

Comparison of Growth of Overall GDP on Three Sectors of the Ghanaian Economy: A Time Series Analysis from 2001-2020

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Abstract

The Ghanaian economy has been growing for the past three decades, but growth, redistribution, and sustainability have all faced obstacles. The economy has been largely grown in three major sectors of the economy i.e., Agriculture, Service and Industry after 64 years of independence. This article is a comprehensive discussion of the contribution of three sectors of the economy to the overall GDP, and it does cover all of the nitty-gritty intricacies of the Ghanaian economy. Finally, the paper seeks to provide some thoughts on the literature for readers on the state of the Ghanaian economy from 2001 to 2020, taking into account the contributions of three major economic sectors. The researcher based the dataset on the work of several researchers and included a significant quantity of fresh data from both primary and secondary data sources such as the Ministry of Finance (MOF), the Bank of Ghana, the Ghana Statistical Service, and the World Bank. The data were gathered from the website of the MOF, Bank of Ghana and the Ghana Statistical Service. The conclusions of the study found that there is a positive relationship between overall GDP (domestic and external) and growth in Ghana's economy, and urge, among other things, that government debt borrowing be discouraged and tax reform initiatives be promoted. According to the findings, interest rates should be kept low enough to allow individuals and investors to borrow and invest while also allowing the economy to expand through industrialization, which will enhance the trade balance and economic growth by raising aggregate demand or income.

Keywords

Agriculture, Service, Industry, Economy, Growth, Inflation, Interest Rate

1. Introduction

Ghana is a sovereign republic on Africa's west coast, bordered on the east by Togo, on the west by Cote d'Ivoire, on the north by Burkina Faso, and on the south by the Atlantic Ocean. In 1957, it became the first country in Sub-Saharan Africa to gain independence from British colonial authority. The country's current population is predicted to be 31.07 million, placing it 47th in the 2020 population rankings.

Ghana has made significant progress toward democracy under a multi-party system in the previous two decades, with its independent judiciary gaining public trust. Ghana consistently ranks in the top three African countries for freedom of expression and press, with a robust broadcast media, with radio being the most widely used medium (World Bank, 2020).

Ghana is now a lower middle-income country, according to the World Bank Outlook 2013, after the country's economy was rebased in November 2010 with a base year change from 1993 to 2006, resulting in a 63 percent increase in debt-to-GDP ratio (Alagidede, Baah-Boateng, & Nketiah-Amponsah, 2013).

Ghana was among the top ten fastest-growing economies globally in 2019, with growth ranging from 6.3 percent to 7.1 percent (African Development Bank, 2020). Ghana's economy continues to rise in 2019, with first-quarter GDP growth projected at 6.7 percent, up from 5.4 percent in the same period last year (World Bank, 2020). Many economic changes and programs were launched to combat macroeconomic instability, with inflation at the forefront, according to Sowa (1993), but no solution was discovered within ten years (Sowa, 1993).

On the other hand, Ghana joined the HIPC1 Initiative in the early 2000s to bring the country's foreign debt ratios down to a manageable level. Ghana left HIPC in 2004 after making significant progress in meeting most of the requirements for attaining the floating completion point (Asiama, Akosah, & Owusu-Afriyie, 2014). More specifically, Ghana joined the IMF-supported Extended Credit Facility (ECF) program in 2015 to restore macroeconomic stability by August 30, 2017. Still, the program was extended until April 2, 2019, following the IMF's last two evaluations of the ECF program (IMF, 2019).

More specifically, the Ministry of Finance announced a fresh rebase in 2018 with a base year change from 2006 to 2013 to account for various industries that had not been adequately accounted for since the last rebase, resulting in a 25% increase in nominal GDP in 2017 (IMF, 2019). In 2007, the Bank of Ghana (BoG) introduced an inflation-targeting regime under the Bank of Ghana Act, 2002 (Act 612) to maintain exchange rate stability while achieving a single-digit inflation rate.

The general objective of this study is to examine the health of the Ghanaian economy by focusing on key sectors that contribute to the economy's growth. The study also discusses essential areas that contribute to the economy's growth.

2. Hypothesis

The null hypothesis of the study includes

1) There is no significant contribution of Ghana's agricultural sector to the country's overall GDP from 2001 to 2020?

2) There is no significant contribution of Ghana's industrial sector to the country's overall GDP from 2001 to 2020?

3) There is no significant contribution to Ghana's service sector to the country's overall GDP from 2001 to 2020?

3. Literature Review

This section discusses a variety of economic growth, inflation, interest rate, and fiscal policy theories. Classical theory, Keynesian theory, Neo-classical theory, Monetarism theory, and others are among the theories to be explored.

3.1. Economic Development

3.1.1. Early Economic Growth Theories

Representatives of mercantilism are the originators of growth theories (15th-17th centuries). Mercantilists saw wealth acquisition as the primary source of economic growth and the primary goal of traders' and the state's economic actions (McDermott, 1999). Physiocrats replaced mercantilists in the 18th century, and they stipulated that a nation's wealth was obtained only from the value of "land agriculture" or "land development" and that agricultural products should be highly valued (Marx, 2000).

3.1.2. Economic Growth as a Classical Theory

According to Adam Smith, theory on the wealth of nations, a pioneer of classical economics, is built on trade rather than gold (Smith, 1776). Furthermore, Adam Smith linked again in people's wealth to an increase in the output of production (land, labor, and capital), which is represented in the growth of labor productivity and the size of functioning capital (Reid, 1989). Furthermore, David Ricardo based economic growth on his theory of comparative advantage, which states that economic growth occurs when countries channel their scarce resources into a specific line of production to gain an international edge in that sector and trade with other countries to obtain products that are no longer produced domestically (Rostow & Kennedy, 1990).

3.1.3. Economic Growth According to Keynesian Theory

The establishment and critical processing of Keynesian macroeconomic equilibrium, based on economic variables such as national income, consumption, savings, and investments, is at the heart of Keynesian growth theories (Keynes, 2015). In a scenario when there is no market leverage to generate aggregate demand for restarting corporate activity in the economy, according to John Keynes, the government should intervene by implementing macroeconomic or fiscal policy, such as tax cuts or increases in government expenditure (Vines, 2003).

Evsey Domar clarified and expanded on Keynes' theory of growth by includ-

ing investment as a source of change that affects income and production capacity creation (Domar, 1946). Domar's idea determines the rate at which investment should increase to maintain revenue growth. This rate is determined by the marginal willingness to save (the marginal propensity to save) and the average efficiency of investments (Piętak, 2014). In addition, Roy Harrod stated that, aside from the functional relationship between income, savings, and investments, entrepreneurs' expectations are not crucial for growth. He stated that actual growth rate is controlled by labor and capital productivity growth rates (Harrod, 1939).

3.1.4. The Growth Theory of the Neoclassical Era

The Neoclassical Growth Theory is an economic growth model that explains how three economic factors, labor, capital, and technology, interact to produce a stable pace of economic growth. The aggregate production function, which ties total output to aggregate amounts of labor, human capital, and physical capital in the economy, as well as a simple measure of the level of technology in the economy as a whole (Piętak, 2014), is the foundation of neoclassical growth theory.

R. Solow's growth theory is based on the notion that the equality of aggregate demand and supply is necessary for the economic system to be in equilibrium (Solow, 1957). He says that aggregate supply is governed by the production function, which describes the functional relationship between production volumes and the components used and their combinations on the one hand, and the factors utilized and their combinations on the other (Piętak, 2014).

4. Inflation

4.1. Inflation and the Monetarism Theory

The monetary theory of inflation is based on the amount of money in circulation at any one time. Friedman and Schwartz (1963) assumed that money is the primary driver of inflation (demand-pull). According to Dornbusch and Fischer (2003), when the supply of commodities is less than the demand, the price of goods would rise, and vice versa. Mishkin (2004) further noted that because the velocity of money and the level of actual output are both constant, an increase in the money supply will create excess demand (oversupply), resulting in higher prices and hence inflation.

4.2. Inflationary Demand-Pull Theory

The demand-pull theory states that demand-pull inflation is caused by an increase in aggregate demand (Keynes, 1960). Consumption, investment, and government spending all contribute to aggregate demand. The inflationary gap occurs when the value of aggregate demand exceeds the value of aggregate supply at full employment (Totonchi, 2011). According to Keynes (1960), the wider the disparity between aggregate demand and aggregate supply, the faster inflation

will be. A tax rise is one of the cuts in government spending, and controlling the volume of money, alone or in combination, can reduce effective demand and control inflation (Keynes, 1960).

4.3. Inflationary Cost-Push Theory

The total volume of products and services produced by an economy at a given price level is called aggregate supply. When enterprises are already operating at total capacity, cost-push inflation indicates that prices have been “pushed up” by increases in the costs of any of the four components of production—labor, capital, land, or entrepreneurship. When expenses are more significant and maximum productivity, companies cannot retain profit margins by producing the same amount of goods and services (Humphrey, 1998).

5. Interest Rate

5.1. The Traditional Interest Rate Theory

The classical theory of interest, the standard explanation of interest in western economics, emphasizes that investments and savings influence interest rates. Because businesses borrow money to invest, interest is a cost of doing business. The interest rate can automatically bring the economy back into balance (Pal, 2018). When the interest rate is higher than the equilibrium level, saving exceeds the investment. The oversupply causes the interest rate to fall, causing less saving and more investment until the equilibrium is reached, and vice versa (Huang & Zhang, 2015).

5.2. The Interest Rate Theory of Keynes

The market interest rate, according to Keynes, is determined by the demand for and supply of money. The price brings the willingness to hold wealth in the form of cash into balance with the availability of money. The interest rate is “a measure of those who own the money’s unwillingness to relinquish their liquid control over it” (Keynes, 1960: p. 167). In a system in which a central monetary institution determines the interest rate, it appears as a potent instrument to influence the allocation of resources, including output, according to Keynes (Appelt, 2016).

5.3. Fiscal Policy

5.3.1. The Fiscal Policy Neo-Classical Theory

According to the neo-classical idea, government dissaving generated by a budget deficit will have a negative impact on growth. Any increase in government borrowing boosts interest rates, which has a negative effect on private investment, which has a negative effect on growth.

Higher external borrowing to close the investment gap has a negative impact on the exchange rate and trade account, which has a negative effect on the growth rate (Ramu & Gayithri, 2016).

5.3.2. Fiscal Policy from a Keynesian Perspective

Government spending, according to Keynes, will have a multiplier effect on output and employment. Increased spending boosts the economy's aggregate demand, increasing the profitability of private investment and encouraging more investment (Ramu & Gayithri, 2016). He also claimed that deficit spending is required in times of depression and emerging countries; many policymakers have suggested that, given the abundance of underused resources, deficit financing would be a beneficial tool for promoting economic growth (Nelson & Singh, 1994).

5.3.3. The Viewpoint of Monetarists on Fiscal Policy

Fiscal policy, according to monetarists, is ineffective. Budgetary policy is impotent to affect actual output unless complemented with accommodative monetary policy (Blinder & Solow, 1974).

Monetarists have developed a single equation model to analyze the economy's behavior. The following is the model:

$$Y_t = f(G_t, T_t, M_t, Z_t)$$

Y denotes gross domestic product (GDP), G denotes government spending, T denotes tax variables, M denotes monetary policy actions. Z represents all other factors that influence total spending (Ramu & Gayithri, 2016).

6. Empirical Review

This part reviews some empirical research on macroeconomic indicators relevant to this subject, such as economic growth, inflation, interest rates, fiscal policy, unemployment, and so on.

Chiaraah and Nkegbe (2014) used the cointegration and error correction model to examine Ghana's GDP growth, exchange rate, and inflation rate. The findings demonstrated a long-run association between money growth and inflation, but no such relationship exists between inflation and the exchange rate in Ghana (Appelt, 2016).

In her analysis on fiscal Deficit, Money Growth, and Inflation Dynamics in Ghana, Johnson (2015) found a positive short-run relationship between fiscal deficits and inflation. She used the Autoregressive Distributed Lagged model (ARDL) from 1960 to 2012 to find the causal relationship between fiscal deficit, money growth, and inflation.

Mahamadu and Phillip (2003) used cointegration and error correction procedures to study the relationship between money growth, exchange rate, and inflation in Ghana. Their findings revealed that in Ghana, there is a long-term relationship between inflation, money supply, exchange rate, and real income.

Money supply and inflation, as well as money supply and deficit, are co-integrated, according to Narayan et al. (2006). Using the ARDL and Granger causality test paradigm, they investigated the link between fiscal deficit, money supply, and inflation in Fiji using annual data from 1970 to 2004 (Appelt, 2016).

From 2000 to 2011, [Özel, Sezgin, and Topkaya \(2013\)](#) investigated the fiscal growth, productivity, and unemployment data for seven industrial nations (G7). The research findings demonstrated that between 2000 and 2007, the pre-crisis period, there was a very substantial negative link between economic progress and unemployment.

[Gyang, Anzaku, and Iyakwari \(2018\)](#) used the Augmented Dickey-Fuller Test (ADF) to examine the static properties of unemployment, inflation, and economy in Nigeria from 1986 to 2015. They also used the Johansen Co-integration Test and Granger Causality Tests to check for cointegration in the long-term and short-term and test for causality between unemployment, inflation, and economics. On the other hand, the findings revealed that there is a short-term and long-term relationship between unemployment, inflation, and economic progress. For 1972-81, [Martin & Fardmanesh \(1990\)](#) attempted to examine the impact of various fiscal variables on economic growth for a cross-section of 76 industrialized and developing nations. The authors discovered that the deficit and tax income are negatively associated with development, whereas total expenditure is positive, using cross-sectional linear regression.

7. Summary

The research above focuses on theoretical and empirical perspectives on economic growth, inflation, interest rates, and fiscal policy in various nations, including Ghana.

8. Methodology

This chapter concentrates on the study's methodology by formulating models, with a specific emphasis on the Ordinary Least Square (OLS) to compare overall GDP growth across the three sectors of the Ghanaian economy, as outlined in the previous chapter.

9. Presentation of Results

Analysis of Mean

CORRELATION ANALYSIS OF RESULTS OF OBJECTIVE THE STUDY

1) **Is there a significant contribution of Ghana's agricultural sector to the country's overall GDP from 2001 to 2020?**

$$Y = Mx + C + Et$$

where Y is the growth to GDP Mx is the Agricultural Sector and C is the constant and Et is the margin of error.

$$\text{GDP growth} = 0.196577 + 1.886275 + Et$$

Table 1: The T statistics is greater than the critical values except AGR which is less than the critical values so we accept the null hypothesis. There is therefore a significant contribution of Agriculture to the overall growth of GDP. There is therefore a significant contribution of Agricultural Sector to the overall growth

Table 1. Contribution of agricultural sector to GDP.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGR	0.196577	0.024543	8.009617	0.0000
Growth	1.886275	0.015666	120.4058	0.0000
R-squared	-0.748898	Mean dependent var		6.163158
Adjusted R-squared	-0.748898	S.D. dependent var		2.396342
S.E. of regression	3.169065	Akaike info criterion		5.195946
Sum squared resid	180.7735	Schwarz criterion		5.245653
Log likelihood	-48.36149	Hannan-Quinn criter.		5.204359
Durbin-Watson stat	0.717990			

of GDP. There is therefore a significant contribution of Agriculture Sector to the overall growth of GDP. From the data provided from 2001 to 2008 there was continuous growth of the agriculture sector from 39.5% to 40.9% which showed about 5% increase in growth to the GDP. This growth was reduced with a slight decrease of about 10% from 2014 to 2019. The decrease affected the growth to GDP which was reduced to 4% at the end of 2019.

2) Is there a significant contribution of Ghana's industrial sector to the country's overall GDP from 2001 to 2020?

The linear equation

$$Y = Mx + C + Et$$

where Y is the growth to GDP Mx is the Industrial Sector and C is the constant and Et is the margin of error.

$$\text{GDP growth} = 0.224967 + 9.594385 + Et$$

The T statistics of 9.594385 is greater than the critical values except IND which is less than the critical values so we accept the null hypothesis. There is therefore a significant contribution of Industrial Sector to the overall growth of GDP. There is therefore a significant contribution of Service Sector to the overall growth of GDP. From the data provided from 2001 to 2008 there was continuous growth of the service. The growth was between 20.8% to 28.5%. This growth was sustained with a slight increase of about 8% from 2014 to 2019 (**Table 2**).

3) Is there a significant contribution of Ghana's service sector to the country's overall GDP from 2001 to 2020?

The linear equation

$$Y = Mx + C + Et$$

Table 2. Contribution of industrial sector to GDP.

Dependent Variable: GRW

Method: Least Squares

Date: 06/17/21 Time: 11:44

Sample: 2001 2020

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IND	0.224967	0.023448	9.594385	0.0000
R-squared	-0.305552	Mean dependent var		6.163158
Adjusted R-squared	-0.305552	S.D. dependent var		2.396342
S.E. of regression	2.738079	Akaike info criterion		4.903586
Sum squared resid	134.9474	Schwarz criterion		4.953294
Log likelihood	-45.58407	Hannan-Quinn criter.		4.911999
Durbin-Watson stat	0.779818			

where Y is the growth to GDP Mx is the Service Sector and C is the constant and Et is the margin of error.

$$\text{GDP growth} = 0.224967 + Et$$

The T statistics of 9.594385 is greater than the critical values except SER which is less than the critical values so we accept the null hypothesis. There is therefore a significant contribution of Service Sector to the overall growth of GDP. From the data provided from 2001 to 2008 there was continuous growth of the service. The growth was from 32.5% to 50%. This growth was reduced slightly by about 10% but remained steady from 2008 to 2014 and then there a decrease from 2014 to 2019 (**Table 3**).

From the data provided in **Table 4**,

$$Y = Mx + Mx1 + Mx2 + Mx3 + C + Et$$

where Y is the growth to GDP Mx1 represents AGR, Mx2 represents IND and Mx3 represents SER Sector and C is the constant and Et is the margin of error.

$$\text{GDP growth} = 0.820640 + 0.045435 + 1.4352545 + Et$$

The T statistics of the three sectors 6.432545 is greater than the critical values except IND and AGR which is less than the critical values so we accept the null hypothesis. There is therefore a significant contribution of all the three Sectors of the Ghanaian economy to the overall growth of GDP from 2001 to 2020. However, from 2014 to 2017 the results showed a steady growth of the economy and then from 2019 to 2020 there was a slight decrease this was as a result of the outbreak of coronavirus pandemic which badly affected the economy of the world.

The following gives a brief description of the various curves in **Figure 1** blue represents Agriculture, red represents Industry, Green represents Service and

black represents overall GDP growth. Each curve represents the overall performance from 2001 to 2020 as compared to the overall GDP growth. The Y-axis shows the percentages of contribution to GDP for the various sectors of the Ghanaian economy.

Table 3. Contribution of service sector to GDP.

Dependent Variable: GRW
Method: Least Squares
Date: 06/17/21 Time: 11:45
Sample: 2001 2020
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SER	0.142396	0.011598	12.27804	0.0000
R-squared	0.148570	Mean dependent var		6.163158
Adjusted R-squared	0.148570	S.D. dependent var		2.396342
S.E. of regression	2.211176	Akaike info criterion		4.476122
Sum squared resid	88.00738	Schwarz criterion		4.525829
Log likelihood	-41.52316	Hannan-Quinn criter.		4.484534
Durbin-Watson stat	1.422484			

Table 4. Correlation.

Dependent Variable: GRW
Method: Least Squares
Date: 06/17/21 Time: 12:07
Sample: 2001 2020
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	954.0853	332.8497	2.866415	0.0053
AGR	0.820640	0.235739	3.481143	0.0008
IND	0.045435	0.157230	0.288969	0.7733
SERV	1.435245	0.539073	2.662433	0.0094
GRW	4.327556	1.968696	2.198184	0.0308
R-squared	0.967607	Mean dependent var		3832.007
Adjusted R-squared	0.966007	S.D. dependent var		634.8494
S.E. of regression	117.0486	Akaike info criterion		12.41944
Sum squared resid	1109731.	Schwarz criterion		12.56213
Log likelihood	-529.0358	Hannan-Quinn criter.		12.47686
F-statistic	604.8763	Durbin-Watson stat		1.865137
Prob(F-statistic)	0.000000			

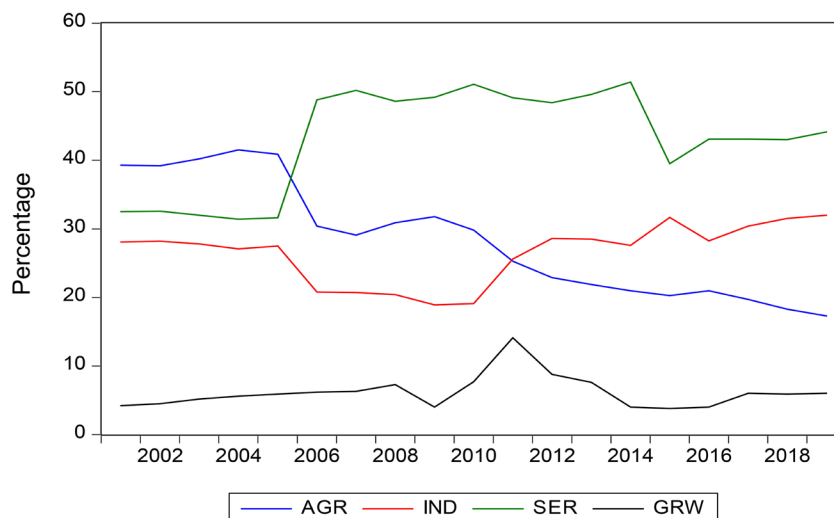


Figure 1. Graphical presentation of the growth of the three sectors for the overall growth of GDP.

10. Conclusion

In a nutshell, this research focused on examining the contribution of the three sectors of the Ghanaian economy to overall GDP growth as of December 2020 by focusing on crucial areas that contribute to the country's growth. The analysis also includes significant areas that contribute to the economy's development and their current contribution to the outlook in 2021.

11. Recommendation

Ghana's GDP increased by 7.0 percent in 2019 compared to 6.3 percent in 2018, and growth in 2020 might be higher if actions are taken to boost the Service Sector, which is the economy's largest sector. In addition, the government should focus on boosting the agriculture and industrial sectors, as their contributions to GDP decreased in 2019. Furthermore, the government should enact policies that would lower the prices of goods (both food and non-food commodities). Finally, the interest rate should be kept low enough to allow individuals and investors to borrow and invest while also allowing the economy to expand through industrialization, which will improve the trade balance and economic growth by increasing aggregate demand or income.

12. Limitation of Research

The data used in this study ranges from 2001 to 2020, and it was challenging to obtain more recent data. As a result, future research can explore more recent data.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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