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The impact of China's foreign direct investment on Africa's inclusive development

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ABSTRACT

It has become a consensus among African countries that China's foreign direct investment is one of the most important ways to promote Africa's economic growth and inclusive development. As a result, Chinese enterprises are investing more and more in Africa, which has boosted Africa's economic growth and China-Africa trade cooperation. However, there are many criticisms that China's investment presence is a curse to the inclusive development of Africa. Therefore, our paper aims to determine the impact of CFDI on inclusive development in Africa. By collecting China's FDI data, the panel data of 48 African countries were analyzed from 2003 to 2020, respectively. The finding of CFDI in the continent was suspicious and needed to measure the impact in the host country. According to the empirical analysis results, it can be found that CFDI promotes the African economy through direct investment. Therefore, our results expand the economic growth literature and inform policy-makers of the need to pay attention to bilateral, multilateral trade and investment with China, which both parties must control with a solid policy.

1. Introduction

China is one belt, one road ahead of the world and the world is facing a political change, the world is facing a great change in the past hundred years. The developed economies in Europe and the United States have issued strict investment restrictions based on national security and environmental protection. Countries along the line and in Africa have become new growth poles for China's foreign investment. Under the new initiative project "One Belt, One Road" initiative is put forward and implemented. Africa's trade strategy is implemented Zhang Hongming (2016). The new development of China's Africa economic and trade relations is conducive to global economic stability. In recent years,

Africa's economy has developed rapidly, and its overall appearance has significantly changed. Africa has excellent business opportunities and has gradually become China's third-largest overseas investment market as an emerging market Chris Mabeya (2017).

Indeed, China plays an essential role in the economic growth and development in sub-Saharan African countries and has become a principal economic and trade cooperation. China-Africa trade relationship increased significantly from \$9 billion in 2000 to \$166 billion at the end of 2012, making China Africa the most considerable and suitable trade partner confirmed UN Comtrade (2014). China's FDI flows in the Africa continent increase significantly with \$200 million in 2000 to \$2.9 billion in 2011 made China the second-largest country after the United States in

Abbreviations: FDI, Foreign Direct Investment; CFDI, China's Direct Investment; UN Comtrade, United Nations Commodity Trade; UNCTAD, United Nations Conference on Trade and Development.

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Africa continent UNCTAD (2013).

From 2013 to 2019, China has become an increasingly important partner in terms of investment in new power generating facilities across Africa. For this reason, Chinese contractors are heavily involved in building this new capacity. Limiting access to electricity and frequent electricity outages represents a significant barrier to economic growth, inclusive development, and poverty reduction in African countries Ousmane (2016). More than 2/3 of the population in sub-Saharan Africa lack electricity, with that figure growing to more than 85% in rural areas. Global Data is currently tracking 242 power projects in Africa for which contracts have been awarded.

From the perspective of China, increasing investment in Africa is conducive to obtain new production capacity cooperation opportunities. Natural resources, and cheap labor, realizing the transfer of marginal industries, promoting the upgrading of industrial structure, and boosting the high-quality development of China's economy Song (2021). From the perspective of Africa, China's direct investment can inject new funds into Africa's economic development. China's government policies help African countries alleviate the employment problem, helping to solve African countries' poverty problem and making the relevant planning in the United Nations Millennium Development Goal for world poverty alleviation a reality.

With the deepening of China's Africa economic and trade cooperation, the research on the relationship between China's direct investment in Africa and the economic growth of relevant African countries has become a hot spot. The research scope of domestic and foreign scholars on this topic is relatively broad, involving the characteristics of China-Africa economic and trade cooperation. The determinants of China's investment, the economic effects of China's investment, and the return of China's investment in Africa positively impact African countries' economics. Furthermore, the One Belt, One Road" proposal has made the development of Sino-African economics and trade more vital. This has further promoted the development of the "Sino foreign economic and trade cooperation Sun (2000).

Viewed the limitations of the author's level, there are some deficiencies in the structural design of the paper; some innovative ideas need to be tested in practice. For this reason, our innovation points are based on the current situation of China's, FDI in Africa. Furthermore, we also elaborated an econometric empirical results by using model panels to analyze the economic and inclusive development impact of China's investment in Africa from 2003 to 2020. Besides, they combined relevant data and analyzed CFDI related influencing factors with the issues studied in this paper were concentrated in 48 African countries. The impact of China's FDI on economic and the inclusive development in Africa, this paper constructs GDP as the core explanatory variable for Africa's regression analysis on the data.

2. Literature review

2.1. Theory of FDI and CFDI in Africa

The theoretical research of foreign direct investment is gradually developed with its practice. International investment originated in Britain, the United States, and Germany, where the industrial revolution was completed earlier. At first, this activity was regarded as the international capital flow caused by the difference in interest rates between countries Jackman (1982). After World War II in 1945 and with the rapid development of foreign investment since the 1960s, many theories on foreign investment began to emerge. The research in this period mainly focused on the motivation and purpose of foreign direct investment. The research object was mainly the foreign direct investment of developed countries because the prominent investors were developed countries. The main theories include international production compromise theory, product life cycle theory, marginal industrial expansion theory, monopoly advantage theory, internalization theory. In the 1970s, with the continuous participation of developing countries in

foreign direct investment, the theoretical research based on the foreign direct investment of developing countries began to enrich gradually. The rich and vital theoretical achievements include small-scale technology theory, localization theory, investment development stage theory.

With the rapid development of foreign direct investment in developing countries, Dunning (1981) creatively developed the International Production Compromise theory and put forward the investment development stage theory. From the micro perspective, this theory makes a macro analysis on the motivation of developing countries' FDI, and discusses the relationship and development trend between FDI and a country's economic development. Dunning empirically analyzes the relationship between FDI and per capita gross national product by using the statistical data of 67 countries' FDI from 1967 to 1978. The results show that each country's foreign direct investment activities are closely related to per capita GNP. Specifically, the inflow and outflow of FDI increase with the increase of per capita GNP.

The research of Chinese scholars and some foreign scholars on foreign direct investment is relatively short and still a big gap between China and developed countries, and there is no systematic theory. However, with the overall improvement of China's foreign direct investment, the role of China's foreign direct investment has been paid more and more attention by the theoretical and business circles. China's foreign direct investment (CFDI), economy, and trade emerged on the international financial scene. As the largest country destination, financial, development, and investment partner with a growing outward FDI in African countries, China-Africa shared real partnership based on win-win benefit. This significant presence in the continent is unsurprising considering the "Go Global" policy launched in 1999. The policy is because of the growing awareness of Chinese government leaders. This offers China an opportunity to project its influence and power beyond the boundaries of the Chinese investment. Thus, China to rise and fortify its influence in the structures and protocols governing international politics and the world economy under the one belt, one road initiative project in the African continent.

As known, Africa has tremendous useable resources for investment and trade with China, that is why China's determination in Africa has been growing in different ways, such as investment, aid, and trade. China's FDI has an important reason for the African countries to emphasize promoting and attracting FDI inflow that helps sustain and increase Africa countries' economic growth and development. China's FDI has grown this earlier year rapidly in the African continent. Electricity energy supply contributed to or stimulated the industrialization and modernization of the African countries enterprise positively, and energy is the one source that provides fundamental support for economic growth and development in the host country Calantone et al. (2002).

2.2. Factors affecting China's direct investment in Africa

The study of Dong Yan et al. (2011) used the limit boundary analysis method to prove that there is no preference for China's investment in African countries, which mainly depends on the target country's economy, market, and energy reserves. Kolstad & Wiig found that African countries rich in natural resources easily attract Chinese direct investment. Chen Yan et al. (2012) explored the critical impact of host country resources and national systems on China's investment in African countries from the perspective of system and resources. With the help of China's ODI flow panel data sample of 27 African countries from 2003 to 2009, and finally showed that the decisive factors for China's investment in African countries are host country resources Factors such as the system of the host country and the home country.

Lin Yifu (2013) believes that Africa is the critical region for the overseas transfer of China's domestic labor-intensive industries, which is an excellent carrier for China's labor-intensive industries to enter the "second spring." After studying the investment environment of the host country, ZhaoBeiwen (2015) pointed out that access to resources is the

main factor to promote China's direct investment in Africa. Based on the Heckman model, [Mu et al. \(2016\)](#) explored the purpose of China's direct investment in relevant African countries. The research found that the essential factors affecting China's investment in Africa are resource level, labor wage level, market scale, and the country's institutional environment to be invested in. Based on the data of China's direct investment in 45 African countries from 2003 to 2012, [Boqiang et al. \(2019\)](#) believe that the natural resources, economic development level, political environment, and other factors of the target country to be invested will affect China's direct investment in Africa.

The resource level of the host country plays the most considerable role compared with the other factors mentioned above. [Zhou and Huang \(2020\)](#) conducted a practical study on China's direct investment in 49 African countries from 2003 to 2016, which confirmed that China's direct investment in Africa is dominated by market seeking. The research of [Martuscelli](#) confirmed that the purpose of China's investment in African countries is to obtain natural resources and seek new export markets. China is not very interested in its governance quality and system.

2.3. The effect of China's direct investment on African economic growth

The research of [Easterly and Rebelo \(1993\)](#) found that attracting foreign direct investment can promote the host country's economic growth. This is also applicable to African countries receiving Chinese direct investment. [Huang and Lu \(2012\)](#) research on China's direct investment shows that it has helped relevant African countries develop their economy and upgrade technology and exacerbated it. The fierce competition in Africa's local textile industry and garment industry; [Whalley and Weisbrod](#) explored the impact of China's direct investment on African economic development through the Solow growth model. Their research showed that China's direct investment has a significant positive impact on the economic development of some African countries.

[Mary's \(2014\)](#) relevant research shows that the economic and trade exchanges between China and Africa have a pronounced positive effect on the economic development of African countries. Trade exchanges positively impact such aspects as employment rate, import and export trade, and per capita national income. According to [Khodeir](#), China's direct investment has a significant positive impact on employment in southern Africa. However, it has no significant impact on employment in North Africa. [Zheng \(2015\)](#) pointed out that the relationship between China's FDI and the poverty level of African countries is inverted U-shaped. It is indicating that the prerequisite for China's direct investment to help reduce poverty in African countries is that the investment amount reaches a certain threshold. [Lin Yun \(2017\)](#) found through research that China's direct investment helps promote the industrial development of Africa, thus promoting the economic growth of African countries.

2.4. Inclusiveness development

For the first instance, the impact of FDI on inclusiveness includes multiple aspects, increasing employment, increasing residents' income, and reducing poverty. The impact on inclusiveness is to play an indirect role through other factors, and to increase residents' income through spillover effects such as promoting technological. African countries have several factors that promote the formation of investment and human capital. Second, it positively and significantly impacts China's direct investment because the long-term education cooperation between China and African countries impacted [Cai \(2020\)](#). China's foreign direct investment enterprises have improved the quality of human capital of the labor force through the technical training of the laborers that can obtain more substantial competitiveness and higher income. Third, the impact of poverty reduction is achieved by promoting economic growth. The government can collect taxes from enterprises established by CFDI, increase fiscal revenue, and provide the public with public services

conducive to poverty reduction [Megbowon et al. \(2019\)](#).

2.5. Effect of China's investment and the environmental problems

Generally, the environment is not only the pollution-haven hypotheses that can be examined but also the rate of tourist arrivals in Africa, which may influence environmental areas. The adverse effects of environmental problems differ by country and region due to differences in laws governing tourism and environmental policies. In addition, energy consumption is an essential determinant of environmental degradation due to energy generation sources that are non-renewable and carbon-oriented.

The latest theoretical research shows that a country's political system, legal construction level, and administrative management level have a solid decisive role in economic development, so these factors also have a decisive impact on the development level of foreign direct investment. [Ashoka and Krishna \(1998\)](#) analyzed the educational level and environmental factors of host countries. They pointed out that a clean environment and a large proportion of the higher educated people can stimulate economic development and bring more foreign direct investment. [Kingsley & Crumbley](#) pointed out a significant positive correlation between the government's financial expenditure and foreign investment, but there is no significant relationship between the population size and foreign investment.

In spite of the fact that, China's investment in Africa significantly promotes the host country's economic growth and development, just like China's early economic boom, it inevitably destroys the environment. For example, China's significant investment in Africa's mining industry accelerates the rapid consumption of non-renewable resources such as oil and mineral resources in Africa and then causes a series of environmental problems. Some large hydropower projects rarely consider the negative impact on the local environment and society. Instead of improving the local power supply, they do significant damage to the local agricultural production environment. In 2013, more than 1 million cubic meters of timber from Mozambique were bought into China through illegal channels. Fishing in West African waters has also been affected by overfishing by Chinese companies; Even in Sudan, the construction of the Malloway dam has led to clashes between local governments and residents.

Regarding these circumstances, it is not surprising that African people are increasingly opposed and unwelcomed Chinese investors into Africa, Chinese investors ignore social standards. [Gankou et al.](#), Environmental standards are also systematically ignored when seeking natural resources and implementing infrastructure projects such as roads, bridges, railways, and dams. The majority of the Chinese enterprises ignored international standards, for example, the construction of the Merowe Dam in Sudan and the illegal import of tropical timber [Reuters \(2017\)](#). According to the survey of [Devincy & Huaqing](#), China's FDI in Africa has not brought dynamic change from life hood or economic growth and development. It also caused environmental destruction, such as the extinction of rare species, air and water pollution.

To sum up, researchers at home and abroad have made many achievements in researching the role of China's direct investment in the economic development of relevant African countries, which provides a reasonable research basis for this paper. However, this paper mainly perfects the existing literature from the following four aspects and makes marginal contributions:

First, compared with the previous research literature, this paper expands the length of research, dating back to 2000 and later to 2021. Furthermore, it expands the scope of research to 48 African countries, more comprehensively and accurately reflecting the impact effect and direction of China's direct investment on African countries' inclusive development and economic growth. Secondly, this paper introduces the theories of FDI and the CFDI effect, which the analysis expands the mechanism of China's direct investment affecting the inclusive development of African countries. Thirdly, the existing research on the

current situation of China's investment contributed to Africa's African infrastructure development. Finally, to make a more detailed investigation on the impact of China's direct investment on African inclusive development and economic growth, this paper uses the spss26.0 static panel regression method to study the impact of China's direct investment on African countries' economy, to overcome the endogenous problem between variables more effectively.

3. Current situation of China's direct investment in African countries

China-Africa's relationship was established and began in the late 1950s when China signed bilateral trade cooperation with few African countries (Algeria, Egypt, Guinea, Morocco, and South Sudan). The former premier Minister Zhou Enlai was visited more than 5 African countries in 1963–1964. Simultaneously, China began to make agreements with African countries in trade, economic, technical, and military support Tull (2006).

During the 1980s and 1990s, Chinese enterprises invested in Africa mainly were large state-owned enterprises. However, with the development of Chinese private enterprises in recent years, this situation changed quietly. Currently, there are a lot of private companies involved in the African market, and the proportion of China's direct investment in Africa is gradually increased. China's trade volume was taking into account the success of early intensive economic assistance to Africa with \$1 billion and at the exact moment to increase the export of industrial products. The Chinese government began to invest in Africa and the investment object is the aid project transferred by the Chinese government to Africa Démurger et al. (2002). The investment and trade mode is mainly joint venture cooperation or lease. In terms of the scale of investment, from 1980 to 1990, China invested a total of \$51.19 million in 102 successful projects in Africa, which was quite a large scale in the continent.

From 1990 to 2000, Africa enjoyed sustained economic growth and trade development. China's investment environment also improved. The domestic market is no longer able to meet Chinese entrepreneurs' ambitions, who are increasingly looking to expand overseas. China carried out reform through foreign aid, and enterprises gradually became the principal investor of China-Africa cooperation, Han Xiushen (2007). China developed with its African countries through various economic exchanges and cooperation modes, including economic assistance, government investment, economic and trade cooperation, and other mutually beneficial cooperation May Tan-Mullins et al. (2010).

From 2000 to 2013, the rapid investment and trade between the African continent and China in the first five months of the year 2012 with 25.5% of importation from Africa to \$49.6 billion, thus showing China's absolute envy perfect cooperation with the 54 African countries. Moreover, the exportation of Chinese made by machinery, electrical, and consumer goods increased by 17.5% to reach \$30.9 billion. Also, China's investment and trade in Africa continent has considerably increased. High investment progression and continue to improve. It has shown the excellent potential for future development because of the new cooperation that China and Africa built for these recent years said.

Since the beginning of the 21st century, the momentum of South-South cooperation between China-Africa has increased. The first China-Africa Cooperation Forum successfully held in Beijing in 2000 has become a good beginning of China Africa cooperative relations in the 21 century. According to the data in the "statistical bulletin of China's foreign direct investment" from 2003 to 2020 released by the Ministry of Commerce, China's direct investment stock in Africa was \$217.3 billion in 2012. After the China-Africa Cooperation Forum in 2015, China's direct investment stock in Africa began to multiply, from \$399.3 billion in 2016 to \$444.9 billion in 2018.

The investment of Chinese-funded enterprises in Africa has created many jobs. A report pointed out that from 2005 to 2016, China invested in 293 projects in Africa, creating more than 130,000 jobs. In 2016, FDI

from China created 38,417 jobs in Africa, more than three times that of the United States (11,430). The jobs created by China accounted for 29.7% of the jobs created by global FDI in Africa that year. China's investment in Africa is mainly concentrated in infrastructure, construction, manufacturing, etc. The manufacturing industry is primarily labor-intensive industries such as textiles and shoemaking. Most of the workers are from the local area, which has better stimulated local employment. Chinese-funded companies invest in Africa to set up factories. The salary they pay for hiring local employees is higher than that of ordinary local companies.

China's investments in Africa provide vocational skills training to improve the quality of the local labor force. In addition, the development of manufacturing requires many skilled workers as a talent base, which is what most African countries lack. Nevertheless, compared with 2008, China's direct investment stock in Africa increased by \$1.528 billion in 2009. The investment stock in 2020 was \$ 296.0 billion with \$271.0 billion over 2019. In the 17 years from 2003 to 2018, China's direct investment stock in Africa has increased 94 times and continued to grow every year. At the same time, CFDI was decreased in 2019–2021 caused by new pneumonia that began earlier in 2020 in Wuhan city China.

Summary, the successfully establishment of the China-Africa relationship have established the China-Africa development fund and economic and trade cooperation. However, it should not be ignored that despite the rapid growth. China's investment in Africa still has many growth stages in terms of the overall layout and volume of China's investment in the world. Therefore, China's investment in Africa has excellent development and growth potential in the future. African countries should manage their policies which can permit a good understanding between Chinese investors and local citizens.

4. Model indicator construction and data collection

4.1. Regression model establishment

They combined relevant data and analyzed CFDI related influencing factors with the issues studied in this chapter. The impact of China's FDI on economic and the inclusive development in Africa, this chapter constructs GDP as the core explanatory variable for Africa's Regression analysis on the data from 2003 to 2020. Different data coefficients are analyzed to obtain the economic growth efficiency of China's foreign direct investment. The assumptions of the model combined with the regression model are as follows:

$$PGDP_{it} = \alpha_0 + \alpha_1 CFDI_{it} + \alpha_2 EMPL_{it} + \alpha_3 TRAD_{it} + \alpha_4 INFL_{it} + \alpha_5 HC_{it} + \alpha_6 AID_{it} + \alpha_7 CRIME_{it} + \mu_{it} + v_t + \varepsilon_t \quad (1)$$

In model (5-1), PGDP represents the per capita GDP of African countries, and CFDI represents China's investment stock in African countries. EMPL represents the employment index of African countries, TRAD represents the openness level of African countries, INFL represents the inflation coefficient, HC represents human resources, as an indicator of technological facilities, AID government expenditure is used as the control variable, and CRIME represents the crime rate, which has a specific influence on the national economic level. α denotes the corresponding regression coefficients of different indicators, α_0 is a constant term, $\alpha_1 \dots \alpha_6$ is the parameter to be estimated constant coefficients, μ and v ε are errors.

On the basis of model (1), the influencing factors discussed in this paper include the influence of medical health level of China's direct investment in Africa. By referring to relevant data, the medical health effect index of influencing factors is added to model 1 to establish specific model 2 and model 3 are shown in formula(2) and (3) as follows:

$$HEAL_{it} = \beta_0 + \beta_1CFDI_{it} + \beta_2EMPL_{it} + \beta_3TRAD_{it} + \beta_4INFL_{it} + \beta_5HC_{it} + \beta_6AID_{it} + \beta_7CRIME_{it} + \mu_i + v_t + \varepsilon_i + \mu_{it} \tag{2}$$

$$PGDP_{it} = \gamma_0 + \gamma_1CFDI_{it} + \gamma_2HEAL_{it} + \gamma_3EMPL_{it} + \gamma_4TRAD_{it} + \gamma_5INFL_{it} + \gamma_6HC_{it} + \gamma_7AID_{it} + \gamma_8CRIME_{it} + \mu_i + v_t + \varepsilon_i \tag{3}$$

Among them, the model 2, HEAL represents the level of medical health care in Africa. The indicators in model 2 are the same as those in model 1. By regression analysis of African health level and influencing factors, β_1 is the impact of China's investment stock in Africa on the health level of African countries and it corresponding regression coefficients for different indicators are obtained, expressed as constant coefficients.

In model 3, by adding the intermediary variables γ_1 and γ_2 coefficient, the impact of the African medical health level of China's investment in Africa and comparing model 1, we can get the impact of medical level on different influencing factors. Therefore, getting the impact of medical health level as an intermediary effect if the coefficient α_1 significant, β_1 significant coefficient, it means that there is an obvious intermediary effect.

4.2. Variable selection and data source

4.2.1. Explained variable

Existing studies mainly quantify economic growth from GDP, per capita, and GDP growth rate. As we know, GDPP represents the per capita GDP of African countries as the explanatory variable of this study based on Philipp et al. (2022). Through the data search of relevant influencing factors and control variables, combined with the regression analysis of the data with the software spss26.0, the influence coefficients of different influencing factors on the per capita GDP of African countries are obtained. Zhixiao relevant research shows that the economic and trade exchanges between China and Africa have a very obvious positive effect on the economic development of African countries, and have a positive impact on such aspects as employment rate, import and export trade and per capita national income.

4.2.2. Explanatory variables and intermediate variables

The core explanatory variable of this chapter mainly studies the impact of China's direct investment in Africa. CFDI said that China's investment stock in African countries was used as an explanatory variable. The data of 48 countries from 2003 to 2020 were collected, and the data were regressed by software. The intermediary variable is the medical health level, which reflects the poverty status of the host country. Based on the availability of data, the neonatal mortality rate in African countries is taken as the parameter standard to judge the medical health development level of the country and expressed in heal. Therefore, through model 2, we know that the corresponding influencing factors are regressed to the medical health level. Furthermore, we are then combined with the medical health level as the influencing factor, with model 1 to get model 3. From this, we can get the impact of intermediary variables on GDP in Africa.

4.2.3. Control variable

The control variables are the main control variable on the impact of other factors on African countries' economic growth and inclusive development. This chapter selects the employment (EMPL), trade openness (TRAD), inflation (INFL), human capital (HC), and criminal rate (CRIME) are mainly selected in this chapter. In this chapter, the employment situation of African countries is closely related to the people's income in the region. Also, it reflects the local human capital situation, and the employed population ratio is used, that is, the proportion of the employed people over the age of 15 in the total population to quantify the local employment situation, which has a significant

impact on the country's overall GDP. The proportion of the country's total import and export trade in GDP quantifies the country's or region's openness. The opening level of African countries and the foreign trade level indirectly affect African countries' domestic GDP. The inflation rate reflects the coefficient of the macroeconomic situation in African countries. Therefore, the impact of macroeconomic changes on economic growth is noticeable and should be controlled. Human capital refers to the index of technical facilities, which is the basis of domestic construction and has a specific impact on domestic GDP. It measured here by the gross secondary school enrollment rate, which was justified whether it is necessary to have an educated population to benefit from a positive impact of the effect of FDI on economic growth. Therefore, it is expressed as a percentage of the population. AID government expenditure as a control variable, as a control indicator, the proportion of government expenditure in GDP has also increased year by year. As a result, government expenditure has become an essential factor affecting the Chinese economy. Finally, crime indicates the crime rate, which has a particular impact on the national economic level.

The data of this paper mainly comes from the World Bank and is sorted out accordingly. Since the research period was from 2003 to 2020, data in some African countries were missing, so we screened out Eritrea, Sahara Occidental, Sao Tome, Principe, and North Sudan. Moreover, the final sample was 48 African countries. In this paper, each variable's tail is reduced to avoid the impact of extreme values on the study, and the processed data are used for subsequent analysis.

Through descriptive statistics, a total of 48 countries could be obtained. Therefore, the minimum, maximum, mean, and standard deviation show up in the table above. After adding the medical condition, the descriptive statistics are shown in Table 1 below:

4.2.4. Model checking

4.2.4.1. Collinearity test. The collinearity test is conducted for the overall data, and the collinearity test is shown in Table 2 below:

The collinearity test shows that the data collected for the influencing factors of GDP, health care, China's foreign direct investment, employment, trade openness, inflation, human capital, aid and crime are not collinear, which means that the data meet the conditions for regression analysis.

4.2.4.2. Hausman test and F test. After the collinearity test, the Hausman test and F test are used to test the data; and it necessary to select the appropriate model, the Hausmann test was carried out the null hypothesis indicates that the random effect model is the preferred model. The first hypothesis is that the fixed effect model is sufficient. When the fixed effect model is retained, the coefficients obtained are unbiased; considering the random effect model, the obtained coefficients are effective. The residual autocorrelation test was also performed. The test table is shown in Table 3 below:

Since the p-values of the Hausman test and F test are lower than 0.05, it indicates that the selected data meet the test conditions, and the original hypothesis is tenable.

Table 1
Adds medical description statistics.

	N	Min	Max	Mean	Standard deviation
PGDP	807	-36.55	3166.32	36.97	269.23
CFDI	790	-11.63	243.00	5.26	13.83
HEAL	843	.7	74.8	27.77	12.19
EMPL	765	0	222643	306.40	8049.13
TRAD	860	-9223.37	9223.37	9223.37	9223.37
INFL	796	-29.69	100.62	7.36	10.98
HC	771	60.22	15672455.00	9223.37	9223.37
AID	762	-17E.00	10E.00	55E.90	71E.20
CRIME		0	9	2.49	1.34

Source: Represented by the author's.

Table 2
Collinearity test.

Variance ratio												
Model	Dimension	Eigenvalues	Condition index	C	CFDI	HEAL	EMPL	TRAD	INFL	HC	AID	CR
1	1	4.722	1.000	.00	.01	.00	.01	.00	.01	.01	.01	.00
	2	.999	2.174	.00	.01	.00	.00	.98	.00	.00	.00	.03
	3	.843	2.367	.00	.49	.00	.01	.01	.02	.16	.09	.00
	4	.741	2.524	.00	.37	.01	.10	.00	.05	.04	.14	.01
	5	.666	2.662	.00	.04	.00	.02	.00	.67	.19	.01	.03
	6	.514	3.032	.00	.03	.04	.16	.00	.20	.21	.21	.89
	7	.327	3.799	.00	.00	.03	.44	.00	.00	.29	.48	.03
	8	.143	5.756	.03	.01	.19	.06	.00	.04	.05	.03	.00
	9	.044	10.336	.96	.04	.72	.20	.00	.01	.07	.04	.03

Source: Represented by the author's.
^a Dependent variable: PGDP.

Table 3
Hausman test and F test.

Hausman specification test	Coef.	F test all $\mu_i = 0$	Coef.
Chi-square test value	27.53	F test Value	183.51
P-value	0.0000	P-value	0.0000

Source: Represented by the author's.

4.2.5. *Solution of model 1*

By collecting and importing data from 48 countries into spss26.0, and performing regression analysis on the data of related influencing factors, the coefficients of different influencing factors are obtained as shown in Table 4 below:

The results of Table 4 show that most variables impact the GDP of African countries; concerning the positive and significant impact of FDI variables on GDP when Africa's GDP increases by 1%, FDI will increase by 0.018%.

In terms of employment variables, employment variables are significant and positively impact GDP. A 1% GDP growth will lead to an increase in employment of 0.009%. Concerning trade variables, it also had a positive and significant impact on GDP, as trade with a 1 percent increase in GDP would lead to a 4.9 percent increase in trade on the continent. The p-value of GDP and trade is less than 0.05, which significantly impacts GDP. Finally, the human capital variable is significant and positive to gross domestic product (GDP). A 1% growth in GDP will lead to a 6.9% growth in human capital.

4.3. *Analysis of the growth effect of CFDI on GDP under the medical level*

4.3.1. *Solution of model 2*

The data was collected from 48 countries imported into spss26.0. The data of health care and related influencing factors were analyzed by regression. As a result, the coefficients of different are influencing factors in Table 5 below:

As can be seen from Table 5 above; the impact of CFDI, employment, human capital and aid variables on the dependent variable health care.

Table 4
Model 1 regression coefficient.

Dependent variable	GDP	
1	Constant	1.408** (0.434)
	CFDI	0.000** (0.018)
	EMPL	0.009** (0.012)
	TRAD	4.935*** (0.000)
	INFL	0.034 (0.014)
	HC	6.922*** (0.000)
	AID	0.000292 (0.00318)
	CRIME	0.109 (0.128)

Source: Authors' computation by STATA 12.
 Note: * 10% significance ** 5% significance *** 1% significance.

Table 5
Model 2 regression coefficient.

Dependent variable	HEALTH	
1	Constant	30.883*** (1.067)
	CFDI	0.091* (0.045)
	EMPL	0.258*** (0.028)
	TRAD	1.212 (0.000)
	INFL	.048 (0.036)
	HC	1.796*** (0.000)
	AID	1.646*** (0.312)
	CRIME	0.000284 (0.00318)

Source: Authors' computation by STATA 12.
 Note: * 10% significance ** 5% significance *** 1% significance.
^a Dependent variable: Health care.

For example, in the variable CFDI (China's investment in Africa), medical quality will be improved by 1%, and GDP will grow by 0.091%. A 1% increase in high-quality health care will lead to a 0.258% increase in employment in terms of employment variables. Human capital variables and aid have significant positive effects on health care quality.

4.3.2. *Solution of model 3*

The data collected from 48 countries were imported into spss26 to conduct regression analysis on added health care data and related factors of GDP. The coefficients of different influencing factors are shown in Table 6 below.

The data collected from 48 countries were imported into spss26 to conduct regression analysis on added health care data and related factors of GDP. The coefficients of different influencing factors are shown in Table 6 below.

As shown from Table 6 above, most variables positively and significantly impact the interest variable PGDP. In contrast, the crime variable has a negative and significant impact on PGDP. CFDI represents China's foreign direct investment in Africa in the equation for the first variable.

Table 6
Model 3 regression coefficient.

Dependent variable	PGDP	
1	Constant	1.494* (0.645)
	CFDI	0.001** (0.018)
	HEALTH	-0.003 (0.015)
	EMPL	0.008*** (0.012)
	TRAD	-4.406 (0.002)
	INFL	0.034*** (0.015)
	HC	-7.4604 (0.000)
	AID	0.00324 (0.00235)
	CRIME	-0.100 (0.131)

^a Dependent variable: PGDP.
 Source: Authors' computation by STATA 12.
 Note: * 10% significance ** 5% significance *** 1% significance.

When 1% PGDP is added to CFDI, it has a positive and significant impact on PGDP, which will increase China's foreign direct investment in Africa by 0.001%. For the second variable in the employment equation, a 1% increase in PGDP will lead to a 0.008% increase in employment in African countries. The third is inflation. A 1% increase in PGDP will lead to monetary stability of 0.034%. Finally, the crime variable is significant and negative, so increasing GDP by 1% will reduce crime by 0.1%.

4.4. Robustness test

To further test the robustness of the model, the robustness of the model is tested by adding variables, replacing variables, and changing parameter estimation methods. The specific methods are as follows: Based on the benchmark model, increase the variable of total capital formation, which is obtained by total capital formation and GDP. Change quantitatively important variable trade openness, namely by African countries to attract foreign direct investment as a share of GDP, to quantify the openness of host country, and then utilizing structural equation model test on African economic growth of China's direct investment in the total effect, direct effect and indirect effect (intermediary effect). The parameter estimation results of the final model are summarized. The robustness test determines the robustness of the model by increasing or decreasing the variables. The specific results are shown in Table 7 below:

The robustness test parameter estimation results show that the total effect of CFDI on PGDP is 0.092, indicating that China's indirect investment has a significant boost to the non-economy. While it is roughly the same as the benchmark regression conclusion, the indirect effect of CFDI on PGDP is 0.091. It also passed the test under the 1% significance level, showing that China's direct investment in Africa, directly and indirectly, affects Africa's economic growth. Based on the above, it concluded that China's direct investment in Africa promotes the economic growth and inclusive development of African countries by promoting the improvement of the host country's medical and health standards. Combining the results of the structural equation model, we can see that the above model has a certain degree of robustness.

4.5. Endogeneity test

In hypothesis testing, this study uses the following methods to avoid the possible endogenous problems of variables. First, in selecting measurement methods of core variables, the research has carried out descaling treatment (logarithmic transformation). The main reason is that the scaled variables can maintain good stability. Moreover, it avoids the interference of the variance of regression estimation residuals by changing independent variables to obtain more stable results. In addition, a 2SLS regression test will be carried out for the possible endogeneity of variables. Specifically, this study has used the following two measures:

- (1) Confirm whether the selection of instrumental variables is reasonable. Firstly, select the instrumental variable for the core

Table 7 Stability checklist.

Constant	Direct effect		Indirect effect		Total effect	
	Coef	Z-statistics	Coef	Z-statistics	Coef	Z-statistics
CFDI	0.001***	0.018	0.091	0.045	0.092***	0.468
HEAL	-0.003***	—	—	—	-0.003***	—
EMPL	0.009**	0.012	-0.258**	0.028	-0.249**	0.040
TRAD	-4.935***	0.000	1.212***	0.000	-3.723***	0.000
INFL	0.034	0.014	0.048	0.036	0.082	0.050
HC	6.922***	0.000	1.796***	0.000	-8.718***	0.000
AID	9.760***	.000	-.030	-4.876***	4.884***	.000
CRIME	-0.109	0.128	1.646	0.314	1.537	0.442

Source: Represented by the author's.

variable, specifically, the investment stock as the instrumental variable of trade capacity, the employment index as the instrumental variable of absorption capacity, and the opening level as the instrumental variable of environmental security. Secondly, the identification deficiency and weak instrumental variable tests are carried out to confirm whether the instrumental variable is adequately selected. Among them, the original assumption of insufficient identification tests is that instrumental variables are not related to endogenous variables and insufficient identification of instrumental variables. However, the insufficient identification test of the model does not mean that the instrumental variables are reasonable, and there may be the problem of weak instrumental variables. Finally, we further tested the weak instrumental variables. The original hypothesis of the weak tool test is a strong correlation between instrumental and endogenous variables.

- (2) Test endogeneity. The Davidson McKinnon test verifies whether the core variables have endogeneity. Rejecting the original hypothesis means that endogeneity exists. The result tests of the above two parts are shown in Table 8.

As shown in Table 8, the p-value of the identification deficiency test of the three main variables is less than 0.01. Therefore, the original hypothesis is rejected; there is no identification deficiency, and the instrumental variables are related to endogenous variables. In the weak instrument test of the three main variables, the Cragg Donald Wald F statistics are 7.686, 55.46, and 7.177, respectively. The critical value of the weak instrument variable when the investment stock and

Table 8 Endogeneity test results.

	(1)	(2)	(3)
Dependent variable	lnPGDP	lnPGDP	lnPGDP
Endogenous variable	lnCFDI	lnEMPL	lnTRAD
lnCFDI	1.265 (1.723)	-0.0552 (0.0694)	0.282 (1.325)
lnEMPL	-0.0511 (0.0690)	-0.000274 (0.00387)	-0.0259 (0.102)
lnTRAD	1.157 (0.833)	-4.828 (7.025)	1.932*** (0.730)
lnINFL	-2.569** (1.087)	-1.854*** (0.718)	-1.873** (0.766)
lnHC	-0.0699 (0.141)	-0.126 (0.107)	-0.134 (0.107)
lnCRIME	-0.00251 (0.0153)	-0.0145 (0.0138)	-0.0109 (0.0145)
R2	0.681**	-0.0386	-0.401
Identification deficiency test	-0.042	0.022	0.030
P-value	7.690	54.97	7.181
Weak tool test	0.00555	0.000	0.00737
Davidson McKinnon test	7.686	55.46	7.177
	0.4656	0.3301	0.8016

Source: Represented by the author's.

Note: ***, **, * respectively indicate the significance of 1%, 5%, and 10%.

employment index are higher than 20% is 6.66. Furthermore, the critical value of the weak instrument variable is when the proportion of the open level to the operating income is higher than 10%. Therefore, the corresponding instrument variables of the main variables are not weak.

In addition, the Davidson McKinnon regression test was conducted on the above three main variables to confirm the existence of the endogeneity of the core variable. The results were sorted in the last row of the table. The p-values of the three main variables were more significant than 0.1. Therefore, the original hypothesis was accepted. Therefore, the three core variables in this paper were selected appropriately, and there was no endogeneity problem.

4.6. Comparison model

The target function of model 1 and 3 are GDP, which is not necessary to compare model 3 to the previous one and in the table because the model 2 target is health care. By comparing the influence coefficients of model 1 and model 2, the specific comparison table is shown in Table 9 below:

Through Table 9, it can be found that the addition of health care improves the impact of CFDI on GDP. The error is the largest for criminal rate, reaching 9%. CFDI, EMPL, TRAD, and HC variations are significant correlation factors, indicating that African economic inclusiveness is vital.

5. Discussion of the results

This part mainly discusses the strategy to analyze the impact of the Chinese FDI on African countries' inclusive development and economic growth. In order to analyze the impact of China's investment contribution on Africa's inclusive development, we used spss26.0 software, and with the help of the relevant sample data of 48 countries in the African continent. We adapted this method regression because most researchers used it and showed the exact results of the different papers.

The results on the impact of China's investment between real GDP per capita and explanatory variables, including health care are discussed below.

For the first instance, the results show that China's foreign direct investment had a significant positive impact on Africa's economic and the influencing factors indicate that Africa's development is inclusive. Our estimates also show that China's foreign direct investment has made a positive and significant contribution to Africa's, employment rate, trade openness, and largest error level of crime rate. It also confirms the findings of another previous study by Espoir (2020), which finds a positive and significant contribution to the SADC region. This means those countries' employment and trade contribution to the SADC region has converged over the period.

Second, it positively and significantly impacts China's direct investment because the long-term education cooperation between China and African countries impacted. China's foreign direct investment enterprises have improved the quality of human capital of the labor force through the technical training of the laborers that can obtain more

Table 9
Comparison of coefficients.

	Model 1	Model 2	Model 3	Error (%)
Constant	1.408	30.88	1.494	-6.10795
CFDI	0.00	0.09	0.001	
HEAL			-0.00	
EMPL	0.09	0.25	0.00	6.666667
TRAD	4.93	1.21	-4.40	0
INFL	0.03	.04	0.03	1.14943
HC	6.82	1.79	-7.46	7.14286
AID	0.163	-0.030	-0.030	0
CRIME	0.10	1.64	-0.10	9.090909

Source: Represented by the author's.

substantial competitiveness and higher income. The result can be compared with Qinxuan's study, which has analyzed the effect of China's investment in Africa.

The result confirmed the findings of other previous studies, which find a positive of China's investment in Africa Miao et al. (2020). However, the study uses a dynamic panel data model. The impact of poverty reduction is achieved by promoting economic growth. The government can collect taxes from enterprises established by CFDI, increase fiscal revenue, and provide the public with public services conducive to poverty reduction Dong & Fan (2017).

By solving model 1 and model 2, the correlation coefficients of different impacts on health care and the correlation coefficients of adding health care on GDP are obtained. It can be seen from Model 2 that there is no significant impact on the various factors of health care. Model 3 shows that health care it has a positive impact on GDP, the influencing factors indicate that Africa's development is inclusive. It also approves the positive effect of health care assistance in Africa on the research work of Shuang et al.

6. Conclusion and policy implications

6.1. Conclusion

In closing, this paper discusses China's foreign direct investment's impact on Africa's economic growth and inclusive development. The main purpose of this chapter is to determine the impact of FDI on economic growth from an economic perspective. The regression model takes GDP as an explanatory variable and analyzes the influencing factors of its GDP.

First, it finds relevant data and performs a collinearity test to ensure that the selected data can be used for regression analysis. Second, the Hausman and F tests show that the chosen data meets the test conditions, establishing the null hypothesis. Third, the robustness test show the stability effect of CFDI on PGDP with 0.18 of direct investment and benchmark regression of indirect investment with 0.196.

6.2. Policy implications

With the rapid development of China's direct investment and trade cooperation in recent years, many scholars have carried out theoretical and empirical research. However, few systematic studies can be used for reference for various reasons, whether from the research methods or theoretical system. At the same time, the situation in Africa continent is complex and dangers. Due to colonial rule, religion, and culture, there are significant differences in countries' political, economic, and legal systems and development. As mentioned earlier, direct investment in Africa has strategic significance and a role in the economic growth and inclusive development of China and African countries. Determining the economic development stage of African countries is an essential basis for understanding their industrial development laws and demands, investment planning, and layout. However, it is affected by the specific national conditions and external environment of the country. For most African countries, economic diversification is the law of the gradual rise of economic development stages. At the same time, the development paths of each country are not the same. Indeed, China-Africa must reform the investment, economic, and trade policies to promote fruitful economic and trade cooperation. The most important of these recommendations are:

6.2.1. Enterprise level measures

First, at the micro-enterprise level, Chinese enterprises lack the understanding of investment trends and income, lack of overseas operation and management experience, weak awareness of risk prediction, and poor ability of crisis public relations. Chinese enterprises should improve their core competitiveness.

Second, Chinese enterprises should try their best to create a group of

compound talents proficient in the language, law, management, and finance to undertake the vital task of overseas operation and management. The way can be to choose the overseas transfer training of internal employees, employ experienced foreign managers with high salaries, and establish a talent reserve mechanism to make the enterprise gain long-term benefits.

Third, Chinese enterprises should learn from the localization strategy of overseas enterprises in European and American developed countries. Chinese enterprises should strive to recruit local talents and promote the localization process of overseas companies. Through the full use of the local human resources of the host country, it can better adapt to the market, culture, policies, and regulations of the host country and play an essential role in the development of the local market and brand building.

Finally, Chinese investors should cooperate with the local governments of host countries to strengthen the supervision of investment projects and prevent corruption. Under the supervision of the government, Chinese enterprise investors should manage their policy activities. China's investors should strengthen the screening and supervision of public and private enterprises investing in Africa, monitor their compliance with local laws and environment regulations, and prevent them from maliciously disrupting market order.

6.2.2. Government level measures

The rapid and vigorous development of China's economy and the acceleration of industrialization and urbanization; as a result, the demand for energy consumption increases rapidly, and external compliance is significant. However, the government faces tremendous challenges in building a stable, economical, clean, and safe energy supply system. According to China's energy situation and policies issued by the State Council in 2007, we can find that China's energy resources have low per capita energy ownership, uneven energy distribution, difficult mining, and low energy quality.

First, we should make full use of foreign oil and gas resources and establish a safe and reliable oil supply system, especially pay attention to the African market, to deal with the threat of American intervention in the oil supply in the continent.

Second, to establish strategic oil reserve mechanism to deal with the potential risk of supply failure, Chinese government should appropriately adjust the structure of the industrial product internally, reduce the high dependence of oil on foreign countries, and vigorously implement the new energy strategy of sustainable development.

Third, active political, economic, cultural, and environmental means strengthen the control and decision-making power over the international oil supply. In the face of fluctuations in the international oil pattern, we should actively carry out economic and trade exchanges with major oil reserve countries and regions through pragmatic foreign policies, promote the rapid development of bilateral trade and consolidate the achievements of China's energy diplomacy.

Fourth, the face of regional instability is caused by energy factors, especially the complex geopolitical pattern and ethnic conflicts in African countries. As a responsible, respectful country, China should actively resolve the crisis, participate more wisely in global governance through political dialogue and diplomatic means, and promote stable relations and economic development among regions. Therefore, Africa and Chinese governments need to solve problems and invest in mitigating environmental challenges. This can be done by initiating environment-friendly regulations to minimize environmental degradation.

Finally, most African countries' leaders should establish, promote and improve the service system for foreign investment. African government leaders should provide consultation and services laws, regulations, policies and measures, and information on investment projects and secure foreign investors and enterprises. Furthermore, African countries' leaders should strictly monitor their environmental indicators and resolutely prevent the destruction of the local environment and ecology effect, which is beneficial for the continent. Therefore, both

governments should further improve their investment policy guidance of direct investment and trade at the policy level to create good external conditions for investment and inclusive development.

CRedit authorship contribution statement

Debongo Devincy Yanne Sylvaire: Formal analysis, Supervision, Writing – original draft, conceived of the presented idea, are in charge of collecting data collection, verified the analytical methods, analyzed and interpretation of results, supervised the findings of the working paper, draft manuscript preparation. **Wu Hua Qing:** Formal analysis, Writing – original draft, conceived of the presented idea, verified the analytical methods, analyzed and interpretation of results. **Chang He Ran:** Writing – original draft, are in charge of collecting data collection, developed the theory of China's FDI in Africa. **Diane Laure Kassai:** Writing – original draft, are in charge of collecting data collection, developed the theory of China's FDI in Africa. **Nzabana Vincent:** Supervision, Writing – original draft, supervised the findings of the working paper. **Djossouvi Adjoa Candide Douce:** Supervision, Writing – original draft, were in charge of collecting data collection, developed the theory of China's FDI in Africa, supervised the findings of the working paper. **Osei-Kusi Frank:** Writing – original draft, draft manuscript preparation. **Nguefio Prince Nicaise:** Supervision, Writing – original draft, supervised the findings of the working paper. **Fatoumata Traore:** Supervision, Writing – original draft, supervised the findings of the working paper, draft manuscript preparation. **Awadji Fabrice Boris:** Writing – original draft, draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

Declaration of competing interest

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work paper publication. There is no professional or other personal interest of any nature or kind in any product, service, or company that could be construed as influencing the position presented in, or the review of, the manuscript entitled, "The impact of China's investment on Africa's inclusive development".

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References

- Ashoka, Mody, & Krishna, Srinivasan (1998). Japanese and U.S. Firms as Foreign Investors: Do They March to the Same Tune? *The Canadian Journal of Economics*, 31 (4), 778–799.

- Boqiang, Lin, Wei, Wu, & Malin, Song (2019). Industry 4.0: driving factors and impacts on firm's performance: an empirical study on China's manufacturing industry. *Annals of Operations Research*.
- Cai, R. (2020). *China's poverty alleviation from the perspective of inclusive development [R]*. Guangzhou, China, 2020.
- Calantone Roger, J., Cavusgil, S. T., & Zhao, Y. (2002). Learning orientation, firm innovation capability and firm performance. *Gestion du Marketing Industriel*, 31(6), 515–524, 2002.
- Démurger, Sylvie, Sachs, Jeffrey D., Woo, Wing Thy, Bao, Shuming, & Gang, Gene (2002). The Relative Contributions of Location and Preferential Policies in China Regional Development: Being in the Right Place and Having the Right Incentives. *Economic Research Journal*, 13(4), 444–465.
- Dong, Y., Zhang, D., & Cai, D. (2011). Entering Africa an empirical study on the determinants of China's investment in Africa. *Economics*, (1), 675–690, 2011.
- Dunning John, H. (1981). Explaining the international direct investment position of countries: Toward a dynamic and development approach. *Welt wirtschaftliches Archive*, 117, 30–64, 1981.
- Easterly, William, & Rebelo, Sergio (1993). Fiscal Policy and Economic Growth: An Empirical Investigation. *National Bureau of Economic Research, Massachusetts*.
- Han, X. (2007). The development and social responsibility of Chinese enterprises in Africa. *The International Economic Cooperation*, 7, 18–20, 2007.
- Huang, M., & Lu, D. (2012). China's investment and evaluation of infrastructure in Africa. *International economic cooperation*, (12), 19–24, 2012.
- Jackman Robert, W. (1982). Dependence on foreign investment and economic growth in the third world. *World Politics*, 34(2), 175–196, 1982.
- Lin, Y. (2013). China's economic development and China Africa Cooperation. *China market*, (35), 3–6, 2013.
- Mabeya, C. (2017). *La Chine Encourage de Nouveaux Investissements en Tanzanie*. China Daily Africa [R], 2017.
- Mary. (2014). *Research on the impact of China's investment and trade in Africa on its economic growth [D]*. Beijing, China: University of International Business and Economics, 2014.
- Megbowon, E., Mlambo, C., & Adekunle, B. (2019). Impact of China's outward FDI on sub-saharan africa's industrialization: Evidence from 26 countries. *Cogent Economics & Finance*, 7(1), Article 1681054, 2019.
- Miao, M., Lang, Q., Gebre, B. D., Jiang, Y., & Zhang, X. (2020). The impacts of Chinese FDI and China-Africa trade on economic growth of african countries: The role of institutional quality. *Economics*, 8(3), 53, 2020.
- Mu, Xiuru, Li, Ronglin, & Han, Meng (2016). Analysis on the motivation of China's direct investment in Africa. Also on the impact of host country institutional factors. *Economic Longitude and Latitude*, 2016(6), 66–71.
- Ousmane, Sall (2016). Chinese Soft Power in Africa: Case of Senegal. *Open Journal of Social Sciences*, 4(11), 133–142. <https://doi.org/10.4236/JSS.2016.411011>
- Philipp, B., Eberle, J., & Howell, A. (2022). The impact of China's R&D subsidies on R&D investment, technological upgrading and economic growth. *Technological Forecasting and Social Change*, 174, Article 121212, 2022.
- Reuters. (2017). *Behind China's silk road vision: Cheap funds, heavy debt, growing risk (Vol. 15)*. May[DB/OL] www.reuters.com/article/us-china-silkroad-finance-idUSKCN18B0YS.
- Song, H. (2021). *Report on Chinese companies investing in Africa released [N]*. China Business Times, 2021.
- Sun, J. (2000). *International operation of capital-Research on the Development of China's blind Foreign Investment [M]*. Beijing: China Economic Science Mountain Press, 2000.
- Tan-Mullins, M., Mohan, G., & Power, M. (2010). Redefining 'aid' in the China-Africa context. *Development and Change*, 41(5), 857–881, 2010.
- Tull, Denis M. (2006). China's engagement in Africa: Scope, Significance and Consequences. *Journal of Modern African Studies*, 44(3), 459–479.
- UN Comtrade. (2014). *United Nations Commodity Trade Statistics Database*. SITC Revision 3, [DB/OL] <http://comtrade.un.org/>.
- UNCTAD. (2013). *World Investment Report 2013*. New York and Geneva. *United Nations*.
- Yan, C., Ma, L., & Zhong, C. (2012). Determinants of China's investment in Africa: An empirical analysis from the perspective of integrating resources and institutions. *World economy*, (10), 91–112, 2012.
- Yun, L. (2017). China's direct investment in Africa and its impact on african economy. *Journal of Zhejiang Normal University (Social Science Edition)*, (6), 100–105, 2017.
- Zhang, H. (2016). *China-africa yellow book: African development report [M]*. Beijing: Social Science and Technology Literature Press, 2016.
- Zhao, B. (2015). Location choice of Chinese enterprises' foreign direct investment under the new situation of economic globalization. *World Economic Research*, (6), 119–126, 2015.
- Zheng, Y. (2015). Poverty reduction effect of China's non direct investment: An empirical study based on dynamic panel. *World Economic Research*, (11), 90–98, 2015.
- Zhou, Jing, Huang, Kai, & Kai. (2020). Research on the Efficiency of China's Foreign Direct Investment Under the Background of High-Quality Development: An Empirical Analysis Based on African countries. *Journal of Shandong University of Finance and Economics*, (1), 26–38.