

# A Study in the Trade Effect of China's Outward Foreign Direct Investment in Ethiopia Based on GTAP-FDI Model

Yangyang Li

University of Maryland, College Park, MD 20742, US.

---

**Abstract:** This paper studies China's trade effect on OFDI of Ethiopia and its impact on local economic development, and explores whether China's direct investment in Ethiopia has a positive or negative impact on the country's economic development. The main conclusions of this study include the following three points. First, China's direct investment in Ethiopia started late and, in general, accounted for a small proportion of China's direct investment in Africa. Second, China's direct investment in Ethiopia shows a creative trend of export. China's direct investment in Ethiopia has shown an obvious export creation effect than that of imports. Third, the results of GTAP simulation show that China's direct investment has a positive impact on Ethiopia's macro economy, promoting the growth of GDP. The impact of Chinese direct investment on specific industries, such as transportation construction and construction engineering, is more obvious. These results indicate that China's OFDI in Ethiopia has played a positive role in the local economic development.

**Keywords:** Trade Effect; OFDI; GTAP; Economic Development

---

## 1. Introduction

This study takes Ethiopia as the object of study to study the characteristics of China's direct investment in Ethiopia as well as the trade effect and macroeconomic impact of these investments on Ethiopia. The Federal Democratic Republic of Ethiopia is located in northeast Africa. Ethiopia, with its harsh climate and low level of economic development, is one of the largest recipients of aid. The purpose of this study is as follows: first, by analyzing the contribution of China's OFDI to Ethiopia's GDP growth, and the changes of import and export of African countries caused by China's OFDI. Analyze whether the influence of China's OFDI on Africa's economic growth can produce a positive effect of win-win cooperation. Second, further explore the influence mechanism of China's OFDI on African economic growth and the influence of China's OFDI on capital, employment and technological progress of African countries.

## 2. Methodology

### 2.1 Introduction to GTAP model

Global trade analysis model (GTAP) is a pre-empirical model, which is predictive and has a good effect on policy quantitative analysis, thus making the research more realistic. In this study, GTAP model was selected to predict China's economic effect on OFDI of Ethiopia, and the latest version of GTAP9.0 database was used for policy simulation. Simulation results were analyzed from the macroeconomic effect, trade flow effect, commodity structure effect and industrial structure effect of China and Ethiopia.

### 2.2 Model parameter setting

To date, the latest version of GTAP 9.0 contains production and trade data from more than 140 countries around the world in 2011, and divides the production sector into 57 industry categories based on actual conditions. The structure of the GTAP-FDI model and the

main differences between GTAP-FDI and the standard GTAP model. GTAP-FDI is an extension of the GTAP model. FDI stock data and FAS data are integrated into the model. GTAP-FDI is a CGE model, which is multi-sector, multi-region and relatively static. In terms of demand and supply, it is different from domestic and foreign enterprises (Lakatos and Fukui, 2014). The biggest difference between the GTAP-FDI model and the standard GTAP model is that the former contains nested ownership. In terms of context setting, GTAP 9.0 data is based on 2011, so it needs to be calibrated. The OFDI stock of China to Ethiopia was updated to 2014 by incorporating FDI stock and FAS data into the model. Country and industry groups. In this paper, more than 140 countries in the GTAP model are divided into 6 groups, namely China (excluding Hong Kong and Taiwan), Ethiopia, Rest of Africa, EU, US, Russia, other east Asian countries (north Korea, South Korea and Japan) and Rest of the World. In addition, this article will China and Ethiopia's main trade products and 57 GTAP model combined the production department, it can be divided into 10 categories: planting, animal husbandry, mining, food processing, clothing textiles, light manufacturing, heavy manufacturing, construction, communications, transportation, public utilities and other services. In terms of factor division, this study divides the eight production factors into land, skilled labor, unskilled labor, capital and natural resources.

### 3. Empirical Analysis

#### 3.1 China's OFDI in Ethiopia

From 2010 to 2017, China's outward foreign direct investment stock in Ethiopia grew by more than 500%. As table 1 shows, among all the major countries in Sub-Saharan Africa, China's OFDI growth in Ethiopia is second only to Democratic Republic of Congo and Angola. Meanwhile, from 2010 to 2017, China's outward foreign direct investment stock in Sub-Saharan Africa has been concentrated in several markets.

**Table 1. China's OFDI in Sub-Saharan Africa countries (Billion \$)**

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Ethiopia</b>	0.368	0.427	0.607	0.772	0.915	1.13	2.001	1.976
<b>Zambia</b>	0.944	1.2	1.998	2.164	2.272	2.338	2.687	2.963
<b>South Africa</b>	4.153	4.06	4.775	4.4	5.954	4.723	6.501	7.473
<b>Nigeria</b>	1.211	1.416	1.95	2.146	2.323	2.377	2.542	2.861
<b>Angola</b>	0.352	0.401	1.245	1.635	1.214	1.268	1.633	2.26
<b>DRC</b>	0.631	0.709	0.97	1.092	2.169	3.239	3.515	3.884
<b>Total</b>	7.659	8.213	11.545	12.209	14.847	15.075	18.879	21.417

Source: China National Bureau of Statistics of PRC, Ministry of commerce, PRC. Statistical Bulletin of China's Outward Direct Investment, 2010-2017. retrieved 23th September 2019 from Ministry of Commerce, PRC Website <<http://fec.mofcom.gov.cn/article/tjsj/tjgb/>>.

China's OFDI in Ethiopia started late and gradually diversified its investment areas. In 2007, China began to invest directly in Ethiopia gradually. FDI from China to Ethiopia grew rapidly in 2009. But in 2010, due to the deep impact of the financial crisis, the stock and flow of Chinese direct investment in Ethiopia declined slightly. Since 2010, China's direct investment in Ethiopia has been growing rapidly, as shown in table 2. With the huge growth of OFDI flow and stock, China has gradually diversified its field of OFDI in Ethiopia. Before 2007, Chinese enterprises mainly invested in engineering contracting, light industry, textiles and catering in Ethiopia. In recent years, Chinese enterprises have invested in glass manufacturing, automobile assembly, industrial park construction, iron and steel, cement and other industrial fields. In particular, Chinese companies have invested heavily in roads, railways, urban water supply, deep well drilling, construction and water conservancy projects in Ethiopia. It can be seen from table 2A and table 2B that China's OFDI in Ethiopia increases year by year. Before 2006, China's annual OFDI flow in Ethiopia was less than \$10 million, accounting for only about 1% of China's OFDI flow in Africa. By 2016, China's OFDI in Ethiopia has exceeded 280 million dollars, accounting for 11.8% of China's OFDI flow in Africa. But that growth seems to have been accompanied by volatility. In 2017, OFDI flow from China to Ethiopia dropped significantly, to 181.08 million dollars, and its share in China's total investment in Africa dropped

to 4%. In general, China's OFDI amount to Ethiopia is still relatively low. As the second most populous country in Africa, Ethiopia receives less than 10% of China's investment in Africa. This may have something to do with Ethiopia's weak industrial base.

**Table 2A. FDI flow and stock from China to Ethiopia from 2003 to 2017 (Hundred Million \$)**

Year	FDI flows from China to ETH	FDI flows from China to Africa
2003	0.0098	0.7481
2004	0.0043	3.1743
2005	0.0493	3.9168
2006	0.2395	5.1986
2007	0.1328	15.7431
2008	0.0971	54.9055
2009	0.7429	14.3887
2010	0.5853	21.1199
2011	0.723	31.7314
2012	1.2156	25.1666
2013	1.0246	33.7064
2014	1.1959	32.0193
2015	1.7529	29.7792
2016	2.8214	23.9873
2017	1.8108	41.0500

**Table 2B. FDI flow and stock from China to Ethiopia from 2003 to 2017 (Hundred Million \$)**

Year	China's stock of FDI to ETH	China's stock of FDI to Africa
2003	0.0478	4.9123
2004	0.0787	8.9955
2005	0.2982	15.9525
2006	0.956	25.5682
2007	1.0888	44.6183
2008	1.2645	78.0383
2009	2.8344	93.3227
2010	3.6806	130.4212
2011	4.2679	162.4432
2012	6.0655	217.2971
2013	7.7184	261.8577
2014	9.1462	323.5006
2015	11.3013	346.9440
2016	20.0065	398.7747
2017	19.7556	432.9650

Source: National Bureau of Statistics of PRC, Ministry of Commerce, PRC. Statistical Bulletin of China's Outward Direct Investment 2016, 2017. retrieved 23th September 2019 from Ministry of Commerce, PRC Website < <http://fec.mofcom.gov.cn/article/tjsj/tjgb/>>.

Trade effects of China's direct investment in Ethiopia. China's direct investment in Ethiopia shows a creative trend of export. According to the above analysis, before 2007, the total amount of China's direct investment in Ethiopia was small. Since 2009, FDI from China to Ethiopia has been growing rapidly, while Ethiopia's export to China has been growing at a rate different from previous years. From the table, we can find, in 2012 and 2014 direct investment growth is significantly larger increase than in previous years, export growth is slower, this is considering the creation of the FDI effect lag reason, there may be a delayed reaction such as large projects or infrastructure investment, etc., is expected to show a direct investment and corresponding increase in the future. It can be judged that China's FDI to Ethiopia has certain export creation effect. In addition, China's direct investment in Ethiopia has also led to changes in the import effect of Ethiopia. From 2004 to 2008, Ethiopia's import volume from China increased rapidly, which was also a period before China's direct investment in Ethiopia started. Ethiopia has a backward industrial base and cannot produce some of its products domestically, so it needs to import from China. Since 2008, Ethiopia's imports from China, though still increasing, have slowed down significantly. This may be due to China's increased direct investment in Ethiopia, which has promoted the development of local industries and replaced some imports. In the process of direct investment in Ethiopia, China's investment structure is also

changing. In the early stage, China's investment mainly focused on the primary industries such as textiles and agriculture, and then shifted to energy, mining and high-tech processing industries, which accelerated the development of local industries. In addition, some enterprises, especially those with high and new technology, set up factories in Ethiopia, and the products they produce are not sold to the Chinese market, but take the international market as the whole market. Therefore, from 2003 to 2015, the export creation effect of China's direct investment in Ethiopia is obviously more significant than that of import. Only from the data perspective, China's direct investment to Ethiopia and associated do exist in the import and export, foreign direct investment to create effect exists in both import and export, but the difference because of the country's economic strength, investment structure, the national policy, the enterprise ability of FDI and investment environment, and so on the different and change, is likely to lead to create the effect of FDI to import less than exports.

**Table 3. Ethiopia's exports to and imports from China from 2004 to 2015 (Billion \$)**

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Imports</b>	0.194	0.284	0.431	0.774	1.231	1.252	1.210	0.885	1.529	1.868	2.922	3.441
<b>Exports</b>	0.014	0.086	0.132	0.087	0.082	0.215	0.274	0.292	0.309	0.316	0.490	0.380

Source: Ministry of Commerce, PRC. National import and export statistics. retrieved 23th September 2019 from <<http://www.mofcom.gov.cn/article/tongjiziliao/cf/?>>.

### 3.2 GTAP simulation results

Simulation results after running the program show that China's OFDI has contributed 0.7% to Ethiopia's real GDP growth after entering different industries. Total output from China's OFDI in Ethiopia increased by \$313 million. In terms of sectors, Chinese investment in Ethiopia is mainly focused on transportation construction and construction engineering, in addition to light industries and services such as textiles and catering. Simulation results show that the transportation construction industry in Ethiopia increased by 0.9% and the construction engineering industry in Ethiopia increased by 1.7%. These results indicate that China's OFDI in Ethiopia has played a positive role in the local economic development. At the macro level, as one of the least developed countries in the world, the lack of capital is one of the serious obstacles to Ethiopia's development. Chinese foreign investment can help Ethiopia get a lot of foreign capital and help rebuild its economy. The positive macro effect is reflected in GDP growth. Chinese direct investment in Ethiopia will also bring more local jobs. The capital from China built factories and recruited local workers, on the one hand, to solve the employment problem of some local people. On the other hand, Ethiopia's cheap labor has also lowered costs for Chinese companies. In addition, Chinese investment in Ethiopia may have a spillover effect on technology. Local industrial chains may also develop. The demand of Chinese companies may help Ethiopia form a corresponding industrial chain foundation. Finally, a large part of China's investment in Ethiopia is focused on infrastructure construction, such as road construction, railway construction, urban water and power supply construction, communication equipment construction and so on. The construction of these projects will not only promote local employment, but also improve Ethiopia's transportation and communication, health and other conditions, thus indirectly stimulating the development of the local economy. However, in general, the proportion of China's outward foreign direct investment in Ethiopia's capital stock is still relatively low, and Ethiopia's industrial base is very weak. Therefore, there are still great opportunities for cooperation between the two countries in the future.

## 4. Conclusion

This paper studies the trade effect of China on OFDI of Ethiopia and its influence on local economic development. By analyzing OFDI data of China in Ethiopia and economic development data of Ethiopia, and using GTAP model for simulation, the following conclusions are drawn. First, China's direct investment in Ethiopia started late and, in general, accounted for a small proportion of China's direct investment in Africa. Through the analysis of the fourth section, China's direct investment in Ethiopia started in 2007. But it grew rapidly in the following years. By 2016, China's OFDI in Ethiopia has exceeded 280 million dollars, accounting for 11.8% of China's OFDI flow in Africa. And that growth seems to be accompanied by volatility. In 2017, OFDI flow from China to Ethiopia dropped significantly, to 181.08 million dollars, and its share in China's total investment in Africa dropped to 4%. In general, China's

OFDI amount to Ethiopia is still relatively low. Second, China's direct investment in Ethiopia shows a creative trend of export. Since 2009, FDI from China to Ethiopia has entered a period of rapid growth. At the same time, the export speed of Ethiopia to China has also started to grow rapidly. In general, the growth of export lags behind the growth of FDI, because the creation effect of FDI lags behind. It may lead to delayed investment in large-scale projects or infrastructure construction. In addition, China's direct investment in Ethiopia has also led to changes in the import effect of Ethiopia. Ethiopia's imports from China have slowed markedly since 2008. This may be due to China's increased direct investment in Ethiopia, which has promoted the development of local industries and replaced some imports. In the process of direct investment in Ethiopia, China's investment structure is also changing. Chinese investment is shifting from primary industries such as textiles and agriculture to energy, mining and high technology, which have accelerated the development of local industries. China's direct investment in Ethiopia has shown an obvious export creation effect than that of imports. Third, the results of GTAP simulation show that China's direct investment has a positive impact on Ethiopia's macro economy, promoting GDP growth. The impact of Chinese direct investment on specific industries, such as transportation construction and construction engineering, is more obvious. When China's OFDI entered Ethiopia, it contributed 0.7% to the country's real GDP growth. Total output from China's OFDI in Ethiopia increased by \$313 million. In terms of sectors, Chinese investment in Ethiopia is mainly focused on transportation construction and construction engineering, in addition to light industries and services such as textiles and catering. Simulation results show that the transportation construction industry in Ethiopia increased by 0.9% and the construction engineering industry in Ethiopia increased by 1.7%. These results indicate that China's OFDI in Ethiopia has played a positive role in the local economic development.

## References

- [1] Ren, YR. 2017. *The China-Africa trade and investment mechanism to examine the effects of industrial transformation in Africa*. University of International Business and Economics, Beijing.
- [2] Kabemba, C. 2016. "China-democratic republic of Congo relations: From a beneficial to a developmental cooperation." *African Studies Quarterly*, Vol.16, No.3:73-87.
- [3] Dunning, J. and Narula, R.. 2003. "Foreign direct investment and governments: catalysts for economic restructuring". Routledge.
- [4] Hymer, S. H. 1976. "The international operations of national firms: A study of direct foreign investment." M.I.T. Press, Cambridge, MA.
- [5] Campbell, T. 2012. "The Impact of Foreign Direct Investment , No.FDI Inflows on Economic Growth in Barbados: An Engle-Granger Approach". *International Journal of Public Administration*, 2012, Vol.35, No.4.
- [6] Inekwe, J. N..2013. "FDI, employment and economic growth in Nigeria". *African Development Review*, Vol.25, No.4: pp.421-433.
- [7] Fan, S. 2013. "Relationship between FDI and economic growth: examples of China and South Africa". *Journal of Guizhou University of Finance and Economics*, Vol.31, No.2: pp.106.
- [8] Adamu, A., & Barde, B. E. 2012. "Foreign direct investment and the performance of manufacturing firms in Nigeria". *Research in Accounting in Emerging Economies*, Vol.12:pp.171-183.
- [9] Xie S. H., Wang, Q. & Gan, C. 2018. "Spatial differences and influencing factors of FDI in African countries". *Journal of Zhejiang Normal University* , No.social science edition, Vol.43, No.05: pp.81-86.
- [10] Chen, Y., Ma, L. & Zhong C. B.2012. "Determinants of Chinese investment in Africa: an empirical analysis from the perspective of integrated resources and institutions". *The Journal of World Economics*, Beijing. Vol.13, No.10: pp.91-112.
- [11] Tian, Z., Dong H, Y. 2015. "Trade effect and empirical study of China's direct investment in Africa". *Journal of Research on Development*. Vol.15, No.3: pp.117-121.
- [12] United Nations. 2015. Growth and Transformation Plan II, United Nations Website, retrieved 23<sup>rd</sup> September 2019,<<https://ethiopia.un.org/15231-growth-and- transformation-plan-ii>>.

About the author: Li Yangyang (year of birth- 1990), male gender, han nationality, native place (from Jiaozuo, Henan Province), degree: Master degree, unit: International Finance Forum, research direction: Green finance, Development Economics.