

*Full Length Research Paper*

# Impact of Chinese foreign direct investment in Africa on Sino-Africa bilateral trade

Fantessi Amavi Agbelenko, Kiprop Symon Kibet\* and Desmond Abdul Kall Conteh

University of International Business and Economics, Chaoyang District Beijing 100029, P. R. China.

Accepted 12 December, 2011

**The purpose of this paper is to investigate the impact of Chinese direct investment in Africa on Sino-Africa bilateral trade. To achieve this objective we used two approaches. First we utilized a panel data to analyze the impact of Chinese foreign direct investment (FDI) on its own exports to Africa, and secondly, a time series data to investigate the effect on its imports from Africa. Our analysis shows that Chinese direct investment in Africa has contributed significantly to increased Chinese exports to Africa as well as imports from Africa. This means Chinese direct investment in Africa is an important factor for explaining the growth of the bilateral trade. Furthermore, we found that the per capita income, annual percentage growth of domestic product, inflation and credit available to domestic sector in those African countries investigated have significant positive effect on china's exports while real exchange rate (depreciation of local currencies against RMB) and military expenditure have negative effect. On the other hand per capita income and annual percentage growth of domestic product of china have a positive effect on its import.**

**Key words:** Foreign direct investment (FDI), trade, China, Africa-countries

## INTRODUCTION

Foreign direct investment (FDI) is usually defined as a transfer of package of resources across countries of the globe, which includes: capital, technology, management and marketing expertise (Odozi, 1995). As most developing countries experience a shortage of capital which is reflected in their savings gap to finance their investment needs. The only way to bridge this gap is through an inflow of foreign capital. In 2007, United Nations report (UNCTAD, 2007) points out that china is one of the major capital providers for developing countries in Africa. That means the economic linkage between China and Africa has been strengthened through China FDI in Africa during the past few years. Hence it is for this reason that this study is set out to investigate the effect of Chinese FDI on the bilateral trade

According to China's yearly statistics, Chinese trade and FDI in Africa has grown sharply over the last few years. Before 2003, there was almost no Chinese direct

investment in Africa. In 2003, China's FDI in Africa was 75 million US Dollars and have been increasing over the years to the tune of 5490 million in 2008.

In 2009, it decreased to 1440 million USD. The values of export and import have followed the same trend like the investment. Export and import was 10180 and 8360 million USD respectively. They have been increasing every year to reach 51240 million USD and 55965 million USD in 2008 and decreased to 47735 million USD and 43330 million USD in 2009 respectively.

There seem to be some evidence of resources seeking motive and market seeking behavior from China's FDI in Africa because China's investments always go to Africa-countries that have natural resources like cocoa beans, rubber, cashew nuts, hide, skin and oil. As a consequence, china's overseas investment plays an important role in the procurement of natural resources to meet its domestic demand induced by its strong economic growth (Yin-Wong Cheng et al., 2010).

In this study, we focus on the impact of Chinese direct investment in Africa on Sino-Africa bilateral trade. First we used panel data for twenty three Africa-countries (Table 4) in which China always invest every year so as

\*Corresponding author. E-mail: [sikiprop@yahoo.com](mailto:sikiprop@yahoo.com). Tel: +8613520190537.

to investigate the effect of China's FDI on its own export to those Africa-countries. Secondly, we used a time series data to examine the effect of China's FDI on its import from Africa.

## LITERATURE REVIEW

A number of recent papers have examined the interaction between FDI and trade, among them include Zhang (2002) who found that FDI increases competition in the host country's market, and helps the host countries to improve their balance of payments position by increasing exports and reducing the burden of imports through the import substitution. Evidence of significant positive role for inward FDI in promoting the expansion of Chinese export has been found by Buckley et al. (2002), Sun (1999) and Zhang and Song (2000).

Boyouni and Lipworth (1998) found that FDI flows only have a temporary impact on export but a permanent effect on import. Morikawa (1998) examined the effect of Japanese outward direct investment on trade balances, and found that FDI decreased Japanese trade surplus in the latter half of 1980.

A study by Jinping and Wenjun (2008) examined the impacts of Japanese direct investment in China on the bilateral trade and they suggested that the relation was complementary. Zhang and Hock (1996) in their study of the relationship between international trade and inflows of FDI found that FDI is not a significant factor affecting trade.

According to Bhagwati et al. (1978), FDI inflows might worsen the country's terms of trade, they suggested that the effect of FDI on developing countries depends on the import substitution and export promotion. Evidence of potential complementary between FDI and trade has also been found by Agnon (1979), Markusen (1995) and Ethier (1996). Wang (2002) in his study found that the primary cause of deterioration of China's terms of trade means that its export growth largely depends on foreign-invested enterprises and labor-intensive products.

Chengqi et al. (2007) explore the impact of inward FDI on the nature and intensity of Chinese manufacturing exports, and they found that, inward FDI exerted a considerable effect on overall Chinese export expansion. Some other empirical studies have been done by interacting the financial flows and trade (Albuquerque et al., 2005; Do and Levchenko, 2004; Swenson, 2004) and the most important argument is that larger inflow of FDI will lead to higher volume of trade as compared with other studies which do not use interaction terms.

Mundell (1957) points out that the factor and product movements are substitutes rather than complements. While Kim and Kang (1997) in their empirical studies based on Japan's experience, found that there is no significant positive effect of outward FDI on exports. O'Sullivan (1993), Blake and Pain (1994) and Cabral (1995) concluded that inward foreign direct investment

was export-oriented and raised the level of exports from host economies.

This study complements the existing literature by addressing for cointegration and country's stability which is utmost important for trade. We have also added many explanatory variables in our model that have not been used by other researchers.

## China-Africa relations

China's relationship with Africa has started since April 1955 by Asia-Africa conference held in Bandung (Indonesia). The aims of the conference were to promote economic and cultural cooperation between the two continents and to fight against colonialism, neocolonialism or imperialism.

Shortly after the conference, Egypt became the first country that established diplomatic relation with China in 1956. From Egypt, China has extended his relation to others Africa-countries which China gave economic, technical and military support. From China-Africa relation, China undertook many aid projects in Africa like Tanzania-Zambia railway in 1970; federal buildings, stadiums, factories, infrastructure, medical teams and student exchange programmes. Africa was also of support to China, especially in obtaining a seat in United Nations Security Council in 1971.

However China has changed ideology after adopting the open door policy in 1980. China-African relations based primarily on ideological (peaceful coexistence, mutual respect for sovereignty and territorial integrity, mutual non-aggression, non-interference in each other's internal affairs, equality and mutual benefit) has changed to economic linkage and trade. From that, trade volume between China and Africa from 1990 to 2000 has increased sharply, from 1664 million in 1990; it reached 10597 million in 2000; about six fold.

## METHODOLOGY

Here we present the method that enabled us to examine the impact of Chinese FDI on the Sino-Africa bilateral trade for the period 2003 to 2009. The study employed two different models namely: panel model to investigate the effect of Chinese FDI on Chinese Export to Africa and time series model to examine the impact of Chinese FDI on Chinese import from Africa.

In the first case (panel model), Chinese export to African-countries is considered as dependent variable. China's FDI in each of the host country and some macroeconomic indicators of the host countries [per capita income, annual percentage growth rate of gross domestic product (GDP), real exchange rate between RMB and local currencies, annual inflation rate of consumer price, credit available to domestic sector as percentage of GDP and military expenditure] are taken as independent variables. However, in the second case (time series model), total value of Chinese Import from Africa is considered as dependent variable and total value of China's FDI in Africa, China's per capita income, China's annual growth rate of GDP are taken as independent variables.

Our primary objective in this study is to investigate whether

Chinese FDI in Africa is for resource seeking motive as well as for market seeking behavior.

### Theoretical assumptions

In order to achieve the objective of the study, Chinese FDI in Africa, per capita income, annual growth rate of GDP and credit available to domestic sector in each of the host country are expected to have positive effect on China's export to Africa. The positive effect of Chinese FDI on bilateral trade is supported in the literature by Buckley et al. (2002), Sun (1999), Zhang and Song (2000) and Jinping and Wenjun (2008). Per capita income and annual growth rate of GDP are measure of market size and market opportunity respectively. High per capita income leads to high demand in the market place. High level of economic growth is also an important indicator of market opportunities. So high level of both per capita income and economic growth will increase Chinese export to Africa according to market seeking behavior of multinational company. Better and adequate credit facilities improve the investment climate for domestic investors and favor business environment. So it will give "green light" to Chinese export.

Based on the similar consideration, real exchange rate and military expenditure are expected to have a negative effect on China's export to those Africa - countries. The real appreciation of Chinese RMB means the rise of the relative price in China to those of Africa - countries; this will negatively affect China's export to those countries. A large proportion of the budget reserved for defense expenditures may imply future uncertainty which means the country is politically unstable; this will have a negative effect on Chinese exports to that country. Finally, inflation in those Africa-countries will have a positive effect on China's export to those countries because domestic product will become expensive, hence, will be forced to purchase (import) foreign goods.

Furthermore, Chinese FDI in Africa, Chinese per capita income and annual growth rate of Chinese GDP are expected to have positive effect on China's import from Africa. Per capita income and annual growth rate of GDP are measure of market size and market opportunity respectively. With the intention of satisfying a high domestic demand; China should import more resources from Africa in order to increase production of goods. Thus, a high level of both Chinese per capita income and annual growth rate of GDP will positively affect Chinese import from Africa.

### Model specification

#### Panel model

The empirical model for explaining Chinese export to Africa is expressed as:

$$\ln(EX_{it}) = B_0 + B_1 \ln(FDI_{it}) + B_2 (PGDP_{it}) + B_3 (GROW_{it}) + B_4 (REXCH_{it}) + B_5 (INF_{it}) + B_6 (CRED_{it}) + B_7 (ME_{it}) + U_{it}$$

Where EX = Chinese export to each country; PGDP = real per capita GDP (current per capita GDP divide by GDP deflator); GROW = annual percentage growth of GDP in the country; REXCH = real exchange rate (obtained by multiplying the nominal exchange rate with China's Consumer Price index and then divided by domestic consumer price index); except of Congo Democratic Republic that we used China GDP deflator and Congo Democratic Republic GDP deflator, because of lack of Congo Democratic Republic consumer price index; INF = inflation, consumer price (as an annual percentage), in the country;

CRED = Credit facilities available to domestic sector as a percentage of GDP, in the country; ME = Military expenditures as percentage of GDP in the country.

#### Time series model

The empirical model for explaining Chinese imports from Africa is specified as:

$$\ln(TIM_t) = B_0 + B_1 \ln(TFDI_t) + B_2 (GROW_t) + B_3 (PGDP_t) + U_t$$

Where TIM = Total value of Chinese import from Africa every year; TFDI = Total value of Chinese investment in Africa every year; GROW = annual percentage growth rate of GDP in China; PGDP = real per capita GDP in China (current per capita GDP divide by GDP deflator).

#### Data type and sources

The analysis is conducted using annual data series for the period 2003 to 2009. The data sets related to Chinese exports and Chinese imports are obtained from various issues of the China Statistical Yearbook; Chinese FDI in Africa is obtained from www.fdi.gov.cn. Nominal exchange rate is obtained from United Nations Conference on Trade and Development (UNCTAD) data base. Per capita GDP, annual percentage growth rate of GDP, inflation rate, credit to domestic investor (CRED) and military expenditure are obtained from World Development indicators (WDI) 2010. A sample of twenty three (23) African countries was selected, for which data on most of the variables were available for this study.

Estimated results for the impact of Chinese direct investment in Africa on the value of Chinese export to Africa are presented in Table 1. Table 2 presents once again the impact of Chinese direct investment in Africa on the value of Chinese export to Africa after controlling for heteroskedasticity. Table 3 presents the impact of Chinese direct investment in Africa on the value of Chinese imports from Africa.

## EMPIRICAL RESULTS AND INTERPRETATION

The variables FDI and PGDP are positively as expected and statistically significant at 1% level; it implies that FDI has a big impact on Chinese export to Africa. A particular interest is the coefficient of the FDI, as this indicates the elasticity of export with respect to outward FDI. From Equations 1 to 4 in Table 1, the coefficient of FDI variable is positive and statistically significant at 1% level, confirming the contribution of Chinese FDI to Chinese export to Africa during the period under study. The result show that a 1% increase in FDI leads to a 0.07% increase in export. This finding is consistent with our hypothesis that Chinese direct investment in Africa is for market seeking behaviour. The variable military expenditure is statistically significant at 5% level. The variables, real exchange rate, annual growth rate; inflation rate and credit to domestic investors are not statistically significant. Although, insignificant, these variables have the correct signs in relation to Chinese

**Table 1.** Parameter estimated of panel model (random effect) by using Stata 10.

Variables	(1) Lex	(2) Lex	(3) Lex	(4) Lex
Lfdi	0.119*** (0.0161)	0.0647*** (0.0137)	0.0676*** (0.0139)	0.0665*** (0.0138)
Pgdp		0.000644*** (6.73e-05)	0.000631*** (6.80e-05)	0.000572*** (7.68e-05)
Rexch			-0.000393 (0.000319)	-0.000367 (0.000317)
Grow				0.00630 (0.0142)
Inf				0.00373 (0.00540)
Cred				0.0110 (0.00760)
Me				-0.130** (0.0617)
Constant	18.07*** (0.249)	17.65*** (0.197)	17.64*** (0.197)	17.65*** (0.320)
Observations	157	157	157	157
R-squared	0.292	0.582	0.587	0.608
Number of country	23	23	23	23

Standard errors in parentheses. \*\*\*,  $p < 0.01$ ; \*\*,  $p < 0.05$ ; \*,  $p < 0.1$ .

**Table 2.** Parameter estimated from panel model after controlling for heteroskedasticity.

Variables	(1) Lex	(2) Lex	(3) Lex	(4) Lex
Lfdi	0.119*** (0.0231)	0.0647*** (0.0169)	0.0676*** (0.0171)	0.0665*** (0.0176)
Pgdp		0.000644*** (6.61e-05)	0.000631*** (6.64e-05)	0.000572*** (8.36e-05)
Rexch			-0.000393 (0.000253)	-0.000367 (0.000246)
Grow				0.00630 (0.0144)
Inf				0.00373 (0.00591)
Cred				0.0110 (0.00751)
Me				-0.130** (0.0602)
Constant	18.07*** (0.360)	17.65*** (0.223)	17.64*** (0.226)	17.65*** (0.345)
Observations	157	157	157	157
R-squared	0.853	0.913	0.914	0.919

Robust standard errors in parentheses. \*\*\*  $p < 0.01$ ; \*\*,  $p < 0.05$ ; \*,  $p < 0.1$ .

**Table 3.** Parameter estimated from time series data (with robust) by using Stata 10.

Variables	(1) Ltim	(2) Ltim	(3) Ltim
Lfdi	0.458*** (0.0501)	0.372*** (0.0746)	0.322** (0.0562)
Pgdp		0.000150* (5.96e-05)	0.000234** (5.63e-05)
Grow			0.0523 (0.0444)
Constant	14.66*** (1.008)	16.06*** (1.411)	16.32*** (1.139)
Observations	7	7	7
R-squared	0.938	0.953	0.970

Robust standard errors in parentheses. \*\*\*,  $p < 0.01$ ; \*\*,  $p < 0.05$ ; \*,  $p < 0.1$ .

export to Africa.

We have tested whether there is heteroskedasticity, and we found evidence of heteroskedasticity in Table 6 ( $n \cdot R^2 = 16.8304 > 14.07$ ). To correct that, we have used command areg with robust option and we got the output

(Table 2).

Since we are using time series data for estimating the impact of Chinese foreign direct investment in Africa on its import from Africa, the estimation methodology is very crucial. The major concern with the time series is that if

**Table 4.** List of Countries.

S/N	Countries
1	Algeria
2	Angola
3	Benin
4	Botswana
5	Cameroon
6	Congo Demo. Rep
7	Congo Rep.
8	Cote d'ivoire
9	Egypt Arab Rep
10	Ethiopia
11	Gabon
12	Ghana
13	Kenya
14	Madagascar
15	Mauritius
16	Morocco
17	Namibia
18	Nigeria
19	South Africa
20	Sudan
21	Togo
22	Uganda
23	Zambia

non-stationary of data series persists then it may lead to spurious relationship. In order to avoid spurious regression, we have checked for unit roots (Table 5) for the variable using Augmented dickey fuller (ADF) and we have found that variable log import is stationary but log FDI, real income per capita and annual percentage growth of GDP are not stationary but have different level of integration so no risk of cointegration which might lead to spurious regression.

The empirical results for the effect of Chinese direct investment in Africa on Chinese imports from Africa is in Table 3. We can see from Table 3 that the coefficient of FDI is positive and statistically significant at 5% level in Equation 3, 1% level in both Equation 1 and 2. This finding confirms our hypothesis that Chinese direct investment in Africa is for resource seeking motive. An increase of 1% of Chinese direct investment in Africa leads to 0.32% increase in Chinese imports from Africa. The variable per capita income is also statistically significant at 5% level. Annual growth rate of GDP is not statistically significant but it has the correct sign. This implies that China has been importing raw material from Africa with a view to sustain its economic growth.

By using robust option for time series regression, stata 10 control automatically for the heteroskedasticity problem, so we have just tested whether there is evidence of autocorrelation of the error term by using command

durbin and the test give us a p-value equal to 0.6741, with null hypothesis of no serial correlation. As p-value is higher than 10%, there is no evidence of autocorrelation.

## Conclusion

The objective of this study was to investigate the impact of Chinese foreign direct investment in Africa on Sino-Africa bilateral trade. The study found that Chinese FDI in Africa has a substantial impact on Chinese imports from Africa than Chinese export to Africa. An increase of 1% FDI lead to an increase of 0.32% of Chinese import from Africa and 0.07% of Chinese export to Africa. That means Chinese foreign direct investment motive in Africa is more for resource seeking than for market seeking behaviour. Besides this Chinese FDI, the other factors that significantly affect the Chinese export to Africa are per capita income and military expenditure. The low impact of other variables (real exchange rate, annual inflation rate, annual growth rate and credit available to domestic sector) on Chinese export to Africa is probably due to the time span effect because the period under investigation is relatively short since the data was only available for the period under study. This is in fact, a major limitation of this study. In addition, the study focused only on the effects of FDI on trade while the effects of trade on FDI are not investigated. This could serve as an area which can be researched in the future.

The study indicates that the Chinese government FDI policies have been very successful in sustaining Chinese economic growth.

While the main question is how can Africa-countries benefit from Chinese FDI inflow? Government of the host country should adopt the following appropriate policy that we offer; policy which might contribute to human capital training and facilitate international exchange integration; create a conducive investment climate that will promote competition between domestic and foreign (Chinese) companies which will enhance economic growth and development; the government of the host countries can lower the tax so as to encourage Chinese potential investors to establish their companies in those host countries.

## ACKNOWLEDGEMENTS

We would like to thank DEKAYIE Akou, YOKO Lora and FANTESSI Victoire for their significant assistance and moral support that they accorded to us when we were writing this paper. Many thanks also go to all our friends in the School of International Business and Economics for their encouragement and insightful comments which enriched our paper.

**Table 5.** Test for unit root by using Augmented dickey fuller (ADF).

Variable	Test statistic	Critical value at 5%	P-value
Logarithm of total import (l <sub>tim</sub> )	7.908	3.6	0
Logarithm of total FDI (l <sub>tfdi</sub> )	0.785	3	0.8236
Real per capita income (rpgdp)	1.206	3	0.996
Annual percentage growth (grow)	2.032	3	0.2729

**Table 6.** Test for Heteroskedasticity.

Variables	Résidu Square
Lfdi	-0.00599 (0.00529)
Rpgdp	-2.16e-05** (1.03e-05)
Rexch	-6.83e-05 (0.000136)
Grow	-0.00629 (0.00527)
Inf	-0.000121 (0.00190)
Cred	-0.000715 (0.000658)
Me	-0.0328** (0.0156)
Constant	0.420*** (0.0897)
Observations	157
R-squared	0.107

Standard errors in parentheses. \*\*\*, p<0.01; \*\*, p<0.05; \*, p<0.1.

## REFERENCES

- Albuquerque R, Loayza N, Servén L (2005). World Market Integration through the Lens of Foreign Direct Investment. *J. Int. Econ.*, 66(2): 267-295.
- Bayoumi T, Lipworth G (1998). Japanese foreign investment and regional trade. *J. Asian Econ.*, 9(4): 581-607.
- Blake AP, Nigel P (1994). Investigating structural change in UK export performance: The role of innovation and direct investment. NIESR Discussion Paper, p. 71.
- Buckley PJ, Clegg J, Wang C (2002). The impact of inward FDI on the Performance of Chinese manufacturing firms. *J. Int. Bus. Stud.*, 33(4): 637-655.
- Cabral S (1995). Comparative export behavior of foreign and domestic firms in Portugal. *Banco de Portugal Econ. Bull.*, pp. 69-78.
- Chengqi W, Buckley PJ, Jeremy C, Mario K (2007). The impact of inward foreign direct investment on the nature and intensity of Chinese manufacturing export. *Transnatl. Corp.*, 16(2): 136.
- Jinping Y, Wenjun Z (2008). The impacts of Japanese direct investment in China on the Sino-Japanese bilateral trade. *J. Chin. Econ. Foreign Trade Stud.*, 1(3): 185-199.
- Kim JD, Kang IS (1997). Outward FDI and exports: The case of South Korea and Japan. *J. Asian Econ.*, 8(1): 40-50.
- Morikawa K (1998). Impact of Japanese foreign direct investment on the Japanese trade surplus. *J. Pol. Model.*, 20(4): 427-60.
- Mundell RA (1957). International trade and factor mobility. *Am. Rev.*, 47(3): 321-35.
- O'Sullivan PJ (1993). An assessment of Ireland's export-led growth strategy via foreign direct investment: 1960-1980. *Weltwirtschaftliches Arch.*, 129: 139-158.
- Odozi VA (1995). An Overview of Foreign Investment in Nigeria: 1960-1995. CBN Research Department, Occasional Paper Series No. 11, Central Bank of Nigeria.
- Rudra PP (2010). Trade Openness and Foreign Direct Investment in India: The Globalization Experience. *IUP J. Appl. Financ.*, 16(3): 26-43.
- Sun H (1999). Impact of FDI on the foreign trade of China. *J. Asia Pac. Econ.*, 4(2): 317-339.
- Swenson DL (2004). Foreign Investment and the Mediation of trade Flows. *Rev. Int. Econ.*, 12(4): 609-629.
- UNCTAD (2007). Asian Foreign Direct Investment in Africa: Towards a new Era of Cooperation among Developing Countries, United Nations, New York and Geneva.
- Wang Y (2002). Upgrading Industrial Structure in an Open Economy, Economic and Management Publishing House, Beijing.
- Zhang HK, Song S (2000). Promoting Exports: The Role of Inward FDI in China. *Chin. Econ. Rev.*, 11: 385-396.
- Zhang Z, Hock OC (1996). Trade Interdependence and Direct Foreign Investment between Asian and China. *World Dev.*, 24(1): 155-170.