

Effects of Chinese FDI on Congolese Exports

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Abstract

This paper examines the effect of FDI on Congolese exports. This study highlights the analysis of the existing relationship between FDI and exports. Indeed, the analysis of this relationship has been carried out theoretically and empirically by several authors who did not find unanimous results. Thus, some authors have found a relationship of substitution (negative effect) and others, a relationship of complementarity (positive effect). In our study, the empirical analysis was carried out using the vector error correction model (VECM) over the period 2005 to 2014. The results obtained show the existence of a substitution relationship between Chinese FDI and Congolese exports. The coefficients associated with the FDI variable in the short and long term are respectively (-0.408367) and (-0.764633) at the 5% threshold.

Keywords

Foreign Direct Investment, Exports, China, Congo

1. Introduction

At the scale of Sub-Saharan Africa, exports have followed the same trend as at the global level. Indeed, the volume of exports increased from US\$124 billion in 2000 to US\$427 billion in 2010 and will reach US\$334 billion in 2020 (WDI, 2021). At the national level, the Congo, like other countries, has seen an increase in its exports in recent years, insofar as the volume of its exports has risen from 2.6 billion US dollars in 2000 to a peak of 11.5 billion US dollars in 2011. These data show that Congo's export volumes are booming, despite certain phases of decline, in this case, the drop in 2015 when exports were around US\$5 billion and then a rebound in 2019 to US\$9.4 billion, which gives rise to reflections on the driving forces behind exports (WDI, 2021).

From this perspective, the literature reveals that exports of goods and services

can be driven by a variety of determinants including human capital (Boussadi & Oubouali, 2018), technology transfer (Caves, 1996; Zhang, 2005), governance (Kuikeu, 2012), FDI (Zhang, 2005), etc. However, in a context where economies are increasingly intertwined, the role of FDI in state development and trade has become prominent. By contributing to the strengthening of local capacities, by sometimes making technology transfer effective and by participating in the increase in the level of exports in many countries, including African countries, FDI helps to support GDP growth (Besada et al., 2008). Thus, FDI is a major determinant of export promotion in host countries. This assertion is justified by the work of Zhang (2005) and Fayou (2018) who found that FDI has a significant and positive impact on exports.

In view of the above, it is clear that the subject is at the centre of divergences between authors, so its treatment in the Congo may confirm one or other of these two trends. However, unlike the work that has been done, we are interested in the case of FDI from China to the Congo and Congolese exports to China. In addition to the scarcity of this type of work in the Congo, the choice of this subject is justified on three levels: 1) The intensification of economic relations between China and the Congo; 2) The participation of Chinese FDI in economic growth; 3) The diversification of the economy through exports.

Firstly, the intensification of economic relations between China and Congo was observed in the 2000s, with the signing of several bilateral agreements¹, five of which were signed in 2017. These bilateral agreements are first and foremost economic: access to raw materials and agricultural products, through the acquisition of extractive companies or exploitation concessions, including forests or land. They are mainly based on commodity contracts against infrastructure, technical assistance and concern the construction and construction, extractive industries and banking sectors (Boungou Bazika, 2008; Dzaka-Kikouta, 2011; Cabestan, 2013; Bokilo, 2022).

China is the Congo's leading trading partner. Indeed, the cumulative flow of Chinese FDI to the Congo between 2003 and 2019 amounted to \$284 million, i.e. 6.8% of Chinese FDI in Africa²; the Congo thus ranks third among countries receiving Chinese FDI (Pairault, 2019). Of all Congolese exports, the share going to China represented 59.8% in 2019 (WTO, 2019). Such statistics manifest on the one hand the evolution of Sino-Congolese cooperation and on the other the motivation of the Chinese state to participate in the development of the country (Niambi, 2018).

Second, the participation of Chinese FDI in economic growth has been enhanced in recent years. Between 2010 and 2019, Chinese FDI flows to Congo increased 24-fold, from \$34.4 million in 2010 to \$931 million in 2019³ (MOFCOM,

¹Cooperation Agreement between the Government of the Republic of Congo and the Government of the People's Republic of China on Investment Promotion and Protection signed in March 2000 in Beijing. <u>http://admin.theiguides.org/Media/Documents/Accord%20Congo%20Chine.pdf</u>.

²Ministry of commerce people's Republic of China (MOFCOM). Annual statistical release on Chinese outbound investment (2020). <u>https://www.pairault.fr/sinaf/doc/ide0319.xlsx</u>.

³<u>https://www.pairault.fr/sinaf/index.php/statistiques/statistiques-generales/2054-flux-d-investissement-direct-chinois-en-afrique-2019</u>.

2020b). By way of illustration, the share of Chinese FDI inflows accounted for 34% of all FDI inflows to Congo in 2014 (MFBPP, 2019). Thus, the evolution of Chinese FDI in Congo is promising, due to China's significant needs for raw materials available to Congo.

Third, diversification of the economy is one of the challenges for the country, whose mono-cultural economy is dominated by the commodity sector, which accounted for 99.2% of Congo's exports in 2005, 89.3% of which was fuel (UNCTAD, 2022). Sino-African cooperation has been described as "win-win" in Africa and has benefited oil and mining exporting countries, including the Congo. These countries have benefited from the rise in oil prices and have diversified their outlets (Chaponnière, 2014). From this last point emerges the justification for the creation of special economic zones in Congo from 2010, with the objective of promoting foreign investment.

From all of these concerns, the following research question arises: What are the effects of Chinese FDI on Congolese exports? The objective of this work is to analyze the effects of Chinese FDI on Congolese exports. To answer the question presented, the hypothesis is that Chinese FDI has a positive impact on Congolese exports.

The rest of this paper is organized into five (5) points. After the introduction, the first point describes the situation of Chinese FDI entering the Congo and Congolese exports. The second point presents the literature review. The third point presents the methodology. The fourth and fifth points present respectively the results and discussions as well as the conclusion.

2. The Situation of Chinese FDI Inflows and Congolese Exports

This section presents the simultaneous evolution of Chinese FDI inflows and Congolese exports over the period 2005-2014.

2.1. The Evolution of Chinese FDI Inflows into the Congo

Over the past few decades, Chinese FDI to Congo has grown by an average of 39% per year, from \$8.11 million in 2005 to \$157.56 million in 2014 (Figure 1). This strong growth is mainly based on commodity-for-infrastructure deals, resulting in massive Chinese investments in the construction, extractive industries (access to raw materials), and banking sectors. Between 2008 and 2012, Chinese FDI in Congo increased by 3416%, a 35-fold increase (MOFCOM, 2020a). This growth was driven by the Congolese government's policy of "accelerated municipalization" of the country. This policy is based on major infrastructure construction works including roads, bridges, airports, ports, soccer stadiums, power plants, and hospitals in the 12 departments of the Congo. But in 2013, Chinese FDI entering the Congo declined by 65% year-on-year. This decline is not specific to Congo. Indeed, according to World Bank statistics, China saw its FDI in the world halved between 2012 and 2013, from 25% to 12% year-on-year (WDI, 2022). However, Chinese FDI inflows to the Congo resumed growth in 2014, up



Figure 1. Trends in Chinese FDI flow to the Congo and Congolese exports of goods and services (2005-2014). Source: MOFCOM for Chinese FDI and WTO for exports.

30% year-on-year, due to the resumption of Chinese investment under the "accelerated municipalization" program, the government's major works program running from 2004 to 2016.

2.2. The Evolution of Congolese Exports of Goods and Services

The Congolese economy is dependent on the commodity sector and increasingly dependent on Chinese demand for raw materials. In 2014, commodity exports accounted for 74 percent of total Congolese exports, 85 percent of which were fuels (UNCTAD, 2022). Within these volumes, China accounted for 51% of Congolese commodity exports and 57% of Congolese fuel exports. This suggests that China is Congo's largest export partner in 2014. Compared to 2005, 45% of total Congolese exports were to China, with commodities each accounting for 49% of that total and fuels 45%. These figures seem to reflect the effects of China's rise in the Congolese economy. Indeed, as China became the world's largest exporter of goods in 2008, it increased its demand for commodities from the Congo. Between 2005 and 2008, Congolese exports increased by 30% before falling by 44% in 2009 due to the 2008 financial crisis. The subsequent strong growth of 155 percent between 2010 and 2011 was driven by strong global demand for commodities, particularly fuels, due to the Arab Spring and strong demand from emerging economies including China. The large variations observed thereafter confirm that Congolese exports are very unstable and strongly influenced by changes in commodity prices.

So has the strong growth in FDI over the period 2005-2014, averaging 39% per year, had an effect on Congolese exports? It seems not. Indeed, economic data (UNCTAD, 2022; WTO, 2022) clearly show that Congolese exports of goods and services grew by only 6.9% per year on average, suggesting that Chinese inward FDI did not positively influence the national productive system. Therefore, export growth through Chinese FDI does not appear to be a solution to boost Congo's exports.

3. Review of Litterature

The empirical review is structured according to two groups of works, namely those that have revealed on the one hand the existence of a substitution relationship and on the other hand those that have revealed a complementarity relationship between FDI and exports.

3.1. The Case of the Substitution Relationship

With regard to the works that have revealed the existence of a substitution relationship, the authors we have listed are: Kimino et al. (2007), Kuntluru et al. (2012) and Bhasin & Paul (2016).

Kimino et al. (2007) studied FDI trade from 17 source countries in relation to exports on behalf of Japan. The study was conducted over the period 1991-2006. Their results show that FDI substitutes for exports.

In his paper, Kuntluru et al. (2012) has highlighted the relationship of substitutability or complementarity. In fact, he aims to determine the impact of foreign direct investment on export performance with respect to pharmaceutical firms in India. The study was conducted using the ordinary least squares (OLS) model. The sample used was 103 pharmaceutical firms for a duration of 8 years with 824 observations. The results obtained showed a substitution relationship between FDI and export. Thus, FDI is considered as a substitute for exports.

The work of Bhasin & Paul (2016) aims to determine whether exports and outward FDI are complements or substitutes. This work examines the FDI-export relationship using panel data for ten large emerging Asian countries over the period 1991-2012. Indeed, the authors use panel vector autoregression, panel cointegration and causality tests. Therefore, the results obtained prove a long-run causality from exports to FDI. Thus, exports and FDI are found to be substitutes.

3.2. Case of the Complementarity Relationship

With regard to the work on complementarity, the authors we have identified are: Pantulu & Poon (2003), Kpétigo & Tapsoba (2011), Martinez-Martin (2010), Shuhei (2013), Haq (2013), Zafar (2013), Bouras & Raggad (2015), Fayou (2018) and Mukhtarov et al. (2019).

Let us start with the work of Pantulu & Poon (2003) who examined the FDI of Japan and the United States on exports to determine the nature of the relationship between FDI and exports. The results obtained through the gravity model showed that FDI has a significant positive effect on exports. The examination was done on FDI from Japan and the USA with 29 industries and 32 countries respectively over a period of 1996 to 1999.

In his paper Martinez-Martin (2010) aims to provide further information on the dynamics of exports and FDI flows in Spain using a time series approach. Thus, the complementarity or substitution relationship is tested using a vector error correction model (VECM) with data for the period 1993-2008. The results show a positive effect of the causal relationship (Granger) of FDI to exports of goods (stronger) and exports of services (weaker). Thus, the complementarity relationship is consistent with long-run and short-run vertical FDI strategies.

Kpétigo & Tapsoba (2011) have empirically analysed the relationship between FDI and exports. Their study highlighted Chinese FDI and exports of SubSaharan African states. Indeed, this analysis was performed by the ordinary least. squares model over the period 2003 to 2009 on a sample of 46 SSA countries and 194 export markets in the world. Thus, the results showed that there is a positive relationship between Chinese FDI and SSA exports.

The empirical study by Shuhei (2013) used new product level data covering 32 products in 49 host countries. This study was conducted during the period 1993-2008. The results found show that FDI by upstream firms leads to additional exports of intermediate goods from Japan. Thus, a complementary relationship is observed between FDI and intermediate exports from Japan.

Ghiasul Haq (Haq, 2013) focused his empirical analysis on the effects of FDI on Pakistan's export performance. This analysis was carried out during the period of 1980-2012 through the ordinary least squares (OLS) model. The results showed that foreign direct investment overall participates in improving the level of exports. Thus, an existence of the complementarity relationship between FDI and exports.

Zafar (2013) in his work, examines the nature of the relationship between exports and FDI in India during the period of 1980-2010. Using Johansen's cointégration method, he finds the result that a stable equilibrium relationship in the long run between FDI and export growth. This Granger causality result being based on the vector error correction model (VECM) shows that causality runs from the direction of exports to the direction of FDI inflows and not from the direction of FDI inflows to exports. In the short run neither Granger exports cause exports from India.

Bouras & Raggad (2015) seek to investigate the analytical bases that would define the nature of the FDI-export relationship. The results identified a complementarity effect between exports and FDI at the macro level for both manufacturing and non-manufacturing sectors. These results were obtained using the disaggregated sectoral database for 10 developed and non-developed countries over the period 1988-2012. The results were obtained using the standard Breusch-Pagan Lagrange (LM) test.

Fayou (2018) examined the question of the link between FDI and export performance: the case of developing countries. He used the GMM model in a panel data approach on 23 developing countries over the period 1990-2013. The results showed a positive relationship between FDI and export performance. Finally, an empirical study of the impact of FDI on exports in Jordan was conducted by Mukhtarov et al. (2019) during the period from 1980 to 2018. This study was highlighted by a cointegration approach of the ARDL (autoregressive distributed lag) model. The results obtained indicated the existence of a complementary relationship between FDI and exports in the long term. Thus, these results indicate that 1% of FDI increases exports by 0.13%.

4. Methodology

This section is structured in three main points. The first deals with the mode of investigation and the source of the data. The second deals with the choice and presentation of the estimation technique. Finally, the third section discusses the choice and descriptive analysis of variables.

4.1. Data Sources

The data used in our study come from different sources due to the unavailability of some data. They are in fact:

• The Directorate General of Customs and Indirect Duties (DGDDI), which served as the source of data on Congolese exports to China. This structure is the one that manages the country's trade with the rest of the world;

• Ministry of commerce people's Republic of China (MOFCOM) is the source of annual data on Chinese FDI to the Congo. This ministry is currently a reliable source of Chinese FDI data in the world;

• Finally, the World Bank's World Development Indicators (WDI), World Trade Organization (WTO) and United Nations Conference on Trade and Development (UNCTAD) databases were used as sources for the rest of the variables. It is a very reliable database, containing in itself several years of data for several variables.

The data covers the period 2005-2014, for which statistics are available, in particular because of the novelty of the phenomenon of Chinese FDI in Congo, which was almost non-existent at the end of the 1990s. Thus, the data used are temporal and divided by quarters to obtain a total of 40 observations. The relevance of an empirical study is reflected in the fact that it is based on at least 30 observations. Since our study presents 40 observations, the results obtained are statistically reliable and can be prepared for analysis.

4.2. Choice and Presentation of the Model

4.2.1. Choice of Mode

The relationship between FDI and exports has been examined by a multitude of models such as the gravity model (Lipsey & Weiss, 1981), the method of ordinary least squares (Kuntluru et al., 2012), the method of generalized moments (Fayou, 2018), etc. Thus, we draw on the model used by Zhang (2005), who analysed the effects of FDI on the export performance of host countries: the case of China. In his work, Zhang suggests that FDI contributed substantially to China's export boom. However, the work in this study has involved the analysis of the determinants of exports. As a result, several empirical specifications could be considered in a study of the determinants of a country's export performance. The focus of this study on the role of FDI, however, requires the use of a model

that could capture or isolate the basic FDI-export link. Thus, FDI can be treated as an additional factor to the conventional framework with countries' export performance being determined by the factor of endowments and economies of scale. Thus, the export equation is as follows:

$$X_f = f\left(K_i^F, K_i^D, W_i, SE, D_i\right) \tag{1}$$

where X_i is the export volume in industry *i*, K_i^F and K_i^D , are respectively the foreign capital i.e. FDI and domestic capital of the industry, is the wage rate, *SE* measures the economy of scale and *D* is an industry dummy based on an intensity factor.

4.2.2. Presentation of the Estimation Framework

The estimation framework will be presented in three points, namely: the test of stationarity (in level or in first difference) of the time series, the selection of the optimal lag number and the Johansen cointegration test.

4.2.3. Choice and Descriptive Analysis of Variables

1) Choice of variables

The microeconomic literature tells us that any production function incorporates inputs (such as labour, capital and materials) in order to produce and sell outputs, thus generating profits, maximising revenues or growing the firm. In our work, we have chosen one output and three inputs. Here, the output is considered as the explained variable and the inputs as the explanatory variables, which we will present as follows:

• The explained variable (*Y*): exports, which is defined by INSEE (2020) as sales declared by statistical units (company, legal unit) for export (i.e. outside the country of residence) and which includes intra-Community deliveries. It is the only variable that plays the role of output and is dependent on the other input variables. In the context of our study, this concerns Congolese exports to China;

• The explanatory variable (X_i) : the stock of inward FDI which measures the value of equity invested by foreign investors. This variable has been used in the work of Lipsey & Weiss (1981), Head & Ries (2001), Liu et al (2001), Pantulu & Poon (2003), Chiappini (2013), Haq (2013), Fayou (2018). Depending on the case, this refers to Chinese inward FDI stocks to Congo;

• The explanatory variable (X_2) : gross fixed capital formation is a variable that measures the domestic investment rate. It was used in the work of Ekodo & Nkot (2017);

• The explanatory variable (X_3) : the active population, which corresponds to the share of the population able to work, is used instead of the wage rate measuring the economy of scale. For in the population are also the employees, so it measures the size of the market. Therefore, the working population was used as an explanatory variable by Head and Mayer (2002) who consider the distance between two cities which is weighted by taking into account the population.

Thus, the equation of the econometric export model is as follows (Table 1):

$$EXPC = a_0 + a_1 \ln(FDI) + a_2 \ln(GFCF) + a_3 \ln(POPCO) + \varepsilon_{ii}$$
(2)

With:

 a_0, \ldots, a_3 : the coefficients to be estimated;

ε: the error term;

i: the symbol for individuals, i.e. exports.

2) Descriptive analysis of variables

The following **Table 2** represents the descriptive statistics of the variables of our study for the period 2005-2014. The unanimity of the number of observations for all variables is 40, because during the period of our study the data was recorded continuously and quarterly.

The results of the descriptive statistics recorded in **Table 2** above highlight the level of volatility of the variables on the one hand, and the situation relating to the distribution of the series on the other. Regarding the volatility of the variables, it is analyzed through the standard deviation which shows the level of dispersion of the variables around their respective means. From these results, it appears that over the study period, only GFCF and FDI experienced a volatile evolution, which highlights a strong dispersion around their average. The values of their standard deviations correspond to the logarithm of 1.661574 and 1.393109, respectively.

Table 1. Expected economic signs.

Variables	FDI	РОРСО	GFCF
Signs	+	_	+

Source: Author based on literature.

Table 2. Descriptive analysis of variables.

	EXPC	GFCF	FDI	POPCO
Mean	32.38442	6.212197	24.12334	13.81290
Median	32.54726	5.615076	24.00674	13.81754
Maximum	33.69916	10.63730	26.25375	13.94379
Minimum	30.14950	4.413380	20.68983	13.67223
Std. Dev.	0.790481	1.661574	1.393109	0.082471
Skewness	-0.772937	1.542644	-0.144545	-0.104295
Kurtosis	3.854147	4.453028	2.581319	1.773933
Jarque-Bera	5.198824	19.38381	0.431444	2.577916
Probability	0.074317	0.000062	0.805959	0.275558
Sum	1295.377	248.4879	964.9337	552.5161
Sum Sq. Dev.	24.36953	107.6723	75.68939	0.265255
Observations	40	40	40	40

Source: Author based on data from MOFCOM and WDI.

As regards the distribution of series, the results show that all series, with the exception of GFCF, are normally distributed. This normality is evidenced by the value of the probability associated with the Jargue-Berra statistic which is greater than 5%, which makes it possible to retain the hypothesis H0 of the normality of the series, and to reject the alternative hypothesis H1, according to which, the series do not follow a normal distribution. For the series of the GFCF variable, it does not follow a normal distribution since the probability associated with the Jargue-Berra statistic is less than 5%.

However, with regard to the number of observations, based on the law of large numbers, we can confirm that all series tend towards a normal distribution, which makes it possible to follow our study.

5. Presentation, Analysis and Discussion of Results

Before proceeding to the discussion of the results, it is judicious to present and analyse them one after the other. These results are obtained by the stationarity test on the one hand and the cointegration study of the series on the other. Thus, the stationarity test will be carried out through three tests, namely: ADF, PP and KPSS. The cointegration study will be carried out by the Johansen test (**Table 3**):

The results contained in this work indicate that all variables are stationary in first difference at least for one test. In other words, they are all integrated of order 1. Indeed, we find that for at least one test the statistical values are below the critical values at the 5% threshold. This allows us to reject the hypothesis H0 of

Variables	Type of test	No constant and no trend	with constant and no trend	with constant and trend	Critical values at 5%	Test statistics	Decision
	ADF	not	not	not	-1.950687	0.0001	NS
EXPC	PP	not	not	not	-1.949856	-2.517124	I(I)
	KPSS		yes	yes	0.463000	0.325518	I(I)
	ADF	not	not	not	-1.952910	0.592575	NS
GFCF	РР	not	not	not	-1.949856	-1.836241	NS
	KPSS		yes	yes	0.463000	0.370463	I(I)
	ADF	yes	yes	not	-1.950117	-3.867436	I(I)
FDI	РР	yes	yes	not	-1.949856	-3.004153	I(I)
	KPSS		yes	yes	0.463000	0.182432	I(I)
	ADF	not	yes	yes	-2.960411	-7.064032	I(I)
POPCO	РР	not	yes	yes	-2.941145	-4.203295	I(I)
	KPSS		not	not	0.463000	0.537019	NS

Table 3. Results of the stationarity tests of the variables.

Source: Author based on data from MOFCOM and WDI.

the presence of a unit root and to retain the alternative hypothesis H1 of the absence of a unit root, which leads to the stationarity of the variables. For example, the EXPC variable is stationary with the PP and KPSS test whose statistical values are respectively lower than the critical values at 5% (-2.517124 < -1.949856; 0.325518 < 0.463000). The FDI variable is stationary with ADP, PP, and KPSS tests whose statistical values are below the 5% critical values, respectively (-3.867436 < -1.950117; -3.004153 < -1.949856; 0.182432 < 0.463000). The GFCF variable is stationary with the KPSS test (0.182432 < 0.463000) and for the POPCO variable it is stationary with the ADF and PP tests whose statistical values are respectively lower than the 5% critical values (-7.064032 < -2.941145; -4.203295 < -2.941145).

5.1. Selection of the Optimal Number of Delays

This step consists in determining the number of delays of the VAR representation in LOG. The calculation of the information criteria LR, FPE, AIC, SC and HQ shows that the optimal number of delays is 3 for all criteria (**Table 4**):

Indeed, among the presented criteria, rank 3 is the one with the smallest value that minimizes the information loss. This corresponds to the optimal delay.

5.2. Johansen Cointegration Test

This test (**Table 5**) is used when there are more than two explanatory variables in the model and all variables (endogenous and exogenous) are integrated in the same order. It allows to notice the existence of several cointegration relationships.

Lag	LogL	LR	FPE	AIC	SC	НQ
0	-83.23680	NA	0.001312	4.715503	4.889656	4.776900
1	204.5932	497.8681	5.49e-10	-9.978011	-9.107244	-9.671025
2	270.4620	99.69327	3.83e-11	-12.67362	-11.10624	-12.12105
3	335.4189	84.26842*	2.96e-12*	-15.31994*	-13.05595*	-14.52178*

Table 4. Determination of the optimal delay.

* significant at the 5% level. Source: Author based on data from MOFCOM and WDI.

Table 5. Johansen test.

Data Trend:	None	None	Linear	Linear	Quadratic
Test Trme	No Intercept	Intercept	Intercept	Intercept	Intercept
Test Type –	No Trend	No Trend	No Trend	Trend	Trend
Trace	2	3	2	3	1
Max-Eig	2	1	1	1	1

Source: Author based on data from MOFCOM and WDI.

As all variables are integrated to the same order of 1, there is then a possibility of cointegration. To this effect, the Johansen test performed reveals that there are more than two cointegrating relationships, as the value of Trace is 2 below the critical value. Therefore, the vector error correction model (VEC) will be used for the econometric estimations.

The econometric analysis carried out by the VECM model through two long-run and short-run estimates. The estimation of the long-run relationship (si $r \ge 1$) is done by OLS with the initial series. The estimation of the short-term relationship is done by OLS on the differentiated series. In this way, the validation of the vector error correction model is carried out on the basis of the same tests as in the multiple linear model (normality, autocorrelation, stability of coefficients, etc.).

The results from the estimation of our model are structured around three points, namely: the results relating to the adjustment towards the long term target of the model, the results of the estimation of the short term model and the results of the estimation of the long term model. The coefficients associated with the results are contained in the tables below (**Table 6**).

The results (**Table 6**) of this estimation show that the coefficient of the recall force (-0.421731) is negative and significant at the 5% level. This result confirms the character of the approach based on error correction, which justifies the existence of an adjustment relationship towards the long term equilibrium. Moreover, the coefficient of determination (\mathbb{R}^2) is 0.76, which shows that the explanatory variables used in the model explain 76% of exports. These elements show that the model is of good quality and the results that emerge from it can be interpreted.

The results obtained show that the coefficients associated with the FDI variable in the short and long term are respectively (-0.408367) and (-0.764633) at the 5% threshold. These results reveal a negative effect of FDI on Congolese exports. Consequently, there is a substitution relationship between Chinese FDI and Congolese exports. These results corroborate those of Kuntluru et al. (2012) who highlighted the impact of foreign direct investment on export performance for pharmaceutical firms in India. This study was conducted through the ordinary least squares (OLS) model. The sample used consisted of 103 pharmaceutical firms for a period of 8 years with 824 observations. Unlike his work, our study focused on Chinese FDI entering the Congo and Congolese exports to China.

The substitutability relationship found shows that the hypothesis of our study was not validated. This hypothesis was that Chinese FDI would favor the performance of Congolese exports. However, there are several factors that explain why this relationship was obtained, including:

• Chinese FDI is only interested in raw materials and Congolese labour. As a result, technology transfer is almost non-existent, as stated by Caves (1996) and Zhang (2005), technology transfer is a determining factor in exports for the host country;

Result of the short-term estimate					
Variables	Coefficients	T-statistics			
D(EXPC(-1))	0.078790	[0.48556]			
D(EXPC(-2))	0.179292	[1.13773]			
D(EXPC(-3))	0.267469	[1.68725]			
D(FDI(-1))	-0.408367*	[-2.94003]			
D(FDI(-2))	-0.154546	[-0.89924]			
D(FDI(-3))	-0.087280	[-0.58891]			
D(FBCF(-1))	-0.547368	[-1.76522]			
D(FBCF(-2))	0.907453*	[1.82031]			
D(FBCF(-3))	0.079438	[0.21836]			
D(POPCO(-1))	363.9343	[1.31595]			
D(POPCO(-2))	-358.5166*	[-3.60964]			
D(POPCO(-3))	-739.2501*	[-2.23278]			
Recall force	- 0.421731*	[-5.14817]			
R ²	0.76				
Result of the long-term estimate					
FDI	-0.764633*	[-5.14817]			
FBCF	-3.282526*	[5.40305]			
РОРСО	5.951784*	[-12.2624]			

Table 6. Estimation results.

* significant at the 5% level. Source: Author based on data from MOFCOM and WDI.

• During our study period, the Congo was in a phase of accelerated municipalization characterised by the construction of infrastructure such as roads, administrative buildings, stadiums, etc. These do not have an immediate effect on exports, but in the long term there may be positive spillovers. These do not have an immediate effect on exports, but in the long term there may be positive spinoffs. If Chinese FDI was concentrated in the construction of factories as in Ethiopia, locally produced goods would be exported;

• The fact that the Congo is still at the bottom of the business climate ranking proves that it is not yet that attractive to foreign investment. For the development of the host country's export performance also depends on the business environment of the host country.

Moreover, the coefficients associated with the variables GFCF and POPCO are positive and negative, respectively, in line with the expected signs in the short run. These results corroborate those obtained by Ekodo & Nkot (2017) who used them as explanatory variables in their model.

6. Conclusion

The objective of our study is to determine the effect of Chinese FDI on the per-

formance of Congolese exports. As a result, the results obtained from the VECM model on quarterly time series data for the period 2005 to 2014 show that Chinese FDI has a negative effect on Congolese exports in the short and long term. These results invalidate the hypothesis of this work, suggesting that Chinese FDI has a positive effect on Congolese exports.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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