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Original Paper

An Econometric Investigation of the Contribution of Major Sectors to Ethiopian Economic Growth: A Time Series Analysis

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ABSTRACT:
The main objective of the study was to analyze the major sectors contribution to Ethiopian economic growth in the 1982 - 2021 in Ethiopia. Data were collected from World Development Index database data. A Stationarity test was performed before conducting the data analysis. The result from the unit root test indicated that both dependent and independent variables were stationary at level and a multiple linear regression model for data analysis was applied. The variables were the annual growth of agricultural sector, industrial sector and service sector annual growth. The results indicated that agriculture, industry, and services service sectors affected the growth level of Ethiopian economic statistically significantly at less than 5% significance level. The coefficient of the variable Agriculture is big and indicated that the main growth engine of the Ethiopian economy was the Agriculture.

Keywords: Sectors Contribution, Economic Growth, Multiple Linear Regressions, Ethiopia

INTRODUCTION:

Ethiopia, situated in East Africa, is the second-most populous country on the continent with a population estimated at 112 million people. Despite the impact of the COVID-19 pandemic, desert locust swarms, and conflict in the northern region of the country, Ethiopia's economy grew by 6.3% during the 2020/21 fiscal year, making it the fastest-growing economy in Africa (NBE, 2021). The agriculture, industry, and service sectors experienced annual average growth rates of 4.1%, 13.5%, and 8.2%, respectively (MOFED, 2021).

A study by Alemu et al (2003) suggested that the contribution of agriculture to the economy is other sectors depended on the economic systems employed and non-policy constraints faced during economic reform. In terms of sectoral contribution to GDP growth in 2016/17, the industry sector had the highest contribution with a 4.7 percentage point increase, followed by the service sector with a 2.9 percentage point increase, and agriculture with a 0.9% contribution (MoFED, 2021).

Several development economists, including Abraham et al (2018), Mishra (2019), and Suthacini and Balageetha (2021), have found a positive relationship between the agriculture, industry, and service sectors and economic growth.

The source of economic growth is a question that many economists seek to answer, particularly about the contributions of different sectors. To encourage economic growth in developing economies, higher agricultural productivity has been believed to enhance the development of the manufacturing sector, which leads to industrialization. However, the growth of the agricultural sector in Ethiopia has been slow, and the manufacturing subsector has not performed well (EEA, 2018, 2022). GDP per capita growth (annual %) is widely used by economists to assess the health of an economy, as it describes an increase in the quantity and quality of economic goods and services produced and consumed by a society. Therefore, this study aimed to investigate the contributions of the major sectors to Ethiopian economic growth, with the results helping macroeconomic policymakers identify the major factors

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that inhibit the growth of the agriculture, industry, and service sectors.

Sources of Data:

The research used secondary data, which was collected for the year 1982 to 2021 from the world development indicator (WDI) of the World Bank. This implies that the research used 40 years to address the pre-defined objectives. The time series data were yearly type in which one can judge the macroeconomic economic level sectorial contributions of major sectors to economic growth in the economy.

Method of Data Analysis:

The collected secondary data were edited and analyzed using appropriate statistical tools such as graphs, mean, standard deviations and other statistical tools. For such computation, Stata 15 was used. To undertake comparative analysis, the study employed multiple linear regression models.

Regression analysis is one of the most commonly used tools in econometric analysis, which is concerned with describing and evaluating the relationship between a given variable often called the dependent variable and one or more variables called the explanatory or independent variables. This study helps to examine how the three major sectors affect economic growth conditional on the level of other potential determinants and control variables.

The general model of multiple linear regression models was adopted from Gujarati (2004) as follows

$$g = \beta_0 + \mathrm{B}_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + U_i \quad (1)$$

g = GDP per capita growth (annual %) which is continuous.

Where

B0- is the intercept

$\beta_1, \beta_2 ..... \beta_{16}, \beta_{17}$, are parameters to be estimated and /or marginal effects of the explanatory variables in the model.

X_1= Agriculture, forestry, and fishing, value added (annual % growth)

X_2 = Industry (including construction), value added (annual % growth)

X_3 = Services, value added (annual % growth)

Ui= represents the regression disturbance term and Ui ~N (0, δ^2)

Diagnostic tests:

Since we are producing multiple regression models using time series data, we need to be aware of hetroscedasticity, multicollinearity, autocorrelation, and stationarity tests.

Results and Discussion:

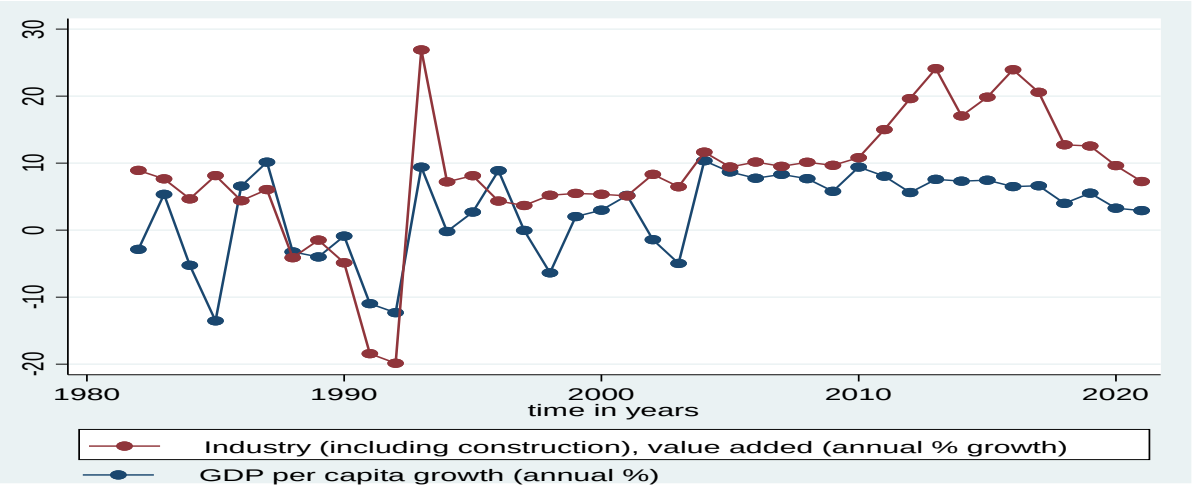
From the descriptive results, on the average the growth of industry, services, agriculture, and GDP per capita growth was 8.275%, 7.534%, 4.231% and 2.752, respectively. According to the data from the World Bank development indicator database in between 1982 to 2021 the minimum economic growth was -13.533% and the maximum was 10.357%.

Table 1: Descriptive Statistics of Variables used in the Model

Variables	Mean	Standard Deviation	Minimum	Maximum
Industry value added (annual % growth)	8.275	9.456	-19.862	26.898
Services value added (annual % growth)	7.534	7.512	-19.46	21.876
GDP per capita growth (annual %)	2.752	6.365	-13.533	10.357
Agriculture value added (annual % growth)	4.231	8.045	-20.528	17.381

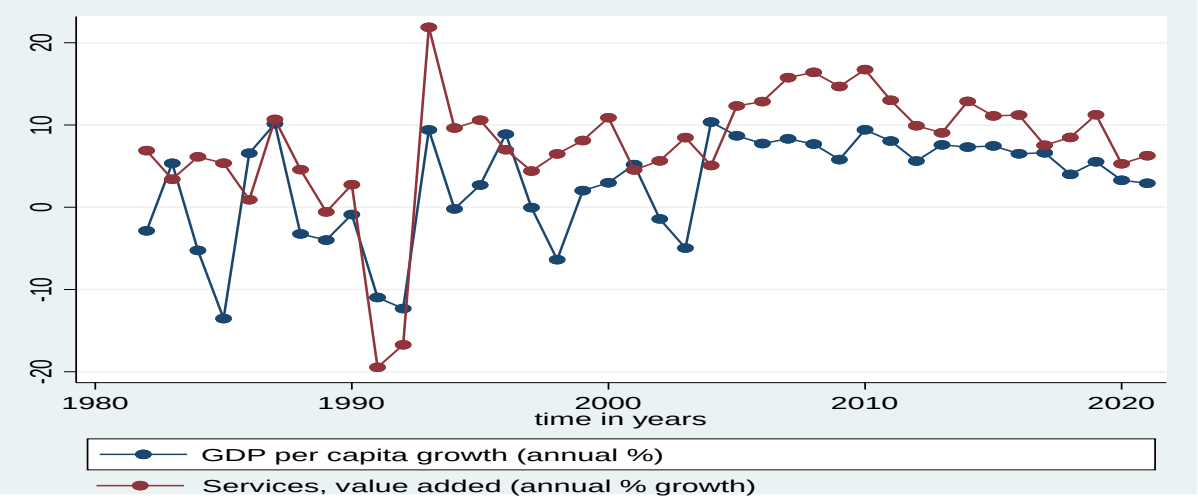
Source: World Bank data (2023)

Figure 1: Relation Between Industry and Economic Growth



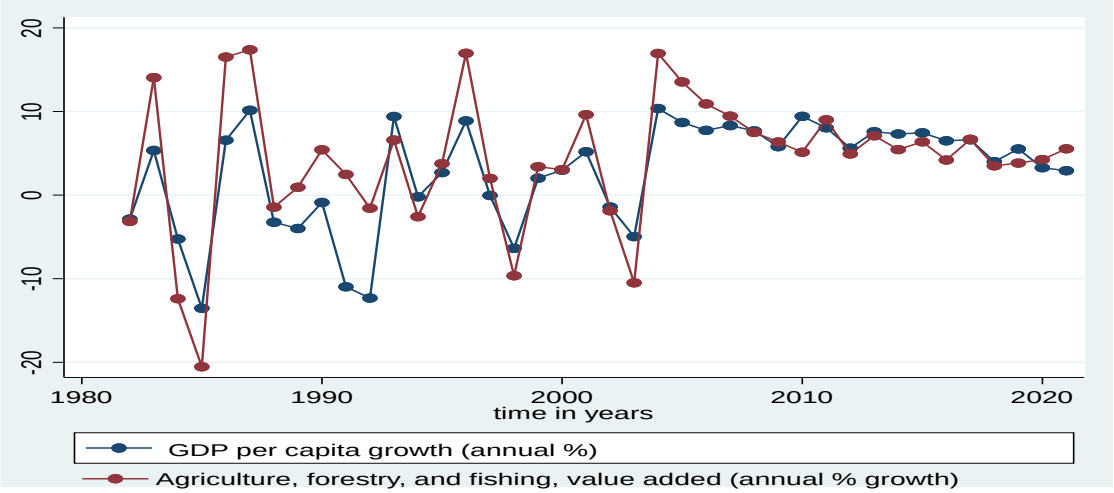
Source: World Bank data (2023)

Figure 2: Relation service sector and economic growth



Source: World Bank data (2023)

Figure 3: Relation between agriculture and economic growth of Ethiopia



Source: World Bank data (2023)

Econometric Model Results:

Various statistical tests can be performed to describe the time series data. Time series modeling requires the data to be in a certain way, and these requirements vary from model to model. These models, once fitted to the data, need some kind of validation which can be done through statistical tests.

Table 1: Unit Root test Results

Variables	Test Statistic	MacKinnon's approximate p-value for Z(t)	Decision
Industry sector	-3.324**	0.0138	Reject the null
Services sector	-3.955**	0.0017	Reject the null
GDP per capita annual growth	-4.395**	0.0003	Reject the null
Agriculture sector	-5.949**	0.0000	Reject the null
Interpolated Dickey-Fuller 1%, 5%, and 10% Critical Value are -3.655, -2.961, and -2.613, respectively Null hypotheses(H0); the variable is non-stationary Alternative hypothesis (Ha): the variable is stationary **Reject the null hypothesis at a 5% significance level			

Source: World Bank data (2023)

To check the stationarity, the Augmented Dickey-Fuller unit root test (ADF) was used. Based on the result; if the Augmented Dickey-Fuller test statistic values are greater than the test critical values then we reject the null hypothesis, which is the variables, have a unit root and accept the alternative hypothesis which is the variables do not have a unit root. It is seen that all variables included in the model are stationary at 5% because MacKinnon's approximate p-value for Z (t) is less than 0.05 for all variables.

Table 2: Multiple Linear Regression Model Result

Independent variables	Coefficient	Standard Error	t-value
Agriculture sector value added (annual % growth)	0.552	0.028	19.59***
Industry sector value added (annual % growth)	0.161	0.023	7.14***
Services sector value added (annual % growth)	0.313	0.034	9.17***
Constant	-3.272	0.207	-15.78***

Number of obs = 40
F(3, 36) = 449.28
Prob > F = 0.0000
R-squared = 0.9775
Root MSE = 0.99346
Post estimation tests

a. Breusch-Pagan / Cook-Weisberg test for testing heteroskedasticity problem

Ho: Constant variance
Variables: fitted values of economic growth
chi2(1) = 0.14
Prob > chi2 = 0.7125

b. **Variance inflation factor for testing multicollinearity problem**

Variables	VIF	1/VIF
Industry sector	2.76	.362
Service sector	2.747	.364
Agriculture sector	1.04	.961

Mean VIF	2.182	.

c. Durbin's alternative test for testing the autocorrelation problem

lags(p)	chi2	df	Prob>Chi2
1	0.707	1	0.400

Durbin-Watson d-statistic(4, 40) = 2.201788

H0: no serial correlation

Source: Computed from World Bank Data (2023)

Hetroscedasticity test:

The situation when the error terms in the regression equation have no common variance or if the errors do not have a constant variance is called hetroskedasticity. To test for hetroskedasticity, Breusch-Pagan / Cook-Weisberg test was used. From the regression table, chi2 (1) = 0.14 and Prob > chi2 = 0.7125 and we fail to reject the null hypothesis that the residuals are homoscedastic.

Multicollinearity test:

Multicollinearity occurs when independent variables in a regression model are correlated. One means of testing for multicollinearity is by using variance inflation factors (VIF). If VIF is less than 10, the model has no multicollinearity problem. Thus, from Table 3 because the VIF of all individual variables and in general mean VIF is less than 10 the model has no multicollinearity problem.

Autocorrelation test:

Autocorrelation is a special case of correlation, which refers to the relationship between successive values of the same variable/ same series. From in table 3, the null hypothesis of no serial correlation is not rejected for the reason that the p-values associated with the test statistic are greater than the standard significant level (0.05).

Multiple regression analysis results portray that the adjusted R squared was 0.9775, which is an indication that there was a variation of 97.75% of economic growth explained by changes in the independent variables. The overall significance F- tests assessing whether the group of independent variables when used together reliably predicts the dependent variable. Therefore, the significance value of F statistics indicates a p-value of 0.000 and it was less than $p < 0.05$ so the model was significant enough. The smaller the value of the p-value (and the larger the value of t), the greater the contribution of that predictor. The result of multiple regression analysis in Table 3 demonstrates that three have a positive and significant influence on the growth of GDP per capita of Ethiopia.

Explanation of significant variable:

Agricultural sector: agriculture includes farming, fishing, and forestry. Industry includes mining, manufacturing, energy production, and construction. This variable has a positive coefficient and is statistically significant at a 1% significance level. The value of the coefficient 0.557 indicates that when the agricultural sector grows at 1% then the level of the growth of Ethiopian GDP per capita is 0.557%. The value of the coefficient of this variable is larger than other sectors. This indicates that the agricultural sector is the dominant sector of the economy in terms of its contribution. Agriculture supplies raw materials and key inputs including labor to industry while it in turn uses important industrial outputs as productivity-enhancing farm implements and machineries. These forward and backward interlink ages between the sectors are important elements of the development process (EEA, 2022). According to Praburaj (2018), increased agricultural output and productivity contribute substantially to the overall economic development of the country. This result also corroborates the findings of Mishira (2009) that when the value of agriculture increases by 1 million birr the economic growth will be increased by 2.43 million birr.

Service sector: Services cover government activities, communications, transportation, finance, and all other private economic activities that do not produce material goods. The coefficient of this variable is 0.313 and statistically significant at 1% significance level. This indicates that a 1% increase in the growth rate of the service sector implies an increase in the level of economic growth by 0.313%. This result is similar to the findings of Mishira (2009) that the money that an increase in money earned from services sectors by one million birr the value of GDP will increase by 2.502 birr.

Industrial sector: Agriculture includes farming, fishing, and forestry. Industry includes mining, manufacturing, energy production, and construction. Industrial sector growth is a lesser contributor to economic growth. An increase in the industrial sector by 1% is expected to increase GDP per capita by 0.161%. This result is congruent with the findings of Abrham et al (2018); Mishra (2019) and Suthacini and Balageetha (2021).

Conclusions and Recommendations:

The main objective of this study was to look into how the growth of agriculture, services, and industry affects the level of growth of Ethiopian economy. The researchers used a variety of post estimation and diagnostic tests to do this. No issues were found during the unit root test, hetroscedasticity, multicollinearity, or autocorrelation testing. Multiple linear regressions was used to the data analysis process depending on the outcomes of the diagnostic tests. The results of the multiple linear regression showed that the coefficient of agriculture, service, and industrial is statistically and significantly affected the level of Ethiopian economic growth at less than 1%. Agriculture was rated top, followed by the service sector in second place, and the service sector in third place based on the size of the coefficient of the multiple linear regressions.

According to the study's results, the transformation of the key economic sectors of the economy will account for a large portion of the fundamental structural change required. All call for a mix of smart design, sound policy, standards and regulation, and institutional reform to boost the growth of Ethiopian economy.

REFERENCES:

1. Praburaj, L. (2018) "Role of Agriculture in the Economic Development of a Country". Shanlax International Journal of Commerce, vol. 6, no. 3, 2018, pp. 1–5, DOI: https://doi.org/10.5281/ zenodo.1323056
2. Alemu, Z.G., Oosthuizen, K. & H D Van Schalkwyk (2003) Contribution of Agriculture in the Ethiopian Economy: A Time-Varying Parameter Approach, Agrekon, 42: 1, 29-48, Doi: 10.1080/03031853.2003.9523608
3. Mishra, Manoj Kumar (2019) Analysis of the contribution of three sectors in Ethiopian Economic Growth, International Journal of Management, IT & Engineering, Vol. 9 Issue 2(1), February 2019, ISSN: 2249-0558 Impact Factor: 7.119
4. Abraham Tezera Gessesse, Zheng Xungang, and He Ge (2018), Inter-Sectorial Linkage of Economic Sectors and Their Contribution to Economic Growth: Time Series Evidence from Ethiopia and China, April 2018American Journal of Trade and Policy 5(1):25-32, DOI: 10.18034/ajtp.v5i1.431
5. Suthacini, V and, M. Balageetha (2021). An Economic Analysis of Sector Wise Contribution to GDP in India, International Journal of Science and Research (IJSR), Volume 10 Issue 3, March
6. MOFED (2021) , Ministry of Finance of Ethiopia, Macro-Fiscal Performance in Ethiopia and Recent Fiscal Policy Developments Addis Ababa, October 2021, No. 04/2021, https://www.mofed.gov.et/blog/annual-development-cooperation-report-efy-2012/
7. EEA (2022) Ethiopian Economics Association, State of the Ethiopian Economy 2022/23, Land, Agriculture, and Finance in the Ethiopian Economy, November 2022, Addis Ababa, Ethiopia
8. EEA (2018). Ethiopian Economics Association (EEA report On the Ethiopian Economy 2018, Foreign Direct Investment in Ethiopia: Structure, Performance, and Determinants, Addis Ababa, Ethiopia.
9. NBE (2021) National Bank of Ethiopia, Annual Report, Addis Ababa, Ethiopia
10. Gujarati, D.N, (2005). Basic Econometrics. Second Edition. McGraw Hill, Inc., New York