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African Real GDP Growth, Views from FDI, Economic Freedom and Corruption of African Countries

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Abstract: This paper uses the data of some African countries and G7 developed countries from 2010 to 2019 to study the impact of foreign direct investment (FDI), economic freedom and corruption on the real gross domestic product (GDP) growth rate of African countries. From the results of simple regression, we can draw a conclusion that the increase of FDI helps promote economic development, and it is significant. The results of the multiple linear regression show that FDI and economic freedom have a significant impact on the real GDP growth rate, and the results of the impact of FDI and economic freedom on the real GDP growth rate are the same as those of the simple regression, which are positive and negative, respectively. However, corruption is no longer significant for real GDP growth in the multiple linear regression. The above results suggest that African countries can increase the extent to which FDI controls economic freedom to achieve economic growth while minimizing government corruption. African policymakers can aggressively attract FDI, control the degree of economic freedom, and fight corruption.

Keywords: Real GDP growth, FDI, Economic freedom, Simple regression, Multiple linear regression

1. Introduction

There are many developing countries in Africa, and Africa only accounts for 2.84% [1] of the world GDP in nominal terms, so they have huge potential in developing the economy. And the average real GDP growth rate in Africa is similar to the figure for the world in recent years. We believe that African countries can play an important role in contributing to world economic development through higher real GDP growth rates.

According to Angus Deaton [2], Africa's slow economic development is due to their bad investment plan and inappropriate government management. Sachs and Warner [3] also think African countries were relatively poorer that other emerging markets. So it is necessary to study African countries' economy, and help them develop their markets.

Besides, the significance of government's management to economic growth is undeniable. Lahirushan and Gunasekara [4] note that Government expenditure in Asia has a significant positive impact on economic growth and has a long-run relationship with economic growth, which means that the government is able to have an effective impact on economic growth, especially in Asian countries. Then it comes to African countries, we are studying the relationship between African economy development and government management. We measure the issue of government management by studying the scale of FDI, economic freedom of African governments, and government corruption. In order to explain the relationship of the three variables and GDP growth, we use specific data like real GDP growth rate, FDI, economic freedom and corruption perception index, to doing regression analysis and significance testing. In this way, the relationship between changes of African economy development and these variables can be summarized.

Furthermore, the source of data is reliable. The data of real GDP growth rate and FDI is given by the IMF and the World Bank respectively. And this study measure government's corruption level by Transparency International's Corruption Perception Index (CPI). Since 2000s, many empirical studies studying the relationship between government and economy started to use CPI, for example, Gründler, Klaus, Pak Hung Mo, Bjørnskov, Cooray and Schneider, Goel and Nelson, and Tsanana et al. [4-9]. The data of economic freedom variable are sourced from the Fraser Institute. And recently, more and more researcher started to use Fraser Institute's economic freedom data to research questions about economy and finance, like Tony Chieh-Tse Hou and Simon Gao, Boris Nikolaev and Daniel L. Bennett, Johan Graafland, Jacob A. Jordaan, Junaid Ashraf [10-14].

Study the influencing created by these three factors of Africa's economic development and obtain research outputs. This can contribute both to Africa's economic development and to the economic development of countries with similar national conditions to Africa. The analysis of research outputs can also extract useful information for developed countries and have a greater or lesser effect on global economic development.

2. Literature Review

Factors affecting economic development in Africa, political factors, international relations, ethnic issues, political events, inflation, and the level of government corruption have all been studied. The results show that even though Africa's GDP growth rate has not increased significantly in recent years, which is in line with the world's average GDP growth rate, the world is optimistic about Africa's economic development, and there is a lot of room for improvement in Africa's economic development.

Previous studies have looked at the export structure of African primary commodities and, although there have been studies on government management, have often concluded that governments are incompetent, and that foreign exchange and international credit are misused. What is more? Previous studies rarely use data for proof, such as regression and significance. Our study focuses on the size of FDI in African countries, economic freedom and government corruption in Africa. We need to find a way to measure these variables. In particular, economic freedom, which has been neglected in previous studies, has been studied by more and more scholars in recent years.

According to Lilik Sugiharti et al. [15], FDI is beneficial for local firms, because FDI will cause spillover effect, and thanks to the spillover effect of FDI, the foreign–domestic link can be strengthened, through the transfer of knowledge, skills, and technology to promote growth. FDI is a very important factor of developing economy. They focus on the spillover effect of FDI on firms, but they did not study the relationship of FDI scale and real GDP growth rate. Regarding economic freedom, the concept has only become popular in recent years and there is a lack of research on economic freedom and economic growth in African countries, so this study decided to examine the relationship between economic growth and economic freedom in African countries. And about corruption, there are two theories explain how corruption works. The "greases the wheels" hypothesis maintains that corruption is good for economic growth, because graft act as piece-rate pays for officers, thus efficiency can be improved. Another hypothesis is called "sand the wheels", it means graft is harmful for economic growth, because it may cause high cost to economic activities. Previous empirical studies tend to believe graft decreases economic growth, especially in emerging markets, like Huang [16]. And most countries in Africa are emerging markets, so considering corruption as one of the factors is necessary.

In this study, we will use a large amount of data, indicators, and multiple linear regression model to study FDI scale, economic freedom, and government corruption influence on economic development in Africa, and the linear relationship between them, to fill the gap in previous studies.

3. Methodology

3.1. Model specification

Measuring and modeling economic growth requires not only the analysis of the characteristics of GDP growth, but also using a multiple linear regression model. Typically, the value of Y depends on multiple explanatory variables. Multiple linear regression model has a general form:

$$Y_t = \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \cdots + \beta_k X_{kt} + u_t \quad Equation\ 3-1$$

In order to assess the extent to which government management affects economic development, we constructed a multiple regression model:

$$GDP_t = \beta_1 Infdi_t + \beta_2 Free_t + \beta_3 CPI_t + d_{country} + d_{year} + u_t \quad Equation\ 3-2$$

3.2. Variables and date source

In order to quantify this indicator of government management, we chose to construct equation 3-2, where Y represents the real GDP growth rate, Infdi represents the data after the logarithmic step of FDI, Free represents a country's Economic Freedom, and CPI denotes a country's rank on the global corruption perception index.

The real GDP growth rate is the GDP growth rate after taking into account inflation, that is, the level of real economic growth after deducting the impact of inflation. In general, the real GDP growth rate is more convincing than the nominal GDP growth rate because it excludes the impact of price changes on GDP. Real GDP growth rates are from the IMF database, World Economic Outlook (April 2023).

FDI is a type of investment made by investors in firms operating in countries other than their own, and FDI can have spillover effects. Some studies[17-19] have shown that FDI can not only provide a new source of funds for industrial development, but also help improve management systems, provide access to global markets, generate innovations, and generate technological spillovers in domestic firms to help local firms increase productivity while taking the logarithm of this treatment serves two purposes: Firstly, educe the absolute value of the data, which is convenient for calculation; Secondly, make the data smoother, weaken the covariance, heteroskedasticity, etc. of the model. And the data of FDI is from World Development Indicators, World Bank database.

The cornerstones of economic freedom are individual choice, voluntary exchange, open markets, and clearly defined and enforced property rights. Economic freedom refers to freedom from government interference or protection of free competition, free markets, free choice, free trade, and private property within the Constitution. Economic freedom is an important index to evaluate the degree of marketization in the world, which has an important impact on economic development. In this study, economic freedom is obtained from the Fraser Institute and measured in five main ways :(1) government size. When government spending, taxes, and the number of government-controlled enterprises increase, government control over the economy increases and economic freedom decreases. (2) Legal system and property rights. The protection of individuals and their legally

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acquired property is the core function of government and the foundation of economic freedom. (3) Sound money. Inflation devalues wages and property. When inflation is not only high but also volatile, it is difficult for individuals to plan for the future, undermining economic freedom. (4) Freedom of international trade. Economic freedom is discounted when freedom of choice excludes firms and individuals in other countries. Freedom of choice includes freedom of buying and selling, freedom of signing contracts and so on. (5) Supervision. Governments have restricted the right to free international exchange, including by imposing onerous regulations that limit the right to exchange, making it difficult to get credit, hire or work for who you want, or run your business freely. And the dataset is available from <www.fraserinstitute.org/economic-freedom/dataset>.

The degree of corruption is an important indicator of a government's management, but there is no clear conclusion in the academic community as to whether or not government corruption adversely affects economic growth. Acemoglu and Verdier [20] argue that corruption is beneficial to economic development to a certain extent, that corruption leads to officials being more motivated to serve businesses and to provide better services because the officials profit from it, and that there is a certain amount of competition between the officials. There is a certain amount of competition between them. From this perspective, corruption increases the efficiency of socio-economic functioning. On the other hand, corruption tends to undermine innovation because innovators need government support more than the incumbent producers, but due to their small initial size, innovators often have a hard time getting access to credit and lack the cash to pay bribes [21] Thus, in the long run, resources are skewed towards rent-seeking activities instead of being used for scaling up production and for innovation. The ranking of countries in terms of corruption in the world was chosen because of the ranking-based methodology which helps to minimize the effect of outliers on the mean and variance and makes the data more symmetric, and the relationship between the corruption levels of countries is contrasting. The measure of corruption level is given from the Transparency International as Corruption Perception Index (CPI).

We selected data for 18 countries over the 2010-2019 decade, which include Algeria, Canada, Central African Republic, Egypt, Ethiopia, France, Germany, Italy, Japan, Morocco, Namibia Nigeria, Nigeria, South Africa, Tunisia, United Kingdom, United States, Zambia, where the developed countries are members of the G7, which is a highly representative group of the top seven developed countries. The rest of the countries are the emerging markets in Africa, where Egypt, Morocco, and Tunisia belong to the North African countries. The reason for choosing the data for the decade 2010-2019 is that the financial crisis occurred in 2009 and the New Crown Epidemic spread globally in 2010, and these two events had an impact on the normal economic development of each country. In order to exclude the effect of these two events, the period 2010-2019 was selected.

3.3. Statistical description

Then Stata is used for descriptive statistics. It can be seen that there are 180 sample sizes for real GDP growth rate, FDI, economic freedom and world ranking CPI in Table (1), while there are only 175 sample sizes for lnfdi. This is because 5 of the 180 FDI data are negative and cannot be logarithmic calculated. Therefore, these five data are eliminated. The mean value of the real GDP growth rate is 2.919%, the standard deviation is 3.962, the minimum value is − 36.40%, and the maximum value is 11.40%. The mean value of FDI is 3.470e+10, the standard deviation is 8.120e+10, the minimum value is -2.51E +10, and the maximum value is 5.110e+11. The mean value of lnfdi is 22.21, the standard deviation is 2.444, the minimum value is 14.43, and the maximum value is 26.96. The mean value of economic freedom is 6.813, the standard deviation is 1.088, the minimum value is 4.760, and the maximum value is 8.380. The mean value of the CPI index in the world ranking is 69.85, the standard deviation is 45.57, and the difference is large, with the minimum ranking being 6 and the maximum ranking being 159.

Table 1: Statistical description of variables

Variable	Obs	Mean	Std.Dev.	Min	Max
gdp	180	2.919	3.962	-36.40	11.40
fdi	180	3.470e+10	8.120e+10	-2.510e+10	5.110e+11
lnfdi	175	22.21	2.444	14.43	26.96
free	180	6.813	1.088	4.760	8.380
cpi	180	69.85	45.57	6	159

4. Empirical Findings

Table (2) reports estimated coefficients of equation 3-2 and the relationship between real GDP growth rate and each variable.

First is infdi and regression analysis on the growth rate of real GDP in the regression eliminated from the id and the influence of the year, the result shows that infdi and have a positive impact relationship between real GDP growth rate, with 1.330, and is significant. The reason why real GDP growth rate goes up when the scale of FDI go up is that FDI can bring advanced technology and good management experience, therefore economic efficiency can be improved. Second, free variable regression and real GDP growth rate for operation, and eliminated from the influence of the year, the results showed significantly negative relation (-0.857). It means that the rate of real GDP growth become lower when the degree of economic freedom increase, and it may because the efficiency of economic activities is suffered from liberal economic environment and low government spending, tax and government-controlled businesses. Third, the growth rate of real GDP and CPI variables regression analysis, which ruled out the influence of the year, according to the results of significant positive correlation, is 0.0180, but the positive correlation coefficient is small, it shows that the influence degree of the CPI for real GDP growth rate is relatively limited, it shows that reducing corruption can improve economic efficiency-manufacturers are more likely to invest in research and development and scale up production rather than using resources to bribe officials-but the economic benefits of reducing corruption are limited. Finally, it comes to multiple regression, and it also eliminated from the influence of the year, however, when the multiple regression is performed, CPI no longer has a significant effect on the real GDP growth rate, infdi and economic freedom still have a significant effect on the real GDP growth rate, with infdi having a positive effect (0.775) and economic freedom having a negative effect (-1.501). This result proves increasing the scale of FDI and reducing economic freedom is good for economic development, but this result shows the rank of CPI worldwide is not significant to real GDP growth rate, and the reason remains to be studied.

Table 2: Simple regression and multiple linear regression

	Dependent variable: growth of real GDP			
	(1)	(2)	(3)	(4)
Infdi	1.330***			0.775***
	(4.22)			(4.17)
free		-0.857**		-1.501**
		(-3.25)		(-2.94)
cpi			0.0180**	0.0189
			(2.83)	(1.53)
country	YES	NO	NO	NO
year	YES	YES	YES	YES
_cons	-23.58***	10.86***	3.701***	-3.348
	(-3.46)	(5.40)	(3.62)	(-0.63)
N	175	180	180	175
R-sq	0.444	0.116	0.104	0.202

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Table 2: (continued).

adj. R-sq	0.342	0.064	0.051	0.143

t statistics in parentheses; * $p<0.05$ ** $p<0.01$ *** $p<0.001$

5. Conclusions

This paper has delved into the complex dynamics of economic development in African countries, with a particular focus on the influence of FDI, economic freedom, and government corruption. Through a comprehensive analysis of data spanning from 2010 to 2019, this study has aimed to shed light on the relationship between these variables and real GDP growth rates in a sample of 18 diverse African and developed nations.

The findings of this research have provided valuable insights into the factors that shape economic development in the African context. Firstly, it is evident that FDI plays a significant role in driving economic growth in African nations. The positive correlation between FDI and real GDP growth rates, as demonstrated by a coefficient of 1.330, highlights the importance of FDI in stimulating economic activities, knowledge transfer, and technological spillovers. This finding is in line with previous research, emphasizing the potential for FDI to act as a catalyst for growth in emerging markets.

However, economic freedom, as measured by the Fraser Institute, has shown a contrasting effect. The negative correlation coefficient of -0.857 may suggest that an decrease in government expenditure, low tax, and lack of government-controlled businesses can impede economic growth. This finding highlights the importance of reducing economic freedom to a certain extent. African governments should be based on the characteristics of their own country fully considering the economic policy of freedom, in order to promote economic growth.

The relationship between government corruption, as measured by Transparency International's Corruption Perception Index (CPI), and real GDP growth rates is more nuanced. While a significant positive correlation was observed (0.0180), the magnitude of this effect is relatively small. This implies that corruption may have a limited influence on economic growth in the sampled African countries. It is crucial to recognize that corruption can have both positive and negative impacts on economic development, depending on the specific context. Policymakers should focus on addressing corruption where it hampers economic activities while ensuring that anti-corruption measures do not stifle efficiency or innovation.

Furthermore, the multiple linear regression model has shown that when considering all three variables simultaneously, CPI no longer retains its significant effect on real GDP growth rates. This result may suggest that FDI and economic freedom are stronger determinants of economic development in the African context, and their effects may outweigh the impact of corruption. In conclusion, this study contributes to the existing body of literature on African economic development by providing empirical evidence on the influence of FDI, economic freedom, and government corruption. African nations stand at a critical juncture where they can increase the scale of FDI and harness economic freedom to accelerate growth while addressing corruption issues that may hinder progress. Policymakers should prioritize strategies that attract FDI, consider the degree of economic freedom carefully, and combat corruption.

Moreover, the insights gained from this research are not limited to Africa alone. They can also be extrapolated to inform economic policy decisions in countries facing similar challenges and conditions. By fostering a favorable environment for economic activities and FDI while maintaining vigilance against corrupt practices, nations can work towards sustainable economic development, contributing to global economic prosperity. However, it is essential to acknowledge the limitations of this study, such as the relatively small sample size and the specific time frame considered. Future research could expand the scope to include a more extensive dataset and examine the long-term effects of these variables on African economic development, at the same time, considering corruption trouble in a larger range. Additionally, qualitative studies and case analyses could provide deeper insights into the intricate relationship between government corruption and economic growth.

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