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Learning from China?

Manufacturing, Investment, and Technology Transfer in Nigeria

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ABSTRACT

The question of how to promote structural transformation is central in fostering sustainable growth and poverty reduction in low-income countries in Africa. Following China's domestic economic transformation and its growing outward investments in the developing world, we seek to understand how Chinese investment in Africa, particularly in manufacturing, may help to foster industrialization and in turn the structural transformation of African economies. We focus on Chinese investments and partnerships in Nigeria, a salient destination for Chinese manufacturing foreign direct investment in Africa, and examine the potential mechanisms of technology transfer that might catalyze such transformation. We find some small but significant cases of potential technology transfer, particularly through technical partnerships between firms. However, the future potential of such mechanisms will depend on the initiative of Nigerian actors to leverage Chinese investment to their interest.

Keywords: China, Africa, Nigeria, manufacturing, technology transfer, FDI, industrialization, structural transformation, training, supply chains

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1. INTRODUCTION

It has long been the case that industrial production moves from higher- to lower-cost countries (Vernon 1966; Akamatsu 2007). After a long period of tremendous economic growth, production and operating costs are now rising in China. As such, many firms have been encouraged to migrate to lower-cost locales. China's accession to the World Trade Organization in the early 2000s coincided with a steadily growing wave of Chinese outward investment, helped by government policies encouraging firms to "go global" (*zou chuqu*). Larger state-owned enterprises (SOEs) are perhaps more visible, but there is also a large and growing number of small- and medium-sized Chinese firms, public and privately owned, investing across the developing world. Africa is an increasingly attractive destination for these firms. According to the United Nations Commission on Trade and Development (UNCTAD), Asian foreign direct investment (FDI) in the Sub-Saharan Africa region has grown significantly—especially in the case of China—since the Asian economic liberalizations of the 1980s (United Nations Development Programme 2007). Yet little systematic data exist on Chinese private enterprises, and the topic has not been researched as much as the larger investments of state-owned enterprises (Kaplinsky and Morris 2009; Gu 2009; Shen 2013).

This study forms part of a wider program of research that examines how such investment linkages can contribute to processes of technology transfer in developing countries and to the catalysis of structural transformation of these economies. This study surveys a sample of Chinese firms and Sino-Nigerian technical partnerships operating in Nigeria, examining firms and industrial clusters in four regions: the states of Lagos and Ogun in the southwest, Calabar in Cross Rivers State, and two cities in Anambra State. Based on field research carried out in 2014 and 2015, we collected data on a total of 20 Chinese and 21 Nigerian firms, gathering information about company histories, the extent of Sino-Nigerian linkages, and relationships with other manufacturers and suppliers to assess how micro-level mechanisms of technology transfer might contribute to these broader processes of economic transformation.

Our findings indicate some limited but significant cases of technology transfer between Chinese and Nigerian partners, particularly in the automobile assembly industry and other light manufacturing industries where government policies have served to encourage Chinese investment through import substitution. The transfer of technology through technical partnerships that often involve extended relationships, equipment sales, and technical training schemes is also an important and growing component of Sino-Nigerian business partnerships. While the Chinese government and two Nigerian state governments have sponsored economic cooperation and trade zones, there appears to be no government recognition or strategy on either side to expand or nurture these instances of technology transfer. Some Nigerian firms have also expressed concern over illicit or unethical practices by Chinese businesses, indicating the need for greater cultural integration and awareness of reputational impacts. It is clear that while Chinese manufacturing investment and machinery exports are affording substantial resources and opportunities for local Nigerian enterprises and workers, more needs to be done by private-sector firms and both governments to enhance the positive development impact of this engagement. There is also a greater role for policy in facilitating the participation of local Nigerian industry through strategic Chinese partnerships in order to leverage these relationships to foster and accelerate processes of technology transfer.

2. BACKGROUND

Manufacturing and Industrial Development in Nigeria

Nigeria's industrial development has been largely stagnant for much of its post-independence history. As a resource-rich country, the oil sector has been a fundamental driver of the Nigerian economy since its first boom in the 1970s, constituting the majority of both exports and government revenue. The effect of this resource dependence has been the crowding out of the non-oil sector, particularly in agriculture, which saw its share of gross domestic product (GDP) fall from 41 percent to 17 percent from 1970 to 2004, as the overall contribution of the non-oil sector to GDP dropped from 94 percent to 52 percent during the same period (Ogunkola, Bankole, and Adewuyi 2008). The dominance of oil exports has been a large contributing factor to the underdevelopment of the manufacturing industry. Despite consecutive industrial development plans from 1960 to 1980, policies of import-substitution industrialization were unsuccessful in spurring manufacturing development. Key obstacles included the lack of human capital and technical and managerial skills for industrial projects (Chete et al. 2014). The growth of East Asia as a global manufacturing hub in the 1990s also further squeezed sectors of Nigerian manufacturing, particularly in textiles and clothing, as cheap imports from China and Asia flooded Nigerian markets (Sandrey and Edinger 2011).

However, this trend is shifting. Nigeria's annual real GDP has increased by about 7 percent in the past decade, and this has been driven primarily by the non-oil sector, with services (for example, telecommunications, retail) constituting 57 percent of this GDP growth and manufacturing and agriculture contributing 9 percent and 21 percent, respectively, to these trends (Barungi, Ogunleye, and Zamba 2015). Nigeria's dependence on resource commodities has rendered it vulnerable to global price fluctuations and other shocks, and 2013 was a particularly difficult year for the oil sector, which saw a decline in revenues due to unrest in the Niger Delta region. As such, the Nigerian government has recognized that the development of the manufacturing sector is an important strategy for promoting economic diversification and adding value to commodities and that it can, in the process, create employment, achieve growth, and reduce poverty.

According to the World Bank, in recent years, manufacturing has constituted a growing share of Nigeria's GDP: in 2013 it was the largest single sector of non-oil-based GDP growth, while the oil sector's contribution to GDP has continued to fall.[1] The food and beverage sector constituted around 4 percent of annual GDP growth in 2013, and the small plastic and rubber industry is also growing (World Bank 2014). Consumer electronics and automobiles are projected to be two sectors with significant potential for expansion, and according to Lin and Treichel (2011), rubber and leather are both abundant resources that Nigeria can develop into promising sectors for manufacturing. The Nigerian Industrial Revolution Plan, released by Goodluck Jonathan's government in January 2014, aims to foster Nigeria as a regional manufacturing hub in West Africa, with plans to increase the manufacturing sector from 4 percent to 10 percent of GDP by 2017 (Nigerian Ministry of Industry, Trade and Investment 2014). This plan appears to have carried through under the new Buhari administration.

Policy trends also present favorable conditions for the development of Nigerian industry: the African Growth and Opportunity Act (AGOA) has been a boon for many African exporters, particularly as the act opened up US markets to exports from textiles and light industry. Nigeria has been a top exporter under AGOA through the expansion of oil exports, yet it has not benefited in other sectors, such as textiles, compared to countries like South Africa or Kenya (Williams 2014; Scheller, Jones, and Oligbo 2002). Thus, while GDP growth has been high, employment generation outside of the oil sector is still lackluster.

[1] According to the World Bank (2014), where previously agriculture, oil, and trade accounted for 84 percent of Nigeria's GDP, this now accounts for only 54 percent, due in part to growth in the manufacturing, retail, and services sectors.

Domestically, Nigeria has instituted a policy of import substitution for certain goods, intended to encourage the localization of manufacturing production. Current policies enact different customs duties for finished versus unfinished goods, which is intended to incentivize domestic manufacturing in key areas. Many household consumer products are prohibited from import, including furniture, used automobiles, tires, cardboard, a number of finished pharmaceuticals, and common processed foods such as noodles. Local content policies such as the Nigerian Content Bill also have been applied to the oil and gas sector, with the aim of building capacity and human capital in this sector. To date, the policy created more than 30,000 jobs from 2010 to 2012, according to the Nigerian Content Development and Monitoring Board.

One policy that may have a significant impact is Nigeria's automotive policy, enacted in November 2014, which could provide a huge boost to Nigeria's domestic auto industry. Nigeria experimented with import substitution policies in the 1960 through 1980s, as well as a program of indigenization of foreign industries in the 1970s. However, lack of foreign exchange and lack of domestic capacity in manpower and skills hindered the development of domestic industry, and manufacturing exports—which were never high—further declined during this period (Wangwe 1995). The current policy will raise import duties on fully assembled cars from 10 percent to 35 percent and is intended to incentivize domestic production and assembly. This in turn could boost foreign investment, auto exports, job creation, and industrial development in Nigeria. Although there are concerns about the impact of this on transport costs, the policy has shown some tentative success: a number of international auto manufacturers have begun to open (or reopen) assembly plants in Nigeria, including Toyota and Peugeot, and our scoping study also saw growing Chinese participation in this sector (Wangalwa 2015).

Overall, despite positive growth trends, the majority of manufactured consumer goods in Nigeria are still imported from the European Union and the United States, followed by China (Nigeria: Socio-economic overview 2014). Nigeria's imports from China primarily consist of manufactured goods, chemicals, and machinery and transport equipment. One study suggests that these imports might have a powerful impact: it estimates that a percentage point increase in imports from China correlates to a 0.2 percent rise in Nigeria's GDP (Ademuyiwa et al. 2014). Unreliable supply chains and poor infrastructure, particularly access to power, are ongoing impediments to the development of Nigeria's manufacturing sector. Though unit labor costs are lower, labor productivity is also much lower compared to that in East Asia, and competition from cheap Chinese imports has put pressure on domestic industry, particularly in the footwear and textile industries. However, as demographic factors in China continue to push up China's labor costs, there are increasing incentives for firms to "go out" to countries like Nigeria.

Sino-Nigeria Economic Cooperation

Nigeria's economic relations with China have evolved from limited diplomatic relations and engagement in the post-independence era to Nigeria's becoming one of the largest destinations for Chinese FDI in Africa. At independence in 1960, Nigeria recognized the Republic of China (Taiwan) as China. In the 1960s, a number of Hong Kong Chinese firms invested in Nigeria, helping shape the textile manufacturing sector in Kano and elsewhere in the north of the country (Utomi 2008). Many of these Chinese family firms had relocated to Hong Kong from Shanghai and Ningbo after the Communist takeover of mainland China in the 1940s. Of the four "big families," two are still present in Nigeria today: the Lee Group (controlled by the Lee family), which includes businesses in shoes, bread, plastic bags, steel, and ceramics, and WEMPCO (controlled by the Tung family), another diversified conglomerate across the ceramics, building materials, and hospitality sectors, which opened the largest cold-rolled steel mill in Africa in 2014. Nigeria broke ties with Taiwan in 1971 and established diplomatic relations with the People's Republic of China. Trade with China grew slowly until the 1990s, when China became a net importer of crude.

Trade and investment between the two countries accelerated particularly under the presidency of Olusegun Obesanjo, yet much of this was concentrated in the oil sector and large state-led projects (Utomi 2008). The current influx of Chinese manufacturing investment in Nigeria represents a second wave, after the first wave of Hong Kong Chinese investment described above. Much of this investment comes from private investors or single entrepreneurs without state support, most of whom have relocated directly from the coastal regions of the mainland such as Zhejiang, Shandong, and Jiangsu (Kaplinsky and Morris 2009; Shen 2013). Chinese official sources estimate that 45 percent of China's official FDI in Africa is now from private-sector sources, although this likely underestimates the reality of the number of small and medium enterprises on the ground since China's Ministry of Commerce (MOFCOM) certification tracks investments only of projects greater than US$10 million[2] and many smaller firms are put off by bureaucratic approval procedures (Shen 2013). In Nigeria, Shen (2013) finds that Chinese FDI in the country has grown quickly within just the past few years. In fact, China is the fastest-growing and largest single source of FDI in Nigeria: Chinese FDI constituted just over 2 percent of contributions in the eight years leading up to 2008, but by 2011, its contribution had jumped to 24 percent of total FDI (Shen 2013). Many firms have cited Nigeria as an attractive investment destination because of its large domestic market and growing middle class as well as because of its access to neighboring North and West African economies.

In 2006, the Chinese government pledged to finance up to five Economic Cooperation and Trade Zones in Africa. Led by Chinese companies, these zones were designed to help attract Chinese investment, allowing host governments the opportunity to learn from China's own domestic Special Economic Zones (SEZs) that were integral to the economic success of its export-led growth strategy and the growth of its coastal provinces (Brautigam and Xiaoyang 2014; Brautigam and Xiaoyang 2011). Two of these zones came to be located in Nigeria, in Lekki and in Ogun State.

Beyond state-sponsored SEZs, some private companies have expressed interest in setting up their own industrial parks in Nigeria (Gu 2009; Shen 2013). A World Bank report on Chinese manufacturing by Shen (2013) reported that several Chinese companies had set up Private Industrial Estates. However, our visits to the two Nigerian examples cited in this study—Hazan Shoe Park, said to have been in development near Ogun State, and Yuemei Fabric Industrial Zone in Calabar—highlighted some of the challenges for private firms. Hazan Shoes had been operating its factory inside the Chinese state-sponsored Economic Cooperation and Trade Zone in Ogun State and went out of business before it was able to build its own industrial park. The Yuemei "zone" was only a cluster of empty factories located in Nigeria's Calabar free trade zone (FTZ), which was itself a Nigerian government project, opened in 1999.

Technology Transfer and Structural Transformation

In the same way that FDI in China's economy was an important stimulus to growth and industrial upgrading, this trend of Chinese investment overseas has potential for fostering this process in developing countries in Africa and elsewhere. China's potential as a development model for Africa and as an alternative source of trade and finance from Africa's traditional development partners has spawned a growing literature, yet the localized impacts of China's African engagement and the mechanisms by which technology transfer can occur remain underexplored.

Research has shown that foreign firms can be catalysts for manufacturing development (see, for example, Winkler 2013). There is extensive evidence for the potential for poor countries to catch up with rich countries through the manufacturing sector. Rodrik (2011) finds that since 1960, manufacturing industries have shown unconditional convergence in labor productivity, regardless of country- or regional-level factors. This suggests that less developed countries can eventually catch up with the productivity levels of developed countries and that the manufacturing sector's role in this is key.

Others have shown the impact of FDI spillovers by measuring the effect of foreign investment on domestic firm productivity growth; in the case of China, backward linkages have been a particularly potent channel for this spillover effect (Cheung and Lin 2004; Liu 2008). The transfer of innovations and

[2] All dollars are US dollars.

ideas between countries has often prompted firms to adopt new practices and technologies. This may occur through a number of mechanisms, including imitation of foreign firms, the poaching of skilled workers, subcontracting, and backward and forward linkages. However, foreign firms also can operate as enclaves, with little connection to the local economy and competing with local firms for market share and supplies.

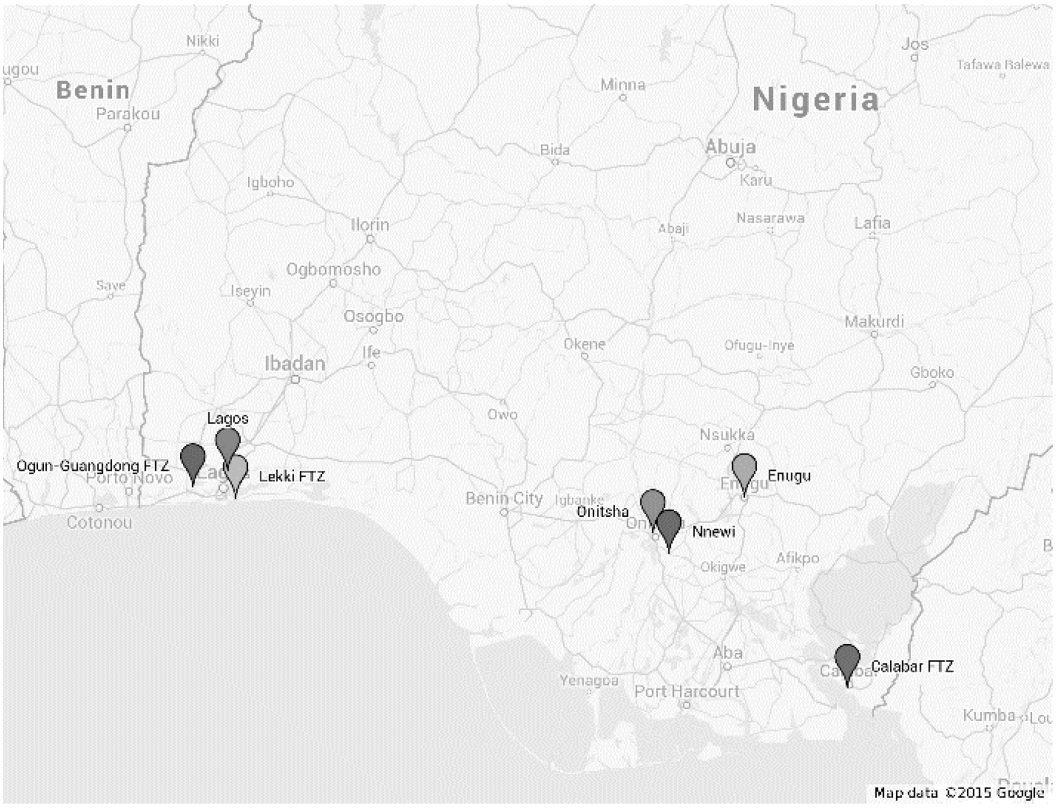
The role of foreign firms as catalysts in manufacturing development can occur through employment, technology transfer, and backward and forward linkages. The role of Japanese factories as "Schumpeterian innovators" in Korea has been noted during the phase of Japanese colonialism, which in turn fostered a "cluster" of Korean imitators (Kohli 1990). In turn, Korean companies in Bangladesh have brought Bangladeshi workers to Korea for training. These workers then later left to set up their own companies, sometimes as subcontractors (Rhee and Belot 1990). Brautigam (2003) documented how Nigerian traders learned about manufacturing processes through site visits to Asian factories, while Mauritians formed joint ventures (JVs) with firms from Hong Kong and then set up their own firms. Over time, skills spread through personnel shifts: smaller firms hire workers trained by a new investor, and skilled personnel can leave to set up their own firms. The current trend of Chinese investment in Nigerian manufacturing can potentially play a similar catalytic role.

3. CHINESE MANUFACTURING INVESTMENT IN NIGERIA

Study Scope and Methods

This study examines Chinese foreign investment in manufacturing as well as other direct linkages through which Chinese technology and skills might affect Nigerian manufacturers. Our goal was to examine the potential of these investments and other forms of Chinese engagement for technology and skills transfer. Our field study covered primarily Nigeria's southeastern and southwestern states with major sites of Chinese manufacturing involvement: Lagos and Ogun States in the southwest, Calabar in Cross River State in the southeast, and finally Nnewi and Onitsha, both in Anambra State (Figure 3.1).

Figure 3.1 Site visits to Chinese industrial investments and technical partnerships



Source: Authors' fieldwork, map by Google openmaps (2015).

We started our study by collecting data on firms' Nigerian investment proposals approved by China's MOFCOM and by the Nigerian Investment Promotion Commission (NIPC). MOFCOM's registration list identified 297 Chinese firms whose investments (in all sectors) have been approved in Nigeria, while NIPC shows 221 Chinese firms. Of these, we determined that 141 proposals on the MOFCOM list pertained to manufacturing, while NIPC had 92 manufacturing projects registered in its database. The latter includes only firms NIPC has assisted, while the former contains only firms that have received official approval from the Chinese government. In both cases, not every firm will actually go through with the investment. A manual matching analysis showed an overlap of around 21 to 30 firms between the two lists. As Chinese firms often establish a new local subsidiary with a different name when they invest abroad, this is likely to explain much of the variation. These official lists provided one of several starting points to find firms for visits during our field study. Nonetheless, given our past

experience in tracking down Chinese investment and our knowledge of the difficulties of investment in Nigeria, we expected to find far fewer than the 91 to 123 registered firms.

Because MOFCOM does not include contact information, we conducted a web search to find contacts, but results were limited. The NIPC list did include contact information, and while this proved to be useful in some cases, in other cases we reached dead ends. More helpful was asking the Chinese commercial office in Lagos, the Lagos Chamber of Commerce, the Manufacturer's Association of Nigeria, and other Chinese entrepreneurs for their contacts with other Chinese businesses. In some instances, we also attempted to cold call Chinese firms; not surprisingly, firms to which we had received an introduction were more likely to agree to interviews. Finally, we also worked with management of the Calabar, Lekki, and Ogun-Guangdong SEZs to contact Chinese firms within their zones.

Initial fieldwork and interviews were conducted in between June 29 and July 27, 2014, in Lagos, Ogun, and Calabar with 20 Chinese manufacturing firms as well as 4 Nigerian firms with Chinese technical partnerships. Our research sites included the Chinese-built Ogun-Guangdong FTZ (Ogun State) and the Lekki FTZ (Lagos State). We also spoke with current and former government officials and representatives from industry associations.

A second round of interviews took place in December 2014 and January 2015 in Anambra State, primarily in Nnewi and Onitsha. This second round focused on Nigerian industries, many of which had affiliations with China. Using semistructured questionnaires and interviews with a sample of Chinese firms and Nigerian firms with Chinese partnerships, we gathered information about firm size, firm history and origins, revenue, and employment. To evaluate the degree of potential technology transfer, we assessed the extent of horizontal and vertical linkages between domestic and foreign firms, hiring of local labor, and the nature of technical skills and practices disseminated between Chinese and Nigerian firms. We also assessed how government policy—for example, new incentives for the automotive sector—has affected incentives for this technology transfer process.

Lagos and Ogun States

The coastal regions around Lagos and Ogun States have a number of Chinese firms and investments ranging from small and medium enterprises to larger investments of around $40 million in the case of Goodwill Ceramics. Many of these operate in industrial zones or FTZs, including the Chinese government–supported Ogun-Guangdong and Lekki zones.

- The Ogun-Guangdong FTZ is one of the fastest-growing industrial zones, focusing on light industry, including ceramics. Chinese enterprises here are primarily in light industry, with a number of furniture firms, such as Winghan Furniture, as well as paper and other light industry for local markets, such as Vindax Tissue and Hewang Cardboard, which manufactures packaging. We also found two Chinese-owned steel and construction firms: Far East Steel and Flying Horse Aluminum. In recent years, more investors have been moving to Ogun due to its relatively low taxes compared to Lagos State.
- The Lekki FTZ was one of the first overseas economic cooperation and trade zones set up under the Chinese government's 2006 pledge (Brautigam and Xiaoyang 2011). Currently it holds primarily Nigerian enterprises, but it also has four or five Chinese manufacturers including Sunday Lightbulbs. Representatives of the zone were seeking to attract more Chinese investors, although problems with land ownership around the zone appeared to be an ongoing issue that has yet to be resolved by the Lagos government.
- In the wider Lagos and Lagos State area, we identified a large number of operating Chinese industries. These include Hongxing Federated Steel, which has a number of subsidiaries around the Lagos and Ogun areas; more furniture/homewares firms, including Lifemate; and smaller firms like Mark Sino.

Calabar, Cross Rivers State

- The Calabar FTZ, situated in Cross Rivers State, was established in 2001 (although construction started as early as 1994) as the first and currently largest—by volume and revenue—FTZ in Nigeria. It is home to a large number of manufacturing enterprises, which comprised 27 of the 74 operating businesses on site as of 2014. Of these, 9 were Chinese. These include Bao Yao Group, operating since 1999, which produces iron rods and billets. Other enterprises include textiles and electronics, with some assembly firms producing appliances and automobiles, such as the heavy-duty trucks of FAW (originally First Automotive Works in China). There is little sign of sectoral clustering between the Chinese firms: Bao Yao Steel has no competitor in southeastern Nigeria, and the three other appliance and electronics firms operate as part of the same company, Skyrun International. Most of Cross Rivers State is dominated by agriculture, and the FTZ forms part of the state strategy to expand into industry, manufacturing, and primary processing.

Nnewi/Onitsha, Anambra State

We also visited three primarily Nigerian manufacturing hubs concentrated in Nnewi and Onitsha (Anambra State) as well as a Nigerian partnership in Enugu, Enugu State. Information from the Nnewi Chamber of Commerce indicates that there are about 11 manufacturing firms in the region with some form of Chinese partnership or cooperation in Nnewi. We also interviewed 6 firms in Onitsha and one in Enugu. Again, using semistructured interviews we obtained information regarding connections with Chinese firms and other manufacturers to shed light on the impact of Chinese linkages in unlocking the potential of the manufacturing sector in Nigeria.

Nnewi and Onitsha are both large cities in Nigeria's southeast, with manufacturing clusters that have developed despite minimal direct intervention or stimulation from the state. Nnewi has much stronger ties to Chinese industry than does Onitsha, due in part to its historical ties with traders from Asia. However, Onitsha, with a river port and a large urban market, has a favorable climate for attracting outside investment. Although most of the industries in Onitsha are relatively small, many have partnerships with other Asian countries, including Singapore, Malaysia, and Korea. While connections and technical partnerships with China appeared to be more prevalent in Nnewi, Indian and Lebanese firms were more common in Onitsha. Many interviewees believed that Chinese are reluctant to settle in Onitsha and Nnewi compared to Indians and other Asians.

The Nigerian firms in this area included industries similar to those found in the coastal FTZs: primarily light industries such as cables and electrical materials (Cutix Cables), plastics and paper, and aluminum and metals. Several firms specialized in household products, processed foods, and beverages. Nnewi is also famous for motor vehicle assembly and the manufacture of auto parts.

Sectors of Investment

Our initial findings show a growing trend of Chinese investment in manufacturing, as well as some evidence of technology transfer through Chinese and Nigerian technical partnerships. However, we do not see much evidence of geographic clustering in any particular sector. The investments reflect typical entry-level industries: furniture, building materials, plastics and food processing, and vehicle assembly, but they are not geographically concentrated. Most of these industries cater to the domestic Nigerian market and its large and growing middle-class consumer base, though some (namely, automobiles) are potentially looking to expand to export markets.

Furniture

The furniture industry in Nigeria is highly fragmented, with the largest firms purportedly holding a market share of about 5 percent. However, two of the largest Lagos firms are Chinese: Bedmate and Lifemate. The two firms have overlapping ownership but are run independently. Smaller Chinese firms, such as Winghan in Ogun State, produce sofas and more specialized furniture.

Steel and Construction Materials

Five Chinese steel manufacturers are registered with NIPC as operating in Ogun, Edo, and Lagos States. We also came across a number of Chinese steel manufacturers that were not registered on the NIPC list, including the Federated Steel Group in Ogun State and Baoyao Steel in Calabar FTZ. The Hong Kong–owned Lee Group and WEMPCO also own steel factories. On the Nigerian side, a number of small firms have relationships with Chinese suppliers, including Cutix, which specializes in telecom cables and other electrical materials; Jocalis Aluminium; and Peter Ventures Industries.

Food and Beverage

The food and beverage industry was consistently identified as a fast-growing area of Chinese manufacturing investment, although many Chinese firms we identified were not registered with NIPC. The Hong Kong–owned firm Lee Group also has divisions in the food industry. Nigerian firms Kotec Group and Stine Industries, market competitors in Anambra for processed foods such as noodles and bottled water, which are primarily sold in the domestic market, have both sought technical partnerships with Chinese machinery firms, which provide training and support in the production process but no equity.

Automotive Assembly

In our fieldwork, we found two Chinese firms that are involved in the assembly of heavy-duty trucks: FAW in Calabar and Jinan in Lekki. This is considered to be a promising area for future Chinese investment given Nigeria's automotive policy, which applies a 70 percent tariff on imported vehicles, thus creating strong incentives to move automotive assembly to the domestic market. Technology linkages between Chinese and Nigerian firms are also quite visible here. In Nnewi, which enjoys a reputation as Nigeria's auto manufacturing and trading hub, several firms we spoke to have entered into partnerships with Chinese firms: Innoson Vehicle Manufacturing and URU industries both have technical partnerships with Chinese firms, and Shacman Motors, which produces heavy-duty trucks, has partnered with Weichai Group from Shaanxi Province to move toward manufacturing their vehicles domestically. Some firms, such as Innoson, are looking beyond the domestic market to export markets in West Africa, including Benin and Ghana.

Our research also identified two sectors that have seen significant attrition: textiles and plastics. Although decades ago Chinese—particularly Hong Kong—investment in textile manufacturing was quite high (and provided local competition for Nigerian firms), the sector is now declining for both Chinese and Nigerian firms. Somewhat ironically, this can be attributed once again to Chinese competition—but this time from Chinese imports and Chinese and Nigerian traders who bring back fabric and clothing. According to the manager of Shifa Plastics, profits in the plastics sector have declined due to increased competition and smuggling. Yet others report that business in plastic construction materials (Mark Sino) and plastic household products has been healthy.

Clustering and SEZs

The sites we visited in the coastal and inland states in Nigeria do not exhibit strong tendencies of sectoral clustering, despite the Chinese funding for two zones and the strong Chinese presence in the Calabar FTZ. None of the enterprises in the Ogun-Guangdong FTZ produce the same type of product, and the two firms

producing furniture—one producing office chairs and the other one sofas—can hardly be called a cluster. Similarly, although the aluminum-molding firm, the iron rod firm, and the ceramic tile firm are all involved in construction materials, there are no economic linkages between them, such as joint distribution. All of the manufacturers in the Lekki FTZ are in different industries.

Chinese manufacturers in Nigeria do not necessarily operate in the same sector that they operated in at home in China; instead, they often manufacture a completely new product. The decision to shift products seems to be based on their analysis of market potential rather than their own past experience. According to the manager of Goodwill Ceramics, since ceramics are heavy to ship "there must be a domestic market in developing countries." Similarly, the CEO of Vindax chose to produce tissue paper despite having no previous experience with the product.

These tendencies might explain the pattern of "anticlustering," wherein we saw few apparent linkages between the Chinese firms operating in these zones. Indeed, some firms see the lack of clustering as a benefit: the manager of Baoyao Steel spoke positively about his firm's competitive advantage as the only steel firm in the Calabar FTZ, meaning he could sell at higher prices than he could in Lagos.

It appears that regional affiliations in China mattered more than industry clustering for Chinese entrepreneurs' decisions to invest in Nigeria. Many, including Mr. Wang of Vindax, were introduced to Nigeria through personal connections to existing firms there. In the Calabar FTZ, a number of Chinese firms originate from Jilin Province in China's northeast. Mr. Kassim, the general manager of the FTZ, expects more investment from Jilin in the future. The Changchun Chamber of Commerce from Jilin's capital city has organized a trade fair to attract Chinese business to Calabar. Likewise, Mr. Kassim's team has been to Jilin twice to attract new investment.

The only intentional experiment of industrial clustering appears to have been the so-called Yuemei Fabric Industrial Zone, which Shen (2013) discusses as a successful case of a private industrial estate. Shen reported that 20 firms had invested in the zone, which was said to have been built by a Zhejiang company, Yuemei. We visited the Yuemei cluster, which was actually renting space in the Calabar FTZ. According to our interviews with a Chinese plant manager from the Yuemei cluster of factories, the original vision was indeed to establish a textile cluster where different specialist textile production firms could colocate. However, despite interest from Chinese textiles firms, only 2 firms ever came to invest in this cluster: Mawa, which specialized in textile dying and printing, and Jinmei, which specialized in embroidery. Even these investments were short-lived. Although Jinmei was operational from 2010 to 2011, according to Mr. Zhang, operations ceased soon after when demand for embroidered cloth plummeted. Mawa also ceased production in early 2014 due to short supplies of dyes. Some Nigerians associated with the Calabar zone raised concerns that the Yuemei investors were more interested in transshipping products from China without paying appropriate duties than in local production. In February 2014, these 2 firms were evicted, and at the time of our visit their assets were in the process of being sold to new, non-Chinese buyers.

Motivations for Investment

Chinese firms decide to invest in Nigeria for a variety of reasons, including lower costs, lower competition, and the country's large domestic market. Many firms cited rising labor costs within China. As the founder of Goodwill Ceramics commented, "Chinese labor is so expensive now, so you have to walk out the door [*zouchuqu*]." Hence, despite the higher cost of some inputs in Nigeria, such as power, Chinese manufacturers perceive the country to be a profitable destination. The manager of Skyrun commented, "The trend of global manufacturing sites is to shift. First it was Europe, then East Asia, and now it's shifting to other countries." Taking advantage of lower tariffs was another major factor in many firms' decisions to relocate—while tariffs on imports of finished goods were 40 percent, they were only 5 percent on locally assembled products, incentivizing many formerly trading-only firms like Skyrun to move from importing goods to manufacturing them domestically.

When asked why they chose to invest in Nigeria, many firms described how they had considered multiple destinations. The founder of Goodwill Ceramics had considered destinations as diverse as Bangladesh, Saudi Arabia, and Mexico before settling on Nigeria. Many Chinese entrepreneurs cited Nigeria's large domestic market and large population with a demand for consumer goods as a draw for investment. Others came to Nigeria from other foreign destinations: Lifemate started out in Tanzania before expanding to Nigeria. Nigeria's growing middle class and its wealthy subset of the population also attract investors in firms producing interiors and furnishings as consumers' ability to pay is an important factor for manufacturers of higher-end goods. Many firms also cited the lack of intra-industry competition for many product types as another factor that influenced their decision to invest in Nigeria. The founder of Shifa Plastics reminisced about the previously high profit margins enjoyed in the plastics industry, where "a single plastic cup could generate 2 RMB [Chinese Yuan Renminbi] of profit."

Despite these strong advantages, respondents consistently identified a number of challenges to investing in Nigeria. Many entrepreneurs cited safety and security as the primary factor driving their choice of investment location within Nigeria. As a manager in Sunday Lightbulbs, which operates in Lekki SEZ, put it, "Our factory would be cheaper in Lagos, but safety is worth paying for." Many firms in Calabar identified the safety and relative predictability of government services as motivating factors for them to invest in Calabar rather than in the Lagos/Ogun area, noting that the zone is planned and predictable with generally functional management and infrastructure.

Local Employment

While criticism of Chinese firms in Africa has often centered on Chinese firms' importing their own labor, it is clear that the industries surveyed have generated significant local employment (Appendix B). Some firms, such as Skyrun, have an explicit policy that demands the localization of its labor force, countering the popular belief that Chinese firms largely employ Chinese. In reality, the high level of local employment we found appears to be driven by business economics; bringing labor from China is significantly more costly than hiring locally, even after taking productivity into account. Many of the government officials we spoke to noted that Nigerian policies allow foreign investors to bring expatriate staff only if they possess skills unavailable locally, but Chinese firms continued to demand higher quotas for Chinese labor. On average, the Chinese firms we sampled employ more than 80 percent of their workforce locally. However, most Nigerians in the firms we surveyed are primarily employed on the factory floor, with few in managerial roles. While some factories provide only basic assembly jobs, others, such as furniture manufacturing or welding firms, require far more specialized training for workers and thus entail higher wages.

Technology Transfer from China

Although we saw evidence of technology and skills transfer in some of the firms we observed, there was no systematic technology transfer. Due to the nature of the work at many of the enterprises, such as basic factory line processes, the potential for building technical skills was often low. However, we did observe a number of cases where firms explicitly promoted skills transfer through both formal and informal training; the transfer and usage of hardware and machinery for industrial upgrading was also a recurring theme. The Nigerian JVs we observed showed particularly positive trends of both Chinese-led training of local labor and Chinese assistance with industrial upgrading. We identified the automotive and construction sectors as sectors where firms showed significant practice of technology transfer (Box 3.1 on the case of Nigeria's automotive sector). Yet evidence of backward linkages between Chinese firms and the local economy was relatively low, which means this is not a promising mechanism for technology transfer.

Box 3.1 The impact of Nigeria's automotive policy

Import substitution policies are one area in which Nigerian government policy has had a major impact on Chinese enterprises. Furniture imports, for example, were banned in 2010, leading to an opportunity for Chinese furniture makers such as Bedmate and Lifemate to assemble products in Nigeria. Likewise, tariffs on imported cars doubled as of November 2014 to 70 percent, while tariffs on complete assembly and partial assembly would be 0 percent and 5–10 percent, respectively. In addition, companies receive a five-year tax holiday on vehicle assembly plants as well as other incentives for meeting 25 percent or greater local content. The Nigerian government's strategy, according to the director of the Investment Facilitation/Incentives Administration of the Nigerian Investment Promotion Commission, is to "build up a crop of SMEs [small and medium enterprises]" to supply car components, after the model of Chennai in India. The policy has been a major boost to businesses seeking partnerships with China, especially in areas of heavy-duty machinery procurement.

There is already a nascent auto parts industry in areas like Nnewi and Onitsha, where a number of Nigerian firms have struck up successful technical partnerships with Chinese firms, and this appears to be rising. Auto firms we spoke to, such as FAW and GAC Motors, both Chinese, spoke of setting up a manufacturing plant in Nigeria as a matter of the firms' survival. FAW, a heavy truck brand, is completing an assembly plant in the Calabar free trade zone. According to Mr. Yang of FAW, there were five competing foreign vehicle firms setting up assembly plants in the Lagos area and one in Calabar. GAC Motors has recently sought distribution agents within Nigeria with a view to testing the market and eventually building assembly plants if sales are promising.

There has been significant dispute about how much the policy will benefit domestic Nigerian firms. Some respondents believed the largest beneficiaries may be the existing large auto manufacturers already operating in Nigeria, such as Toyota and Peugeot. The policies have already had spillover effects for Nigeria's neighbors. While the policy has taken its toll on Nigerian car imports, which dropped 63 percent between January 2014 and January 2015, Cotonou Port in Nigeria's neighbor Benin has seen its car imports increase 50 percent in the same period (Nigeria's Neighbors Profiting 2015). This suggests that some car importers may be circumventing the higher tariff by bringing vehicles across the porous border.

Source: Authors' fieldwork, multiple interviews, June-July 2014.

Hardware and Machinery Transfer

The transfer of hard technology was also a common theme. The Nigerian enterprises we interviewed were selected because of their prior technical linkages with Chinese firms: nearly all had procured machinery from China for their manufacturing needs, which entailed the transfer of Chinese technology and knowledge. These machines were set up and serviced by Chinese equipment suppliers or were sourced through maintenance deals, except for more technical manufacturing (such as automobiles) that required more expert input on the production process.

One primary advantage of Chinese technology is cost. The sales manager from Chartered Aluminum, Mr. Kingsley, noted the low cost of the step tiles machines imported from China, which ranged from $25,000 to $30,000, compared to $100,000 to $150,000 for European machines. Similarly, Mr. Okoli of Louis Carter Industries, which manufactures plastics, noted the lower cost of Chinese technology. European machines that cost more than $450,000 could be procured in China for around $23,000—1/20 of the cost—making it the only cost-viable option. Many firms also noted the advantage of having easily accessible support services to maintain the machines, and in many cases, they teach local staff basic maintenance skills. Mr. Okuwasa of Cutix Cables noted that his Chinese machinery supplier offered one year's worth of support for machines procured from its company, even after-sales support, free of charge. He commented, "Although these products don't last as long as European machines would, it just helps us get by, in that we could break even before the machine deteriorates. That's the advantage."

There is often a tradeoff between cost and quality for Chinese machinery. A number of Nigerian firm owners complained about the poor quality and unreliability of Chinese-made machinery. Mr. Kingsley (Chartered Aluminum) noted, "If you're lucky, you get a good one that would last. Sometimes you may end up with some that would even last the haul. … This one here was brought over in 2012 and wasn't used for up 'til a year, and when we tried to use it, it packed up. … The machines supplied may be looking all right physically, but technically … we may end up fabricating some missing components."

In the case of the steel industry, most firms can get away with older, lower-standard machinery. Most of the machinery from Baoyao steel in Calabar FTZ, for example, was from an old Shanghai steel mill that was closed because of more stringent environmental regulations by the Shanghai government, a case of Chinese sunset industries' being offshored. This sort of pollution caused by Chinese enterprises operating in Africa seems not to be an isolated case. However, the large market potential and low competition allowed firms to invest in larger-scale factories. The Lee Group, for example, has one of the largest rubber thong sandal (flip-flop) factories in the world in northern Nigeria, and Goodwill Ceramics in Ogun runs production lines double that of any other ceramics manufacturer in Nigeria.

Education and Skills Training

In general, formal skills training is low in many of the Chinese firms. Most provide informal on-the-job training, which is relatively rudimentary and overlaps with a trial period during which a firm can let the worker go if he or she proves unsatisfactory in some way. A few Chinese firms have invested much more heavily in training workers, although not always as much in retaining these well-trained workers. In Calabar, for example, the Baoyao steel mill uses ship wreckages as raw material. This requires a higher level of technical ability; as such, its welders have become renowned for their skill and speed. "It's like we opened a school!" said Mr. Zhang, the plant manager at Baoyao, on the steady stream of workers showing up at his door seeking to learn the welding trade. Indeed, the Nigerian Maritime College sends its trainees to Baoyao for two months to get welding training. After learning on the job, many welders leave for better-paying jobs, often being poached by other companies in the area. Rather than raising salaries, the plant manager seemed resigned to this state of affairs, even seeing it as a form of giving back to local society. Other firms, including Skyrun Electronics, which explicitly aims to localize its labor force, similarly acknowledged that many of the workers it trained would be poached by other companies once they were fully trained. However, Skyrun noted that "it's expensive and hard to bring Chinese because of the immigration system. We aspire to be like American companies, which have almost no Americans here."

In the Lekki Zone in Lagos State, Jiuhua Furniture has invested in training its workers to produce products for household interiors: custom doors, patterned glass for storefronts, and special-order staircases, all of which require a high level of customization. The company provides several months of training after taking on a worker and works hard to retain those trained workers, paying NGN 30,000 (30,000 Nigerian Naira) to NGN 60,000 per month (around $150–$300)—significantly more than the Lagos state minimum wage of NGN 18,000 ($90) per month. It even provided accommodations for workers who moved with the firm when it relocated last year. According to the head of Jiuhua factory operations, due to the custom nature of the work and the long training period, "We don't want them to leave. If they want to leave, we want them to really have to think about it."

Language and cultural differences remain barriers for this form of interpersonal skills transfer between Chinese and Nigerian staff. Many firms expressed frustration with the low education level of Nigerian workers, which made training a slow process. Many of the Chinese firms we interviewed also cited cultural differences in attitudes toward work as a challenge, namely, the stark contrast between Chinese work culture and the relaxed attitude and time management among local Nigerians. Lack of trust of Nigerian staff and fear of losing sensitive business knowledge were also noted as obstacles to skills transfer.

Joint Ventures and Partnerships

Our study found relatively few examples of JVs within the manufacturing sector, and the overall sense from interviewees is that equity JVs between Chinese and Nigerian firms are rare. There are many cases of Chinese firms' providing small minority shares to local government officials (presumably as quid pro quo for political protection, favorable land rates, or both), but few true partnerships with equitable sharing of investments, responsibilities, and profits exist.

One exception is Techno Oil, a local producer of lubricants that is actively exploring a JV agreement with a Chinese firm. Its interest in partnering with Chinese firms was sparked when two other Nigerian firms in the downstream oil sector entered into JVs with Chinese partners. Techno Oil's JV is still under discussion, but the proposed ownership structure would be 55 percent Chinese and 45 percent Nigerian. The Chinese party would supply technology and equipment, and Techno Oil would supply capital and land. According to the business development manager at Techno Oil, the company is attempting to build an explicit technology transfer process into the agreement whereby after 20 to 30 years Techno Oil will gradually take over all of the equity and own the rights to the technology, illustrating the importance of negotiation and initiative on the part of Nigerian firms. In contrast, the Nigerian mining firm Multiverse has only a 25 percent stake in its joint investment partnership with a Chinese firm and no explicit agreement for technology transfer, which leaves it open to risk. As the owner noted, "If they're suddenly recalled to China, we need a backup for operating the mine and the quarry."

Innoson Vehicle Manufacturing, part of a diversified manufacturing group in Anambra and Enugu States, was another case. The company's CEO described how he had been looking to diversify his investments with Chinese enterprises. Currently, he holds a 55 percent stake of a tire and tube company located in Wuxi, China. However, he described how his attempts to open a tire factory with Chinese JV partners in Nigeria were halted by the Nigerian Environmental Standards Regulations and Enforcement Agency, leading to the factory's closure and job losses. Although the reasons for the agency's objections were not clear, sources at Innoson implied that regulators may have been angling for payments that the firm refused to provide. Undaunted, Innoson was planning to diversify into the furniture and wood business through a JV with a Chinese company based in Zhejiang. The firm had already signed a memorandum of understanding with the Nigerian partner owning 40 percent and the Chinese 60 percent. The factory would be established in Enugu.

Franklin Marble, a smaller enterprise producing marble and granite, also stated plans to partner with a Wuhan firm to set up a vertically integrated quarry-to-retail operation. Currently, its memorandum of understanding is at an early stage and would require funding from the Nigerian Bank of Industry. The Chinese partners would manage the hardware part of the scheme—technology provision of all machinery and production equipment—while providing technical assistance.

In general, the Nigerian firms we spoke to that had imported manufacturing equipment and technology with technical assistance from Chinese firms were optimistic about technology transfer. These partnerships generally incorporated some form of Chinese technical training in using machine equipment and the production process for Nigerian staff. Together, the 12 Nigerian firms we interviewed had a total of 54 Chinese (and 56 other foreign) employees in the factories during our visits, compared with a total of 14,063 Nigerian employees. The CEO of Innoson Group explained, "Our people can do the work without any input from our Chinese partners. Now they are able to run the production line by themselves. The number of our Chinese technical partners is depreciating [*sic*] because our people are being taught to use the technology." Similarly, the head of Shacman Motors, also an automotive company, stated that the Chinese were brought in to provide training to the former ANAMMCO staff on how to assemble Chinese trucks. "Now that the Chinese partners have taught them, they can do it all by themselves." A number of firms saw the presence of Chinese in training roles as temporary, necessary for training Nigerian workers to take over the running of production lines. This demonstrates that rather than simply playing a supervisory role, Chinese technicians do impart valuable technical skills to Nigerian workers without entailing a continued need for, or dependence on, Chinese staff.

Similarly, the CEO of Ngobros and Co., which manufactures diapers, described the Chinese staff training positively, noting that they had started with 11 Chinese technicians but now had only 6. "By the middle of this year, we may have no more need for them, especially after our people can … run the whole production line by themselves."

Some Nigerian firms have sent staff for training in China, including both Chicason Group and Innoson Group. Chicason has sent staff for three months of training when it was necessary for specific projects such as the opening of a new product line. Innoson Group hired a Chinese-speaking Nigerian to be a translator for its Chinese technicians in their vehicle assembly plant. It also has actively dealt with the language barrier by sending six of its staff to China to learn to read, write, and speak Mandarin, and it is "proposing to send a few more."

Local Linkages and Supply Chains

Technological gains and spillovers from FDI may occur through backward linkages, where domestic firms are suppliers for foreign firms: such backward linkages have been found to be positive mechanisms for technological gains. Our study of Chinese firms, however, did not find strong signs of such backward linkages. The anticlustering tendencies of many Chinese firms meant there were few opportunities for cluster-based supply chain linkages to develop, and of the Nigerian firms we observed, their relationships with Chinese partners were based primarily on technical assistance and support rather than upstream or downstream production. In terms of local economic relations, Chinese firms were not very integrated: only three Chinese firms were members of the Lagos Chamber of Commerce.

In the SEZs we visited, Chinese firms' decisions to relocate were based largely on concerns about reducing competition, leading to low industrial clustering: indeed, the only attempt at creating a textile cluster, Yuemei in Calabar FTZ, appears to have failed; we will return to this case below. The existing Chinese firms view other firms more as competitors than as potential subcontractors or collaborators (this also seems to be the case with Nigerian firms, as even the famous Nnewi auto parts cluster has few, if any, instances of subcontracting or JVs). Although our sample size is small, it appears that when there is a need for or opportunity to reduce costs, firms tend to use vertical integration—absorbing upstream or downstream production into the firm—rather than trying to attract other firms to locate nearby to produce those services, according to value chain complementarity. One example of this is Hewang Cardboard Packaging Company, which, concerned about the high price of pulp, built an upstream pulp production plant itself.

In the case of the furniture industry, furniture and sofa imports are banned in Nigeria, which has incentivized domestic production in the FTZs. Firms must have a minimum local content (or value added) of 35 percent to be able to sell products produced in the FTZ to the rest of Nigeria (Kuye 2013). However, Chinese firms still import the majority of their raw materials from China; only low-value and bulky materials such as rock for ceramics, scrap metal, and wood for furniture are purchased locally, and many entrepreneurs complained about the poor quality of local materials. Winghan Furniture in Calabar, for example, purchases its wood and foam locally, but the leather material it uses for its sofas is still purchased from China. The company explained that the design and processing of Chinese leather is better quality. Cutix Cables in Nnewi (similar to some other Nigerian firms we interviewed), sources some of its inputs and accessories, as well as machinery, from a supplier in Shanghai, a surprising case of backward linkage from Nigeria to China.

Firms claimed to have met their local raw materials suppliers either from going to the relevant local market (for example, going to the wood market in the case of furniture makers) or through having suppliers show up at their doorsteps (for example, steelmakers found that scrap metal peddlers would come to their factories). Many tried several suppliers before settling on one that best fit their needs, but even so, many of the relationships seemed shallow. Although a few Chinese entrepreneurs commented that their local suppliers had become more consistent on quality and delivery times over the course of working together, no interviewed Chinese businessperson had actively invested in upgrading the technology or skills of their local suppliers.

In general, of the Chinese firms we observed, firms tended to have more downstream linkages with local firms than upstream ones. On the downstream side, nearly all Chinese firms relied on local distributors for their goods. According to Hong Kong businessmen with longtime investments in Nigeria, there is an "unwritten rule that Chinese business stops at the factory door," at which point local distributors take over. This arrangement seems to suit recent Chinese immigrants well, given that most have limited English abilities and no local distribution network.

One interesting trend is the growing role of "agent suppliers," an informal network that provides a link between Nigerian manufacturers and mainland China for the supply of basic needs and services. These are Chinese traders and businesspeople living in Nigeria whose business it is to serve as middlemen between Nigerian manufacturing firms (generally in the southeast) and Chinese suppliers. They arrange contacts between factories in China that specialize in the required area and often earn commissions. They are mostly found in the large trade fair complexes and the Chinatown in Lagos. Some Nigerians also play the role of agents, securing contacts for Nigerian businesses needing some form of Chinese technical expertise or inputs.

4. CHALLENGES FACING FIRMS AND INVESTORS

Power, Safety, and Security

Despite the many factors that make investment in Nigeria attractive, Chinese interviewees consistently identified poor power supply, corruption, and concerns about personal safety as major concerns when considering investing in Nigeria. Baoyao Steel, for example, identified power as its major challenge in doing business in Nigeria—the firm operates at 50–60 percent capacity due to power limitations. In addition, concerns about corruption and personal safety have been a significant factor in many Chinese businesses choosing to locate in SEZs rather than leasing their own land. Entrepreneurs in Calabar also identified safety as a major concern for choosing that particular FTZ: the region was perceived as safer than the area around Lagos, making it more attractive despite the lower costs of operation in Lagos.

The establishment of Ogun FTZ also was motivated by security concerns. The original plans were to set up the FTZ in Imo State, near the Niger Delta. However, it was eventually relocated to Igbessa, Ogun, due to concerns about instability and high operating risks in the Niger Delta region. Political lobbying also may have played a part as former president Obasanjo is from Ogun State and produced pressure for its relocation to Ogun. Instrumental actors such as the former governor of Ogun State, Daniel Gbenga, a staunch advocate of Chinese investment in Nigeria, also played a role, telling one of the authors, "The Ogun-Guangdong FTZ is my baby."

Negative Impacts of Chinese Investment

While many Nigerian respondents interviewed were generally positive about their economic and technical relationships with Chinese partners, some also expressed frustration at several instances of what they perceived as abusive business practices, including corruption and illegal smuggling activities on the part of Chinese firms. In the case of the Yuemei industrial cluster, which was eventually closed down, Nigerians in Calabar noted that the factories on site did not appear to be operating despite large numbers of containers coming into the local port. They worried that the factories might be fronts for a smuggling operation.

Some expressed anger at underhanded Chinese practices, including product imitation and duplication. The CEO of a Nnewi company described how the Chinese company he formed a technical partnership with had sold him products that were duplicates, using his company's own design specifications, as well as copies of German companies' goods. "They cheat us a lot! Most of the steel rims they sold to us … were either not enough as quoted in the bill of supply or of low quality," he noted. "It's terrible. I lost a lot of money and decided never to partner with the Chinese again."

The case of steel production being offshored from China to Africa for being too polluting raises questions regarding the environmental impacts of Chinese firms operating in Africa—Chinese firms have been involved in a number of high-profile environmental scandals (for example, Sinopec's operating illegally in Gabon's Loango National Park) (Taylor 2007). However, existing research does not suggest that Chinese companies have a notably worse record than firms of other nationalities; weak regulatory regimes and enforcement from African governments have a larger role to play than the origin of firms (Tang and Sun 2016). Further work is needed to understand the comparison of the environmental impact of the manufacturing sector and other industries.

In general, our study found complaints about Chinese businesses often centered on the poor quality of competing Chinese products, which were not only cheap but crowded the markets and made for difficult competition for Nigerian firms. This also affected the image of Chinese equipment suppliers. Many Nigerian entrepreneurs noted the poor quality of Chinese products and equipment, which they attributed to the lack of standards in China and poor quality control. One Anambra State entrepreneur noted, "There are no standards in China. … You need to know what you want, or else you would be utterly disappointed." From these interviews, it is apparent that the business practices of some Chinese firms seeking export profits in Nigeria have had a profoundly negative impact on the general reputation and image of Chinese firms, which also carries negative spillovers for other Chinese who seek business collaborations with Nigerians.

5. CONCLUSION

As China's domestic economy develops, the overseas expansion of its enterprises is an increasingly salient trend, adding another layer to an already complex China-Africa economic relationship. While Chinese development finance and large state-owned enterprises have made major contributions to African infrastructure and growth, private businesses and manufacturing firms from China also could have a significant impact on economic development, with implications for the structural transformation of African economies. Chinese manufacturing FDI not only offers employment generation but can contribute to industrialization and the economic transformation of the country through promoting technology transfer and spillovers, allowing developing countries to upgrade domestic production and create higher-value goods; by providing opportunities for training, skills transfer, and human capital development; and through local forward and backward linkages that integrate domestic firms into manufacturing supply chains.

Our study of Chinese industrial investment in four Nigerian states and technical partnerships between Chinese suppliers and Nigerian firms explored the nature of these linkages to assess whether these mechanisms are present and the degree to which they present opportunities for technology diffusion and learning. We identified Chinese firms in three FTZs as well as in the cities of Lagos, Onitsha, and Nnewi, operating in a number of key sectors, including furniture, construction materials, food, and household products. We foresee significant potential growth in the automobile sector, particularly in the wake of Nigeria's automotive policy shifts, which have already shown successful signs of spurring greater investment in Nigeria's auto and auto parts sector.

We found a number of cases of positive technology transfer in the firms surveyed, through skills transfer and training in production methods. However, this was not a systematic trend, and the level and formality of training varied substantially between firms and product industries. While some industries, such as welding and steel production—which require significant training—have furnished local workers with valuable technical skills that have increased their income and their labor market value, other basic assembly jobs show less promise. On the whole, training is rudimentary and highly informal in most of the Chinese firms we observed. However, despite popular claims that Chinese firms import their own labor, Chinese manufacturing enterprises appear to have had a positive impact on employment creation: in the firms surveyed, local Nigerians constituted the majority of the workforce, with Chinese workers on average constituting only 20 percent of all labor employed. Chinese manufacturing firms largely stayed out of downstream distribution, leaving room for Nigerians to take these opportunities. Chinese technology also has been a boon to Nigerian manufacturing enterprises, particularly in the industrial town of Nnewi, where a significant number of Nigerian firms use Chinese machinery and production methods in their plants. Some have fruitful technical partnerships with Chinese firms; these involve supervision and training of Nigerian labor but no equity investment.

Despite the proliferation of FTZs around Nigeria's coastal states, these zones have not had the desired effect of encouraging sectoral clustering. Chinese firms in these zones appear to be making disparate products rather than grouping by sector to capture agglomeration economies. Backward linkages with local firms and suppliers are also weak and generally shallow, with little sign of significant technology or skills transfer through this avenue. Lack of quality raw materials and poor infrastructure are ongoing problems in building up supply chains. As a catalyst for Nigeria's industrialization, current patterns of Chinese manufacturing investment have had only limited impact. Moreover, while many Nigerian firms benefit from technical partnerships with Chinese firms, some interviewees raised concerns about unethical and illegal behavior on the part of some Chinese firms; these reputational effects may create barriers to potential partnerships and integration between foreign and domestic firms.

Finally, the role of Chinese and Nigerian brokers and middlemen in connecting Nigerian and Chinese firms is an area for further research. Building long-term broker relationships with trusted suppliers is one way to overcome fears about poor quality and reduce risks that short-term profits from cutting corners will continue to place barriers in the way of technology transfer. These relationships can, over time, also be the foundation for JVs, as has been seen in the cases of several firms in Nnewi.

Nigerian actors do have a fair amount of agency to shape the likely outcomes of Chinese manufacturing investment. The case of Techno Oil shows that private Nigerian firms are able to negotiate technology transfer into JV agreements if they deem it a priority. On the policy level, the Nigerian government's import substitution policy is a way of directing FDI into priority sectors, and although it is still early, it already seems to be having its intended effect of spurring automobile makers to invest in local assembly. This implies that purposeful and coordinated Nigerian private- and public-sector action can have a significant impact on already robust Chinese manufacturing investment, shaping it to help achieve Nigerian goals of employment, skills development, and industrialization.

APPENDIX: SUPPLEMENTARY TABLE

Table A.1 Chinese firms visited during fieldwork

Firm	Year established in Nigeria	Location in Nigeria	Products	% Capacity	Investment (RMB)	US dollar equivalent (2014)	Number of Chinese	Number of Nigerians	% local workers
Baoyao Steel	1999	Calabar FTZ	Iron rods and billets	55.6			65	350	84.3
FAW	unknown	Calabar FTZ	Heavy-duty trucks				30	85	73.9
Federated Steel (4 subsidiaries)	1982	Ogun (2 firms); Lagos (2 firms)	Steel rods, bars, electrodes; brand name biscuits	100.0			20	1200	98.4
Flying Horse	unknown	Ogun-Guangdong FTZ	Aluminum piping		7,000,000	1,136,790	4	70	94.6
Goodwill Ceramics	2011	Ogun-Guangdong FTZ	Ceramics	80.0	250,000,000	40,599,600	85	1000	92.2
Hewang Cardboard	2007	Ogun-Guangdong FTZ	Cardboard packaging		80,000,000	12,991,900	30	255	89.5
Hongxing Steel	2008	Lagos; Edo State	Steel	100.0			86	1600	94.9
Jiuhua	2004	Ogun-Guangdong FTZ	Doors, windows, furniture				65	100	60.6
Lifemate	2004	Ikeja, Lagos	Furniture, beds				100	400	80.0
Longgan Furniture	2011	Lekki FTZ	Furniture, office chairs		325,733	52,899	4	21	84.0
Mark Sino	2000	Calabar FTZ	PVC ceilings				6	25	80.6
Shifa Plastics	unknown	Lagos Island	Plastic household items				10	300	96.8
Skyrun Holdings (3 subsidiaries)	2005	Calabar FTZ	Household appliances; electronics		977,199	158,695	20	200	90.9
Sunday Lightbulbs	2013	Lekki FTZ	Lightbulbs	53.3	3,000,000	487,195	3	30	90.9
Vindax Tissue Paper	2004	Ogun-Guangdong FTZ	Tissue paper		10,000,000	1,623,980			
Winghan Furniture	2004	Ogun-Guangdong FTZ	Furniture, sofas	40.0	10,000,000	1,623,980	12	20	62.5
Average				71.5	45,162,866	7,334,370	36	377	84.9

Source: Authors' fieldwork.
Note: FTZ = free trade zone; RMB = Chinese Yuan Renminbi; PVC = PolyVinyl Chloride.

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