

An Empirical Research on the Impact of China's Financial Aid to Egypt and its Effect on Egyptian Economy

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Abstract — *China's assistance supports Egypt's political independence efforts, Egypt's economic growth, and China's efforts to build a positive international reputation as a major power. This research investigates if China's financial support for Egypt can advance Egypt's economic growth. China's financial assistance to Africa is referred to as financial aid throughout this essay. This work uses the systematic GMM for econometric regression method for the empirical research portion. Study the effects of China's overall financial support for Egypt on GDP first, and then analyze the effects of loan assistance, free aid, and investment help on GDP of Egypt. The findings of the study indicate that China's financial assistance to Egypt has a sizable positive impact on its GDP and industrial added value. Among these, the loan assistance method significantly contributes to the GDP of Egypt with a medium level of economic growth, and the free aid method significantly contributes to the GDP of Egypt with a low level of economic development.*

I. INTRODUCTION

China has carried out foreign aid for more than 70 years. Foreign aid means that one country or organization provides some paid or free goods or financial support to another country or organization to help the recipient country solve its political, economic, cultural, and other problems. The numerous ways of assistance can be reflected in various aspects, such as directly sending talents, providing intellectual and technical assistance, or aiding for project contracting and transporting materials, as well as providing food and goods assistance free of charge.

The focus of this study is financial aid, and all the aid in the form of providing funds is collectively referred to as financial aid. Financial assistance is also divided into loan,

investment, and free financial assistance. Financial assistance is the most extensive, far-reaching, and lasting form of assistance. Building a railway can promote economic and trade exchanges between countries or regions, improve transport efficiency, and promote social and economic development along the railway. Building a dam can irrigate land more efficiently and develop agriculture, forestry, and fishery, thus benefiting millions of residents. Building a hospital can improve the local medical and health level, reduce the death rate caused by diseases, and bring hope for the people in deprived areas. Most of the above infrastructure construction, medical and health services, and the development of agriculture, forestry and fishery require financial assistance in the form of loans or

direct investment. Therefore, most people believe that financial assistance can play a good role in promoting and promoting the economic development of poor and backward countries, but there are also different people who question this, and they think it has a negative impact. Based on these different views, this paper will study the impact of China's financial assistance to Egypt on the economic development of Egypt.

Through the development and theory of China's aid to Egypt, we can deepen our understanding of China's aid to Egypt. China's aid to Egypt has its own distinctive characteristics. This paper summarizes and studies previous scholars' research on China's aid to Africa and Egypt, and on this basis, studies the impact of China's financial aid to Egypt on Egyptian economies, further improving the research system of China's aid to Egypt. The empirical research has studied whether China's financial aid to Egypt can promote Egypt's economic development. Practice has proved that China's various aid to Egypt has played a particularly good role in promoting Egypt's economic development. However, the effectiveness of various funds provided to China, in addition to theoretical research, the results of the empirical research are still convincing. This paper selects China's financial aid to Egypt, including loan aid, investment aid as the research object, the free financial assistance is expected to provide a certain direction for China's future assistance to Egypt.

II. LITERATURE REVIEW

By observing the research on China's concept of aid to Africa at home and abroad, it was found that the research conclusions of both sides are different. The research of domestic scholars has concluded that China's aid to Africa has Chinese characteristics, does not attach conditions, and can achieve win-win results; However, most foreign scholars doubt the original intention of China's aid to Africa and believe that China's aid to Africa is neo colonialism.

Many domestic scholars have made a detailed study of the concept of China's aid to Africa. Li (2012), after studying the principles of China Africa cooperation, concluded that China Africa cooperation is equal treatment, mutual support and common development, and China's assistance to Africa can be said to be a model of China Africa cooperation. Li (2008) also studied the concept of

China's assistance to Africa in another article. He believed that China's assistance to Africa was not a unilateral grant, but a mutual help between China and Africa without additional conditions. Zhang (2011) studied the concept of China's foreign aid. He believed that it was China's socialist system that decided that China's aid to Africa was not attached with any extra premise. Huang et al. (2014) pointed out that China's aid to Africa is mutually beneficial politically and economically. Wang and Zhu (2009) believed that China's assistance has shouldered the responsibility of being a big country, and its content and form are remarkably diverse and pragmatic. Wang (2015) believed that China's concept of aid to Egypt was different from that of the West. When providing aid, China did not only start from its own needs, but fully considered the actual situation and needs of the recipient countries. Ren and Guo (2017) believed that China's foreign aid had the following three main motivations: to be partners in politics and to achieve win-win in economy. At the same time, China also had humanitarian considerations. The research results of foreign scholars on the concept of China's aid to Africa are different from those of domestic scholars. Most of them believe that China's aid to Africa is egoistic. Kovner (1969) analyzed China's aid to Africa in the light of the international situation at that time. He believed that China's aid to Africa was the result of the rift in Sino Soviet relations at that time. China needed to balance the Soviet Union through Africa, so it was the reason for its aid to Africa. After the reform and opening, China's assistance to Africa has developed rapidly. Most foreign scholars believe that China's assistance to Africa is not to help Africa's economic growth, but to promote neo colonialism. Dennis (2016) believed that China's aid to Africa was not as noble as China itself said. China's actual purpose was to occupy the markets of African countries with many cheap Chinese goods and to exchange aid for Africa's rich natural resources. Even the US Congress believed in their relevant research that China's aid to Africa is for the supply of African oil and other resources, to help China's rapid economic development will not be limited by resource constraints. Foreign scholars have also raised objections to China's claim that assistance does not come with political preconditions. Woods (2018) studied China's assistance to Egypt, the believed that China's financial assistance to these

two countries would endanger the security of relevant regions. However, for the above research conclusions of foreign scholars that China’s aid to Africa is self-serving and harmful, some foreign scholars also refuted them through relevant research. For example, Deborah (2013) pointed out that China’s aid to Zimbabwe did not provide the government with authoritarian regime support and did not see the harmful aspects of the so-called China’s aid. Sutigam (2015) showed through research that China’s aid to Africa is very pragmatic and has fully considered the actual situation of African countries. He believes that the statement that China’s aid is to obtain resources is untenable.

III. VARIABLE ANALYSIS AND DATA SELECTION

3.1 Variable Selection

As mentioned above, China’s aid to Egypt has many ways, which have different impacts on Egypt and Egypt’s economies. This paper wants to study the impact of financial aid on Egypt’s economies through empirical analysis. Considering the significance of variable selection and the availability of data, variables in this paper are selected as follows:

1. Independent variable

On the data selection of China’s financial aid to Egypt, this paper quotes the concept of financial aid introduced in the third section of the previous chapter and considers its composition. Therefore, the four independent variables selected in this paper are as follows:

- i. China’s total official financial assistance to African recipient countries within one year. First, this paper analyzes the impact of the total amount of financial assistance on African economies from a broad perspective. Suppose that China’s total financial assistance to Africa has a positive role in promoting African economies.
- ii. China’s free aid to African recipient countries within one year.
- iii. China’s foreign investment assistance to African

recipient countries within one year.

- iv. China’s loan assistance to African recipient countries within one year.

2. Dependent variable

On the selection of representative data of Egypt’s economy, this paper selects the following three variables:

- i. Annual GDP data for Egypt: It is believed that GDP can effectively reflect the economic situation of a country. Because it reflects the total production activities of a country or region in a period.
- ii. Industrial added value: Industrial added value is a basic indicator of national economic accounting. The sum of added values of all sectors is GDP, which reflects the total market value of all final products and services produced and provided by a country (region) in a certain period.
- iii. Employment rate: The employment rate is an indicator reflecting the employment degree of the labor force. Calculating and studying the employment rate is to improve the economic benefits of employment.

3.2 Sample Data

This study uses panel data, which is two-dimensional data obtained from both cross section and longitudinal section. In terms of cross section, it is the horizontal observation value of many samples at the same time, while in terms of vertical section, it is a time series observed by a sample at different time points. As for the amount data of China’s aid, since China has not joined the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD), the organization has no statistics on China’s official aid, and the official white paper of China has no detailed statistics on aid projects. This paper selects the detailed information about China’s aid projects and amounts to Egypt collected from the AidData database. The data selected in this paper is from 2010 to 2019. Data sources and introduction are shown Table 1:

Table 1 Introduction and Source of Variables

Variable name	Variable unit	Data source
China’s total official financial assistance to Egypt	USD	American AidData database
China’s free aid to Egypt within one year	USD	American AidData database
China’s foreign investment assistance Egypt within one year	USD	American AidData database

China's loan assistance to African recipient countries within one year	USD	American AidData database
The straight-line distance between the capital of China and the capital of Egypt	Kilometer	CEPII database
GDP of Egypt	USD	World Bank Database
Industrial added value of Egypt	USD	World Bank Database
Employment rates in Egypt	Percentage	World Bank Database

According to the development theory, the per capita GDP of 1000-3000 US dollars is recognized as the initial stage of industrialization, and the per capita GDP of 4000-6000 US dollars is called the middle stage of industrialization. With reference to this division standard, combined with the overall economic development level of Egypt, according to the per capita GDP figures of Egypt in 2019. By analyzing the data of China's financial aid to Egypt this paper finds that: China's aid to African countries with higher economic development level is mainly loan aid; China's aid to countries with medium economic development level includes the above three types of aid: loan aid, gratuitous aid, and investment aid; China's assistance to countries with low levels of economic development mainly consists of two types: loan aid and free aid.

IV. METHOD AND MODEL ESTABLISHMENT

4.1 Method Introduction

Based on the panel data selected previously, this paper uses the method of parameter estimation to study the problem. The commonly used parameter estimation methods are least square method, maximum likelihood estimation method and moment estimation method. Maximum likelihood estimation (MLE) and generalized moment estimation (GMM) are widely used to estimate model parameters in the case of large samples. However, the premise of MLE method is that the distribution of variables is known, but its parameters are not known. Once the wrong distribution assumption is given, the MLE estimator is often biased. The GMM method does not need to assume the distribution of variables. If the actual parameters of the model meet certain moment conditions, the GMM estimators are always consistent.

In addition, GMM method has the following advantages compared with other methods: First, GMM method is improved based on tool variable method. When

the explanatory variables are endogenous, the problem is solved by looking for instrumental variables. When the number of moment conditions satisfied by instrumental variables is greater than the number of parameters to be estimated, the solution of the equation system is not unique. At this time, GMM can estimate the unknown parameters and obtain the effective parameter values. Second, GMM method allows heteroscedasticity and correlation in model settings. For heteroscedasticity or autocorrelation, GMM accounting methods have different matrix construction methods. The GMM method is a robust estimator, and the parameter estimator obtained is more practical than other parameter estimation methods. Moreover, the least square method and maximum likelihood estimation are cases of the GMM method.

The effectiveness of the GMM method is also inseparable from the hypothesis test of the GMM method on the model setting and its parameters. There are two tests: one is to test whether the over recognition limit is effective, and the other is to test whether the constructed moment condition is valid. Sargan test is used. If it is invalid after verification, then the GMM method has no advantage.

Among the GMM methods, there are two common methods: differential GMM and system GMM. The system GMM is an extension of the differential GMM. The difference GMM is to make difference to the original equation, using the variable lag order as the tool variable. The disadvantages of differential GMM are that the individual effect of non-observation section and other variables that do not change with time will be eliminated when differential GMM is used, and sometimes the lag order of variables is not an ideal tool variable. The system GMM is equivalent to the simultaneous difference equation and the original horizontal equation. The lag order of the variable is used as the tool variable of the difference equation, and the lag term of the difference variable is used as the tool variable of the horizontal equation.

As the aid data in this paper comes from the AidData database, and its data collection method is based on the media, there is inevitably some measurement error in the data statistics process. At the same time, in the process of building the model, this paper only considered some influencing factors and did not include all factors in the model, so there would be a problem of missing variables, which would lead to the existence of endogenous model and affect the regression results of China's economic assistance to Egypt's economic growth. In addition, this paper incorporates multiple variables that do not change with time when setting the model. The differential GMM estimation method cannot estimate the coefficients of variables that do not change with time. Therefore, this paper uses the system GMM method to estimate the model. The system GMM method can not only reduce the error problem of estimation results caused by endogeneity, but also improve the estimation efficiency. At the same time, it can estimate the coefficients of variables that do not change with time.

4.2.2 Model Establishment

This paper first studies the impact of China's total financial aid to Egypt on the GDP of Egypt, and then studies the impact of diverse types of aid such as loan aid, gratuitous aid, and investment aid on the GDP of Egypt. To study the impact of China's diverse types of financial assistance to Egypt on the GDP of Egypt. After analyzing and studying the impact of China's financial assistance to Egypt on the GDP of Egypt, this paper supplements the research on the total amount of China's financial assistance to Egypt and the impact of three diverse types of financial assistance on the industrial added value and employment rate of Egypt.

In addition, considering that economic data often has

certain inertia, the lag term of dependent variables is included in the model, and the three groups of models are finally constructed as follows:

$$GDP_{it} = \alpha + \rho GDP_{it-1} + \beta_1 aid_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

$$GDP_{it} = \alpha + \rho GDP_{it-1} + \beta_1 fa_{it} + \beta_2 ia_{it} + \beta_3 la_{it} + \mu_i + \varepsilon_{it} \tag{2}$$

$$VA_{it} = \alpha + \beta_1 aid_{it} + \mu_i + \varepsilon_{it} \tag{3}$$

$$VA_{it} = \alpha + \beta_1 fa_{it} + \beta_2 ia_{it} + \beta_3 la_{it} + \mu_i + \varepsilon_{it} \tag{4}$$

$$ER_{it} = \alpha + \beta_1 aid_{it} + \mu_i + \varepsilon_{it} \tag{5}$$

$$ER_{it} = \alpha + \beta_1 fa_{it} + \beta_2 ia_{it} + \beta_3 la_{it} + \mu_i + \varepsilon_{it} \tag{6}$$

The value of *i* is 1, representing Egypt the sample; The value of *t* ranges from 1 to 10, representing the period from 2010 to 2019; *aid_{it}* is the total amount of Chinas' assistance to African recipient countries; *fa_{it}* is the amount of China's free assistance to African recipient countries, *ia_{it}* is the amount of China's foreign investment assistance to African recipient countries, and *la_{it}* is the amount of China's loan assistance to African recipient countries; *GDP_{it}* is the GDP data of African countries; *VA_{it}* is the industrial added value of African countries; *ER_{it}* is the employment rate of Egypt; *μ_i* is the individual fixed effect of Egypt; *ε_{it}* is the error term.

V. EMPIRICAL RESULTS AND ANALYSIS

5.1 Descriptive Statistical Analysis of Variables

The statistical results of the main distribution characteristic indicators of the independent variable and dependent variable are as follows. The employment rate is in percentage, and others are in millions of dollars:

Table 2: Descriptive statistics of independent and dependent variables

Variable	Maximum	Minimum	Average	Standard deviation
GDP	568500.00	350.26	30676.00	67512.96
VA	140098.65	23.87	8975.38	21251.87
ER%	87.82	30.61	52.12	26.37
Free aid	300.05	0.01	16.41	30.86
Investment aid	1600.00	10.81	296.28	353.16
Loan aid	18800.00	1.21	539.92	1490.81
Official aid	18800.00	0.01	334.80	1167.00

From the above Table 2, we can see that China's total

financial assistance amount, sub gratuitous assistance,

foreign investment amount, and loan assistance amount to Egypt are quite different. The maximum and minimum values of each variable are vastly different, and their standard deviations are also exceptionally large. The gap in GDP, industrial added value and employment rate among Egypt is also large, but overall, the amount of loan aid is the largest among the three financial aid modes.

Table 3: Estimated results of China's total aid funds on Egypt's GDP

Variable	Coefficient	Standard deviation	P value
α	2655.21	2382.98	0.27
GDP_{it-1}	0.97	0.03	0.00
aid_{it}	2.63	0.37	0.00

Since the premise assumption of the system GMM estimation method is that there is no autocorrelation of the disturbance term, once the disturbance term has autocorrelation, the system GMM estimation results are inconsistent. Therefore, it is necessary to test whether the disturbance term has autocorrelation. The test result of Arellano Bond shows that the difference item of the disturbance term does not have second-order autocorrelation, and its corresponding test result z value is -0.1264, and the corresponding P value is 0.8994, greater than 0.1. Therefore, the original hypothesis cannot be rejected, that is, the disturbance term does not have autocorrelation. Further use Sargan test method to test whether all tool variables are valid. The chi square test result corresponds to a P value of 0.6761, which is also greater

Table 4: Estimated results of three different aid types on Egypt's GDP

Variable	Coefficient	Standard deviation	P value
α	2690.59	2208.50	0.22
GDP_{it-1}	0.97	0.05	0.00
fa_{it}	5.96	11.60	0.61
ia_{it}	-3.53	2.63	0.18
la_{it}	2.68	0.57	0.00

The autocorrelation of the disturbance term and the validity of the tool variable were tested, and the corresponding P values were 0.8664 and 0.7048, respectively, which showed that the system GMM method could be used for estimation.

It can be seen from the estimated results in Table 4 that at a significant level of 1%, loan assistance is significant, indicating that China's loan assistance to Egypt will be

5.2 Analysis and Explanations of GMM

After a simple descriptive statistical analysis of the basic data, GMM estimation method is used for panel data regression.

We first studied the impact of China's total aid amount on Egypt's GDP, and the estimated results are shown in Table 3.

than 0.1, indicating that the tool variables used are valid and can be estimated using the system GMM.

It can be seen from the estimated results in Table 3 that under the condition that the significance level P value is lower than 1%, China's total financial assistance to Africa is significant and has a positive role in promoting the GDP of Egypt. On average, for every US \$100 million increase in China's financial assistance to Egypt, the GDP of Egypt will increase by US \$263 million.

Next, we further divided the amount of financial assistance into three categories: free assistance, foreign investment assistance and loan assistance, and studied the impact of diverse types of assistance on the GDP of Egypt. The estimated results are shown in Table 4.

conducive to GDP growth. For every 100 million dollars of China's loan assistance to Africa, the GDP of Egypt will increase by 268 million dollars. Although free aid to Egypt can promote GDP growth, its role is not significant. China's foreign investment assistance to Egypt will inhibit economic growth, but the inhibition effect on economic growth is not significant. There is no significant difference between the direction of estimated coefficients of other

variables in Table 4 and Table 3. Only the value and significance level have changed, indicating that the estimated results are robust.

To increase the overall effectiveness of this study, we have more effective variable control, Next, this paper will study the impact of the above three subcategories of aid on

the GDP of Egypt by economic development according to the per capita GDP level. As China's aid to Egypt with economic development level is loan aid; Therefore, the following empirical studies of this paper are the impact of loan aid on GDP of Egypt with high economic development level. The specific empirical results are shown in Table 5.

Table 5: Estimated results of loan aid on GDP of Egypt by economic development

Variable	Coefficient	Standard deviation	P value
α	-303.37	997.99	0.76
GDP_{it-1}	1.04	0.01	0.00
fa_{it}	-2.80	15.97	0.86
ia_{it}	0.16	3.92	0.97
la_{it}	2.17	0.30	0.00

It can be seen from the estimated results in Table 5 that the impact loan aid has a significant positive effect on the economic development of African countries with medium economic development level; Free aid has a significant positive effect on the economic development of Egypt with economic development level. This paper concludes that diverse types of China's aid to Egypt will have different effects on economic development.

After analysis and research on this conclusion, this paper believes that for Egypt with medium economic development in Africa, people's basic material life has been guaranteed. China's loan assistance to Egypt is widely distributed in agriculture, industry, commerce, transportation, energy, education, and other fields. China provides funds for Egypt to develop projects with local development advantages or development needs through

loans Labor and technology can effectively optimize the allocation of resources, make it easier to achieve economies of scale, improve the labor efficiency of these countries, and thus more easily drive economic growth.

The above studies are empirical studies on the impact of China's financial assistance to Egypt on the GDP of Egypt. To make this paper more persuasive, for the economic development of Egypt, this paper selects two variables of industrial added value and employment rate of Egypt as research objects. First, this paper will conduct an empirical study on the impact of China's financial assistance to Egypt on the industrial added value of African countries. The impact of China's total aid and three types of China's aid to Egypt on the industrial added value of African countries was studied and empirically analyzed. The estimated results are shown in Table 6 and Table 7

Table 6: Estimated results of China's total aid amount on Egypt's industrial added value

Variable	Coefficient	Standard deviation	P value
α	434.90	350.94	0.22
aid_{it}	2.98	0.49	0.00

When taking industrial added value as a dependent variable for empirical analysis, it is found that China's aid has a significant positive relationship with Egypt's

industrial added value. On average, when China's aid increases by 100 million dollars, Egypt's industrial added value will increase by 298 million dollars.

Table 7: Estimated results of three different aid types on industrial added value in Egypt

Variable	Coefficient	Standard deviation	P value
α	440.19	334.84	0.19
fa_{it}	14.63	21.52	0.50
ia_{it}	-3.49	5.29	0.51
la_{it}	3.04	0.50	0.00

The above research found that the analysis of the impact of China's total financial assistance to Egypt and three types of financial assistance on the industrial added value of Egypt is consistent with the analysis of the impact on the GDP of Egypt, which can also prove the stability of the conclusions of the article to a certain extent. At the same time, it also shows that Egypt is still in the stage of industrial development, and industrial development still dominates economic development.

Table 8: Estimated Results of China's Total Aid Amount on Egypt's Employment Rate

Variable	Coefficient	Standard deviation	P value
α	75.38	29.92	0.01
aid_{it}	-0.01	0.01	0.28

Table 9: Estimated results of three different aid types on Africa's employment rate

Variable	Coefficient	Standard deviation	P value
α	75.27	24.15	0.00
fa_{it}	-0.09	0.49	0.85
ia_{it}	0.14	0.11	0.18
la_{it}	-0.01	0.01	0.50

The empirical analysis of employment rate as a dependent variable shows that China's aid has no significant impact on Egypt's employment rate. After analyzing the reasons for this phenomenon, we found that the main ways of China's assistance to Egypt include large amount credit and preferential export credit, which are used for infrastructure projects, or to provide large equipment. Although China has paid attention to the needs of Egypt and tried to provide services and facilities that consider local conditions when implementing assistance, most of these projects are undertaken by Chinese enterprises, The employed workers are still mainly Chinese, which is not particularly effective in driving local employment. In addition, the employment rate studied in this paper is estimated by the ILO, rather than the real survey, which may have some errors.

VI. CONCLUSION

The results of empirical analysis show that China's total financial assistance to Ghana has an incredibly significant positive effect on the GDP and industrial added value of Ghana. The GDP of Ghana with mid economic development level is significantly promoted; Free aid has a

In addition, China has always been overly concerned about people's livelihood, so this paper will then supplement the research on the impact of China's financial assistance to Egypt on the employment rate of African countries, and separately study the impact of China's total financial assistance to Egypt and three types of financial assistance on the employment rate of Egypt. The results of empirical analysis are shown in Table 8 and Table 9.

significant positive effect on the GDP of Ghana to economic development. However, China's financial assistance to Ghana has no significant impact on the employment rate of Ghana. Although China's financial assistance to Ghana is distributed in agriculture, communications, infrastructure and other fields, the rapid development of Ghana in recent years is closely related to China's financial assistance to Ghana. Most of the loan aid provided by China to Ghana to economic development is of good profitability, such as energy resource development, production and business projects, ports, manufacturing, etc. These items themselves will play a vital role in a country's economic growth, and the way of loan provides to Ghana with projects with development advantages or needs Capital, labor and technology can effectively optimize the allocation of resources.

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