

IMPACT OF FOREIGN DIRECT INVESTMENT (FDI) ON ECONOMIC DEVELOPMENT IN ETHIOPIA

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Abstract: Foreign Direct Investment (FDI) plays a pivotal role in stimulating economic growth and development in developing countries, such as Ethiopia. This study explored the impact of FDI on the economic development of Ethiopia by analyzing the relationship between FDI inflows and key economic indicators including gross domestic product (GDP) growth, employment, poverty reduction, technological advancement, and health conditions. This study employed a VAR model to collect quantitative data from secondary sources such as the World Bank and Ethiopian Investment Commission, as well as qualitative data from experts in key sectors in the country to analyze the research problem. Additionally, this study conducted case studies of various sectors in Ethiopia to provide examples of successful FDI attraction and lessons learned.

Keywords: Foreign Direct Investment (FDI); Productivity and technology; Ethiopia; Economic growth

1. INTRODUCTION

Foreign Direct Investment (FDI) has become a vital catalyst for economic development and expansion in developing countries, without difference in Ethiopia. As one of the most rapidly expanding economies in Africa, Ethiopia has proactively sought FDI to improve its productive capabilities, promote technological progress, generate employment prospects, and boost overall economic prosperity. This study examined and evaluated the effect of FDI on Ethiopia's economic development, providing invaluable insights into the efficacy of FDI policies and strategies in the context of a low-income nation. Ethiopia's economic development trajectory has been marked by substantial policy adjustments aimed at attracting foreign investors and promoting sustainable growth. Over the past few decades, the country has implemented various economic reforms, thereby creating a more hospitable environment for foreign businesses to invest in and engage in the nation's economic activities. The government's commitment to liberalizing the economy, upgrading infrastructure, and designating special economic zones has been instrumental in attracting FDI inflows from a diverse range of industries and regions [1].

FDI has emerged as a crucial catalyst of economic growth in developing countries, including Ethiopia. This study evaluated the impact of FDI on the development of the Ethiopian economy by examining its effects on various indicators such as Gross Domestic Product (GDP), employment opportunities, poverty reduction, technology transfer, and health outcomes. To achieve this, a mixed-methods approach was employed, incorporating both quantitative data obtained from reputable sources, such as the World Bank and the Ethiopian Investment Commission, as well as qualitative insights gleaned from interviews with key stakeholders. Each case study provides a sector-specific analysis of successful FDI policies along with valuable lessons learned. The objective of this comprehensive evaluation was to provide critical information on the functioning of FDI policies in underdeveloped countries [2].

The significance of FDI in Ethiopia's development strategy cannot be overemphasized. Foreign investments have contributed to crucial improvements in the country's economic indicators, including GDP growth, employment generation, and poverty reduction initiatives. FDI has facilitated the expansion of domestic industries through the injection of much-needed capital and technology, thereby enhancing productivity and competitiveness in both the local and international markets. However, although FDI presents numerous opportunities for Ethiopia's economic growth, it also poses challenges that require careful consideration. Ensuring that the benefits of FDI are equitably distributed across various sectors and regions and fostering linkages between foreign investors and local businesses is a crucial aspect that needs to be addressed. Furthermore, managing potential risks such as dependency on specific industries or volatile global economic conditions requires a prudent and strategic approach from policymakers [3].

This study examined the relationship between FDI inflows and key economic indicators in Ethiopia. Specifically, it investigated the impact of FDI on GDP growth, employment generation, poverty reduction, and technological advancement. Moreover, this study assessed the mechanisms through which FDI affected Ethiopia's economic development and identified the challenges and opportunities associated with attracting and maximizing the benefits of foreign investments.

2. LITERATURE REVIEW

The impact of FDI on Ethiopia's economic development has been a subject of significant interest among scholars and policymakers. A thorough examination of the literature reveals a multitude of studies that elucidate the relationship between FDI inflows and key economic indicators in the context of this developing nation.

Dejene Mamo Bekana, titled "Determinants of Foreign Direct Investment in Ethiopia; Time Series Evidence From 1991–2013" (2016). The researcher utilized time-series data to investigate the effect of FDI on Ethiopia's economic growth. The results indicate a positive relationship between FDI inflows and GDP growth, suggesting that FDI plays a critical role in driving economic development in the country [4].

Similarly, in an empirical study conducted by Saidatulakmal Mohd and Abdillahi Nedif Muse in Ethiopia titled "Impact of Foreign Direct Investment on Economic Growth in Ethiopia: Empirical evidence" (2021), they investigated the long-term relationship between FDI inflows and GDP growth in the country. They found evidence supporting the positive impact of FDI on Ethiopia's economic growth, highlighting the significance of foreign investments for sustained development. In addition, a study conducted by Zewdu E.G., Workneh G.G., and two other authors titled "The Effect of Foreign Direct Investment on Ethiopian Economic Growth" (2021) analyzed the connection between FDI and economic growth using time series data from 1990 to 2020. The authors adopted multiple linear regression analysis by employing STATA V15 to demonstrate the impact of the independent macro variables on a country's GDP growth, which serves as a measure of economic growth and the dependent variable of the study. The findings of this study provide additional evidence of the positive impact of FDI on Ethiopia's economic growth [5].

3. FDI INFLOWS AND ECONOMIC INDICATORS IN ETHIOPIA

FDI has played a significant role in reshaping Ethiopia's economic landscape and aiding the achievement of its development objectives. This section examined the interconnectivity between FDI inflows and crucial economic indicators in Ethiopia, focusing specifically on the consequences of these inflows on GDP growth, employment, poverty alleviation, and technological advancement.

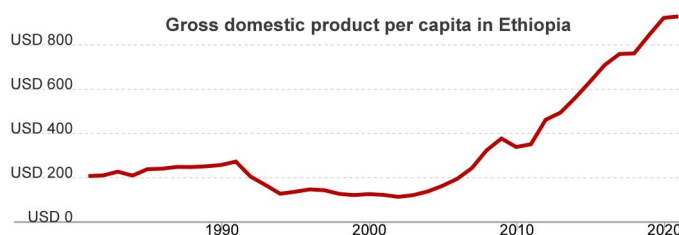


Fig. 1 Total FDI in Ethiopia and FDI/GDP from 1977 to 2022

3.1 GDP Growth

Ethiopia has witnessed substantial and robust growth in its GDP in recent years, and FDI has played a pivotal role in driving this expansion. Foreign investments have injected substantial capital into various sectors, thereby enhancing production capacity and bolstering export competitiveness. The establishment of industrial parks and special economic zones has attracted substantial FDI, particularly from the manufacturing and agro-processing industries. This has contributed to the diversification of the economy and reduced its reliance on traditional agricultural sectors [6].

Furthermore, FDI has facilitated technological advancement and knowledge transfer, thereby enabling local industries to adopt more efficient and modern production methods. Consequently, Ethiopia's GDP growth has been positively affected by the inflow of FDI, which has been instrumental in establishing the country as one of the fastest-growing economies in the region.



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Fig. 2 Trends in GDP Per Capita in Ethiopia (Year Range)

By analyzing Figures 1 and 2, it becomes evident that prior to 1995, there was no significant FDI in Ethiopia, and the growth rate of GDP per capita was relatively slow. After 1995, FDI in Ethiopia began to increase annually, concurrent with an increase in its per capita GDP. After 2010, both FDI and GDP per capita experienced a pronounced upward trend. During the decade from 2010 to 2020, FDI increased from US\$0.29 billion to US\$2.40 billion, reflecting an impressive average annual growth rate of 72.76%. During the same period, GDP per capita experienced a notable increase from US\$380.42 to US\$882.19, with an average annual growth rate of 13.19%.

3.2 Employment Generation

Employment is an essential component of Ethiopia's economic development plan, considering its substantial and young population. FDI plays a critical role in the creation of employment opportunities in certain industries such as manufacturing, construction, and services. The influx of foreign investments has led to the establishment of new businesses and the expansion of existing ones, thereby enhancing the demand for both skilled and unskilled labor.

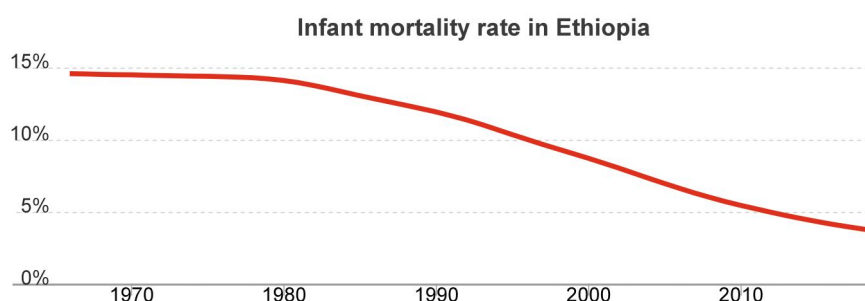
As indicated in Figure 3, there was a year-by-year increase in FDI, coincidentally accompanied by a decrease in the proportion of children in employment each year. Specifically, between 2005 and 2011, the proportion of children employed dropped from 58.12% to 27.82%. This dual trend suggested that FDI had positively improved Ethiopia's job market while indirectly benefiting the country's education system. This development held great significance from the long-term perspective of poverty alleviation and national development.

Although FDI has facilitated the creation of employment opportunities, there are concerns regarding the quality of these jobs. Numerous FDI-driven industries in Ethiopia are characterized by low-skilled labor-intensive work with limited benefits. Therefore, it is imperative that policymakers strike a balance between attracting foreign investment and ensuring that employment opportunities provide decent wages and working conditions [7].

3.3 Poverty Reduction

Ethiopia's dedication to eradicating poverty is manifested in its extensive Growth and Transformation Plan (GTP), which seeks to elevate millions of Ethiopians out of poverty. FDI has been recognized as a catalyst for poverty reduction as it stimulates economic growth and generates employment prospects, resulting in increased household income [8].

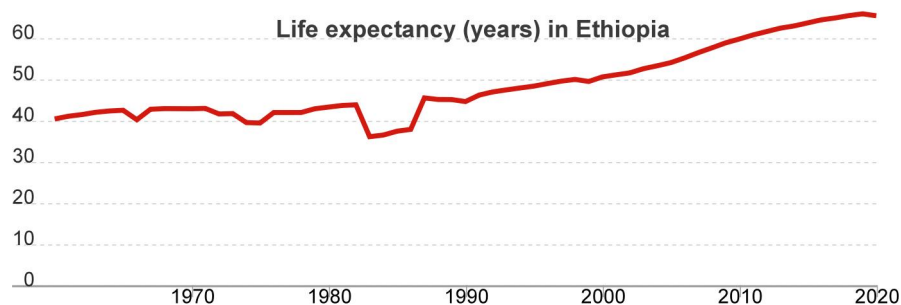
Through the enhancement of productivity in various sectors and the promotion of export-oriented industries, FDI has made significant contributions to increasing household income and reducing poverty rates. Investments from abroad in infrastructure such as roads and energy have enhanced market and essential service accessibility for rural communities, thereby contributing to the alleviation of poverty [9].



Note: Data from datacatalog.worldbank.org via Data Commons

Fig. 3 Infant Mortality Rate in Ethiopia

In Figure 3, the downward trend in infant mortality rate in Ethiopia over the years is depicted. This decline is a positive indicator of improvements in healthcare, nutrition, and general living conditions, which can be associated with economic growth and development. While FDI is primarily an economic instrument, its broader social impact, as reflected in health indicators, cannot be ignored. The increased financial resources and infrastructural developments stemming from FDI can lead to improved healthcare services and access, contributing to this favorable outcome in infant mortality rates.



Note: Data from datacatalog.worldbank.org via Data Commons

Fig. 4 Life Expectancy (Years) in Ethiopia

Figure 4 presents the trajectory of life expectancy in Ethiopia, which shows a significant upward trend. This increase in life expectancy is commonly linked to improved economic conditions, better healthcare, and higher standards of living, which are, in part, outcomes of effective investment and economic policies. The role of FDI in enhancing the economic capacity of Ethiopia to support health infrastructure and services may be inferred from these trends. Consequently, as the economy grows with the help of foreign investments, the cumulative effects on public health and life expectancy become more apparent.

3.4 Technological Advancement

Technological advancement is a vital aspect of Ethiopia's economic development. FDI plays a pivotal role in introducing cutting-edge technologies, expertise, and management practices. By introducing advanced technologies that are not commonly available locally, foreign investors have enabled domestic industries to enhance their production processes. Additionally, FDI has facilitated the exchange of knowledge and skills as local employees working with foreign experts acquire valuable expertise. This has resulted in the development of a more skilled workforce and has strengthened Ethiopia's ability to innovate and compete in the global market.

4. CASE STUDY: ETHIOPIA'S EXPERIENCE WITH FDI

The role of FDI in Ethiopia's economic development strategy is of paramount importance. By actively seeking FDI, the country has been able to attract external capital, facilitate technology transfer, and promote industrialization. This section presents a comprehensive examination of Ethiopia's experience with FDI inflows, assesses their influence on economic development, and identifies crucial lessons learned.

4.1 FDI Trends in Ethiopia

In the past two decades, Ethiopia has experienced a substantial increase in FDI inflows, primarily attributed to its appealing investment climate and the government's commitment to economic reforms. The government has implemented various initiatives to attract foreign investors such as providing tax incentives, simplifying administrative processes, and establishing industrial parks and special economic zones [9].

According to the "World Investment Report 2022" published by the UNCTAD, foreign direct investment inflows witnessed a rise from \$2.4 billion in the previous year to US\$4.2 billion in 2021. Meanwhile, national FDI stock stood at US\$31.6 billion, which accounted for approximately 31.8% of the country's domestic production. Most foreign investments have been concentrated in the refining, mining, real estate, manufacturing, and renewable energy sectors. Additionally, the country leveraged the challenges faced by the textile industry to attract foreign textile companies. China is among the top investors, accounting for 60% of the newly approved foreign direct investment projects, with significant investments in manufacturing and services. Other major investor nations include Saudi Arabia, the United States, India, and Turkey.

The manufacturing industry is a significant beneficiary of FDI in Ethiopia. Investors have been drawn to the country's abundant workforce, expanding markets, and favorable access to regional and international markets through trade agreements. Sectors, such as textiles and garments, leather products, and agro-processing, have experienced substantial FDI inflows, thereby contributing to the diversification of the economy and enhancing the nation's export competitiveness [10].

4.2 Foreign Investment in Manufacturing

The textile and garment industry in Ethiopia has been a recipient of substantial FDI, with Asian companies particularly active in investing in the country. One of the most notable success stories in this regard is the establishment of the Hawassa Industrial Park, which has created thousands of jobs and has contributed significantly to Ethiopia's export growth in the apparel sector.

Arab governments implemented Growth and Transformation Plan I (GTP I) as their primary development strategy during the financial years 2010-11 to 2014-15. The success of this strategy led to the development of a follow-up plan, GTP II, which began in 2015/16 and continued along a similar path. The primary objective of both GTP I and GTP II is to attract foreign investment and encourage economic growth, while promoting the transfer of technology from local enterprises. As stated by the State Planning Commission (2016), “Due to the limited capacity of domestic investors to meet all required investments, Foreign direct investment (FDI) will account for a significant portion of investment in the coming years”.

4.3 Infrastructure Development

FDI plays a pivotal role in financing and developing infrastructure projects in Ethiopia. Chinese organizations have made substantial investments in constructing roads, railways, and energy facilities, thereby enhancing connectivity and supporting industrialization efforts. Among the most prominent infrastructure projects in Ethiopia is the Addis Ababa-Djibouti Railway, which connects the capital city, Addis Ababa, to the port of Djibouti. China played a significant role in this project as a major investor and contractor by providing financial and technical assistance in building the railway. Completion of this railway has significantly improved transportation efficiency, reduced logistics costs, and facilitated trade with Djibouti's major port, thereby enhancing Ethiopia's connectivity to international markets.

Another instance illustrating the substantial impact of China's FDI on Ethiopia's infrastructure is the construction of roads and highways. China has played a pivotal role in the development of Ethiopian transportation networks through numerous road and highway construction projects. One noteworthy endeavor is the Ethio-Djibouti Road, which has bolstered the economic relations between Ethiopia and Djibouti. Moreover, China's participation in road construction within Ethiopia has enhanced access to remote areas, fostering trade, tourism, and socio-economic development [11].

5. METHODOLOGY

The selected data analysis strategy employed a VAR model of a multivariate time series (M-T-S). The VAR model has been demonstrated to be effective, flexible, and straightforward for the analysis of multivariate time-series data, which is why it was selected. In contrast to other models, the VAR model necessitates the differentiation of variables as dependent, independent, or non-linear, which can be accomplished through a statistical approach based on linear regression. Significantly, the VAR model can incorporate both long- and short-term information supported by co-integration attributes, which are crucial for this analysis [12].

Econometrics employs the VAR method to quantify linear correlations among time-series data. This technique surpasses univariate Auto Regression (AR) models by accommodating multiple variable changes [13]. The VAR model captures alterations in a set of k endogenous variables based on their prior values from the same time frame. To analyze quantitative data, a VAR model is a suitable choice, owing to its ability to handle multivariate time-series data. A VAR model with a p -lag, identified as VAR(p), can be mathematically represented as:

$$Y_t = v + A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

$$Y_t = \begin{bmatrix} Y_{1,t} \\ Y_{2,t} \\ Y_{3,t} \\ Y_{4,t} \end{bmatrix} \text{ denotes a } 4 \times 1 \text{ random vector of time series variables.} \quad (2)$$

Where

Dependent variables are represented by:

$Y_1, t \rightarrow$ GDP Growth Rate.

$Y_2, t \rightarrow$ Employment Rates.

$Y_3, t \rightarrow$ Poverty Rate.

$Y_4, t \rightarrow$ Technology Index.

Independent variable

Foreign Direct Investment (FDI) Inflows.

5.1 Data

Quantitative data was sourced exclusively from reputable databases, such as the World Bank and the Ethiopian Investment Commission, for the purpose of this study. Key economic indicators, including GDP growth (Y_1, t), employment rates (Y_2, t), poverty rates (Y_3, t), and the technology index (Y_4, t), were collected over a specified period, enabling in-depth statistical analysis. This study was conducted based on secondary data sources from the MOFED and the EIA. Variables such as real per capita GDP, foreign direct investment, gross domestic savings, governmental consumption, GDP deflator, and trade were utilized in the analysis to gain a better understanding of the economic changes that have taken place in Ethiopia during the specified time period.

The data analysis for this project was conducted with the aid of Stata, a statistical software program commonly utilized by researchers who desired to manipulate and visualize their data. Stata was an econometric program offering a range of

tools including VAR analysis. The time frame for the analysis spanned from 1983 to 2022, comprising a total of 40 observations. This extended observation period enabled a comprehensive evaluation of the influence of FDI on various economic indicators over a substantial duration.

5.2 Results and Discussion

5.2.1 Descriptive statistics

The summary and descriptive data are presented to depict the contributions of six distinct variables in the comprehensive analysis of our findings, which can be elaborated on subsequently.

Table 1 Annual Economic Indicators and FDI Inflows in Ethiopia (1982-2022)

Year	Growth Rate	Employment	Poverty Rate	Technology	FDI
1982	0.9160138	65.243	30	50.123	.345
1983	8.235005	65.748	28.5	52.345	1.234
1984	-2.848022	64.925	31.2	49.678	-.789
1985	-11.14435	63.295	35.8	45.901	-1.567
1986	9.661613	63.865	33.5	54.234	2.345
1987	13.85933	64.582	32	58.567	3.456
1988	.5036745	65.012	30.5	51.789	.123
1989	-3.610442	65.375	29.8	50.456	-.456
1990	2.726452	72.852	28.2	53.789	1.234
1991	-7.13748	75.455	28.1	40.012	-2.345
...
2022	5.31709603	77.345	9.6	67.456	.789

Table 1 chronicles the annual figures for Ethiopia's economic growth, employment, poverty rates, technology index, and FDI inflows. The data demonstrate periods of economic volatility, with significant declines in growth rate during years of political and social unrest, such as the mid-1980s. Conversely, periods of high growth correlate with increased levels of FDI, suggesting a potential positive influence of foreign investment on economic performance. However, the data also indicate years where FDI is negative, reflecting outflows that could be attributed to periods of instability or poor investor confidence.

Table 2 Descriptive Statistics of Key Variables (1982-2022)

Variable	Obs	Mean	Std. Dev.	Min	Max
iYear	41	2002	11.97915	1982	2022
Growth Rate	41	5.884616	6.283331	-11.14435	13.85933
Employment~e	41	75.28129	5.49132	63.295	79.969
Poverty Rate	41	20.88293	7.686934	9.6	35.8
Technology~x	41	61.74876	10.38274	38.345	76.789
FDI	41	1.489439	1.966011	-3.456	5.678

Table 2 provides an aggregate view of these variables. The average annual growth rate is approximately 5.88%, with a high standard deviation, underscoring the economic fluctuations over the period. Employment rates average around 75%, indicating a relatively stable labor force participation rate. The poverty rate's average of 20.88% with a considerable range signifies a decline over time, potentially pointing to the gradual effectiveness of economic policies and foreign investment in poverty alleviation. The technology index has increased, on average, suggesting gradual progress in technological adoption or innovation. The mean FDI inflow is positive, but the standard deviation indicates variability, highlighting the fluctuating nature of foreign investment.

5.2.2 Impact FDI on economic development

The findings of the VAR analysis for Ethiopia offered valuable insights into the behavior of economic indicators during the specified period. Each equation within the system demonstrated the relationship between FDI and indicators such as GDP growth, job creation, percentage of individuals living below the poverty line, and technological advancement. In particular, the growth rate equation revealed that the model explained 22.89% of the variance in Ethiopia's economic growth, with the joint effect of the variables being statistically significant (chi-square test, $p=0.0366$). Consequently, FDI can be considered as a key factor influencing economic development.

Vector autoregression					
Sample: 1983 - 2022			Number of obs	=	40
Log likelihood = -397.4842			AIC	=	21.37421
FPE = 1334.387			HQIC	=	21.83219
Det(Sigma_ml) = 294.3657			SBIC	=	22.64087
Equation	Parms	RMSE	R-sq	chi2	P>chi2
growthrate	6	5.93648	0.2289	11.87383	0.0366
employmentrate	6	1.34692	0.9441	675.2047	0.0000
povertyrate	6	1.73472	0.9551	850.7243	0.0000
technologyindex	6	5.05614	0.7917	152.0631	0.0000
fdi	6	1.98465	0.1262	5.778093	0.3284

Fig. 5 Vector Autoregression (VAR) Analysis of Economic Indicators and FDI in Ethiopia (1983-2022)

The employment rate equation demonstrated a high explanatory power, with an R-squared value of 94.41%. This indicated that the equation provided a strong explanation for the variations in employment levels. Furthermore, a chi-square test yielded a highly significant result (p-value = 0.0001), providing strong evidence that the model effectively captured the dynamics of job creation. One key variable identified as contributing to employment in Ethiopia was FDI. The poverty rate also exhibited high explanatory power (0.9551%), with a chi-square test yielding a p-value less than 0.0001, presenting a significant relationship between FDI and poverty reduction. Hence, FDI, along with other factors, played a critical role in advancing a country's poverty reduction agenda.

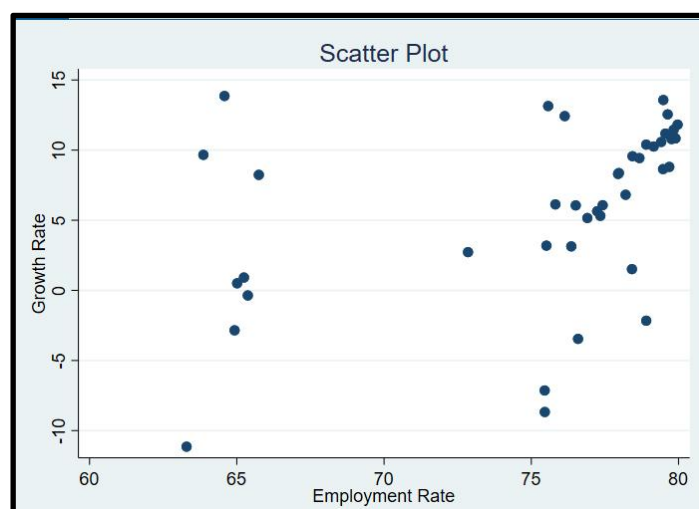


Fig. 6 Scatter Plot of Economic Growth Rate vs. Employment Rate in Ethiopia (1983-2022)

In Figure 6, the scatter plot reveals a positive correlation between the employment rate and the economic growth rate in Ethiopia over the period from 1983 to 2022. The points cluster more densely as they progress towards the upper right, indicating that higher employment rates are associated with higher growth rates. This visual representation corroborates the results of the VAR analysis, which demonstrated a strong explanatory power for the employment rate equation with an R-squared value of 94.41%. The significant chi-square test result (p-value = 0.0001) further substantiates the relationship, suggesting that FDI is a meaningful contributor to employment in Ethiopia. The positive correlation observed in this scatter plot underscores the importance of FDI in job creation and, by extension, its role in economic growth and poverty reduction.

The tight clustering of points at higher levels of both employment and growth rates may indicate a period of accelerated economic development, potentially influenced by increased levels of FDI and other economic reforms. However, the less dense areas of the plot, particularly where either growth or employment rates are low, highlight the variability and the challenges faced in consistently translating FDI into tangible economic benefits. This variability warrants further investigation into the conditions under which FDI most effectively contributes to employment and growth.

The evidence presented in this scatter plot and the VAR analysis implies that FDI, while not the only factor, plays a crucial role in shaping Ethiopia's economic landscape. Policy implications drawn from this analysis would suggest that strategies aimed at attracting FDI should be designed to maximize its impact on job creation and poverty reduction.

The technology index equation exhibited a satisfactory R2 value of 0.7917, suggesting that it accounted for nearly 80% of the variation in technologies. A highly significant chi-square test, with a p-value of less than 0.0001, validated the model's efficacy in capturing the relationship. The FDI equation, despite its relatively low R-squared value of 12.62%, indicated slightly less explanatory power than the other equations. In addition, the non-significant chi-square value (p-

value = 0.3284) suggested that the model for FDI may not be as robust as that for the other variables. This required further analysis and inclusion of additional determinants of foreign direct investment in Ethiopia.

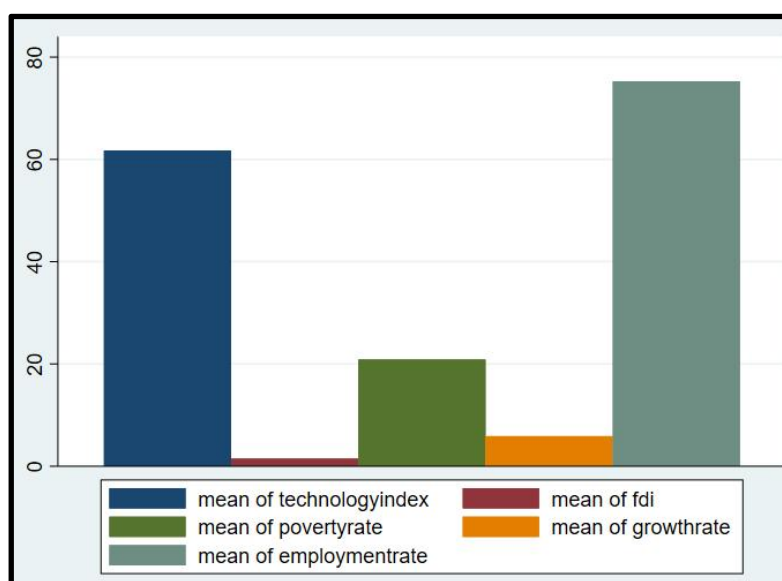


Fig. 7 Mean Values of Economic Indicators and FDI in Ethiopia (1983-2022)

Figure 7 provides a visual comparison of the average values of critical economic indicators — the technology index, poverty rate, employment rate, and growth rate — alongside the mean value of FDI in Ethiopia from 1983 to 2022. The bar graph illustrates that the mean growth rate towers over the other indicators, suggesting a strong overall economic expansion during this period. In contrast, the mean values of FDI, while lower, present a noteworthy contribution to this growth, considering the relatively smaller scale of FDI flows compared to the size of the economy.

The combination of log likelihood, AIC, FPE, HQIC, and SBIC provided an impressionistic view of the system's impact on Ethiopian economic development, particularly with regard to foreign direct investment. These variables were significant because they implied that the combined impact of FDI and other economic indicators significantly contributed to the Ethiopian economy during this period. The log likelihood functioned as an indicator of how well the model fits the data, representing the probability of obtaining data under the assumed parameters. In this case, the log likelihood provided a negative number, such as -397.4842, indicating that the fitted parameter had a good fit with the data. There were several information criteria, including the Akaike Information Criterion (AIC), Final Prediction Error (FPE), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC), which struck a balance between model complexity and the amount of information used to estimate the model parameters. The obtained values suggested that the model fitted the data relatively well and did not overcomplicate it.

Lower AIC, FPE, HQIC, and SBIC values suggested that the model was more concise and insightful. The results highlighted the impact of FDI coupled with other economic factors on economic growth, job creation, and poverty alleviation in Ethiopia during the specified period. This study highlighted the importance of conducting further research on the relationship between FDI and technology as well as other factors. This exhibited the need to examine the extensive effects of FDI comprehensively. The findings of this study for formulating policies aimed at harnessing FDI to promote sustainable development in Ethiopia's context indicate that a more holistic approach is required, one that goes beyond short-term economic indicators and considers technological and other dimensions more broadly.

Table 3 Vector Autoregression (VAR) Coefficients of Economic Indicators and FDI in Ethiopia

	Coef.	Std.Err.	z	P> z	[95% Conf. Interval]
Growth rate					
Growthrate L1.	.2260831	.3865133	0.58	0.559	-.5314691 .983654
Employment~e L1.	.5292263	.3026881	1.75	0.080	-.0640315 1.122484
Povertyrate L1.	.4975029	.4256038	1.17	0.242	-.3366652 1.331671
Technologh~x L1.	.4063841	.2941882	1.38	0.167	-.1702141 .9829823
Fdi					
L1.	-1.12307	1.091988	-1.03	0.304	-3.263372 1.017187
cons	-69.01129	42.76635	-1.61	0.107	-152.8318 14.8092
Employment~e					
Growthrate L1.	-0.319823	.0876958	-0.36	0.715	-.2038629 .1398982
Employment~e L1.	.9524862	.0686767	13.87	0.000	.8178823 1.08709
Povertyrate L1.	-.0016202	.096565	-0.02	0.987	-.1908841 .1876437
Technologh~x L1.	-.0154909	.0667482	-0.23	0.816	-.1463149 .1153331
Fdi					
L1.	.0797871	.2477605	0.32	0.747	-.4058145 .5653888

cons	4.934049	9.703229	0.51	0.611	-14.08393	23.95203
povertyrate						
Growthrate L1.	.1191442	.1129447	1.05	0.291	-.1022233	.3405117
Employment~e L1.	-.2680222	.0884497	-3.03	0.002	-.4413805	-.09466638
Povertyrate L1.	.527339	.1243674	4.24	0.000	.2835833	.7710947
Technologh~x L1.	-.3046022	.0859659	-3.54	0.000	-.4730923	-.136112
Fdi						
L1.	.3445193	.3190944	1.08	0.280	-.2808941	.9699328
cons	47.20046	12.49693	3.78	0.000	22.70692	71.694
Technology~x						
Growthrate L1.	.1890794	.3291964	0.57	0.566	-.4561337	.8342926
Employment~e L1.	.2382608	.2578018	0.92	0.355	-.2670214	.7435431
Povertyrate L1.	-.1261667	.36249	-0.35	0.728	-.8366342	.5843007
Technologh~x L1.	.7582911	.2505624	3.03	0.002	.2671979	1.249384
Fdi						
L1.	-1.32784	.9300547	-1.43	0.153	-3.150713	.4950341
_cons	.9557384	36.42443	0.03	0.979	-70.43483	72.34631
fdi						
Growthrate L1.	.0608873	.129217	0.47	0.637	-.1923733	.314148
Employment~e L1.	.1789367	.101193	1.77	0.077	-.019398	.3772713
Povertyrate L1.	.1622296	.1422855	1.14	0.254	-.1166448	.4411041
Technologh~x L1.	.09501	.0983514	0.97	0.334	-.0977551	.2877751
Fdi						
L1.	-.3251752	.3650674	-0.89	0.373	-1.040694	.3903438
_cons	-21.09922	14.29741	-1.48	0.140	-49.12163	6.92318

6. CONCLUSION

The impact of FDI on Ethiopia's economic progress has been considerable, contributing to increased growth, job creation, and technological advancement. FDI has facilitated critical investments in key sectors, including manufacturing, infrastructure, and telecommunications, resulting in a significant transformation in Ethiopia's economic landscape. The strong positive relationship between FDI inflows and essential economic indicators, including GDP growth, employment generation, poverty reduction, and improved healthcare, highlights the substantial role foreign investments play in Ethiopia's development trajectory. Nonetheless, challenges persist, such as ensuring an equitable distribution of benefits, addressing environmental concerns, and promoting sustainable development [1].

Economic indicators, as well as the analysis of FDI inflows in Ethiopia, suggest that foreign investors' influence on the Ethiopian economy is significant. FDI has played a vital role in facilitating economic growth, particularly in job creation, poverty reduction, and technological development in various economies. However, despite its positive implications, certain challenges should be addressed. Policymakers should devise ways to ensure the equitable sharing of FDI benefits and mitigate associated risks. To achieve this, linkages should be established between foreign investors and local companies, technology should be transferred, and value-added products and new export diversities should be created by strategic investment in selected sectors. Ethiopia should continue its path towards sustainable economic growth and improve its citizens' quality of life [4].

Given that Ethiopia is increasingly attracting foreign investment, it is essential for policymakers to strike a delicate balance between seizing opportunities presented by FDI and safeguarding the country's long-term economic and social interests. Enhancing human capital development, promoting local linkages, and aligning FDI with development goals will be crucial in maximizing the positive impact of foreign investments on Ethiopia's economic prosperity and inclusive growth. Ethiopia can utilize foreign investment as a catalyst for transformative and sustainable development by fostering a conducive environment for FDI and implementing policies based on evidence.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

- [1] Abebe, G., McMillan, M.S., & Serafinelli, M. Foreign Direct Investment and Knowledge Diffusion in Poor Locations. *Foreign Direct Investment and Knowledge Diffusion in Poor Locations*. 2018. <https://www.nber.org/papers/w24461>
- [2] Akinlo, A. E. Foreign direct investment and growth in Nigeria: An empirical investigation. *Journal of Policy Modeling*, 2004, 26(5): 627–639. DOI: 10.1016/j.jpolmod.2004.04.011.
- [3] Bekana, D. M. Determinants of Foreign Direct Investment in Ethiopia; Time Series Evidence from 1991-2013. *The Journal of Developing Areas*, 2016, 50(1): 141–155. <http://www.jstor.org/stable/24737341>.
- [4] Gelaye, Z. E., Gelalcha, W. G., Chali, B. D., & Tyagi, D. The Effect of Foreign Direct Investment on Ethiopian Economic Growth. *Journal of Positive School Psychology*, 2002, 6(4): 9284–9294. <https://journalppw.com/index.php/jpsp/article/view/5688>

- [5] Alfaro, L. Gains from Foreign Direct Investment: Macro and Micro Approaches. *The World Bank Economic Review*, 2017, 30(S1): S2–S15. DOI: 10.1093/wber/lhw007
- [6] Muhammed, A., & Asfaw, M. Government Spending for Economic Growth in Ethiopia. *Journal of Economics and Sustainable Development*, 2014, 5(9): 66–74.
- [7] Basu, P., & Guariglia, A. Foreign direct investment, inequality, and growth. *Journal of Macroeconomics*, 2007, 29(4): 824–839. DOI: 10.1016/j.jmacro.2006.02.004
- [8] Kedir, R. The Impact of Foreign Direct Investment on Poverty Reduction. In *Ethiopia: Cointegrated Var Approach*. Addis Ababa University. 2012, DOI: 10.1515/cer-2017-0013
- [9] Astatike, G., & Assefa, H. Determinants of foreign direct investment in Ethiopia: a time series analysis. Paper Prepared at the 4th International Conference on the Ethiopian Economy, 2005, Addis Ababa, Ethiopia.
- [10] Dereje, M. The impact of government expenditure on economic growth in Ethiopia. Master's Thesis, Jimma University, 2012, Jima City, Ethiopia.
- [11] Geiger, M. T., & Goh, C. Chinese FDI in Ethiopia: A world bank survey. World Bank. ET-Ethiopia Economic Policy And Dialogue, 2012.
- [12] Chen, X., & Sun, L. Bayesian temporal factorization for multidimensional time series prediction. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2021, 44(9): 4659–4673. DOI: 10.1109/TPAMI.2021.3066551
- [13] Fathian, F., Fakheri-Fard, A., Ouarda, T. B., Dinpashoh, Y., & Mousavi Nadoushani, S. S. Multiple streamflow time series modeling using VAR–MGARCH approach. *Stochastic environmental research and risk assessment*, 2019, 33: 407–425. DOI: 10.1007/s00477-019-01651-9