



***The Impact of Chinese Foreign Direct Investment on
Economic Growth in Ethiopia
An Econometric Study for the Period 2003-2024***

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Abstract:

This study examines the impact of Chinese foreign direct investment (FDI) on economic growth in Ethiopia from 2003 to 2024, using a VAR model. The results indicate a reciprocal relationship between Chinese indirect investment and the economic development of Ethiopia. Economic growth in Ethiopia acts as an attraction for Chinese FDI, while Chinese FDI, in turn, contributes to supporting economic growth in Ethiopia through multiple channels. This reflects the structural interaction between the two variables in the Ethiopian economy.

Keywords: Foreign direct investment; Economic growth; Chinese FDI; Ethiopia; VAR model

JEL Classification Codes:F21, O47, O19,O55, C32

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1. Introduction

Foreign direct investment is one of the most important sources of financing for economic development, especially in developing countries. It works to boost economic growth by creating jobs, improving productivity, and most importantly transferring technology. China is one of the most important countries directing its investments worldwide, including to Africa. In recent decades, it has emerged as a major player in FDI flows to the African continent, witnessing a significant expansion in the volume of its investments and a diversification of targeted sectors.

Ethiopia is among the leading African economies experiencing rapid growth, attracting significant Chinese foreign direct investment, particularly in infrastructure, manufacturing, and construction. This investment expansion coincided with Ethiopia's relatively high economic growth rates over consecutive periods prompting researchers and policymakers to examine the extent to which Chinese investment contribute to economic growth and the achievement of development goals.

Based on this, this article aims to analyze the impact of Chinese foreign direct investment on economic growth in Ethiopia, by studying the relationship between Chinese investment flows and Ethiopia's GDP growth rate, taking into account the role of some relevant macroeconomic variables. The study seeks to contribute to the existing literature by providing an applied analysis that helps to understand the nature of this relationship and assess the extent to which Chinese investment can support sustainable economic growth in Ethiopia.

Research problem

Is there a statistically significant effect of Chinese foreign direct investment on economic growth in?

Research questions

To answer the research problem, we pose the following sub-questions:

- ✓ Does the stock of Chinese foreign direct investment have an impact on Ethiopia's economic growth?
- ✓ Does the flow of Chinese have an impact on Ethiopia's economic growth?
- ✓ Does the total annual revenue of construction projects by Chinese companies in Ethiopia have an impact on Ethiopia's economic growth?
- ✓ Does Chinese exports and imports to Ethiopia have an impact on Ethiopia's economic growth ?

Research hypotheses

- ✓ There is statistically significant effect of the stock of Chinese foreign direct investment on Ethiopia's economic growth.
- ✓ There is statistically significant effect of the flow of Chinese on Ethiopia's economic growth.
- ✓ There is statistically significant effect of the total annual revenue of construction projects by Chinese companies in Ethiopia on Ethiopia's economic growth.
- ✓ There is statistically significant effect of Chinese exports and imports to Ethiopia on Ethiopia's economic growth.

Aim and objectives

This study aims to:

Examine the dynamic interactions between economic growth and Chinese foreign direct investment

Analyze the response of Chinese investment to economic growth shocks over time

Estimate the contribution of each variable to explaining the variance in prediction errors for the other variables

Draw economic implications to support investment and development policies

Research importance

The importance of this study stems from its adoption of the vector auto regression model (VAR), which allows for the analysis of the reciprocal dynamic relationships between Chinese foreign direct investment and the economic growth of Ethiopia without assuming a prior causal direction. This approach is of particular importance in the case of Ethiopia, the study also enables the analysis of impulse response functions and the analysis of variance decomposition, which contributes to a deeper understanding of the effects of Chinese foreign investment over time.

2. Literature review

Economic literature has addressed the relationship between foreign direct investment and economic growth from multiple theoretical and applied perspectives. theoretically, classical growth models have emphasized the importance of investment in achieving growth. Harrod asserts that investment is the pivotal element in the economic growth process, as it influences aggregate demand on the one hand and expands productive capacity on the other. According to his dynamic model, the economic growth rate is linked to the saving rate and the capital –output ratio. Any discrepancy between the actual growth rate and the guaranteed rate leads to economic instability, making investment a crucial factor in achieving or disrupting economic equilibrium. **(Harrod, 1939)** Also Solow asserts that investment plays a central role in determining income levels and economic growth in the short and medium term through capital accumulation. An increase in the saving rate –which is then changed into investment-leads to rise in the capital stock, positively impacting

output. However, the model shows that this effect is not permanent, as it is subject to the law of diminishing returns on capital, this means that the economy eventually reaches a stable equilibrium where growth driven solely by investment ceases, and technological progress becomes the only factor capable of achieving sustainable growth. **(solow, 1956)**, Dunning provides a comprehensive theoretical framework for explaining foreign direct investment (FDI) through the three advantages model, which posits that multinational corporation's decision to invest in a particular country depend on the availability of ownership advantages, location advantages, and internationalization advantages. This framework highlights that economic growth, market size, and institutional stability in the host country are key drivers of FDI, while the latter contributes to supporting economic growth through technology transfer, improved productivity, and enhanced competitiveness of the host economy. **(Dunning, 1981)**, returning to the subject of our study, there are many studies that have focused on the impact of Chinese foreign investment in Ethiopia, including the following: **(Negash, zhu, Lu, & Wang, 2020)** the study was conducted using data from 2554 manufacturing companies, 15.04% in Ethiopia. The study employed the least squares method and the two-step generalized moment method for estimation. The study concluded that the presence of Chinese enables local Ethiopian companies to achieve positive impacts by directly improving productivity and competitiveness through technology transfer to local industries, ultimately contributing to sustainable development. As for the study **(seyoum, wu, & yang, 2015)** this study used data from 1033 Chinese companies operating in Ethiopia in 2011 to examine the impact of Chinese direct investment on the productivity of local companies .local companies with high absorptive capacity benefit from these effects, while those with low absorptive capacity are negatively impacted, the study also found that small and non-exporting companies benefit from these effects more than other local companies. And **(Tadesse ,2014)** examined the trends and determinants of chinese foreign direct investment in sub –saharan

africa , with a particular focus in Ethiopia. The findings revealed that economic growth,government,policiesand infrastructure development are among the most important factors attracting chinese investment,while the development impact of these investments remains contingent on the local economiys capacity to absorb and maximize their benefits.

Despite the abundance of studies that have addressed the relationship between foreign direct investment and economic growth, and the difference in treatment between them theoretically and practically, the literature still suffers from a lack of studies that focus on Chinese investment in Ethiopia using standard dynamic models that take into account the mutual interactions between growth, investment, and shocks , which is what this study seeks to address through the autoregressive vector model.

3. data and Methodology

3.1 Methodology

this study relies on annual time series data for the period 2003 to 2024, this period was chosen based on the availability of data for the variables. The determine the impact of Chinese foreign direct investment on economic growth in Ethiopia, the study employed autoregressive methodology, unit root test, Impulse response functions and decomposition analysis of prediction errors to examine the interaction relationships between variables within the VAR model.

The first time of the vector auto-regression model was introduced in 1977 by the work of Sergeant and Sims, in a context of criticism of the models' macroeconomic structures and structures on their hypotheses a priori. Stricter, many of structural parameters placed on these models are solid and have a suitable empirical application, but this approach comes with this (Koopmans, 1947) a quality of “measure without theory.

A critique of the address, text and comment; according to the methodology of the national bureau of economic research (NBER)

(Qin & Gilbert, 2007), part of this criticism, sergeant and Sims on you propose an alternative model, inspiring the NBER style into a quantitative analysis of economic cycles, which can force the credit analysis of economic models without recording a similar structure.

(Sargent & Sims, 1977)

The vector autoregressive (VAR) model is considered one of the most suitable econometric models for analyzing the dynamic reciprocal relationships between macroeconomic variables.

VAR model is distinguished by the fact that it does not impose strict prior theoretical restrictions and does not require distinguishing between endogenous and exogenous variables within the system. indeed, all variables are treated as endogenous, which gives the model great flexibility in representing economic interactions. **(akkaya, 2021, p. 198)**.

VAR model is considered one of the most widely used and effective econometric models for analyzing multivariate time series, due to its flexibility and ease of application. It represents a natural extension of the univariate autoregressive model to a dynamic multivariate framework, allowing for the examination of reciprocal interactions between variables over time.

VAR models have proven particularly effective in describing the dynamic behavior of economic and financial time series, as well as for forecasting. They often provide more accurate forecasts than those obtained from univariate time series models, and even than those from more complex structural models based on economic theory, such as simultaneous equation models. Furthermore, forecasts from VAR models exhibit a high degree of flexibility, as they can be formulated conditionally, based on the potential future trajectories of specific variables within the model. **(pesaran & pesraran, 1997)**

3.2 Data: variable selection, sources and expected signs

this study considers GDP growth rate of Ethiopia as independent variable in the model, Chinese FDI stock and Chinese FDI flow to

Ethiopia, gross annual revenues of Chinese companies' construction projects in Ethiopia, china's exports and imports from Ethiopia as dependent variable in the period 2003-2024.

Table 1. Table 1:description and data sources of the variable

Variable	Description	Source
Gdp	Ethiopia’s Gross domestic product (gdp) growth rate	World bank World Bank Open Data Data
Fdis	Chinese FDI Stock in Ethiopia	Data: Chinese Investment in Africa — China Africa Research Initiative
Fdif	Chinese FDI Flow to Ethiopia	
Gar	Gross Annual Revenues of Chinese Companies' Construction Projects in Ethiopia	
Cexp Cimp	China's Exports to Ethiopia China's Imports from Ethiopia	

Source :prepared by the researcher.

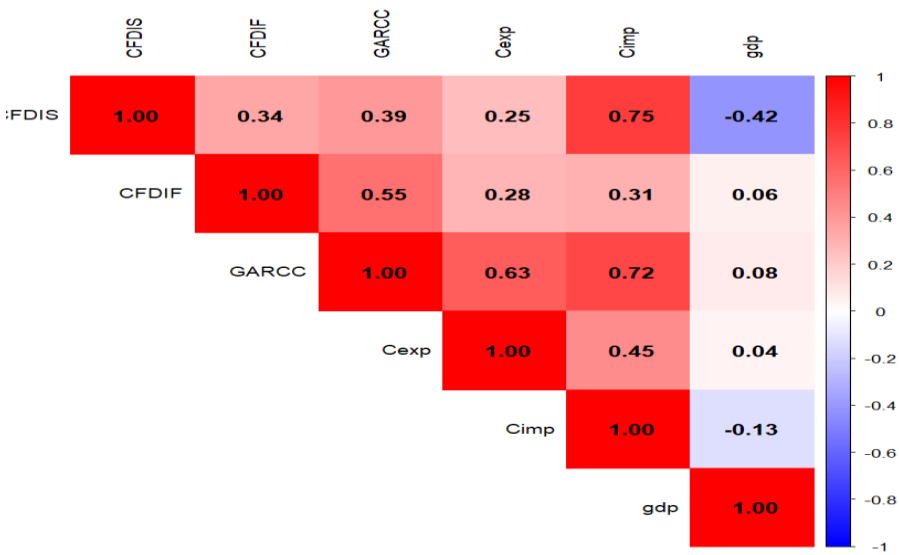
Descriptive statistics:

	GDP	GARCC	CIMP	CFDIS	CFDIF	CEXP
Mean	8.738155	2391.864	280.0123	1256.590	95.25591	2224.416
Median	9.498836	1887.230	327.0550	843.2300	73.29500	2042.705
Max	13.57260	6832.030	489.9000	2992.800	375.3000	13763.47
Min	-2.161360	180.4800	4.740000	4.780000	-139.1700	152.7500
Std. Dev.	3.405645	1942.492	148.2478	1140.093	136.5361	2742.327
Skewness	-1.433330	0.841329	-0.581754	0.295226	0.547693	3.542195
Kurtosis	5.749520	2.730025	2.066131	1.368822	2.614543	15.70173
Jarque-Bera	14.46279	2.662208	2.040374	2.758593	1.236077	193.8956
Probability	0.000724	0.264185	0.360528	0.251756	0.539001	0.000000
Sum	192.2394	52621.01	6160.271	27644.99	2095.630	48937.14
Sum Sq. Dev.	243.5668	79238798	461525.4	27296067	391484.0	1.58E+08
Observations	22	22	22	22	22	22

Source : output of eviews 12.

Correlation test :

Fig.1 correlation matrix



Source : output of R studio.

The results of the Pearson correlation test proved a negative correlation between china's imports and Chinese FDI Stock in Ethiopia with Ethiopia’s gdp growth rate. Conversely it reveals a weak positive correlation between Chinese FDI Flow to Ethiopia, Gross Annual Revenues of Chinese Companies' Construction Projects in Ethiopia, China's Exports to Ethiopia and with Ethiopia’s Gdp growth rate.

4. Results and discussion

Time Series Stationarity Test:(break unit root tests)

Variable	Adf-level	Adf-1 st difference	Philip perrons- level	Philip perrons-1 st difference	Order of integration
Gdp	-0.3399 (0.9013) -13.0137 (0.0000) -1.4895 (0.1240)	-6.6827 (0.0000) -6.5394 (0.0002) -13.0298 (0.0000)	-4.9835 (0.0007) -12.4756 (0.0000) -0.7642 (0.37642)	-34.9405 (0.0000) -38.2917 (0.0000) -15.5747 (0.0001)	I(1)
CFdis	-0.3012 (0.9093) -2.3523 (0.3895) 1.4200 (0.9561)	-1.7315 (0.3458) -1.7315 (0.6967) -1.3939 (0.1467)	-0.3804 (0.8958) -1.9670 (0.5848) 1.0090 (0.9114)	-4.7297 (0.0014) -4.6127 (0.0080) -3.9507 (0.0005)	I(1)
CFdif	-2.1191 (0.2396) -1.7993 (0.6598) -1.7128 (0.018)	-4.3824 (0.0029) -4.6536 (0.0079) -4.5086 (0.0001)	-2.1146 (-0.2412) -1.8965 (0.6206) -1.6504 (0.09206)	-4.6003 (0.0018) -6.8495 (0.0001) -4.7912 (0.0001)	I(1)
Garcc	-1.4753 (0.5260) -1.0443 (0.9150) -0.6296 (0.4324)	-3.7900 (0.0104) -3.9252 (0.0304) -3.8728 (0.0006)	-1.4753 (0.5260) -1.1433 (0.8963) -0.6296 (0.4324)	-3.8046 (0.0101) -3.8994 (0.0319) -3.8871 (0.0005)	I(1)
Cexp	-3.4156 (0.0221) -3.5592 (0.0586) -2.3129 (0.0233)	-6.6265 (0.0000) -6.4707 (0.0002) -6.7954 (0.0000)	-3.4156 (0.0221) -3.5592 (0.05856) -2.3129 (0.0233)	-10.8777 (0.0000) -13.3228 (0.0000) -10.3500 (0.0000)	I(1)
Cimp	-1.7392 (0.3983) -2.0205 (0.5573) 0.4644 (0.8063)	-5.5124 (0.0003) -5.6850 (0.0010) -4.9987 (0.0000)	-1.7910 (0.3743) -2.0205 (0.5573) 0.6045 (0.8389)	-5.5791 (0.0002) -6.0699 (0.0004) -4.9985 (0.0000)	I(1)

Source : output of evIEWS 12.

Table4 :Optimal lag period

VAR Lag Order Selection Criteria
Endogenous variables: CEXP CFDIF CFDIS CIMP GARCC GDP
Exogenous variables: C
Date: 12/28/25 Time: 12:34
Sample: 2003 2024
Included observations: 20

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-786.0957	NA	1.01e+27	79.20957	79.50829	79.26788
1	-702.7431	108.3584	1.07e+25	74.47431	76.56534	74.88250
2	-592.7803	76.97392*	2.45e+22*	67.07803*	70.96139*	67.83610*

Source: output of eviews 12.

The results included in the tests Akaike and schwarz indicated that the optimal lag period lag=2, which allows to ensure dynamic adjustment of the model.

VAR model result:

each variable is explained by its own lagging values and the lagging values of the other variables. In this study, we will focus on the economic growth equation for Ethiopia.

It is evident that Ethiopia lagging GDP (-1) is currently having a positive Impact on itself, but GDP(-2) the effect is less impact and less statistically Significant, meaning that the dynamic effect of growth weakens over time. Chinese foreign direct investment in Ethiopia has a positive impact, bu it is not statistically significant because it needs time to become apparent (lagged effect). But the investment equation reveals a cumulative pattern of Chinese foreign investment in Ethiopia. Economic growth in Ethiopia is more of an attraction for Chinese foreign investment than a consequence of it. Regarding the revenues of Chinese construction companies, their Coefficient is significant and positive, but its significance is weak, indicating that infrastructure projects contribute to Ethiopia’s economic growth, but their overall impact depends on the degree of local integration. Exports and imports prove the continuity and importance of foreign trade between Ethiopia and China.

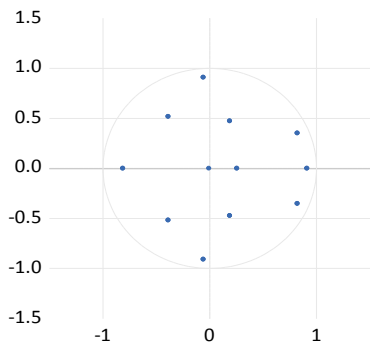
Regarding the model’s quality, the coefficient of determination R^2 is Relatively high in most equations, with 93% of the changes in Ethiopia’s Economic growth explained by independent variables and the remainder by other factors. As for the overall significance of the model, most Equations are significant, which proves that the model is statistically Appropriate.

Furthermore, the model is stable, allowing for shock response analysis and variance analysis.

The stability of the model:

After estimating the autoregressive model, a stability analysis is performed, along with a test of the models roots and an examination of the normality of the residual distribution.

Inverse Roots of AR Characteristic Polynomial



Compo nent	Jarque-Bera	Df	Prob.
1	0.208223	2	0.9011
2	1.653803	2	0.4374
3	0.366635	2	0.8325
4	1.977903	2	0.3720
5	0.136426	2	0.9341
6	5.723946	2	0.0572
Joint	10.06694	12	0.6101

*Approximate p-values do not account for coefficient Estimation

Source: output of EViews 12.

The results of the root test indicate that the estimated model satisfies the stability condition, as all roots lie within the unit circle and have values less than one. furthermore, the Jarque Bera normality test confirms that the residuals follow a normal distribution, with the probability associated with this test estimated at 0.61, a value greater than the 5% significance threshold, which leads us to not reject the null hypothesis of normality.

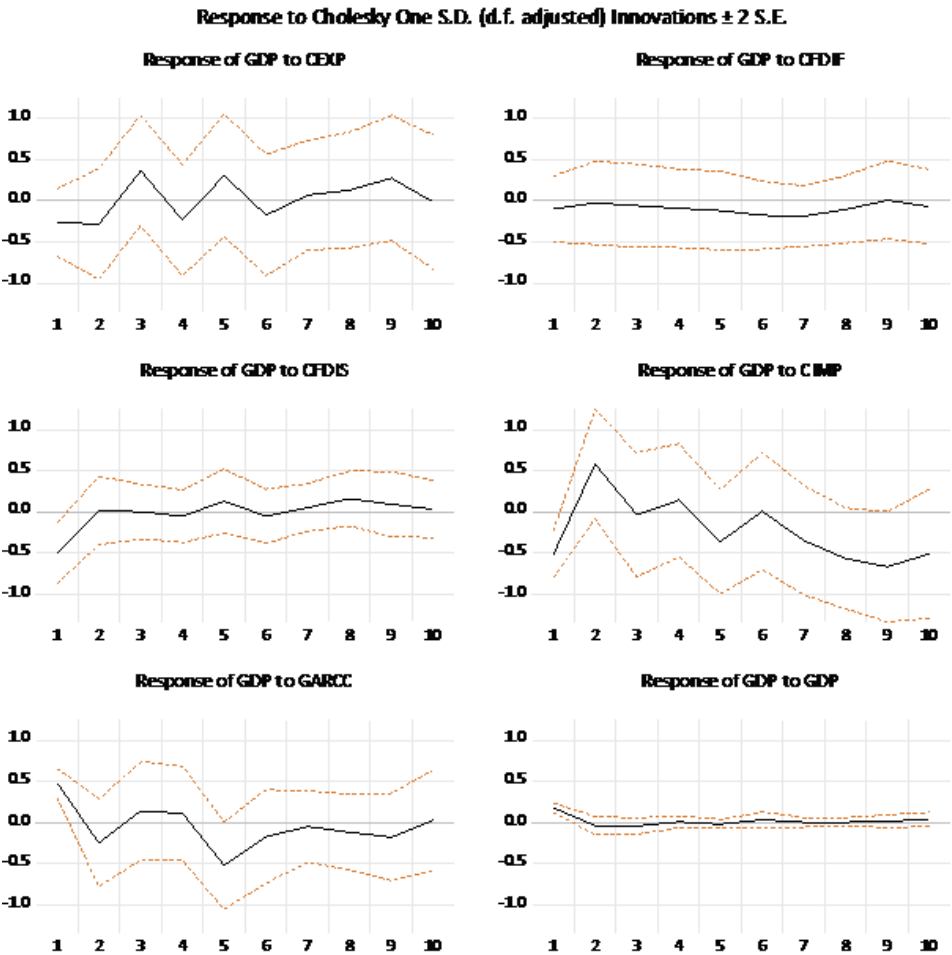
Impulse response functions

From an empirical perspective, the results derived from the impulse response functions indicate that shocks associated with Sino-African economic relations exert positive effects on Ethiopia’s GDP growth rate, although these effects differ in terms timing and persistence. In

particular, Chinese exports to Africa contribute positively and with a delay to Ethiopia economic growth, with the impact reaching its peak after three periods. this pattern reflects a non-monotonic dynamic characterized by a phase of gradual adjustment prior to the stabilization of the system, these finding suggest that the trade spillovers from China to the Ethiopian economy do not immediately, but rather emerge after a certain time lag.

Similarly, shocks related to both the flows and the stock of Chinese foreign direct investment (FDI) in Africa generate a positive response in Ethiopia's economic growth, peaking in the short run and then gradually fading as it converges toward zero. This behavior reflects the transitory nature of FDI impacts and a dynamic adjustment process over the medium and long term, moreover, the results concerning Chinese imports from Africa, along in the gross annual revenues of construction projects carried out by Chinese firms, reveal a positive, immediate, and persistent response of economic growth, albeit accompanied by fluctuations before returning to equilibrium. the confidence intervals confirm that the observed peaks are statistically significant over the considered analysis horizon, thereby reinforcing the robustness of the results and the stability of the estimated dynamic system.

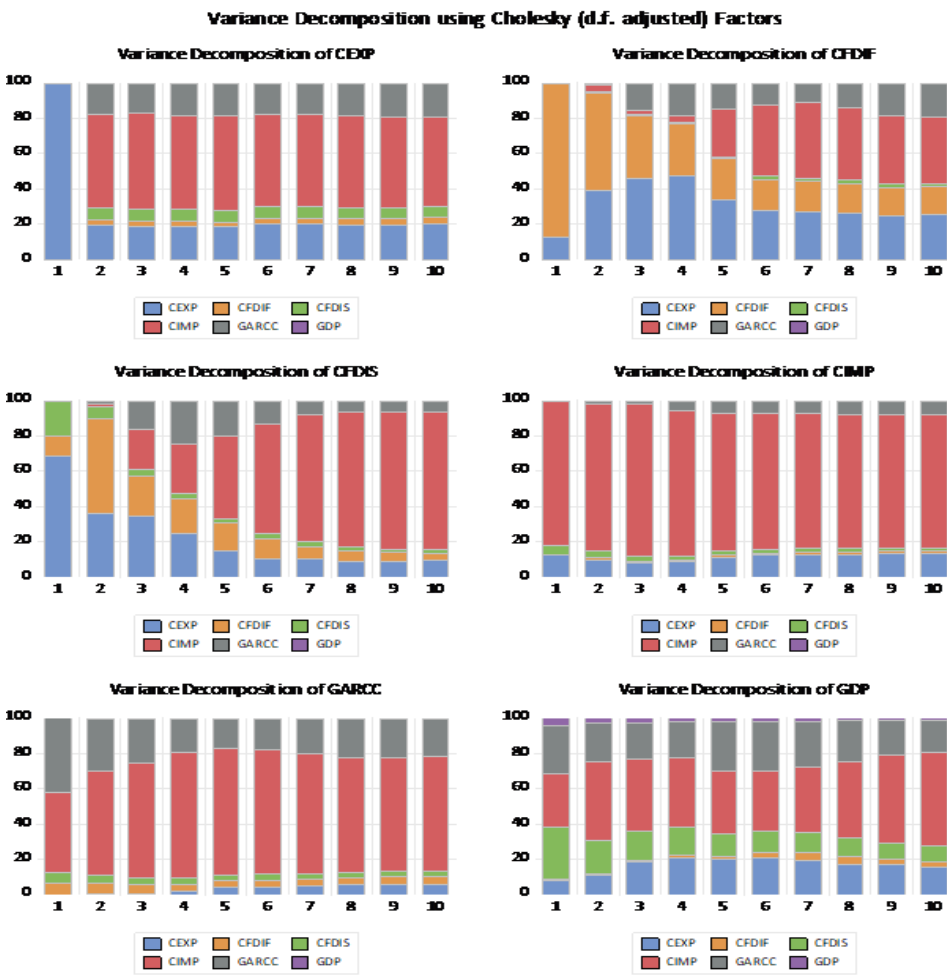
Fig.2 Impulse response



Source: output of EViews 12.

Variance Decomposition:

Fig.3 variance Decomposition



Source: output of EViews 12.

Figure 3 reports the forecast error variance decomposition of Ethiopia’s GDP over ten forecast horizons; each column shows for the response variable, the proportion of the forecast error variance explained by structural shocks to each of the variables included in the

model, as indicated in the figure. By construction, the contributions in each column sum to 100% at every forecast horizon.

In the short run, forecast errors in Ethiopia's GDP are overwhelmingly driven by its own shocks, which account for approximately 93% of the total variance, however, this contribution declines markedly over time, reaching about 15.6% by the tenth period. this substantial reduction suggests that fluctuations in GDP growth become increasingly influenced by external and structural factors in the medium and long run.

In particular, chain s imports from Ethiopia and the gross annual revenues of Chinese construction companies project in Ethiopia emerge as the most influential determinants of GDP forecast errors beyond the short term. These factors are followed by China's stock of foreign direct investment and its exports to Ethiopia, while Chinese foreign direct investment flows to Ethiopia play a comparatively smaller role. Overall, the results highlight the growing importance of China-Ethiopia economic linkages in shaping Ethiopia's growth dynamic over the medium to long term.

4. Conclusion

Our study aimed to highlight the impact of Chinese foreign direct investment (FDI) on economic growth in Ethiopia, given the significant expansion of Chinese investments worldwide, particularly in African countries. Our choice of Ethiopia stems from the strong economic ties between the two countries over the past two decades and Ethiopia's remarkable economic growth, the fastest in Africa. The results showed that Chinese investment is a key component in supporting Ethiopia's economic growth, especially through financing infrastructure projects, developing the industrial sector, and enhancing the productive capacity of the local economy through technology transfer. However, the impact of Chinese FDI is not automatic or guaranteed. It depends on several structural and institutional variables, such as human capital, the effectiveness of economic policies, and the quality of the investment climate. While investment contributes to

stimulating economic activity and creating jobs, maximizing its developmental impact requires strengthening ties between foreign companies and the local economy, improving technology transfer, and raising the level of national skills. The standard study using the Vector Auto regression (VAR) model highlighted the reciprocal dynamic relationship between economic growth and Chinese investment flows. Economic growth in Ethiopia acts as an attraction for Chinese foreign investment, while Chinese foreign investment, in turn, contributes to supporting Ethiopia's economic growth through multiple channels. This reflects the structural interaction between the two variables in the Ethiopian economy, provided it is managed within a long-term strategic vision based on maximizing benefits, minimizing costs, and strengthening internal economic integration. Based on the above, the following recommendations can be made: The necessity of directing foreign investments towards productive sectors with high added value; The activation and strengthening of the institutional and regulatory framework to ensure the maximum possible benefit from the economic partnership with China; The adoption of educational and training policies that transfer technology and support human capital development, as this is a crucial element in transforming foreign investment flows into sustainable economic growth.

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