positive (but not statistically significant) coefficient on the skill interaction term and a negative and significant coefficient on the capital interaction term, after controlling for country and sector fixed effects. These results suggest that while Chinese ODI tends to be concentrated in labor-intensive sectors in Africa on average, it is biased toward the more capital-intensive sectors in capital-scarce countries. The fact that we do not have the deal values in our data set might prevent us from having the most accurate description about the sectoral pattern of Chinese ODI. It is possible that a country receives a large number of small ODI projects in a sector, causing us to mistakenly identify a high prevalence of ODI in that sector. Two remarks are in order regarding this concern. First, as long as the average size and the number of deals in a country-sector are positively correlated, our results based on counts are still informative. Later on we will show that the number of deals within a sector is indeed positively correlated with host countries' economic size, consistent with the results in Table

[22] =-0.15*(Togo's capital endowment - Cameroon's capital endowment)*[machinery's capital intensity – chemical's capital intensity] = -0.15*(-1.63)*(0.12)

1. Second, if the number of deals and the total value of FDI are weakly correlated across country-sector pairs, it would go against us from finding any significant results supporting our hypotheses. With these caveats and remarks in mind, one could interpret the findings in Table 4 that Chinese firms tend to exploit the local comparative advantage of the host country when investing abroad.

We have shown in Table 1 that Chinese ODI is attracted to countries in Africa that are politically stable. What extra lessons can we possibly learn from the country-sector level? To answer this question, we split our sample into two subsamples based on whether a country has rule of law that is above or below the continent's median. Similarly, we also split the sample into two based on whether a country is above or below the median value of political stability. We then use the two subsamples to repeat the analysis of Table 4. Table 5 reports the regression results. In columns (1)-(4), we examine the probability of Chinese ODI across sectors and countries. In columns (5)-(8), we use the number of deals as the dependent variable. The estimation methods and the standard error clustering are the same as Table 4. Panels A, B, and C using factor intensity measures constructed using US, Chinese, and African data, respectively.

We find that host countries' political stability does affect the pattern of FDI distribution across sectors in Africa, while their quality of governance (rule of law indices) is not systematically related to the pattern of FDI. In particular, for the group of countries that are politically less stable (column (3) and column (7)), we find a positive (and sometimes significant) coefficient on the skill interaction term, and a negative and always significant coefficient on the capital interaction term. In other words, in country where the cost of capital is higher, Chinese FDI tends to be concentrated in the capital-intensive sectors, particularly in politically unstable markets. A potential explanation is that in politically unstable business environments, investment is risky but the expected return could be high. The same can be said to rationalize the positive and significant coefficient on the skill interaction term in column (7) in Panel A when the US-based factor intensity measure is used. Facing a risky

investment environment, investors need to be more cautious when choosing projects to invest. Confirming Hypothesis 2, such investment incentives imply that investors will be more motivated to exploit the host country's comparative advantage (and disadvantage).

So far, we have explored the patterns of Chinese ODI on the continent based on the vertical FDI model that features host countries' factor endowment differences. Another strand of literature proposes that firms invest overseas to set up affiliates for foreign sales. The motivations for horizontal FDI should be stronger when the size of the market is larger or the costs to ship the goods or services from the origin country to the destination are higher. Table 6 reports the regression results based specifications (1) and (2), but using ln(GDP), ln(trade costs), and the interaction of the two as the regressors of interest. Since these variables vary across countries but not sectors, we can include sector fixed effects but not country fixed effects. Notice that by not including factor intensity measures as regressors, we can now include both manufacturing and non-manufacturing deals in the regressions.

The coefficient on ln(GDP) is positive and significant in columns (1) and (4) when it is included along with sector fixed effects, suggesting that within a sector, Chinese FDI are more likely and more prevalent in larger economies. Market seeking is one of the reasons, though GDP is certainly highly correlated with other economic fundamentals. To provide more evidence to show market seeking as an important driver of Chinese ODI in the region, we include in columns (2) and (4) ln(trade costs) and in columns (3) and (6) the interaction between ln(GDP) and ln(trade cost) as well. While the standalone ln(trade cost) is not significant, the coefficient on the interaction term is positive and significant in columns (3) and (6), while the coefficient on ln(GDP) is now negative and significant. The combination of all coefficients suggests that, while Chinese ODI is more likely and prevalent in larger economies, this is only the case when trade costs are sufficiently high. This result is consistent with the proximity-concentration tradeoffs highlight by the studies on horizontal FDI, such as Brainard

(1997), that when trade costs are low, firms are more inclined to export directly from their home countries where production is concentrated, rather than setting up foreign affiliates for both production and foreign sales.

In Table 3, we have highlighted the prevalence of service sectors in Chinese ODI. We now examine whether and how the prevalence of service ODI from China is related to the host country's economic fundamentals. Since there is no particular sector-level measure for services that we can use, we aggregate the data to the country level, and use the fraction of Chinese ODI deals in services for each recipient African nation as the dependent variable. Table 7 shows that a country's stage of development (column 1), capital abundance (column 2), rule of law (column 4), political stability (column 5), market size (column 6), and trade costs (column 7) do not appear to be correlated with the prevalence of Chinese FDI in services. The only significant relationship we find in this table is a negative correlation between the prevalence of service FDI from China and host countries' skill and natural resource endowments. These findings need to be taken with a grain of salt as omitted variables bias could be present in cross-country regressions. Nevertheless, the conventional views that investment in education promotes industrialization, while natural resource abundance with limited political constraints could slow down economic development, are consistent with the results here. The bottom line is that the predominance of Chinese ODI in services appears to be widespread and cannot be explained by the standard market-seeking motives (as country size and trade costs do not seem to matter).

6. Concluding Remarks

Our analysis provides a nuanced view of China's direct investment into Africa. First, using aggregate data on China's direct investment in each African country, we debunk a number of popular myths about China's activity on the continent. According to the most recent data, China accounts for

about 3% of the stock of direct investment in Africa. No doubt that figure is growing rapidly, but still China's investment is relatively small. Chinese investment is attracted to natural resource wealth, but no more so than Western investment. A final point about the allocation of Chinese investment overall is that it is indifferent to the recipient countries' property rights/rule of law, whereas Western investment tends to stay away from the poor governance environments. Since Chinese investment is equally distributed between good and poor governance environments, whereas Western investment is concentrated in the former, *the share of Chinese investment in the poor governance environments tends to be high.*

The aggregate data is naturally influenced to a large extent by some very large deals, which tend to involve state-enterprise investment in natural resource projects. The second main contribution of our paper is to use MOFCOM's database on Chinese firms that invested in Africa between 1998 and 2012. We argue that this database gives a more accurate picture of what small- and medium-sized private Chinese firms are doing in Africa. In this database relatively few investments are in the natural resource sectors. Service sector investments dominate, and there are a significant number of investments in manufacturing as well. These investments are spread throughout the continent.

Using the firms' transaction-level ODI data, we examine how Chinese ODI is distributed according to the recipient countries' and sector characteristics. We find evidence that Chinese ODI is profit-driven, just like investors from other countries. Specifically, our cross-country-sector regressions show that Chinese firms tend to invest in the more skill-intensive sectors in skill-abundant countries, but in the less capital-intensive sectors in capital-abundant countries. These patterns are mostly observed in politically unstable countries, suggesting stronger incentives to maximize profits in tougher environments. We also find that market-seeking is part of the reasons for Chinese private firms to invest on the continent, as illustrated by a positive correlation between host countries' market size and the incidence of ODI. Such positive correlation is strengthened when host countries'

costs of international trade increase. Finally, the predominance of Chinese ODI in services appears to be widespread across host countries, independent of their economic size and trade costs, but is negatively correlated with their skill and natural resource endowments.

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Figure 1. Total FDI and rule of law, African countries

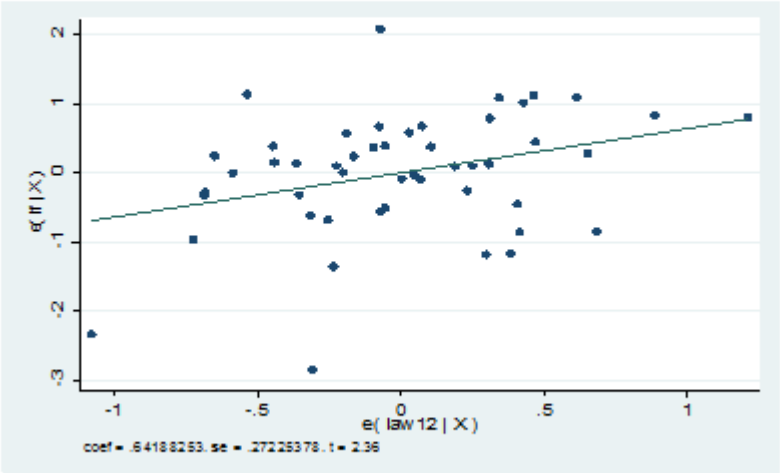


Figure 2. Chinese ODI and political stability, African countries

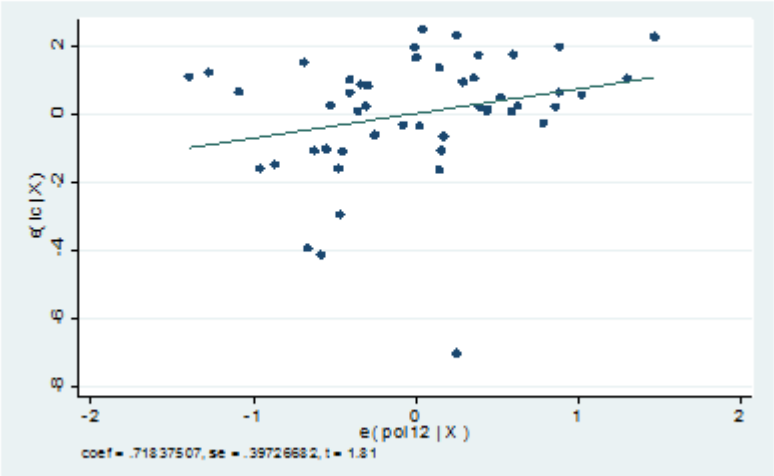


Figure 3. Chinese ODI by governance environment

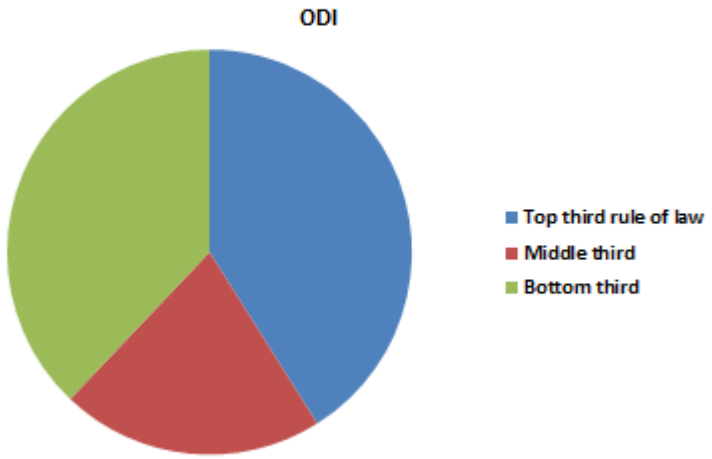


Figure 4. Total FDI by governance environment

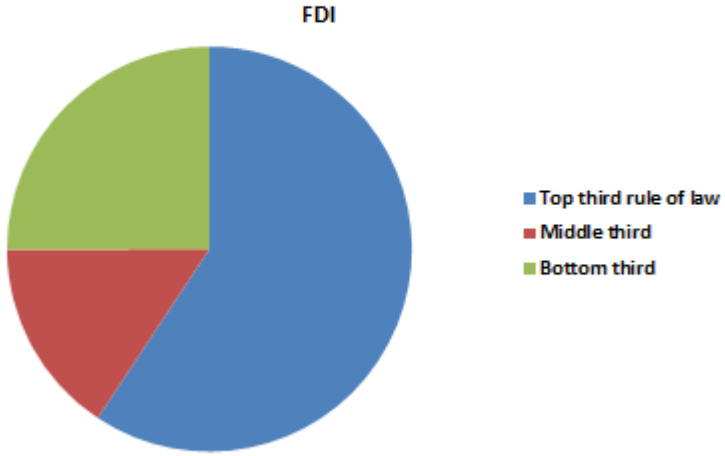
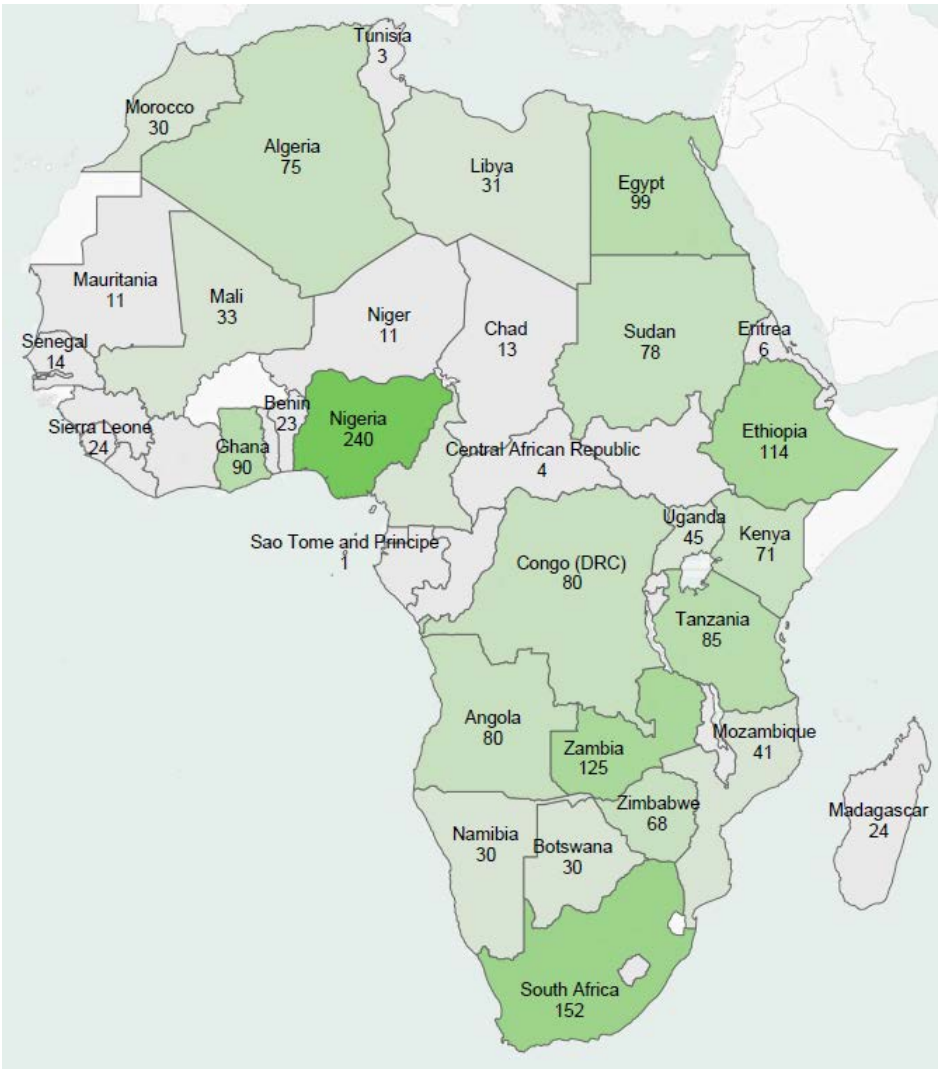
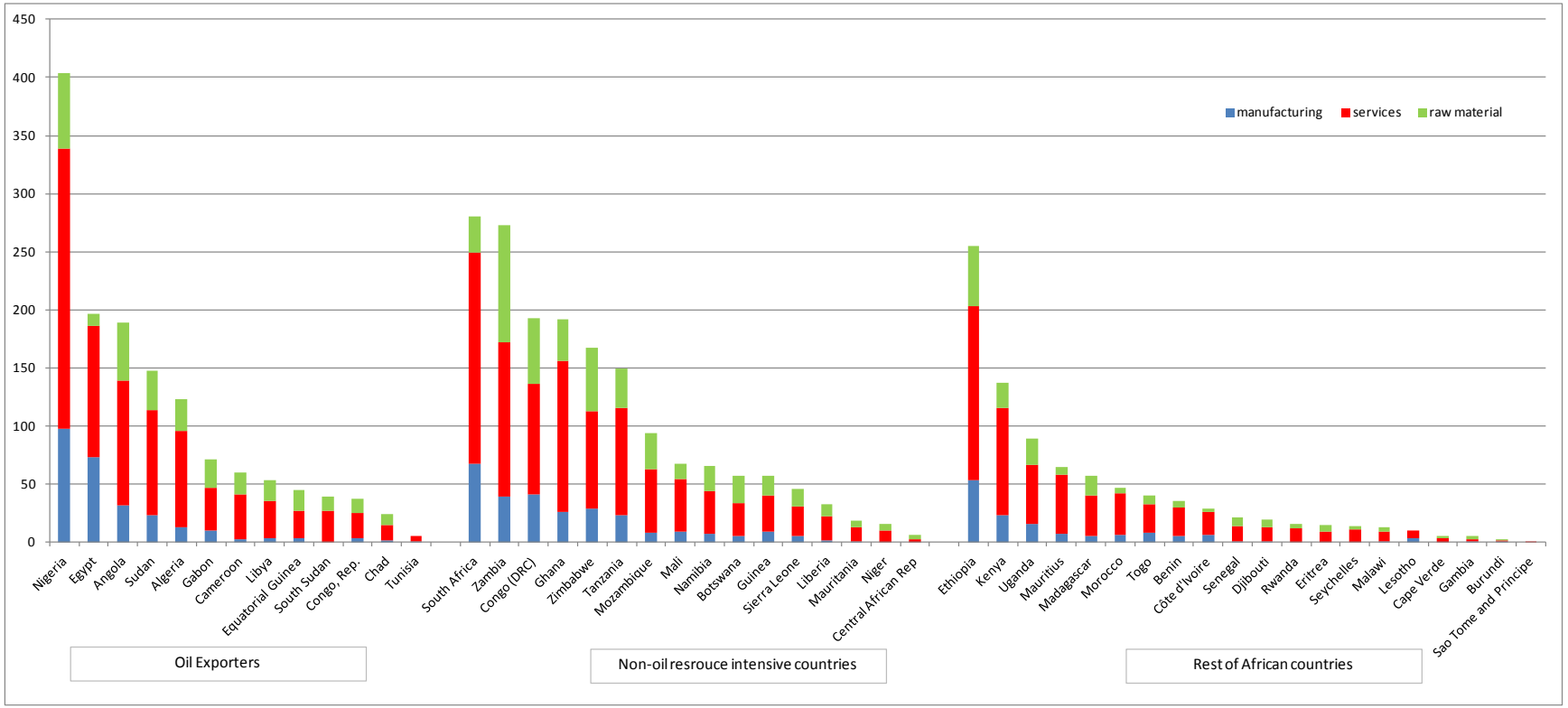


Figure 5. Number of Deals by Country



Source: MOFCOM and authors' calculations.

Figure 6. Distribution of Chinese ODI Projects by Country



Source: MOFCOM and authors' calculations.

Table 1. Allocation of FDI and Chinese ODI among African Countries

Dependent Variable	FDI	Chinese ODI	Chinese ODI	Chinese ODI	Chinese ODI
	(1)	(2)	(3)	(4)	(5)
Number of Countries	49	49	49	49	49
(ln) PPP GDP	.74	.97	1.00	.99	.24
	(9.24)	(5.59)	(5.65)	(5.45)	(0.76)
Natural Resource Rents/GDP	0.028	0.036	0.030	0.037	0.052
	(3.59)	(2.21)	(1.71)	(2.23)	(3.20)
Rule of Law	.64		-.55		
	(2.36)		(0.37)		
Political Stability				.15	0.72
				(0.42)	(1.81)
(ln) Population					1.05
					(2.82)
R-squared	0.75	0.49	0.50	0.49	0.57

Note: t-statistics, based on robust standard errors, in parentheses

Table 2. Top 20 Destination Countries

Country	Number of projects	Number of firms
Nigeria	404	240
South Africa	280	152
Zambia	273	125
Ethiopia	255	114
Egypt	197	99
Congo (DRC)	193	80
Ghana	192	90
Angola	189	80
Zimbabwe	167	68
Tanzania	149	85
Sudan	148	78
Kenya	137	71
Algeria	123	75
Mozambique	94	41
Uganda	89	45
Gabon	71	23
Mali	68	33
Namibia	66	30
Mauritius	65	40
Cameroon	60	28

Source: China's Ministry of Commerce Transaction-level ODI Data.

Table 3. Sector Distribution

Sector ID	Sector Description	Nb of Deals
	Agriculture	
2	vegetable products	72
1	live animals; animal products	41
	Manufacturing	
12	articles of stone, plaster, cement, etc.	96
15	machinery and mechanical appliances; electrical equipment; parts thereof.	76
10	textiles and textile articles	75
3	prepared foodstuffs; beverages, spirits and vinegar; tobacco	64
11	footwear, headgear, umbrellas, etc.	54
5	products of the chemical or allied industries	45
13	other manufacturing	45
16	vehicles, aircraft, vessels and associated transport equipment	40
8	wood and articles of wood.	35
6	plastics and articles thereof; rubber and articles thereof	22
17	miscellaneous manufactured articles	17
9	pulp of wood or of other fibrous cellulosic material	15
7	raw hides and skins, leather, etc.	9
	Service	
21	business service	1053
20	wholesale and retail	693
24	import and export	539
18	construction, transportation, storage and postal services	392
22	finance	68
19	information transmission, computer services and software	14
23	social service	12
	Mining	
4	mineral products	319
25	petroleum, water and electricity production and supply	45
Total		3841

Source: China's Ministry of Commerce Transaction-level ODI Data (1998-2012).

Table 4. Host Countries' Factor Endowments and the Pattern of China's ODI

Dependent Variable:	ODI dummy			Number of Deals		
	(1)	(2)	(3)	(4)	(5)	(6)
Data source of factor intensity measures	US	China	Africa	US	China	Africa
ln(K/L) x k	-0.0680	**-0.127****	**-0.150***	-1.393	-0.821	**-1.987*****
	(-0.431)	**(-2.616)**	**(-2.053)**	(-1.433)	(-1.703)	**(-2.975)**
ln(H/L) x s	0.0156	0.00820		0.0391	0.0104	
	(0.994)	(0.791)		(1.058)	(0.274)	
Fixed Effects	Country and Sector					
Nb of Countries	33	33	44	33	33	44
Nb of Sectors	13	13	13	13	13	13
Nb of Observations	429	429	572	429	429	572
R-sq in col. 1-3; Log likelihood in col. 4-6	.467	.468	.48	-424	-423	-564

t statistics, based on standard errors clustered at the sector level, are reported in parentheses; * p<0.10; ** p<0.05; *** p<0.01. Columns (1)-(3) are estimated using a linear probability model, while columns (4)-(6) are estimated using a negative binomial regression model.

Table 5. Differential Effects of Factor Endowments Depending on Host Countries' Political Environments

Dependent Variable:	ODI dummy				Number of Deals			
Panel A. Using factor intensity measures computed using US data								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Rule of Law		Political Stability		Rule of Law		Political Stability	
	Low	High	Low	High	Low	High	Low	High
ln(K/L) x k	-0.00975	0.106	-0.281	0.126	-0.556	-1.128	**-2.386*** **	-1.109
	(-0.027)	(0.490)	(1.114)	(0.687)	(-0.707)	(-0.933)	**(-3.954)**	(-0.709)
ln(H/L) x s	-0.0152	**0.0286***	0.100	0.0153	-0.226	0.0378	**0.514** **	0.000465
	(-0.161)	**(1.822)**	(1.114)	(1.077)	(-0.852)	(0.836)	**(2.558)**	(0.011)
Fixed Effects	Country and Sector							
Nb Obs.	208	221	208	221	208	221	208	221
R-sq (col. 1-4); log likelihood (col. 5-8)	.462	.52	.48	.487	-180	-238	-194	-224
Panel B. Using factor intensity measures computed using Chinese data								
	Rule of Law		Political Stability		Rule of Law		Political Stability	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Low	High	Low	High	Low	High	Low	High
ln(K/L) x k	0.114	-0.147	**-0.230** **	-0.0384	0.388	**-0.955***	**-1.444** **	-0.557
	(0.838)	(-1.517)	**(-2.675)**	(-0.341)	(1.126)	**(-1.933)**	**(-1.964)**	(-0.909)
ln(H/L) x s	-0.0555	0.0212	0.0655	0.00391	-0.196	0.0256	0.269	-0.0242
	(-0.865)	(1.577)	(1.045)	(0.350)	(-0.860)	(0.641)	(1.399)	(-0.643)
Fixed Effects	Country and Sector							
Nb Obs.	208	221	208	221	208	221	208	221
R-sq (col. 1-4); log likelihood (col. 5-8)	.464	.52	.48	.486	-180	-238	-194	-224
Panel C. Using factor intensity measures computed using African data								
	Rule of Law		Political Stability		Rule of Law		Political Stability	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Low	High	Low	High	Low	High	Low	High
ln(K/L) x k	0.0632	-0.216	**-0.238** **	**-0.0579**	**-1.815*** **	-1.602	**-2.287*** **	**-1.621***
	(0.281)	(-1.183)	**(-2.473)**	**(-0.397)**	**(-2.614)**	(-1.608)	**(-3.048)**	**(-1.902)**
Fixed Effects	Country and Sector							
Nb Obs.	273	299	273	299	273	299	273	299
R-sq (col. 1-4); log likelihood (col. 5-8)	.468	.535	.519	.464	-229	-325	-285	-273

Notes: t statistics, based on standard errors clustered at the sector level, are reported in parentheses. * p<0.10; ** p<0.05; *** p<0.01. Columns (1)-(4) are estimated using a linear probability model, while columns (5)-(8) are estimated using a negative binomial regression model. This sample covers 33-44 countries and 13 manufacturing sectors.

Table 6. Presence of Horizontal FDI from China

Dependent Variable:	ODI dummy			Number of Deals		
	(1)	(2)	(3)	(4)	(5)	(6)
ln(GDP)	0.105***	0.123***	-0.829**	0.539***	0.622***	-6.744***
	(15.357)	(14.562)	(-2.147)	(13.925)	(14.263)	(-6.420)
ln(Trade Cost)		-0.0626	-4.054**		-0.0791	-31.79***
		(-0.975)	(-2.505)		(-0.278)	(-7.020)
ln(GDP) x ln(Trade Cost)			0.167**			1.299***
			(2.478)			(7.069)
Fixed Effects	Sector					
Nb of Countries	47	38	38	47	38	38
Nb of Sectors	25	25	25	25	25	25
Nb of Observations	1175	950	950	1175	950	950
R-sq in col. 1-3; Log likelihood in col. 4-6	.371	.392	.399	-1794	-1484	-1480

t statistics, based on standard errors clustered at the sector level, are reported in parentheses; * p<0.10; ** p<0.05; *** p<0.01. Columns (1)-(3) are estimated using a linear probability model, while columns (4)-(6) are estimated using a negative binomial regression model. This sample includes both manufacturing and non-manufacturing sectors (see Table 3 for details).

Table 7. What kinds of countries tend to get service FDI from China?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep Var :	Fraction of Deals in Services						
ln(GDP/L)	0.0199			0.0103	0.0164		
	(1.338)			(0.635)	(1.045)		
ln(K/L)		0.0059	0.0185				
		(0.350)	(1.144)				
ln(H/L)		-0.0009	**-0.0040****				
		(-0.470)	**(-2.482)**				
ln(M/L)			**-0.0338*****				
			(-3.813)				
Rule of Law				0.114			
				(1.582)			
Pol Stability					0.0445		
					(0.654)		
ln(GDP)						**-0.0186***	0.371
						(-1.727)	(1.025)
ln(Trade Cost)							1.662
							(1.076)
ln(GDP)							-0.0691
X ln(Trade Cost)							(-1.076)
Nb Obs (Countries)	47	33	32	47	47	47	38
Log likelihood	.034	.0092	.227	.0769	.0436	.0755	.170

Notes: t statistics, based on robust standard errors, are reported in parentheses. * p<0.10; ** p<0.05; *** p<0.01.

Appendix

Table A1: Sum Statistics

	10%	25%	50%	75%	90%	mean	nb of obs
Sector Level							
Capital intensity (US)	0.61	0.61	0.66	0.70	0.80	0.67	15
Capital intensity (China)	0.26	0.39	0.46	0.55	0.56	0.45	15
Capital intensity (African nations)	0.50	0.54	0.57	0.66	0.68	0.59	15
Skill intensity (China)	0.32	0.32	0.40	0.51	0.52	0.41	15
Skill intensity (US)	0.20	0.23	0.26	0.32	0.41	0.28	15
Country Level							
Rule of law (btw 0 and 1)	0.08	0.22	0.36	0.54	0.68	0.39	47
Political stability (btw 0 and 1)	0.14	0.30	0.54	0.72	0.90	0.52	47
% of secondary sch completed	3.38	6.02	12.13	16.53	26.38	13.42	35
ln(capital per worker)	9.06	9.73	10.61	11.36	12.49	10.66	44

Capital intensity is always measured as 1 minus the ratio of total wage bill to value added of the sector. Skill intensity measures based on US data are computed as the ratio of non-production workers to total employment of the sector. Skill intensity measures based on Chinese data are computed as the ratio of workers with high-school education and above to total employment of the sector. Source: NBER-CES Manufacturing Industry Database for the US, China's National Bureau of Statistics (NBS) Manufacturing Survey Data for China, and United Nations Industrial Development Organization (UNIDO) Industrial Statistics Data for African nations. The "Rule of law" and "Political Stability" indicators are obtained from World Governance Indicators for each African nation. Percentage of high-school completed is from Barro and Lee (2010). Ln(capital per worker) is obtained from the Penn World Table.

Table A2: Correlation between sector characteristics

	Cap Int (US)	Cap Int (Chn)	Cap Int (Africa)	Skill Int (US)
Capital Int (China)	0.543			
Capital Int (African nations)	0.425	0.282		
Skill Int (US)	0.332	-0.143	-0.130	
Skill Int (China)	0.508	0.316	-0.131	0.714