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Relationship between Public Expenditure and Inflation

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Abstract:
Effective management of inflation remains one of the arduous tasks for managers of global economies. Inflation remains a macroeconomic indicator whose management outcomes have the potential to decide the electoral fortunes of elected governments and determine the purchasing power of household incomes. The purpose of this research was to assess how a steady increase in public expenditure could impact inflationary levels. The quantitative approach to scientific inquiry was adapted and used in the research. Specifically, the cross-sectional design formed the basis of the research. Data required for the research were obtained mainly from secondary sources. These included textbooks, peer-reviewed articles published in journals and grey literature. Other sources were Google Search Engine, including Netcials, MacroTrends, and databases of the World Bank and Bank of Ghana, among other significant sources. Respective data on Ghana's annual GDP values from 1960 through 2020, annual inflation data from 1965 through 2020, changes in annual inflation rates from 1965 through 2020, and annual public expenditure values from 1983 through 2020 were collected and used in the research. Descriptive statistics and regression models were used to describe the research variables and to evaluate their behaviour over the stated time frame on inflation. The study revealed lax monetary policy as the root cause of consistently high inflationary rates over considerable periods and remained a strong contributor to the weak purchasing power of national fiat currencies. Further, relative price distortions away from their economic equilibrium are not healthy for the economy, while disinflationary policies adapted for implementation should be contingent on the causes of inflation. The single largest cost of inflation to consumers is the erosion of income, whereas higher tax rates are not the panacea for the challenges of mounting public expenditure and public debts. Respective inflation rates recorded in Ghana during 2012 (7.13%) and 1995 (59.46%) remained the lowest and highest from 1993 through 2020. Fiscal periods 2017 through 2020, 2009 through 2012, and 2005 through 2008 recorded the respective best (9.33%), second-best (11.46%) and third-best (13.32%) annual average inflation rates. With the exception of 2013 through 2016, the performance of the Ghanaian economy in relation to annual average inflationary control witnessed improvements during the second political and administrative terms compared to the first terms. However, the best annual average inflation rate over an eight-year period during the Fourth Republic was recorded from 2009 through 2016 (13.45%). Findings from the research revealed a positive and significant relationship between public expenditure and inflation (coefficient value = 1.2004653; $p = 0.004$, $p < 0.05$). Public expenditure accounted for 21.30% of the variation in inflation rate from 1983 through 2020. Results from the statistical output validated the significant influence of public expenditure on inflationary hikes, the need for monetary and fiscal policies related to inflation control to be strategically reviewed and strengthened to improve implementation outcomes, and the potential of rising public expenditure to undermine the rigidity and robustness of economic fundamentals through an unexpected surge in inflationary levels. The findings underscored the need for managers of various global economies to be keen on "economic" public expenditure to the neglect of profligate public expenditure, so the socio-economic derivatives from investments in public infrastructure would strongly add to, rather than subtract from, national development and growth efforts. The fundamental objective of MPC should be pivoted around three cardinal functions: the creation of maximum employment, moderation of long-term interest rates and ensuring price stability. Excessive public expenditure requires careful consideration by economies that whet their national development appetite with increased public infrastructure projects.

Keywords*: Inflation, inflation rate, public expenditure, public expenditure theory*

1. Introduction

Inflation remains one of the indicators with a strong influence on the development and growth of global economies. Several explanations have been advanced to render economic meaning to the concept of inflation. For instance, Fernando and Boyle (2021) defined inflation as the consistent fall in purchasing power of the currency of a given economy over considerable periods of time. Further, the concept refers to the rate at which the value of a currency declines while prices of goods and services keep increasing. Oner (n.d.) described inflation as measuring the extent to which sets of goods and services have become relatively expensive over a given period, usually a year.

The rate of increase in average price levels of baskets of selected goods and services within an economy over time fairly reflects a decline in the purchasing power of the country's currency, and this is often accentuated by quantitative estimates of the rate of inflation. Usually, the increase in general price levels is expressed as a percentage, implying the unit of currency at issue could effectively buy less quantity of goods and services in the current period, relative to the previous period. Deflation is the inverse of inflation. Contrary to inflation, *deflation* leads to a decline in general price levels of goods and services and an increase in the purchasing power of the country's fiat currency (Fernando & Boyle, 2021).

The current determined value of all finished goods and services within an economy is known as aggregate expenditure. In other words, aggregate expenditure represents the value of all the expenditures undertaken by each and all the total economic output determining factors of a country during a given period of time. Aggregate expenditure is mathematically expressed as AE = C + I + G + NX, where AE represents aggregate expenditure, C connotes household consumption, I is symbolic of investments, G is indicative of government expenditure, and NX symbolises net exports (Lumen, n.d.b).

In the foregoing equation on aggregate expenditure, consumption affirms the value of total goods and services consumed by households during a specified time frame. The total value of all expenditures on capital goods is expressed by investments, while expenditures at the local, state and federal levels affirm government expenditures. Government expenditures could include transfers and infrastructure development, which stimulate spending within the economy, while net exports represent total exports less total imports (Lumen, n.d.b).

Factors that trigger inflation could be categorised into demand-pull, cost-push and built-in inflation. *Demand-pull inflation* describes situations where the total production of goods and services is not sufficient to keep up with the pace of total demand, leading to price increases. *Cost-push inflation* relates to increases in production costs, compelling producers to increase the prices of finished goods and services. The increase in the prices of goods and services may be necessary to ensure that firms offset the rising costs of inputs, such as wage increases. This trend of increases in the cost of wages and the resultant increases in the prices of products and services could continue cyclically. The agitations of labour for higher wages may be occasioned by the desire to maintain the current standard of living. Inflation that is necessitated by the foregoing development is called *built-in inflation* (Fernando & Boyle, 2021).

The total amount that households and businesses plan to expend on goods and services at each level of income is determined by aggregate expenditure. The sum of all the identified and measured activities within an economy is referred to as the gross domestic product (GDP). One of the identified methods for computing gross domestic product is the *aggregate expenditures model*. The economic importance of gross domestic product stems from its measurement of the growth of a given economy over a specific period of time. The aggregate expenditures model helps determine and graph potential gross domestic product, real gross domestic product, equilibrium point, shift in supply or demand and the impacts on gross domestic product (Lumen, n.d.b).

Varied reactions often greet inflation in various global economies. For instance, excessive inflation is considered harmful, whereas too little inflation is described as detrimental to smooth economic development and growth. To address the conundrum, economists have clamoured for a middle ground of low-to-moderate inflation of approximately 2% per annum. A higher inflation rate is not useful to savers, as the purchasing power of their savings is eroded over time. Contrarily, an increasing rate of inflation is refreshing to borrowers because their outstanding debts on an inflation-adjusted-value basis reduce over a given period (Fernando & Boyle, 2021).

The impact of inflation on a given economy could be diverse and several. For instance, inflation could lead to a fall in the value of a country's fiat currency. This economic situation has two basic implications. First, the weakened value of the national currency would render exported goods more affordable in the external markets, especially when prices of the exported goods are quoted in a foreign-denominated currency such as the American dollar, European euro or British pound sterling with comparatively stable and stronger value. Second, the cost of total imports would surge as more of the weakened national currency notes would be required to purchase the same quantity of goods and services in foreign-denominated currency (Fernando & Boyle, 2021).

In summary, inflation renders total imports expensive and total exports cheaper. A consistent increase in the rate of inflation may encourage impulse buying. That is, it tends to influence consumers' decision to purchase goods and services ahead of time to prevent further price increases and loss of purchasing power. However, the ability of savers to invest or spend in future periods could be harmed by persistent increases in inflationary levels. When price increases within an economy are excessive, rapid and out-of-control, hyperinflation is said to have occurred. Hyperinflation remains an accelerated form of inflation because inflation is concerned with the measurement of the pace at which prices of goods and services increase, while hyperinflation connotes a rapid increase in inflation, which is estimated at 50% or more each month (Fernando & Boyle, 2021).

When aggregate supply or production equals aggregate expenditures, we say the economy is in equilibrium. However, the state of equilibrium within an economy is not fixed or constant. Rather, an equilibrium level is attained when aggregate supply and aggregate demand engage in self-adjustments. During periods of excess supply over expenditure, a decrease in either prices or total quantity demanded is recorded. The effect is a decrease in the gross domestic product of

the economy. Conversely, excess aggregate demand is created when aggregate expenditures are larger than aggregate supply. This leads to price increases or increases in supply to offset the excess demand and increase in gross domestic product. Generally, increased economic equilibrium and a potential increase in the gross domestic product are assured by a surge in aggregate expenditures (Lumen, n.d.b).

The ratio of change in national income relative to change in government expenditure that induces the change is known as *the fiscal multiplier*. It is likely for national income to change in direct response to changes in expenditure, be it consumer expenditure, private investment expenditure, foreign export expenditure or government expenditure. Moreover, it is possible for the fiscal multiplier to increase in excess of one. When this occurs, the resultant effect on national income is referred to as the *multiplier effect* (Lumen, n.d.b).

1.1. Background of the Study

In 2011, a joint review of public expenditure and financial management was conducted by a team of experts on the Ghanaian economy. Members of this team of experts were predominantly Ghanaians. Among the tasks of the steering committee included the identification of strategic ways through which periodic and annual reports on public expenditure outcomes by the various sector ministries, departments and agencies (MDAs) could be improved. The latter remains crucial to enhancing the accuracy of reports on public expenditures and measuring the economic usefulness of public expenditures. Thus, one of the cardinal objectives of the committee was to bridge the existing gap in the quality and effective reporting standards on public expenditures within the Ghanaian economy (Ministry of Finance & Economic Planning, 2011).

Specifically, the review sought to provide a comprehensive summary of public expenditure arrangements, with special emphasis on sectors such as education and health, and attention to fiscal decentralisation and public wage bills. Further, the review sought to complement some reports with an in-depth analysis of aspects of public expenditures. Examples of reports with in-depth analysis during the period included the review of targeting mechanisms in 2010; Ghana infrastructure country diagnostics; sector-status reports on education and health of 2011; and poverty report of 2011. The review of targeting mechanisms concentrated on benefits related to major public programmes such as health, education, price subsidies and social programmes. The Ghana infrastructure country diagnostics identified the government's priority areas in infrastructure, identified gains likely to be derived from improved maintenance culture, and reduced public sector management inefficiencies, including underpricing essential public utilities. Discussions on the poverty report were centred around the effectiveness of social protection and geographical differences (Ministry of Finance & Economic Planning, 2011).

One of the obvious challenges to the committee's tasks during the review period was the lack of reliable and readily available comprehensive sets of data related to public expenditures. This, notwithstanding the accuracy and success rate of the committee's report, was assured through extensive data collection manually, and aggregation and reconciliation of the sampled data in collaboration with several local and central public agencies (Ministry of Finance & Economic Planning, 2011).

Implementation of the Ghana Integrated Financial Management and Information System (GIFMIS) was envisaged to serve numerous economic purposes, including comprehensive, accurate and consistent reports on the actual expenditure of various public institutions to facilitate public expenditure review in the immediate-, medium- and long-term. The reports on the actual expenditure of various public institutions were expected to be presented based on varied classification models. The overarching objective is to ensure economic and functional classifications are adapted to ensure the regular presentation of public reports on fiscal outturns and ensure different components of the budget are covered, while comprehensive reports on actual expenditure, which is disaggregated on a district basis, are presented. In line with international standards, harmonised charts of accounts were expected to be adapted and implemented to facilitate comprehensive and consistent reports on public expenditures. Through this initiative, programme-based budgeting was expected to be implemented from the 2013 fiscal year and beyond (Ministry of Finance & Economic Planning, 2011).

Emphasis was placed on immense efforts towards a high level of transparency in the operations of government. This was envisaged to improve accountability mechanisms in the executive arm of government. However, formal and informal accountability mechanisms related to public expenditure were believed to be severely impacted when access to information which is critical and needed for decision-making is poor. The provision of quality information on a timely basis has been the hallmark of Ghana's finance ministry since 2009. The user-friendly reports on fiscal outturns are accessible to key stakeholders, both internally and externally, from the finance ministry's website (Ministry of Finance & Economic Planning, 2011).

The government of Ghana is noted for employing over seven hundred thousand workers and remains the largest employer within the economy. Between fiscal years 2000 and 2008, the annual increase in average remunerations per worker within the public sector was 17%. This growth in annual average remuneration was nearly 5.7 times faster than the 3% increase recorded in GDP growth per capita. During the 2008 fiscal year, the public wage bill accounted for 57% of total government revenue, leaving marginal resources for investments, goods and services. The question, however, remained whether the rapid expansion in public wage bills was commensurate with improved public service delivery (Ministry of Finance & Economic Planning, 2011).

As of 2011, the cost of managing human resources constituted the bulk of public expenditure. As the nation's invaluable assets essential to constant improvements in service delivery, efficient and effective management of the country's human resources deserves the utmost attention of policymakers. Surging public wage bills has at least three immediate adverse economic implications:

- The quality of public expenditure is impacted,

- Effective budget execution becomes problematic and
- Macroeconomic stability is affected (Ministry of Finance & Economic Planning, 2011).

The government of Ghana's decision to ensure equal access to health and education has increased the public wage bill in these two sectors through rapid expansion in the sectors' labour force. However, the quality of public expenditure related to education and health services delivery in deprived communities and rural areas remained a challenge. Stated differently, the quality of education and health services delivery in rural areas and deprived communities fell short of public expenditure or investment in human resources in these areas. For instance, average learning outcomes from increased access to primary education were determined to be on the decrease during the review period. However, this reflected low individual remunerations within the public sector, while collective wage negotiations were substituted for effective performance management systems (Ministry of Finance & Economic Planning, 2011).

In most cases, allocations to earmarked statutory funds such as the district assembly common fund, Ghana education fund and road fund often affect overall funds allocation to public expenditure. It is worth stressing that the statutory funds were established through various acts of the Parliament of Ghana and are legally financed through their respective fixed shares of tax revenue. These statutory funds are believed to be effective and provide the requisite protection for the efficient allocation of resources to intended sectors of the economy. However, statutory funds have the potential to add rigidities to the execution of planned annual budgets. For instance, the government of Ghana was impelled to reduce increases to public expenditure funds during the 2009 and 2010 fiscal years owing to the rigidities of annual budget execution occasioned by the earmarked statutory funds (Ministry of Finance & Economic Planning, 2011).

During 2008, one hundred and thirty-two subvented agencies of government, which constituted 19% of the total labour force within the public sector, represented 35% of the overall public wage bill, including salaries and allowances. Further, subvented agencies were recipients of 82% of total allowance payments to workers within the public sector. The sources of funding for these subvented government agencies included expenditures and block grants. The latter are intended to absorb costs related to allowances and salaries. However, a few of these subvented agencies were integrated into the payroll system during the period. As a result, it was challenging to exercise control over expenditures or headcount, leading to a rapid surge in the wage bill for subvented agencies. The increases were more pronounced in the payment of allowances than salaries. To address this challenge, remedial steps and measures were taken to integrate the payroll of subvented agencies into the integrated payroll system, albeit the integration process for major agencies was determined to be slow (Ministry of Finance & Economic Planning, 2011).

1.2. Problem Statement

Effective management of inflation remains one of the arduous tasks for managers of various economies across the globe. Further, inflation remains one of the macroeconomic indicators whose management outcomes have the potential to decide the electoral fortunes of elected governments and determine the purchasing power of household incomes. Some central bankers prefer to be called *inflation hawks*, while the electoral fortunes of some political parties and their respective elected and constituted governments have been defined by promises made to fight and reduce inflation rates to appreciable levels. In 1974, former United States President, the late Dr. Gerald Ford, described inflation as the number one public enemy in the United States (Oner, n.d.).

Further, inflation remains a macroeconomic indicator with a double-edged sword. That is, it has the potential to determine the profitability or loss of public or private investments or both; it could assure electoral victory when promises of its reduction to desirable limits are fulfilled; and has the ability to cost electoral fortunes or cause electoral defeats when public expectations related to inflationary control are not met. Practically, a consistent increase in inflationary levels has the potential to plunge the implied country or countries into extended periods of economic instability, including a reduction in the purchasing power of their respective national fiat currencies.

During the first quarter of 2019, the Bank of Ghana struggled to meet the demand for foreign currency, especially the American dollar, from the forex markets, financial institutions, corporate bodies, and exporters within the economy. This resulted in a shortage occasioned by excess aggregate demand over supply of the American dollar. The eventual outcome was a sharp fall in the value of the Ghana cedi by 7.9% at the end of the first quarter of 2019. It remained the worst performance of the local currency compared to the 3.7%, 3.6% and 2.3% recorded during the respective first quarters of 2016, 2017 and 2018. As of 29th June, 2019, the Ghana cedi had fallen in value by 8.2%. This was considered the worst performance after the 26.2% depreciation recorded in 2015 (Bour, 2019).

Stability in prices of goods and services in most global economies, including Ghana, was severely impacted by the outbreak of the ominous COVID-19 pandemic during the 2020 fiscal year. As of the end of June 2020, Ghana's year-on-year (YOY) inflation rate was 11.2%. Sectoral or basket analysis of the consumer price index revealed a year-on-year inflation rate of 21.3% was recorded by gas, electricity, water and housing, whereas food and non-alcoholic beverages recorded a year-on-year inflation rate of 13.8% during the period (Ghana Talks Business, 2020).

The inflation rate recorded by goods produced locally within the Ghanaian economy during June 2019 was 8.2%. This rate remained 3.1% lower than the 11.3% recorded by imported goods. During the same fiscal year, the Bank of Ghana, through its Monetary Policy Committee (MPC), was impelled to stay the policy rate at 16% for two consecutive quarters due to rising inflationary levels within the economy. The 0.5% increase in the rate of inflation recorded from January through April 2019 compelled the Monetary Policy Committee to stay on red alert. The respective year-on-year food and non-food inflation rates recorded during May 2019 were 6.7% and 10.6%. These rates were marginally higher than the respective rates recorded during June 2019: 6.5% and 10.3% (Business & Financial Times, 2019).

Buiter (as cited in Shultz, Cogan & Taylor, 2021) argued that the relative calm and low consumer price inflation witnessed in some global financial markets are not recipes for economic comfort. Further, periods of increased public debt

have been followed by periods of consistent increases in interest rates, steady increases in inflation, and deepened financial crises. However, these economic consequences of excessive public debts, the latter being the end-product of a consistent surge in annual public expenditure, usually occur without prior warnings or early signals. Dupor (2016) posited that a surge in public expenditure has the tendency to increase production costs, and the latter has the potential to spur inflation.

The inflation rate recorded within the Ghanaian economy during the 2020 fiscal year was 9.95%. This rate was 2.77% and 2.14% higher than the respective rates recorded during 2019 (7.18%) and 2018 (7.81%) but remained 2.42% lower than the rate recorded during 2017 (12.37%). The pattern of inflationary level increases in the preceding four fiscal periods (2013 through 2016) was not too distinct from the last four years (2017 through 2020). The rate of inflation recorded during 2016 (17.45%) remained 0.30%, 1.96% and 5.78% higher than the respective rates recorded during 2015 (17.15%), 2014 (15.49%) and 2013 (11.67%). Although the rate of inflation recorded during 2009 was 19.25%, the respective rates recorded during the subsequent three fiscal periods were 8.54%, 10.52% and 12.12% lower: 2010 (10.71%), 2011 (8.73%) and 2012 (7.13%) (MacroTrends, 2020b).

During the 2009 and 2010 fiscal years, some adjustments were made to the Ghanaian economy. These included strategic accumulation of public debt while compressing investments. However, this initiative had torrential effects on the economy; both public and private productive capacities of the Ghanaian economy were severely impacted, while long-term growth potential was stymied (Ministry of Finance & Economic Planning, 2011).

- ***The general management problem*** is the failure of economic management teams of successive elected governments or otherwise to institute proactive and pragmatic measures that would assure efficiency and effectiveness in the containment of risks inherent in internal and external debt distress while improving on hard and soft infrastructure developments through increased public expenditure; maintaining consumer price inflation at appreciable levels; improving on the quality of public service delivery and intensifying public education to minimise the level of resistance that greet taxation as strategic and essential resource mobilisation tool among a section of taxpayers.

Public expenditure interacts with other determining factors of total economic output; it also interacts with many microeconomic and macroeconomic development indicators within a given economy. The foregoing implies the possibility of an interactive relationship between public expenditure and inflation, as well as the likelihood of unregulated public expenditure degenerating into the record of higher rates of inflation within the economy. Though evidence of the foregoing phenomenon exists, there are limited recent scientific inquiries to establish clearly the implications of surging public expenditure for rising inflationary levels within the Ghanaian economy.

- The specific management problem is how economic management teams of successive elected governments or otherwise could assure creativity, innovativeness and ingenuity towards mobilisation of national resources to ensure efficiency and effectiveness in the provision of public projects and developments towards improving the living standards of the population through job creation and competitive earnings; enhancing competitiveness and attractiveness of the economy to the global business community through the delivery of state-of-the-art public infrastructure such as good roads and bridges, public and private transportation services, adequate electricity and water supplies and other essential facilities; and towards monitoring, closely, monetary policies related to inflation to avoid price escalation of goods and services, or to prevent higher inflationary rates within the economy. The purpose of this research was to examine how a steady increase in annual public expenditures could impact annual inflation rates.

1.3. Research Objectives

1.3.1. General Objective

The central objective of this research was to evaluate the implications of surging public expenditure for rising inflationary levels within the Ghanaian economy.

1.3.2. Specific Objectives

Specifically, the study sought to achieve the following objectives:

- Examine trends in public expenditure across global economies.
- Assess the economic impact of inflation measurements on global countries.
- Evaluate the impact of public expenditure on inflation.
- Make recommendations for adapting and implementing strategic monetary and fiscal policies that would assure the success and sustainability of public expenditures, ensure the meaningful and productive contribution of public expenditures to economic stimulation and deceleration of inflation, and control inflation to appreciable levels.

1.4. Conceptual Definitions

For the purpose of this research, terms such as *public expenditure, government expenditure, public spending* and *government spending* were used interchangeably with the same underlying meaning. That is, to explain purchases of or expenditures on goods and services by governments at various levels – national, regional and district - for countries such as Ghana that implement the executive system of economic governance and expenditures on goods and services by

governments at the federal, state and local levels for countries practising the federal system of economic governance such as the United States and Nigeria.

Finally, *inflation rate, inflationary level, rate of inflation,* and *inflationary rate* were used interchangeably to explain the percentage and monetary change in the value of goods and services during the current fiscal or financial period compared to the previous fiscal or financial period, using either the percentage approach, monetary approach, or both. Each of the foregoing approaches to measuring the inflation rate is explained further in the research methodology section.

2. Literature Review

The fundamental topic for development of the current research was: "*Relationship between Public Expenditure and Inflation*." The main purpose of this research was to examine how rising levels of public expenditure impact inflation during the research period. This section presents a review of existing literature and a synthesis of literature for the research. As noted in prior works, in a scientific inquiry such as this, it is imperative to identify relationships between the reviewed literature and research problem and between the research objectives and reviewed literature. Further, it is appropriate for the researcher to ensure these relationships exist, as evidenced by the current research. The principal question that underpinned the current research was: "*What are the identified and proven strategies that policymakers in developing, emerging and developed economies could adapt and implement to ensure economic stimulation and to enhance the global competitiveness of their respective economies through increased public expenditure without heightening inflationary levels?"*

Data required to develop discussion in this section were obtained from textbooks, peer-reviewed articles published in journals and grey literature. Other sources were Google's search engine, including Netcials, MacroTrends, and databases of the World Bank and Bank of Ghana. The following key phrases were used to generate relevant information from the Google Search Engine and other relevant databases for the discussion: inflation, inflation rate, public expenditure and public spending.

Two major themes were developed to facilitate extended discussion in this section. These included factors influencing public expenditure in global economies and the causes and effects of inflation on an economy. The discussion contributed significantly to the purpose of the current research by facilitating our determination, understanding, and appreciation of the underlying causes of surging public expenditure and various factors that play a part in determining inflationary levels among global economies. A theoretical framework preceded discussions on reviewed literature in this section.

2.1. Theoretical Framework

The renowned economist, Paul Anthony Samuelson (15th May, 1915 – 13th December, 2009), remained the first American to win the Nobel Memorial Prize in Economic Sciences in 1970. This distinguished American economist was credited with textbook publications such as *Foundations of Economic Analysis (1947), Economics (1948), Economics: The Original 1948 Edition (1997)* and *Inside the Economist's Mind: Conversations with Eminent Economists (2007)*. Paul Anthony Samuelson was an economic legend and noted for propounding one of the dominant and most cited neoclassical theories of public expenditure. In 1954, Paul Anthony Samuelson published another work entitled *The Pure Theory of Public Expenditure*. This work was considered a model for the effective development of theoretical underpinnings for the current research.

2.1.1. Assumptions

Samuelson (1954) noted the neglect of the theory of optimal public expenditure for the adaption and implementation of the theory of taxation by most economists, except for economists such as Bowen, Sax, Wicksell, Musgrave and Lindahl, whose works bore semblances of the theory of optimal public expenditure during the period. The Theorist advanced a set of assumptions to buttress the pure theory of public expenditure. He assumed the existence of two categories of goods. These include ordinary private consumption goods and collective consumption goods. Samuelson (1954) described ordinary private consumption goods as those that can be bundled out among different persons (I, 2, …i, …, s) based on the relations Xj = the sum of s up to 1 multiplied by X^ij. The ordinary private consumption goods are denoted by X1, …, Xn.

The collective consumption goods are denoted by Xn+1 …, Xn+m. These collective goods are enjoyed by all persons in common to the extent that each person's consumption of the collective good does not lead to subtraction from any other person's consumption of that good. As a result, Xn+j = X^in+j concurrently for each and every ith person and each collective consumption good. Further, Samuelson (1954) assumed the absence of any mystical collective mind bent on enjoying collective consumption goods. Rather, he assumed each person has a consistent set of ordinal preferences in relation to his or her consumption of collective goods, including private goods. These ordinal preferences can be summarised using regularly smooth and convex utility index $u^i = u^i (X^i1, …, X^in+m)$.

Samuelson (1954) averred that any attempt to subject the utility index to monotonic stretching could amount to an admission to the fact that the utility index is cardinal and remains a strong preference. As a convention, the Theorist wrote the partial derivative of each function with regards to its jth argument by a "j" subscript such that u^ij equals $\partial u^i/\partial X^ij$ and so forth.

The theorist assumed that the quantities of economic goods could be grouped into two. The first group relates to goods or outputs that each person always seeks to maximise; the second group refers to factors or inputs that each person always desires to minimise. Suppose these assumptions hold. Samuelson (1954) noted that the algebraic signs of the second assumption could be modified with relative ease to allow for the use of the term "goods," implying issues related to

factor inputs have been covered or addressed. On the basis of the foregoing, we are certain that $\mathbf{u^ij}$ is greater than zero at all times. Further, the Theorist developed the following equations for the theory:

$[(u^i j \div u^i r) = (Fj \div Fr)]$. (i = 1, 2, …, s; r, j = 1, …, n) or (i = 1, 2, …, s; r = 1; j = 2, …, n) (i)

Sum of s up to i = 1 $(u^i n+j \div u^i r) = (Fn+j \div Fr)$. (j = 1, …, m; r = 1, …, n) or (j = 1, …, m; r = 1) (ii)

$(Uiu^ik \div Uqu\text{^}q\ k) = 1$. (i, q = 1, …, s; k = 1, …, n) or (q = 1; i = 2, …, s; k = 1). (iii)

Samuelson (1954) simplified the assumptions related to production. He assumed the production-possibility schedule related to total outputs, both private and collective, is regularly convex and smooth. Alternatively, he assumed F(X1, … Xn+m) = 0, with Fj > 0, and ratios Fj ÷ Fn determinate and subject to the generalised laws of diminishing returns. Controlling for feasibility considerations, the Theorist assumed the existence of a maximal or ordinal utility frontier that represents the Pareto-optimal points. This ordinal utility frontier exhibits an (**s - 1**) fold infinity with the "property that from such a frontier point you can make one person better off only by making some other person worse off" (p. 387).

Samuelson (1954) argued that to be able to make normative judgements with regard to the relative ethical desirability of different configurations which involve persons considered as being on a higher level of indifference and others on a lower level of indifference, it is imperative to be presented with a set of ordinal interpersonal norms; or with social welfare function which is representative of all the consistent set of ethical preferences inherent in the possible states of the identified system.

The Theorist contended that it is not the responsibility of the economist to make empirical deductions about the form of the social welfare function because it could have as many forms as there are ethical views. The only limitation placed on the social welfare function by Samuelson (1954) in the theory is its consistent decrease or increase in response to a decrease or increase in the ordinal preference of an individual. However, the indifference level for all others remains the same. Mathematically, the social welfare function could be narrowed, and any of its indices could be written as U = U $(u^1, …, u^3)$ with Uj > 0.

2.1.2. Optimal Conditions and Decentralised Spontaneous Solution Challenges

Discussions on the theory were extended to include explanations of optimal conditions and how attempting to decentralise spontaneous solutions may be impossible. Under the latter, Samuelson (1954) argued that seeming market failures are not grounds enough for us to object to the fact that it is relatively easy for economies and individuals to weigh all pools of eligible resources around them and to settle for the one believed to be most suitable for the desired ethical welfare function. The Theorist averred that though the solution is not far-fetched, the challenge relates to how to find it. Equations one through three above formed the integral basis of explanation for the optimal conditions and challenges associated with the implementation of the decentralised spontaneous solution, with the following budget equations for each person added:

$p1X1 + p2X^i2 + … + pnX^in = L^i$ (I = 1, 2. …, s) (i)

In the above equation, L^i represents a lump-sum tax for each person selected in an algebraic value leading to the most desired state of the world. The Theorist argued that the solution for equations (i) and (i)′ could be simplified with relative ease if there were no collective consumption goods. Samuelson (1954) concluded that the attempt to explore the concept of public expenditure further has the potential to lead us into the mathematical domain of other disciplines, such as sociology and welfare politics.

2.2. Factors Influencing Public Expenditure in Global Economies

Burkhead and Miner (2017) affirmed the substantial and growing contribution of public expenditure to total economic activity in all advanced economies across the globe. The authors integrated the normative and positive theory and empirically analysed public expenditure while concentrating on the optimal provision of public goods and estimating their costs and effects.

Saunders (1985) analysed data on the size and growth of general public expenditures and receipts in relation to gross domestic product for countries affiliated with the Organisation for Economic Co-operation and Development (OECD) during the period 1960 through 1981. A characteristic of the foregoing macroeconomic trends was the widespread presentation of budget deficits during the mid-1970s, following the steep surge in public expenditures in relation to gross domestic product during the two years that followed the first oil shock recorded by the global community during 1973.

Burkhead and Miner (2017) outlined various techniques available for reaching collective decisions related to the provision of public goods. Further, they emphasised the significance of income distribution and intergovernmental fiscal relations and stressed the need for the nature of public expenditures to be closely evaluated and studied in a mixed economy where the growth of the public sector is faster than that of the private sector.

The proponents of increased public expenditure have advanced several arguments to buttress their claim and stance. For instance, they argued that, in economies such as the United States, interest rates have been at a record low and show no signs of increasing despite the consistent surge in public expenditure. Thus, these proponents do not perceive any direct relationship between increased public expenditure and rising inflationary levels in economies such as the United States. The implication is that allocations to public expenditure could be increased unabated since a consistent increase in the provision of public facilities and projects does not lead to inflation. Further, many economies, including the United States, were exhibiting steady performance until the outbreak of COVID-19, and it is hoped the affected economies would soon bounce back strongly into full action and operations (Shultz et al., 2021).

Burkhead and Miner (2017) delineated controversies surrounding public expenditure by defining the concept, analysing its core functions, demonstrating its operation processes, and evaluating research related to public expenditure. The theoretical works of prominent economists, including Kenneth Arrow, Lionel Robbins, and Paul Samuelson, among

others, were considered by the authors in the formulation of a clear statement of theory in its application to operational challenges.

Saunders (1985) adapted an international cross-section framework to test several hypotheses related to the size and growth of government and macroeconomic performance. Economic performance indicators applied to the research included private sector employment growth, economic growth and consumer price inflation rate. The research outcomes revealed little evidence of the harmful effect of the size and growth of government on economic performance, especially during the period after 1975. However, an inverse relationship was found to exist between the size of government and economic growth during the 1960s.

Bose, Haque and Osborn (2007) drew on panel data drawn from the 1970s and 1980s from thirty (30) developing economies to examine growth effects of government expenditure with special emphasis on disaggregated government expenditures. Bose et al. (2007) noted the improvement in their methodology in previous research, as their methodology ensured explicit recognition of the role of government budget constraints and the biases that were likely to occur from omitted variables. Findings from the research revealed a positive and significant correlation between the share of government capital expenditure in gross domestic product and economic growth. When budget constraints and omitted variables were taken into consideration, the research analysis revealed a significant association between government investment in education and growth at the disaggregated level.

Burkhead and Miner (2017) paid strong and appropriate attention to modern techniques such as cost-benefit analysis, analysis of the determinants of public expenditure, and programme budgeting. The publication serves as a useful reference for professional economists interested in reliable information to facilitate the conduct of empirical research on public expenditure and arrive at practical solutions to its challenges. Further, the publication focuses on the integration and critique of modern theories related to public expenditure, distributional challenges, and the political framework of decisions on public expenditure.

Proponents of increased public expenditure further submitted that despite the rising levels of public infrastructure funding in economies such as the United States, one does not feel the whimper of inflation. This notwithstanding, Shultz et al. asserted that the line of reasoning of the foregoing contentions is not only dangerous but also symptomatic of economic short-sightedness and that basic economic laws, which remain unchanged, do not support these arguments. Moreover, unregulated public expenditure could have some damaging consequences for the implied economies.

Muhammad, Wasti, Hussain and Lal (2009) were interested in assessing the long-run relationship between money supply, inflation, public expenditure and growth in the Pakistani economy. Muhammad et al. (2009) adapted the Johnson cointegration test model to determine long-run relationships; they also employed the Granger causality model to establish unilateral and bilateral causality. Muhammad et al. used annual data from 1977 through 2007 to conduct their study. Outcomes from the research revealed that public expenditure and inflation were negatively related to economic growth in the long run, while the long-run relationship between money supply and economic growth was positive. The reason assigned for the negative relationship between inflation, public expenditure, and economic growth was that a substantial portion of public expenditure allocations was appropriated to non-development sectors, while inflation was driven by adverse supply shocks or cost-push inflation within the Pakistani economy.

Aschauer (1989) examined the existing relationship between aggregate productivity, stock, and flow of government expenditure variables. Findings from the research revealed that the determination of productivity by non-military public capital stock is dramatically more important than the determination by either the flow of military or non-military spending. The relationship between military capital and productivity was found to be weak, while core infrastructure, including mass transit, airports, streets, highways, water systems and sewerage, among others, was found to have the most explanatory power for productivity. The research outcomes suggested that a slowdown in productivity over the past decade-and-a-half was largely influenced by net public capital stock.

Solanki and Sen's (2015) publication, which is related to public expenditure, economic growth, and inflation, sought to address relevant and pertinent issues associated with inflation within the Indian economy. The researchers were interested in testing and establishing the relationship among the three macroeconomic indicators: public expenditure, inflation and economic growth. An overview of increasing public expenditure and its attendant composition during the post-independence period were outlined in the publication.

Buiter (as cited in Shultz et al.) stressed the need for the Federal Reserve of the United States to make conscientious efforts to ensure monetisation of debt accumulated by the government during relief efforts of the COVID-19 pandemic outbreak. The author asserted that the relative stability and lower inflationary consumer price levels observed in some global financial markets are insufficient grounds for economic comfort. Moreover, periods characterised by surges in public debt have been followed by periods of consistent hikes in interest rates, steady increases in inflation, and worsened financial crises. In most cases, these economic challenges of excessive public debts occur without prior warnings.

Premchand (1993), from a management perspective, presented a comprehensive discussion on the expenditure processes in public institutions. The content of the publication was extended to include analysis of budget formulation, courteous delivery of services to the general public, critical challenges saddled with advanced, emerging and developing economies, and measures to be adapted to ensure effective management of public expenditure. The practical illustrations sought to wean global economies off the challenges related to the effective application of public expenditure funds and the determination of public expenditure's relevance to the computation of total economic output.

Solanki and Sen (2015) relied on secondary data to establish a possible relationship between public expenditure, inflation, and economic growth, whereas the Wagner law of increasing state activity was found to be applicable to the

Indian economy in both relative and absolute terms. A positive correlation was established between public expenditure and economic growth. The analysis revealed an inverse relationship between inflation and economic growth. The motivation to maximise social welfare was determined as a major driver of increasing public expenditure within the Indian economy. Thus, any attempt to reduce total allocations to public expenditure may imply a sacrifice of the social welfare objective.

Shultz and Taylor (as cited in Shultz et al.) recounted that no early signals were picked from the economic indicators in the United States during the late 1960s of the accelerated rates of inflation and interest recorded during the early 1970s. Similarly, very few early warnings were picked from the financial markets in the run-up to the Great Recession recorded from 2007 through 2009.

Magazzino (2011) adopted a time series approach to examine empirical evidence of the relationship between public expenditure and inflation for countries in the Mediterranean region by relying on data gathered from 1970 through 2009. Stationarity tests conducted by the researcher revealed that the public expenditure-to-gross domestic product ratio remained a '1(1) process,' whereas the price index remained a '1(2) process.' Among the economies sampled, data on Portugal showed a long-run relationship between growth in public expenditure and inflation. Results from the Granger causality tests showed evidence of directional flow from expenditure to inflation for economies such as Spain, Cyprus and Malta in the short-run, bidirectional for Italy, and from inflation to public expenditure for France. The study concluded with policy implications of the statistical outcomes for the sampled economies.

Nyambe and Kanyeumbo (2015) examined the components of public expenditure, household expenditure, and inflation, as well as the effects of these variables on the growth of the Namibian economy. The authors posited that economic growth is pivotal to the creation of job opportunities and the reduction of poverty. The success of the decision to enhance economic growth is dependent on various elements, such as monetary and fiscal tools. The Namibian economy benefits from exports of natural resources such as diamonds, fish and agricultural products. This, notwithstanding, microeconomic and macroeconomic policies, remained central to the creation of consumer satisfaction and the ensuing expansion of the domestic economy.

Shultz et al. revealed that each federal tax rate required a one-third increase prior to the outbreak of COVID-19 to ensure the current level of public expenditure was financed without adding to the debt stock. However, should the increase in the federal tax rate be applied, the impact on the economy would be harmful, and the harmful effect could be similar to the impact of rising public debt on job creation and the growth of the economy. Thus, higher tax rates are not the panacea to the challenges of mounting public expenditure and public debts.

Dupor (2016) affirmed that the poor GDP growth performance of the United States economy could serve as the basis of the argument for increased public expenditure as a means of stimulating the economy. However, the surge in government purchases has the potential to increase production costs, and the latter could lead to inflation. Should the United States Federal Reserve fail to counteract the increase in public expenditure with restrictive monetary policy, the increase in inflation could drive down real interest rates. Increases in businesses' investments in structures and equipment and increases in household consumption may be encouraged by a reduction in the cost of borrowing.

Dupor (2016) described the forgoing as an interesting theoretical mechanism by which a surge in public expenditure could lead to an indirect increase in output through inflation. However, whether the foregoing could be proven empirically remains a puzzle and extends to the broader macroeconomic question of how fiscal policy impacts inflation. The author found no strong effect of public expenditure on inflation. The research findings revealed that a 10% surge in public expenditure resulted in an 8 basis point reduction in inflation. Further, the statistical effect was determined not to be different from zero. The author asserted that results from the research did not necessarily imply that counter-cyclical public expenditure is ineffective at boosting total economic output. Rather, findings from the research established that inflation driven by increasing public expenditure does not scientifically affirm the significant influence of public expenditure on the United States economy.

Nyambe and Kanyeumbo (2015) revealed that business activities within the Namibian economy are ably supported by household consumption and emphasised the need for inflation to be held in check since it affects various sectors of the economy and has the potential to contract household consumption. The researchers relied on annual time series data from 1980 through 2011 to assess the impact of public expenditure, household expenditure and inflation on economic growth in Namibia. Sampled data were analysed using a multiple regression model. The research findings revealed a positive effect of public expenditure, household expenditure and inflation on economic growth. However, the relationship between inflation and economic growth was determined to be negative; the relationship depicted a test statistic value of negative 3.258.

Skidelsky (as cited in Shultz et al.) noted the dominance of fiscal policy in the implementation strategies of economic management teams after the period of the Great Recession (2007 - 2009). In the past, the United States Congress was noted for reducing public expenditure on defence as a strategic way of closing the fiscal deficit gap, and it was expected to repeat this strategy during the post-COVID-19 periods. However, some experts have affirmed that these initiatives have demonstrably failed in the past due to the approach.

Ezirim, Muoghalu and Elike (2008) relied on the cointegration analysis and Granger causality model to assess the relationship between growth in public expenditure and inflation in the United States. Annual time series data from 1970 through 2002 were applied to the research. The study outcomes revealed cointegration between public expenditure and inflation and an existing long-run equilibrium relationship between the two research variables (public expenditure and inflation). However, the relationship between growth in public expenditure and inflation was determined to be bi-causational, while decisions related to public expenditure were significantly influenced by inflation.

The United States Congress was noted for approving savings from lower defence outlays to finance additional domestic expenditure instead of reducing the budget deficit. Skidelsky (as cited in Shultz et al.) argued that attempts to reduce public expenditure on defence in contemporary periods would practically fail (as has been the case in the past) unless beliefs held by policymakers on budget deficits are reviewed and transformed. Failure of policymakers to strategically address the issue of fiscal deficit could undermine the effectiveness of national security while strengthening external adversaries and dissidents. This argument holds, especially when China is making giant economic strides in Asia and investing massively in the country's military.

The foregoing notwithstanding, Skidelsky (as cited in Shultz et al.) noted the success story of some global governments' resolve to borrow during looming and prevailing international crises. As an illustration, decisions by successive governments of the United States to borrow during such periods proved invaluable to strengthening national security. Moreover, the ability of the United States to borrow over two centuries ago proved vital to the declaration of self-independence from England; the borrowing proved useful to the preservation of the Union during the Civil War; and proved vital to the defeat of totalitarian regimes during World Wars I and II of the 20th century.

However, critics argue that excessive public expenditure in recent periods has been defeating this long-standing tradition. The critics argued further that the borrowing "well" of the United States federal government would eventually dry up if the current fiscal path were sustained over considerable periods. The eventual dissipation of the country's borrowing sources would affect the United States government's ability to effectively counter national security threats. Global peace is likely to be undermined when foreign dissidents, terrorist groups, and hostile governments realise the fiscal challenges and inherent weaknesses (Skidelsky, as cited in Shultz et al.).

Based on the outcomes of their empirical research, Nyambe and Kanyeumbo (2015) stressed the need for policies geared toward growth of the Namibian economy to strongly consider components such as public expenditure and household expenditure. All things being equal, these components have the proven potential to increase the stream of national income. However, persistent inflation requires the utmost attention and consideration of key policymakers to minimise its damaging effects on consumers and economic growth.

Ezirim et al. (2008) revealed that the growth in public expenditure drives up inflationary pressures, while a decrease in public expenditure contributes to a reduction in inflationary levels. The research findings affirmed the relevance of Keynesian fiscal policy in counteracting inflation in advanced economies. Moreover, the research outcomes revealed a direct relationship between growth in public expenditure and inflation in advanced economies such as the United States. This contradicted Dupor (2016), who found that a 10% surge in public expenditure resulted in an 8 basis point reduction in inflation within the United States economy.

Ezirim et al.'s research was focused on an advanced economy (United States). However, the findings proved useful to the current research, which sought to assess the link between public expenditure and inflation within a lower-middle-income economy (Ghana). Current research findings helped establish whether or not the empirical relationship between public expenditure and inflation among lower-middle-income economies such as Ghana was not distinct from the prevailing relationship between the two variables among advanced economies such as the United States.

Eltis (1983) examined the interconnection between public expenditure and inflation and outlined two fundamental arguments that link the two variables. First, public expenditure is not financed by taxation, while inflation is attributed to the financing of consequent deficits through methods including increases in the supply of money into the economy. The second argument, in contrast, is related to partial financing of public expenditure through taxation and partial attribution of inflation or the level of unemployment needed to reduce the higher rate of inflation to an appreciable level, to an additional increase in the price of wages required by workers to ensure they access the expected rate of growth, net of tax real income. The researcher systematically examined the significance of these two theoretical approaches to the acceleration of the inflation rate within the British economy.

The United States has made conscientious efforts to maintain an enviable position in the global financial market. Skidelsky (as cited in Shultz et al.) stressed that the establishment of the United States' strong position in the global financial market was occasioned by prudent management of the federal finances. During sixty-three of the seventy-five years following World War II, public expenditure in the United States has exceeded national income. The author attributed the culture of deficit expenditure in the United States to the New Deal signed by former President Franklin D. Roosevelt, which allowed the country to wean itself off the agreement with the Bretton Woods Institutions. The eventual end to the conditionalities of the Bretton Woods Institutions allowed the United States to engage in limitless public expenditure and support national debt payments by printing new notes as and when necessary or deemed appropriate.

Prior to the signing of the New Deal by former President Roosevelt, successive governments were believed to be mindful of public expenditure; excessive public expenditure and its attendant consequences were a source of worry and concern to most public officials. However, over time, the anxiety of public officials in relation to increased public expenditure ameliorated and opened the "floodgates" for public expenditure. Thus, the relaxation of public officials on the possible consequences of unbridled public expenditure culminated in a rapid surge in budget and fiscal deficits. The growth in deficits was so rapid; by the mid-1970s, growth recorded in total national debt was more rapid than growth in national income (Skidelsky as cited in Shultz et al.).

Hussain and Zafar (2018) drew on available data from 1972 through 2015 to examine the interrelationship between money supply, inflation, public expenditure, and growth within Pakistan's economy. The researchers relied on the ARDL bounds testing approach for cointegration and ECM technique to assess the long-run and short-run relationship among the research variables. To determine the direction of causality, the Granger causality test was applied by the researchers. The analysis revealed a long-run relationship between economic growth, public expenditure, and inflation. Results from the ECM analysis revealed a short-run relationship among the above-listed research variables. However, the

speed of adjustment was determined to be slow; it was less than 20%. The Granger causality test revealed causality to run from inflation to economic growth, whereas causality between inflation and public expenditure, inflation, and the money supply was bidirectional. The study revealed that economic growth is impacted by both monetary and fiscal policies.

Shultz et al. observed the unleashing of the torrent of novel public expenditure following the disbelief among public officials that growing deficits and debts are consequential to the health of the United States economy. As of 2019, the United States was believed to be spending approximately US$1 trillion annually more in inflation-adjusted terms than the country spent about twelve years earlier. The estimated add-ons to the national debt during 2020, following the outbreak of COVID-19, was US$2 trillion. This new public expenditure raised the total national debt-to-national income ratio to one hundred per cent (100%). Total public expenditure for 2021 was projected at US$1 trillion.

Wenzhe and Yean (2009) sought to analyse the relationship between public expenditure at the local level and inflation through the analysis of various forms of provincial fiscal expenditure, using data from 1992 through 2006. The researchers analysed the mechanisms of the seignorage effect, productive effect, home demand effect and wealth effect from the perspective of intergovernmental fiscal competition. The foregoing variables were analysed in relation to public expenditure at the local level, whereas three hypotheses were advanced to underlie the research. These hypotheses were tested through the use of the dynamic panel data model.

Fiscal concerns expressed by some economists in relation to the United States economy affected both the Democratic and Republican parties, the two leading political parties in the country. Shultz et al. affirmed that concerns held by either of these two major political parties during the last decade have vanished into thin air. The authors observed a strong thirst for excessive public expenditure and, by extension, rising public debt by various governments across the globe. However, over time, the destructive path of fiscal policy and fiscal deficit would manifest, and this would accentuate the economic usefulness of an alternative approach to fiscal deficits.

Findings from the research conducted by Wenzhe and Yean (2009) revealed that the effect of fiscal competition on inflation is weakened by the decision to centralise fiscal revenue. Further, the home demand effect and productive effect allow fiscal competition to result in a future decrease in inflation. Meanwhile, reverse causality was found to exist between fiscal expenditure at the local level and inflation. This relationship was due to the reverse adjustment of local public expenditure based on previous inflation by local governments.

2.3. Causes and Effects of Inflation on an Economy

Fernando and Boyle (2021) affirmed that it is relatively easy to ensure accurate measurement of changes in the price of individual goods and services over a stated time frame. However, do the needs of individuals, organisations, and governments extend beyond one or two such identified products? For instance, to live comfortable lives, individuals need a large and diversified set of products and services. Examples of such needs include:

- Services like work or labour, transportation, education, healthcare and entertainment.
- Commodities such as food items, fuel and metal.
- Utilities including water and electricity.

Ganti (2021) averred that one of the derivatives used to hedge against inflation is a zero-coupon inflation swap (ZCIS). It is a derivative that allows fixed-rate payments on notional amounts to be exchanged for payments at an inflation rate. It is a basic form of inflation derivative and involves cash flow exchange, which enables investors to either increase or decrease their exposure to changes inherent in the purchasing power of money. This derivative is sometimes referred to as *a breakeven inflation swap*. A contractual arrangement that allows for the transfer of inflation risk from one party to another is called *an inflation swap*. This contractual arrangement facilitates the exchange of fixed cash flows.

The aim of inflation is to measure the overall effect of changes in the price of a diversified set of goods and services. This measurement ensures we emerge with a single value for the increase in price levels of products and services in a given period. At its June 2021 meeting, the Federal Reserve of the United States neither announced an increase in nor changes to the national policy rate nor raised concerns about rising inflation. However, a report released by the United States Bureau of Labour Statistics (a week prior to the Federal Reserve's pronouncement) showed a 5% increase in the consumer price index for all urban consumers (CPI-U) through May 2021. Analysts believed the 5% increase remained the index's largest surge in 12 months since the 5.4% increase recorded during the month of August 2008 (Fernando & Boyle, 2021).

The zero-coupon inflation swap arrangement allows for a stream of income linked with the inflation rate to be exchanged for a stream of income tied to a fixed interest rate. Periodic interest payments are not effected on zero-coupon securities during the lives of the investments. Rather, the holder receives a lump-sum payment on the maturity date. Similarly, the zero-coupon inflation swap contractual arrangement calls for income streams to be paid as a lump sum at the maturity date of the swap and when the level of inflation is determined. Payoffs on zero-coupon inflation swaps at maturity dates are contingent on the rate of inflation realised during a given time period, as measured and affirmed by an inflation index (Ganti, 2021). Discussion in this section revealed that ZCIS remains a bilateral contract that is useful for the provision of hedge or protection against inflation.

Another terminology that facilitates explanations of inflation is price inflation. Cheng (2021) described price inflation as the increase that occurs in prices for standardised goods and services or the increase in prices for baskets of goods and services over a given period of time, usually a year. The author indicated that the quantity of goods supplied for purchase and possible consumption grows smaller relative to the nominal amount of money available in the economy. These demand-pull pressures have the tendency to result in some degree of price inflation, especially when the total supply churned out by the production capacity is not large enough to meet the total market or consumers' demands. The resultant effect may be upward price adjustments.

From a theoretical viewpoint, the theory of monetarism is noted for providing a succinct explanation of the existing relationship between the money supply of an economy and inflation. Fernando and Boyle (2021) recounted massive amounts of gold, and especially silver that flowed into the economies of Spain and other European countries following the conquest of the Inca and Aztec empires by Spain. The rapid increase in money supply led to the deceleration in the value of money and a sharp rise in prices in the implied economies.

Cheng (2021) asserted that price inflation could be engineered by cost-push factors, including increased input costs required in the production process, if Firm A has to incur higher input costs in the form of increased costs of labour and raw materials during the production process. All else held constant, the increased production cost would be factored in determining the selling price per unit of the final product or service. Thus, the additional cost incurred in production would be passed on to final consumers through higher prices per unit of goods and services.

Measurement of inflation is contingent on the types of products and services considered. Thus, the measurement of inflation varies with the variety of goods and services included in the basket of items. Deflation is recorded when the inflation rate is below zero percent (0%). In most cases, individuals with ownership of fixed assets such as property or stocked commodities may aspire for some level of inflation since it has the tendency to increase the value of their assets. Fernando and Boyle (2021) cited an increase in money supply as the underlying cause of inflation in an economy. Nevertheless, this has the potential to occur through different channels within the economy.

Cheng (2021) revealed that price inflation could manifest in a different form. For instance, it is possible for the price of certain items or goods to remain unchanged or constant over several years. However, the quantity of these goods received by consumers tends to decline gradually. Examples include the observed weights of snack foods such as chocolate bars and potato chips, which are reduced gradually while the prices remain unchanged. Consistent with Fernando and Boyle (2021), Cheng (2021) identified the consumer price index as the most common measure of price inflation. However, the role of price inflation in setting monetary policy standards by central banks cannot be overemphasised.

The appropriate monetary authorities of an economy could increase the supply of money through a variety of ways, including the decision to print and issue more notes to the general public, give away more money to individuals, legally devalue or reduce the value of the country's currency or legal tender and the decision to loan new money into existence as reserve account credits, usually through the banking system. The latter strategy involves the decision to purchase government bonds from financial institutions on the secondary market. Nonetheless, the purchasing power of money is reduced when either of the foregoing measures is applied to ensure an increase in money supply (Fernando & Boyle, 2021).

Wolfers (2020) was convinced that statistics released for inflation fall short of the prevailing realities of the inflation phenomenon in many global economies, with special emphasis on the United States. The author argued that the United States government's pronouncement on low inflation rate during the pandemic period was at variance with the increasing cost of living, especially for poorer Americans during the period. Wolfers (2020) asserted that the evidence suggests that the increasing costs in the economic lives of many Americans are usually not captured in the computation of official estimates for national inflation rates.

Oner (n.d.) noted that a relative increase in the price of goods and services over a given period is measured by inflation. The latter remains one of the most familiar economic terminologies and practically has the tendency to usher economies to prolonged periods of instability. The author noted the aspiration of some central bankers to be known as inflation hawks and the likelihood for politicians to emerge victorious during elections on the back of promises to keep inflation rates under control.

In some cases, consumers' expectations are that prevailing rates of inflation will be sustained and maintained into the future. When this occurs, consumers are said to have adaptive expectations and built-in inflation is linked to these adaptive expectations. Workers and others, including input suppliers, tend to agitate for wage and cost increases as prices for goods and services rise. The agitations are borne out of their expectations of a continuous increase in inflation at similar rates in the future. Thus, the agitation or demand for a raise is intended to ensure workers maintain their standards of living prior to the record of inflation, if not improved. Management's decision to heed the request of labour would imply an increase in the costs of production inputs and a further increase in the cost of the final goods and services. The increase in costs of producing these finished goods and services is passed on to final consumers in the form of higher price per unit. This wage-spiral effect continues since one factor induces the other and vice versa (Fernando & Boyle, 2021).

Oner (n.d.) identified lax monetary policy as the root cause of consistently high inflation rates over considerable periods in most global economies. As the unit value of a country's currency falls, prices for goods and services increase, and purchasing power reduces when growth in the money supply outweighs growth in the size of the economy. This observed relationship between the size of an economy and the supply of money is known as the *quantity theory of money*. The latter remains one of the classical hypotheses formulated to underlie and empirically explain money supply within global economies.

The government's decision to increase money supply and credit could stimulate overall demand for goods and services within an economy to the extent that aggregate demand increases more rapidly than aggregate supply. When an increase in the supply of money and credit leads to excess demand over the production capacity of the economy and affects prices for goods and services upwardly, demand-pull inflation is said to have occurred. An increase in the amount of money available to individuals has the potential to stimulate positive consumer sentiment. This leads to increased spending and an upward review of general price levels for goods and services engendered by the demand-pull factors. The demand-pull pressures create a demand-supply gap. That leads to a surge in demand with less flexibility in supply, resulting in price hikes (Fernando & Boyle, 2021).

Oner (n.d.) believed that inflation could be triggered by pressures from either the demand or supply side of the economy. Supply shocks such as increased costs of production, including rising prices for oil, and natural disasters such as the outbreak of COVID-19, among others, could cause disruption in production and affect the total supply of finished goods and services, leading to cost-push inflation. The foregoing affirms that disruption to supply is a major driver of cost-push inflation. An example is the food and fuel inflation experienced by the global economy during 2008. Fuel and food prices, which rose very sharply, were transmitted from one economy to the other through trade during the period.

Another important factor that is considered in the analysis of inflation is price indices. It is possible for varieties of baskets of goods and services to be calculated and kept on track as price indices. However, the foregoing is premised on and facilitated by the set of goods and services selected and used in the computation process. The consumer price index and wholesale price index (WPI) remain the dominant price indices used in economic analysis. In some cases, economists may be interested in examining the weighted average of prices for baskets of products and services which constitute basic consumer needs. This measurement is facilitated by the *consumer price index*. Food, clothing, medical care and transportation are examples of basic consumer needs (Fernando & Boyle, 2021).

Oner (n.d.) observed demand shocks triggered by expansionary policies, including the decision of central banks to lower policy rates or governments' decision to increase spending, and other factors, such as the rally of the stock market, could result in a temporary boost of overall demand and economic growth. However, it is possible for the increase in demand occasioned by the foregoing factors to result in excess demand over the production capacity of the economy. That is, the increasing demand could cause a strain on available production resources, leading to demand-pull inflation, which would reflect in the prices for the limited supply of goods and services. The author stressed the need for actions of policymakers to be geared toward striking a balance between economic growth and an increase in demand as and when necessary without triggering inflation and over-stimulating the economy.

To calculate the consumer price index, we price changes related to each item in the predetermined basket of goods and determine their average, depending on their relative weight in the entire basket. Available retail prices at which individuals purchase each item are factored into the computation process. The consumer price index remains one of the most frequently applied statistics to determine periods of deflation and inflation. Frequent application of the consumer price index in this regard is attributable to its usefulness in the assessment of changes in prices related to cost of living (Fernando & Boyle, 2021).

The name of the United States Bureau of Labour Statistics resonates strongly with the consumer price index. The Bureau presents monthly reports and has computed consumer price index dating back to 1913. Available figures revealed that the monthly consumer price index for April 2021 rose by 0.8% on a seasonally adjusted basis. The April 2021 index was 0.2% higher than the 0.6% recorded earlier in March 2021. However, the index showed a year-on-year (YOY) increase of 4.2%, representing the highest increase during a 12-month period since September 2008 (Fernando & Boyle, 2021).

Inflation may be determined by future expectations where businesses and individuals expect prices to rise in the foreseeable future and ensure these price-increase expectations are factored into contractual price adjustments and negotiations for wages and salary increases. Automatic increase in rental payments serves as an example of contractual price adjustments. Oner (n.d.) noted that expectations tend to be self-fulfilling when wages increase, contracts are exercised, and prices for goods and services increase. Economists believe inflation for the next period is partly determined by the foregoing behaviour. A cyclical pattern of inflation is created and maintained when future inflation expectations are based on reference to the recent past records on inflation. The author argued that this cycle tends to create inflation inertia over time.

Another popular measure of inflation is the *wholesale price index*. This index facilitates the measurement and tracking of changes in the price of goods at various stages prior to the retail level. Generally, items included in the computation of the wholesale price index vary from one economy to the other. However, common characteristics across countries are the inclusion of items at the producer or wholesale level. Fernando and Boyle (2021) noted the possible inclusion of cotton prices for cotton yarn, cotton grey goods, cotton clothing and raw cotton in the basket of items for calculating the wholesale price index. This notwithstanding, an equally good number of other economies, such as the United States and Ghana, apply a similar variant known as the producer price index (PPI).

The *producer price index* is a collection of indices used in the measurement of the average change in selling prices received by local producers of intermediate products and services over time. We observe a sharp contrast between the producer price index and the consumer price index. The latter measures price changes from the perspective of the consumer or buyer, while the former measures changes in price from the perspective of the seller or producer. In all the identified variants, price offsets are possible to observe. That is, it is not out of place for the increase in the price of one component, say wheat, to cancel out the decrease in the price of another commodity, say rice, in the basket of items for the measurement of a producer price index. Overall, each index is representative of the average weighted price change for the given constituents, which invariably applies to various levels, including commodity and sector levels, and extends to the entire economy (Fernando & Boyle, 2021).

Oner (n.d.) shed light on measures taken by policymakers to control inflation and affirmed that disinflationary policies adapted for implementation are contingent on the causes of inflation. In other words, the causes for a particular type of inflation would determine the mitigating measures to be adopted and implemented. Suppose an economy is overheated. The central bank or relevant government agency could implement policies that would ensure the contraction of the economy through a decrease in aggregate demand. The latter could be made feasible through interest rate hikes to ensure stability in the prices of goods and services. Raising interest rates would discourage borrowing, limit the quantity, and increase the value of money supplied to the economy through banks and other financial intermediaries.

The formula for measuring inflation utilises the price indices mentioned earlier. These variants facilitate calculation of the value of inflation between two given periods: two months or two years. A lot of electronic calculators developed for the computation of inflation rates are available on various financial websites and portals. However, it is imperative for users to be aware of the methodologies that underlie these inflation calculators to ensure accuracy, clear understanding, appreciation, and application. Fernando and Boyle (2021) affirmed that the percentage change in the inflation rate could be presented mathematically as ((Final consumer price index value ÷ Initial consumer price index value) x 100%).

Suppose we are interested in determining how the purchasing power of US$1,000 changed between September 1975 and September 2018. Tabular presentation of data on price index could be accessed from various websites, including that of the United States Bureau of Labour Statistics. The corresponding consumer price index figures for the months of September 1975 and September 2018 are 54.6 and 252.439. Thus, we have an initial consumer price index value (54.6) and a final consumer price index value (252.439) to facilitate our computation. On the basis of the available data, the percentage change in inflation is 462.34% [(252.439 ÷ 54.6) x 100%) = 4.6234 x 100% = 462.34%].

Since we are interested in the change in the purchasing power of US$1,000 from September 1975 to September 2018, we could advance mathematically as follows: change in purchasing power equals 4.6234 x US$1,000 = US$4,623.40. The calculations suggest a basket of goods and services purchased during September 1975 and included in the definition of the consumer price index would be worth US$4,523.40 during September 2018. Should a consumer decide to purchase similar goods and services during September 2018, the cost of the items in the basket would be US$4,623.40.

Fernando and Boyle (2021) noted that the frequency of occurrence of price changes and the perceptions of analysts often influence the determination of whether or not inflation is good. As stated earlier, persons owning assets such as stocked commodities and properties which are priced in currencies may be interested in some level of inflation, which increases the prices of their assets such that the profits to be derived from the sales would be higher. Conversely, buyers of these assets may not clamour for inflation since they may end up paying more money for the same quantity of assets.

Oner (n.d.) shared that the cost of living of consumers is dependent on the prices of a variety of products and services and the share of each consumer in the household budget. Surveys are usually conducted by government agencies on households to measure the average cost of living for each consumer. The survey helps government agencies identify baskets of commonly purchased goods and services and track the cost of purchased goods and services in the basket over a given period. In the United States, housing expenses, including rent and mortgages, are the largest component of the consumer basket.

Investors are able to increase their fortunes when they invest in inflation index bonds. Holders of assets such as cash and bonds may not vouch for inflation because the value of their assets is likely to be reduced by inflation. To mitigate the effect of inflation, it is necessary for investors to consider inflation-hedged asset classes, including real estate investment trusts (REIT), gold and other commodities. Inflation has the tendency to promote speculation by individuals with investments in stocks of organisations and by businesses with investments in risky projects due to the expectations of increased returns than inflation (Fernando & Boyle, 2021).

The cost of purchased goods and services in the basket over a given period measured in relation to a base year is known as the consumer price index. However, percentage change in the consumer price index over extended periods results in consumer price inflation. The latter remains the most widely used inflation measure. To illustrate, Oner (n.d.) noted that if the consumer price index for the current year is 110 and the consumer price index for the base year is 100, inflation during the period equals 10% (110 – 100) ÷ 100) x 100% = 10 ÷ 100) x 100% = 10%).

One of the descriptive characteristics and measurements of inflation is core consumer inflation. It stresses the underlying and persistent developments in inflation and excludes prices determined by governments and prices of goods considered more volatile in the computation process. Examples of goods and services whose prices are excluded in the computation process include energy and food. These goods are invariably affected by temporary supply conditions or seasonal factors (Oner, n.d.).

The planning, selling, and buying decisions of businesses, employees, individuals, and consumers are usually influenced by the effects of general price increases. Predictions on the future rate of inflation by these stakeholders may be wrong, and this could increase the levels of uncertainty in the economy. Economists usually expect time and resources spent on research, estimates and projections and on adjustments to economic behaviour to be the main drivers of higher price levels rather than the real fundamentals of the economy, which inevitably are representative of cost to the economy in general (Fernando & Boyle, 2021).

Changes in prices of goods and services occur at different periods and rates. Oner (n.d.) affirmed daily changes in prices of traded commodities, whereas prices of labour (wages), which are determined on a contractual basis, take longer to adjust. Prices that extend over longer periods are termed as sticky in economic terms. The single largest cost of inflation to consumers is the erosion of income. In an economic environment characterised by inflation, the purchasing power of some consumers is reduced by uneven increases in prices. For payers and recipients of fixed interest rates, their purchasing power could be distorted by inflation. Assume a pensioner receives a fixed-seven percent (7%) yearly increase to his pension. If the inflation rate falls below 7%, the pensioner's purchasing power will rise. However, an increase in inflation rate in excess of 7% would imply a reduction in the purchasing power of the pensioner as the pension income could now purchase fewer goods and services relative to the previous period. However, for homeowners with fixed rate payments of 7% on mortgages, 7% inflation would imply zero percent payment on real interest rate; the nominal interest rate (7%) minus the inflation rate (7%) would equal zero percent (0%). Thus, homeowners with mortgage payments

stand to benefit from inflation, and servicing debts during periods of high inflation would be easier, especially when the incomes of homeowners match inflationary levels.

The foregoing notwithstanding, real income of lending institutions declines during periods of rising inflation, especially when inflationary effects are not considered in the determination of nominal interest rates. Many economies have had to contend with inflation and, in some cases, hyperinflation of one thousand percent (1,000%) or more annually. Oner (n.d.) recounted that the inflation rate recorded by Zimbabwe during 2008 was estimated at one point of five hundred billion percent (1.5 billion %). Economists described it as one of the worst cases of hyperinflation ever recorded in human history, and it remains arguably the highest inflation rate recorded during the 21st century. Hyperinflationary levels are catastrophic; they compel economies to adapt painful and challenging policy measures to ensure that the inflation rate is brought back to reasonable and appreciable levels. Some of these difficult measures include giving up the national fiat currency for another country's currency, as witnessed in the case of Zimbabwe, which adopted and utilised the American dollar during the country's economic crisis period.

Central bankers often keep a close watch on core inflation. The gross domestic product (GDP) deflator with broader index coverage is an example of indices required when computing overall inflation for the economy. To ensure consistency, the consumer price index basket is mostly kept constant over extended periods. However, changes in consumption patterns require that the consumer price index basket is occasionally tweaked to reflect the same. For instance, it may be necessary to replace goods and services such as old-fashioned technology items with goods modelled on current technology with high demands. The GDP deflator tells us, on average, how prices change over a given period for each item produced within the economy. As a result, the contents of the GDP deflator vary every financial or fiscal year and remain current relative to the contents of the consumer price index basket, which is mostly fixed. However, the GDP deflator is often considered a non-good measure of the cost of living because its contents reflect non-consumer items such as spending on the military (Oner, n.d.).

Fernando and Boyle (2021) observed along the line that this new money supply and credit spiral led to initial price increases for some goods and services and later increases in price for others. The foregoing leads to the *Cantillon effect*. That is, it results in a sequential change in prices and purchasing power, implying that the inflation process leads to an increase in general price levels over a given period and further leads to distortions in rates of return relative to prices and wages during the process. A belief commonly held among economists is that relative price distortions away from their economic equilibrium are not healthy for the economy; they have the potential to drive economies into periods of recession. It remains the responsibility of the financial regulators of each economy to put the necessary measures in place to keep the inflation rate under control. Implementation of measures related to monetary policy ensures financial regulators inch closer to the realisation of this objective.

Oner (n.d.) contended that high inflationary levels are noted to have negative effects on an economy. However, consistent fall in prices or deflation is equally not desirable. Falling prices of goods and services often influence consumers' decision to delay purchases, if it is within their means, to a later date with the expectation of further price decreases in future. Though beneficial to some consumers, the benefit does not extend to the entire economy; it does not stimulate the economy; income generated by producers is reduced, and the growth of the economy is slowed. Growth in the Japanese economy is believed to have been low over considerable fiscal periods due to deflation. One of the measures adopted by the United States Federal Reserve and other central banks across the globe to prevent deflation during the financial crisis that erupted in 2007 was to keep interest rates low for extended financial periods. Further, other monetary policies were formulated to ensure the availability of more liquidity through the financial systems.

Fernando and Boyle (2021) described monetary policy as the actions taken by central banks or relevant committees to determine the size and growth rate of the money supply. As noted in the problem statement section, in the case of Ghana, the relevant body under the central bank is called the *monetary policy committee*. The goals of the Monetary Policy Committee of the United States Federal Reserve are structured to create maximum employment, moderate long-term interest rates and price stability. The function of each goal is to promote stability in the financial environment. The long-term inflation goals of the United States are communicated clearly by the Federal Reserve. The objective is to maintain a steady long-term inflation rate, which is believed to be beneficial to the economy. Effective planning for the future by businesses in terms of knowing what to expect is enhanced by stability in the prices of goods and services or constant inflationary levels over extended periods.

Non-monetary factors are useful for the determination of maximum employment. These factors fluctuate over time and, hence, are subject to change. Due to the fluctuating nature of these maximum employment-induced factors, the United States Federal Reserve does not set specific goals to that effect; employers' assessments largely influence maximum employment within the economy. A certain level of volatility is witnessed at any given moment; people go on vacation while others start new jobs. To this end, maximum employment does not imply zero unemployment. Exceptional measures are taken for implementation by monetary authorities during periods of extreme economic conditions (Fernando & Boyle, 2021).

A bond-buying programme known as *quantitative easing* and keeping interest rates near zero percent remains one of the main policies implemented by the United States Federal Reserve after the Great Recession of 2007 through 2009. Although some critics argued that the quantitative easing programme would lead to inflation in the American dollar, a steady decline in inflation was observed over an eight-year period after 2007 (Fernando & Boyle, 2021).

Several complex reasons account for the inability of quantitative easing to result in inflation or hyperinflation. The simplest explanation proffered by Fernando and Boyle (2021) was that the recession served as a more prominent deflationary environment, the effects of which were strongly supported by quantitative easing. It remains the strategy of policymakers in the United States to keep inflation rate steady around 2% annually. Targeted inflation rates for Brazil and

India remained at 4.25% and 4% respectively. Quantitative easing has rigorously been pursued by the European Central Bank as a counter-measure for deflation in the Eurozone and in other economies that have experienced negative interest rates owing largely to speculations of deflation creeping in the Eurozone and possibly leading to stagnation of economies.

However, the possibilities of economies experiencing higher growth rates to effectively absorb higher inflation rates are on the higher side. An increase in the price of stocks usually reflects the effects of inflation. Stated differently, inflation effects are included in the rising prices of stocks. As a result, stocks are often considered the best hedge against inflation. In contemporary economies, increases in money supply usually occur in the form of bank credit injections through the financial systems. Immediate effects of these injections on prices are recorded in financial assets such as stocks whose value is priced in currency. Special financial adjustments allow investors to hedge their investments against inflation. These include treasury inflation-protected securities (TIPS), which are low-risk treasury securities often indexed to inflation, and the invested principal amount increases by the percentage of inflation. Treasury inflation-protected securities-based exchange-traded funds (ETFs) and treasury inflation-protected securities mutual funds remain other options for investors (Fernando & Boyle, 2021).

A brokerage account is required to access exchange-traded funds, stocks and other funds that could prove useful in mitigating the dangers of inflation during investment periods. Nonetheless, differences in brokerage activities make the choice of a stock broker quite a herculean task. Gold remains one of the global commodities considered a strong safeguard against inflation despite the volatilities inherent in its price per ounce on the world market in recent years (Fernando & Boyle, 2021).

The legal tenders for global economies are fiat currencies. As a result, a rapid increase in money supply could be motivated by political reasons, which may lead to a surge in price levels. The hyperinflation succumbed to by the German Weimar Republic during the early 1920s is a classic example. During this period, countries that emerged victorious from the First World War demanded reparations from Germany. However, payments on these requests could not be effected in German paper currency because its value remained suspicious due to borrowing by the German government. As a solution to the phenomenon, Germany decided to print more currency notes, purchase foreign currency with the printed notes, and apply the foreign currency to payments on the reparation debts (Fernando & Boyle, 2021).

Implementing the foregoing policy led to the rapid devaluation of the German mark, which was followed by hyperinflation. In response to the inflation cycle, consumers in Germany attempted to spend their money as quickly as possible to avoid rapid loss of value of money in their possession over a long period of time. The German economy was inundated with more printed notes, and the value kept falling to the extent that individuals decided to paper their walls with practically worthless German marks. Hyperinflation has been recorded in Peru (1990) and Zimbabwe (2007 - 2008) in recent financial periods (Fernando & Boyle, 2021).

Consistent with Fernando and Boyle (2021), Oner (n.d.) outlined some positives and negatives associated with the record of inflation within an economy. Oner (n.d.) submitted that the real inflation-adjusted income or purchasing power of consumers' nominal income falls when the increase in nominal income does not match the increase in prices of goods and services. The proxy for the standard of living is real income. All else is held constant: the standard of living increases when real income rises, and vice versa. Due to this development, consumers become worse off when their current nominal income can purchase fewer goods and services compared to previous periods.

Most economists believe that a stable, low, and, above all, predictable inflation rate remains good for the health of the economy. Capturing low and predictable inflation rates in price-adjustment contracts is easier and lessens their distortionary impacts. Consumers may be encouraged to increase spending during the current period if they are aware of future price increases. The decision to increase spending now ensures economic stimulation and charts the economy on a positive path of growth (Oner, n.d.).

Floyd and Boyle (2021) described inflation as one of the economic terminologies used to explain sustained increases in the prices of products and services over time. The authors averred that some people perceive inflation as a sign of a struggling economy, while to others, it indicates an economy charting the path of prosperity. Floyd and Boyle (2021) catalogued the residual effects of inflation to include erosion of purchasing power, increasing spending and investments, resulting in more inflation, higher cost of borrowing, lower borrowing cost, reduction in unemployment, increases in economic growth, reduction in employment and growth; and weakening and strengthening of national currency.

Regarding the notion of reduction in unemployment, Floyd and Boyle (2021) affirmed the existence of evidence to suggest that inflation could positively impact unemployment. They argued that wages are sticky. That is, the changes observed in the prices for wages occur slowly in response to economic shifts. Keynes (as cited in Floyd & Boyle, 2021) theorised that the downward stickiness of wages contributed to the Great Depression. Record unemployment numbers were observed because labour resisted pay cuts and were laid off instead. Floyd and Boyle (2021) argued that the same phenomenon could work in reverse. That is, the upward stickiness of wages implies that as the inflation rate reaches a certain mark, real payroll costs for employers would decrease, enabling them to hire more workers to assist in the production process.

The foregoing serves as the underlying hypothesis seeking to render meaning to the inverse correlation between inflation and unemployment. This relationship is known as the *Phillips curve*, albeit a common explanation places the responsibility on unemployment. All things being equal, the theory posits employers are compelled to pay more for labour with the needed skills for production. The spending power of consumers surges as wages increase, which may heat up the economy and encourage higher inflationary rates. Floyd and Boyle (2021) described this model as cost-push inflation.

Floyd and Boyle (2021) asserted that inflation has the potential to increase growth. Because the purchasing power of savings erodes over time, inflation tends to discourage savings unless central banks maintain policies that allow them to

be sensitive and attentive to interest rate adjustments as remedial measures. This crowd of uncertainty spurs consumers and businesses to increase spending and investment, the impact of which boosts the economy in the short run and increases economic growth. In the same vein, the negative correlation between inflation and unemployment affirms the potential to increase the level of employment, leading to economic growth.

Conversely, Floyd and Boyle (2021) hinted at the ability of inflation to reduce employment and stymie economic growth. High unemployment numbers are associated with slow economic growth because the level of economic stimulation is negatively impacted by a reduction in the income of household consumers. When the foregoing is accompanied by double-digit inflation, *stagflation* is believed to have occurred. Stagflation is an economic term attributed to the British Tory MP in 1965. Stagflation appears to defy the inverse correlation between inflation and unemployment. However, its effective application to economic realities manifested in the supply shock occasioned by the 1973 oil embargo, during which productivity decline was recorded in five successive quarters. The consecutive decline in productivity ended with a healthy expansion during the fourth quarter of 1974. However, the productivity decline during the third quarter of 1973 was recorded prior to the decision of Arab members of the Organisation of Petroleum Exporting Countries (OPEC) to shut down the taps in October of the same year.

Another effect of inflation on an economy is the tendency to weaken or strengthen its fiat currency. When the currency of an economy is weak, persistent increase in inflation tends to affect the exchange rate, and volatilities inherent in the national fiat currency are worsened by the new development. If the economy with weaker currency is import-driven and a significant amount of goods and services are imported, more of the local currency would be needed to pay for the purchased items in the currency of the foreign trading partner or partners (Floyd & Boyle, 2021).

3. Research Methodology

The current research was developed on the quantitative approach to scientific inquiry. Specifically, cross-sectional design, an example of survey design, was adapted and used in the research. This design allowed the researcher to gather relevant research data over a specific time frame (Ashley, Takyi & Obeng, 2016; Creswell, 2009; Frankfort-Nachmias & Nachmias, 2008). Data required for the conduct of the current research were obtained mainly from secondary sources. These included textbooks, peer-reviewed articles published in journals, grey literature, reviewed documents on public expenditure, annual budget presentations and newspaper publications. Other sources were Google Search Engine, including Netcials, MacroTrends, and databases of the World Bank and Bank of Ghana, among other significant sources.

Respective data on Ghana's annual GDP values from 1960 through 2020, annual inflation data from 1965 through 2020, changes in annual inflation rates from 1965 through 2020, and annual public expenditure values from 1983 through 2020 were collected and used in the research. Secondary data on Ghana's annual public expenditure values accessed from the Bank of Ghana during the research period were stated in Ghana cedis, the local currency. To ensure uniformity in currency usage and application to data in the current research, annual public expenditure values in Ghana cedis were converted into United States dollars using the annual average cedi-dollar exchange rate. However, annual average cedi-dollar exchange rates accessed from Netcials (2021) were for limited fiscal periods: 2020 (5.668561:1); 2019 (5.304788:1); 2018 (4.663604:1); 2017 (4.382731:1); 2016 (3.938439:1); 2015 (3.77105:1); and 2014 (3.200231:1).

To facilitate and extend the computation process to the entire research period, that is, from 1983 through 2020, an annual average cedi-dollar exchange rate of 2.9000:1 was assumed and applied to fiscal years 2010 through 2013, whereas an assumed annual average cedi-dollar exchange rate of 2.500000:1 was applied to fiscal years 2000 through 2009. For fiscal years 1990 through 1999 and 1983 through 1989, respective annual average cedi-dollar exchange rates of 2.000000:1 and 1.500000:1 were assumed and applied. Thus, we could derive the Ghana cedi equivalent of annual public expenditure values by multiplying the annual average cedi-dollar exchange rates enumerated in this section with the respective public expenditure values in column 2, table 1. Annual public expenditure values from 1983 through 2020 were measured as a percentage of annual GDP values during the stated period and used in the statistical analysis.

Further, annual average public expenditure values, annual average inflation rates, and average accumulated public debt values for specific (four-year) intervals from 1993 through 2020 were computed using available data on annual public expenditure, inflation and accumulated public debt during the research period. Although available data on Ghana's annual inflation rates (dependent research variable) extended to 1965 (MacroTrends, 2020b), its application to the main statistical analysis was limited to 1983 to commensurate with the "earliest" available data accessed on annual public expenditure (independent research variable) during the study period. However, descriptive statistics tests conducted on annual inflation rates and presented in figure 3 involved full complements of the available data from 1965 through 2020 in figure 4. Similarly, available data on annual GDP values, which extended to 1960 (MacroTrends, 2020a) and presented in figure 3, were limited to 1983 for the computation of public expenditure as a percentage of GDP rates in table 2. In addition to the foregoing, annual average inflation rates for fiscal periods 1966 through 1969, 1970 and 1971, 1972 through 1979, 1980 and 1981, and 1982 through 1992 were computed and utilised in the research.

3.1. Analytical Tools

Descriptive statistics and regression models were used to describe the research variables and to evaluate their behaviour over the stated time frame on the inflation rate. Measures such as mode, mean, and median were used to identify the desired average of the observations and to summarise the research data, while standard deviation and range were employed to describe the extent of dispersion about the central tendency (Ashley et al., 2016; Creswell, 2009; Frankfort-Nachmias & Nachmias, 2008). Specifically, these measures were used to describe trends in annual public expenditure and inflation rates during the research period.

3.2. Research Variables

As affirmed in the preceding section, the *independent* research variable was *public expenditure,* while the *dependent* research variable was *inflation rate*. The unit of analysis was the Ghanaian economy.

3.3. Regression Model

Time series data are often described as a sequence of observations of defined variables at uniform intervals over a specified time frame in successive order. Generally, time series data are presented in the frequencies of daily, weekly, monthly, quarterly and annually. However, economic time series data are noted for possessing unique characteristics, including strong volatility, clear trends, a higher degree of persistence on shocks, and sharing and meandering co-movements with other series of data. Understanding the behaviour of variables and their levels of interaction and integration over specific time periods enhances the success rate of time series data analysis (Shrestha & Bhatta, 2018). Annual time series data were collected and applied to the current research.

Shrestha and Bhatta (2018) affirmed that when the essential features of time series data are clearly understood and properly addressed, including graphical examination of the properties of time series data and statistical confirmation, the choice of simple regression in the analysis of such data would yield the desired analytical outcomes. That is, simple regression analysis could confirm existing patterns of relationships among the research variables when it is diligently applied to the conduct of scientific inquiry.

The regression statistical model was adapted to measure the effect and level of interaction of annual public expenditure on inflation during the research period. Extant literature (Shultz et al.; Fernando & Boyle, 2021; Skidelsky as cited in Shultz et al.; Ezirim et al.) revealed that rising and unbridled public expenditure could have damaging consequences for an economy, including spurring inflation to unimaginable levels. Due to the foregoing phenomenon, it was deemed necessary to evaluate the elements of public expenditure and the extent to which rising public expenditures could influence inflationary hikes within the economy. Stated in different terms, it was imperative to examine how surging public expenditure could accelerate inflationary levels and lead to damaging economic consequences; examine whether monetary and fiscal policies related to inflation control require strategic review and strengthening to improve on their implementation outcomes; and whether rising public expenditure could undermine the rigidity and robustness of the economic fundamentals through unexpected increase in inflation rates.

The current research sought to measure the extent to which, in a given fiscal year, public expenditure could significantly impact the measurement of the national inflation rate, controlling for other major components of GDP, including gross private domestic investment, personal consumption and net exports. The Microsoft Excel analytical software was adapted and used in the research. Diagrams and tables were derived from Microsoft Excel to analyse the research data.

3.4. Research Hypotheses

The current research tested the causal relationship between annual public expenditure and annual inflation rates, using the null and alternative research hypotheses stated in the following sub-section.

3.4.1. Research Hypothesis

- Ho: $\mu 1 = \mu 2$; this implies that annual public expenditure has no strong effect on the annual inflation rate.
- H1: $\mu 1 \neq \mu 2$; this implies that annual public expenditure has a strong effect on the annual inflation rate.

Mathematically, the equation for gross domestic product is expressed as:

$GDP = G + C + I + Xn$

Where:

GDP = Gross domestic product / total economic output

G = Government purchases or expenditure

C = Personal consumption

I = Gross private domestic investment

Xn = Net exports. That is, total exports less total imports

The foregoing affirms the invaluable contribution of public expenditure (denoted by government purchases or expenditure) to the computation of annual gross domestic product. Ghana's annual public expenditure in recent fiscal periods has the following major components: purchase of goods and services, wages and salaries, interest payments on public debt, transfer to statutory funds, transfers to other earmarked funds, capital expenditure; and payments on the public debt (Ministry of Finance, 2019). On the basis of the foregoing, a mathematical description of public expenditure components is presented as follows:

$PE = \beta 0 + \beta 1GS + \beta 2WS + \beta 3IPD + \beta 4TSF + \beta 5TOEF + \beta 6CE + \beta 7PPD + \mu t$

Where:

PE = Public expenditure

GS = Purchase of goods and services

WS = Wages and salaries

IPD = Interest payments on public debt

TSF = Transfers to statutory funds

TOEF = Transfers to other earmarked funds

CE = Capital expenditure

PPD = Payments on public debt

β0 = Intercept term (Constant)
β1 = Coefficient of purchase of goods and services
β2 = Coefficient of wages and salaries
β3 = Coefficient of interest payments on public debt
β4 = Coefficient of transfers to statutory funds
β5 = Coefficient of transfers to other earmarked funds
β6 = Coefficient of capital expenditure
β7 = Coefficient of payments on public debt
μt = Error term

Further, the inflation rate could be measured in percentage, monetary, or both. In percentage terms, the rate of inflation is computed as follows:

IR = [(CPI2 ÷ CPI1) X 100%]

Where:
IR = Inflation rate
CPI2 = Consumer price index of the most recent period
CPI1 = Consumer price index of the previous period

However, in monetary terms,

IR = [(CPI2 ÷ CPI1) X Amount]

Where:
Amount = The monetary value under economic consideration. That is, the previous period's amount whose value during the most recent period is subject to determination.

Based on the preceding information, the ensuing model was formulated for the current research, specifically in relation to the research hypothesis:

IR = PE

Where:
IR = Inflation rate
PE = Public expenditure

However, the foregoing equation can be expanded and expressed as:

[(CPI2 ÷ CPI1) X 100%] = β0 + β1GS + β2WS + β3IPD + β4TSF + β5TOEF + β6CE + β7PPD + μt

OR

[(CPI2 ÷ CPI1) X Amount] = β0 + β1GS + β2WS + β3IPD + β4TSF + β5TOEF + β6CE + β7PPD + μt

4. Research Findings and Discussions

4.1. Management of Ghana's Economy in Perspective

Ghana was officially declared an independent State on 6th March, 1957 by the British Colonial Government. At this stage in the nation's political history, the elected President, the late Osagyefo Dr. Kwame Nkrumah, was still answerable to the Queen of England. Prior to 1st July, 1960, Dr. Nkrumah somewhat assumed the role of a Prime Minister. The Declaration of Independence freed Ghana primarily from the shackles of colonial rule and slavery and allowed the country to be counted among the comity of independent economies across the globe. This section presents a summary of the performance of Ghana's economy, including records of inflation under various political administrations from the period of independence through periods of coup d'états and military rule to another period of stable democratic rule. The discussion begins with national economic stewardship during the First Republic and concludes with a brief explanation of the performance of the Ghanaian economy during the Fourth Republic.

4.1.1. First Republic

On 1st July, 1960, Ghana attained a Republican status. This "immuned" the elected President and leader of the Convention People's Party (CPP), Dr. Nkrumah, from being directly answerable to the Queen of England. Following independence from Great Britain in 1957, Ghana's economy was characterised by the following features:

- Well-developed infrastructure for trade servicing;
- The world's leading producer of cocoa;
- A country endowed with natural resources such as gold, diamond, manganese, and bauxite in commercial quantities;
- An economy endowed with oil palms in commercial quantities;
- Relatively advanced system of education;
- Socio-economic stability and prosperity, and
- Central economic planning.

Further, the availability of resources encouraged the adaption and implementation of State-led economic strategy. There was limited room for free trade; implementation of socialist-driven policies implied the provision of free health care, housing, and education; the country maintained positive economic recognition in the international community; economic management strategy included redistribution of national prosperity; while the country remained an agriculture-led economy. Moreover, the State was perceived as *the mother* and *father* of citizens and maintained an irreversible process of

economic, social and political development, among other important socio-economic considerations (Brydon, 1999; Brydon & Legge, 1996; Martinson, 2000).

Thus, the state of the Ghanaian economy during the immediate post-independence era was an obvious envy of other African countries that were struggling for socio-economic and political freedom. The country was on the path of economic stardom among the comity of nations not only in Africa but also across the globe. There is no gain-saying that the foundational economic development model of Ghana, whether socialist-driven or otherwise, required consolidation and building on the gains through the introduction of other economic development models, such as the capitalist model. Indeed, a blend of the two protagonist economic models, capitalism and socialism, remains the dominant national economic management approach in many advanced, emerging and developing economies around the world.

4.1.2. Immediate Post-Independence Economic Measures

Immediately after independence, Dr. Nkrumah latched on to the relative stability of the Ghanaian economy to embark on expansion and diversification, a transformation of the Ghanaian economy from an agriculture-led to a mixed agricultural-industrial-led economy. Further, he considered the establishment of industries for import substitution and processing of goods for export. Industries were established through borrowing (loan), using proceeds (revenues) from cocoa as collateral or security. The latter was not too distinct from the current cocoa syndicated loans contracted by successive governments for economic growth through increased productivity in cocoa farming activities and the cocoa processing industry and through support for other key and deprived areas within the Ghanaian economy.

Dr. Nkrumah's economic policies sought to minimise Ghana's vulnerability to world trade and to reduce Ghana's over-reliance on foreign goods (imports). Unfortunately, cocoa prices suffered a sharp decline during the mid-1960s. As a result, the fundamentals of the Ghanaian economy were adversely affected; it became difficult for the President Nkrumah-led government to continue with the intended projects. During the period, some state enterprises were over-staffed while incompetence characterised the performance of some staff of state enterprises. Further, allegations of corruption were leveled against some government officials whilst the prevailing economic challenges induced government's major source of revenue to be eventually borrowing.

Some opponents described President Nkrumah's development agenda as "over-ambitious." For instance, Dr. Nkrumah believed that the infrastructural development witnessed in the United States for a hundred years could be carried out in Ghana within ten years. However, President Nkrumah's submission could be described as contextual. Given the geographic size, population, and natural and financial resources at the beck and call of the United States compared to Ghana's related features during the period, President Nkrumah's declaration on infrastructural development within the Ghanaian context may not be described as an exaggeration.

Indeed, the geographic size, population, human capital, and natural and financial resources of the country supported President Nkrumah's assertion on infrastructural development. Proponents of President Nkrumah's development agenda argued that his positive intentions for the country would have been feasible and realisable if key stakeholders at the time demonstrated holistic commitment to the national cause. Although the socio-economic development continuum was elusive during the first republic, the reverse seems to characterise development efforts during the fourth republic.

4.1.3. Effects of Fall in Cocoa Prices – 1960s

The fall in the price of cocoa during the 1960s had the following debilitating effect on the Ghanaian economy: weak demand for the leading export commodity - cocoa; over-valuation of the nation's currency; crippled productive capacity; accumulation of debt, especially foreign debt; failure to settle debts resulted in ten times increase in the country's debt between 1960 and 1966. Suggestions by some economists during the mid-1960s to devalue the Ghanaian cedi as a solution to the prevailing economic crisis were not heeded, owing to the following economic arguments: repayment of loans in foreign currencies, such as the United States Dollar, would have required more cedis; and cost of importing finished goods and raw materials would have been very high to consumers and the infant industries.

Further, it was believed that the economic consequences outweighed the economic benefits of devaluation. However, the opponents were firm believers that a devaluation of the cedi would have made the cocoa price more attractive to buyers in the world market (Brydon, 1999; Brydon & Legge, 1996; de Hoyos, 1991). The resultant economic effect of this adjustment would have been an increase in the government's total revenue, reducing the extent of borrowing and total national debt.

4.1.4. Major Economic Reforms – 7-Year Development Plan

The first major comprehensive economic plan developed in Ghana for implementation was the 7-Year Development Plan under Dr. Nkrumah. The 7-Year Plan had three broad objectives: speeding up Ghana's economic growth rate, rapidly developing the State and cooperative sectors of the economy through a socialist transformation approach, and completely eradicating and replacing the colonial structure within the Ghanaian economy. The plan sought to ensure balanced development in the areas of social, institutional, and industrial infrastructure across the country.

It is worth emphasising that the 7-year plan was developed after a thorough examination of the country's needs and resources. Besides, the first-ever drawn-up economic plan for Ghana was the 7-year development plan. The 7-year plan was highly integrated and comprehensive; it was designed to lend credence to CPP's programme dubbed - "Work and happiness," which had gained popularity across the country. The plan was designed to consolidate the socialist production and distribution ideology of the CPP Administration, among other significant socio-economic considerations (Azindow, 2005; Hutchful, 2002; Nkrumah Infobank, 2017).

The 7-year development plan sought, inter alia, to protect Ghana's independence and socialist ideology and encourage higher growth in the public and cooperative sectors than in the private sector; it sought to encourage growth in the areas of agriculture and industry. The state enterprises were expected to be efficient, self-sustaining, and profit-driven, while profits from the operations of the state enterprises were expected to develop into capital for new investments (Azindow, 2005; Hutchful, 2002; Nkrumah Infobank, 2017). Thus, expectations of elected governments from state-owned enterprises (SOEs) to be profit-oriented date back to the first political administration of the country. A major challenge to the successful management and derivation of profits from the operations of SOEs under the First Republic was the lack of qualified human capital to ensure efficiency and effectiveness in the management of day-to-day operations.

The narratives revealed that despite the relatively low level of an educated population, the country had individuals with the requisite skill and acumen to effectively steer the affairs of the SOEs to assure the nation of economic success and profit. However, most of these qualified personnel were found in the opposition political parties and groups. They were not ready to offer their services through the President Nkrumah-led government to the nation. This professional reluctance had dire economic implications for the economy. Indeed, it contributed immensely to the accumulation of national debt through increased infrastructural development with less than proportionate increases in total inflows (revenues), especially from the operations of state-owned enterprises. Inarguably, effective management of the SOEs would have actualised the foundations of the country's development agenda during the first republic to set strong development imprints for subsequent periods. Data accessed from MacroTrends (2020b) and presented in figure 3 affirm that the rate of inflation recorded within the Ghanaian economy during 1965 was 26.44%. This was almost twice the rate recorded (13.24%) during the following fiscal year.

4.2. NLC's Approach to Economic Leadership

Recurring economic challenges led to the overthrow of the Dr. Nkrumah-led government through a bloodless coup d'état on 24th February, 1966, by the National Liberation Council (NLC) under the leadership of Gen. Joseph A. Ankrah. Most of the industrial projects commenced by Dr. Nkrumah were abandoned by the NLC. The latter had the support of the International Monetary Fund (IMF). The NLC became pro-IMF. De Hoyos (1991) noted that major projects launched, and in some cases nearly completed by the Dr. Nkrumah government, were abandoned following IMF orders. Some of these included the fully completed state concrete panel factory and the huge state farms which were abandoned. Others included the Ferro-manganese project, which was left to rust; construction of the gold-refining factory, which was halted; and the pulling down of the cocoa storage silos on orders of the IMF. The latter was intended to compel the country to release all her cocoa during a given year for export, irrespective of the prevailing price in the world market.

Abandonment of major projects completed or initiated during the first republic extended beyond the NLC era to subsequent political administrative periods. The NLC's decision to discontinue industrial projects and programmes commenced by the President Nkrumah-led government could be attributed mainly to the former's implementation of austerity measures on the dictates of the IMF and the overt divergence in socio-economic development views of the two governments – capitalism and socialism. Strict adherence to the economic management orders of the IMF by the NLC culminated in the clarion call by organised labour and other national key stakeholders for general elections to be organised, and the country returned to civilian rule during the period (Boafo-Arthur, 1999b).

Economic history revealed that discussions between representatives of the NLC and IMF were centred on monetary and fiscal discipline, liberalisation of Ghana's trade, devaluation of the cedi, and removal of subsidies. The NLC sought to redirect Ghana's development focus from the socialist-driven approach to a neo-liberal (market-oriented) approach by revising Dr. Nkrumah's state-led policies. The new regime identified the private sector as the engine of economic growth and, as part of its remedial economic measures, sought to empower the private sector to assume its rightful role as the major stimulant of the Ghanaian economy.

As noted in the preceding section, the NLC's market-oriented economic approach was heavily resisted by organised labour; professional associations comprising industrial workers, teachers, and lawyers were opposed to the "novel" economic policies that sought to increase individuals' financial commitments and responsibilities while reducing government subsidies. We observe that suggestions by the IMF to the NLC during the 1960s for economic recovery were not too distinct from those proffered by the IMF to the National Democratic Congress (NDC) through the *Extended Credit Facility Agreement* in April 2015. The extended credit facility agreement emphasised the removal of subsidies and introducing taxes to shore up the government's revenues to expedite debt servicing, among other key economic management strategies and considerations.

Under the National Liberation Council, one would dare say a good economic policy was introduced at the wrong time. For instance, as of 1960, Ghana's total population was estimated at 6 million people. However, only 6% of the total population was presumed to be literate, and this translated into 360,000 people (6,000,000 x 0.06 = 360,000 people), implying nearly 5.64 million people (6,000,000 – 360,000 = 5,640,000) could barely read and write. This large population (5.64 million people) depended essentially on the few literates (360,000 people) to decipher and appreciate the government's planned and implemented policies and programmes.

Further, the majority of the population was accustomed to the socio-economic freebies enjoyed under the Dr. Nkrumah administration and were, therefore, at variance with the neo-liberal economic policies, which sought to increase their stake in governance through increased financial burden and commitments. However, the economic strategies adapted for implementation by the NLC were able to tame inflation during the period. As an example, the rate of inflation during 1966 was 13.24%. This was 13.21% less than the 26.44% recorded in the preceding year. The respective rates of inflation during 1967 and 1968 were negative 8.42% and (positive) 7.89% (World Bank as cited in Macrotrends, 2020b), whereas the annual average inflation rate recorded from 1966 through 1969 was equivalent to 5.01%; the lowest annual

average rate recorded by any government from 1965 through 2020. The best inflation rate performance within the Ghanaian economy from 1965 to 2020 was recorded in 1967 (-8.42%).

The data in figure 1 depict periods of single-digit inflation in the chronicles of Ghana's economic history. The data suggest that for over fifty-five (55) years, that is, from 1965 through 2020, Ghana recorded single-digit inflation during ten (10) fiscal years—1967 to 1971, 2011 and 2012, and 2018 to 2020. Two of the single-digit inflation rates (8.42% and 7.89%) were recorded under the economic watch of the Gen. Ankrah-led government.

Evidently, the market-oriented or capitalist approach to economic development and growth, which was introduced during the mid-1960s and the early 1970s, remains the model that drives Ghana's economy today. Its adaption and implementation among economies on the African continent are widespread. The mode of acceptance and implementation is characterised by minimal resistance. Today, the lop-sided ratio of the educated population relative to the total population of Ghana and most African countries has increased considerably.

In Ghana, the literacy rate among persons who are 15 years and older was estimated at 79%. This is significantly higher than the literacy rate in La Cote d'Ivoire (47%) (World Bank Group, 2020b). The positive effect of increased investment in education is the people's ability to comprehend things with relative ease and to appreciate government policies and programmes. All things being equal, high literate population minimises the government's burden of providing innumerable explanations for an education campaign on intended policies and planned programmes. Besides, it engenders compliance, among others.

4.3. PP's Economic Approach – Second Republic

Incessant pressures from the citizenry compelled the National Liberation Council to organise elections and hand over to a democratically elected President or government. On 3rd October, 1969, the NLC handed over political power to the Progress Party (PP) led by Dr. Kofi A. Busia. The latter was declared the winner of the presidential polls organised during the period. Dr. Busia's government was formed during the Second Republic. Like the National Liberation Council, the Progress Party pursued market-oriented or neo-liberal policies. That is, the economic trajectory of Dr. Busia's administration was private-sector-focused.

As part of the economic reforms, the Progress Party sought to tackle inflation. The success story of Dr. Busia's government in terms of inflation cannot be underestimated. One of the lowest inflation rates in the annals of Ghana's economic history from 1965 through 2020 was recorded in 1970 (3.03%). Shared data in figure 1 affirm that Dr. Busia's stewardship was characterised by single-digit inflation rates: 3.03% during 1970 and 9.56% during 1971. The annual average inflation rate recorded during the two-year period was nearly 6.30%, the second-lowest annual average recorded by any political administration from 1965 through 2020. However, investments in the public sector and employment in the private commercial sector witnessed a steady decline, while the budgetary allocation for agriculture was reduced by 35% (World Bank as cited in Macrotrends, 2020b; de Hoyos, 1991).

In 1968, the Ghana Gold Company became a junior partner to the London-Rhodesian Mining Company (Lonrho) in the ownership and management of the Ashanti Gold Mines (now AngloGold Ashanti). Lonrho's investment in Ashanti Gold Mines during this period was described as the major single takeover in the company's history (de Hoyos, 1991).

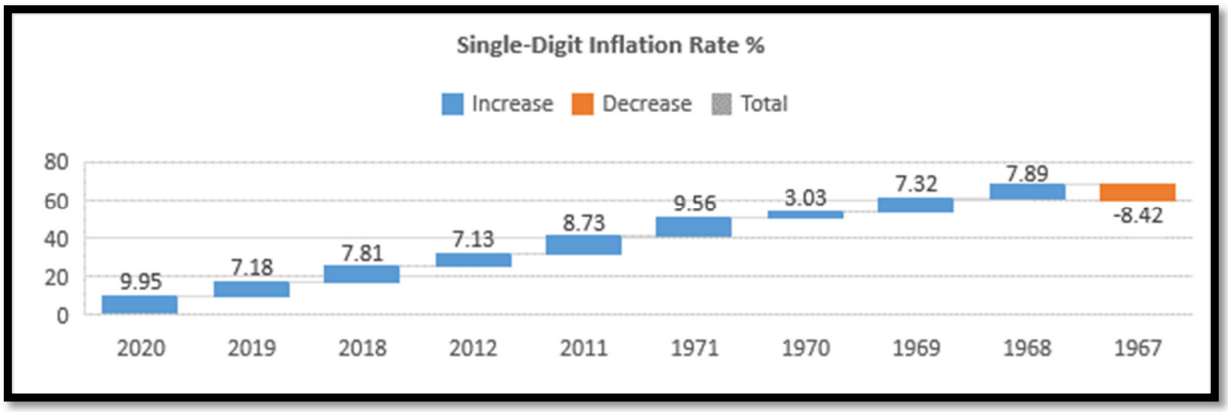

Figure 1: Single Digit Inflation Periods (1965 – 2020)
Sources: World Bank (2021g), MacroTrends (2020b)

In 1971, the Dr. Busia-led government prepared an austerity budget, which included the introduction of development levies, import taxes, trade liberalisation, withdrawal of subsidies, abolishing free transport and free education, and devaluing the Ghanaian currency (cedi) by 44%. The austerity measures of the Progress Party attracted public uproar. A large section of the population was discontented with the Progress Party government's neo-liberal stance.

4.4. NRC/SMC's Economic Approach

On 13th January 1972, the Dr. Busia-led government was toppled by the National Redemption Council (NRC), led by then Col. Ignatius K. Acheampong. On 9th October 1975, now Gen. Acheampong changed the name of his government to the Supreme Military Council (SMC). This later became known as SMC I after the *Palace Coup* led by Gen. F. W. K. Akuffo on

5th July, 1978, emerged with the Supreme Military Council (SMC) II. The NRC/SMC I & II promised to propel Ghana's economy to greater heights. The regime sought to abolish the market-oriented economic approach. Under the NRC, benefits to public sector workers were fully restored; the country's currency (cedi) was revalued by 42%; most of the country's foreign debts were cancelled - the NRC refused to pay external national debts; the development levy was abolished; and efforts were made to achieve food sufficiency through Operation Feed Yourself (OFY) (Shillington, 1992; Gyimah-Boadi, 1993).

The NRC/SMC's economic management measures gained immediate domestic popularity but later worsened the nation's economic plight and position. The regime was believed to be characterised by corruptive practices, incompetence, economic mismanagement, siphoning off the nation's limited resources, diversion of a substantial part of foreign exchange earnings from the sale of cocoa, and high inflation rates. During 1972, the inflation rate was 10.07%. This was a marginal increase from the 9.56% recorded earlier in 1971. Other inflation rates recorded during the NRC/SMC I & II period, as shown in figure 2, were: 1973 (17.68%); 1974 (18.13%); 1975 (29.82%); 1976 (56.08%); 1977 (116.45%); and 1978 (73.09%) (World Bank as cited in Macrotrends, 2020b). The inflation rate during 1977 (116.45%) remained the third highest in the 55-year economic history of the country. The average inflation rate recorded over the eight-year period (from 1972 to 1979) was approximately 46.97%. Figure 3 asserts that this remained the second-highest annual average inflation rate recorded by any government from 1965 to 2020.

4.5. AFRC's Economic Approach

On 4th June, 1979, the Armed Forces Revolutionary Council (AFRC) led by Flt. Lt. Jeremiah (Jerry) John Rawlings toppled the National Redemption Council and Supreme Military Council government. A section of Ghanaians described the 1979 Coup as the "1stComing of J.J." The AFRC succeeded in fighting economic mismanagement; corruption; profiteering and exploitation. After cleaning the "mess" in Ghana's economy, the AFRC supervised a Presidential Election in 1979. The political mandate of the AFRC ended on 23rd September 1979, barely three-and-half months after assuming the reigns of political leadership and governance.

4.6. PNP's Economic Approach – Third Republic

The baton of political leadership was passed on by the AFRC, led by Flt. Lt. Rawlings, to the People's National Party (PNP), led by Dr. Hilla Limann on 24th September, 1979. Dr. Limann's government was formed during the Third Republic. The PNP government inherited weak state institutions, limited foreign exchange earnings, limited supply of goods, economic mismanagement under the NRC/SMC I & II regime, and deteriorating social infrastructure.

Under the PNP, external assistance, including the International Monetary Fund loan, was sought to revive the economy. However, negotiations with the International Monetary Fund were opposed vehemently by pressure and labour (professional) groups such as the National Union of Ghana Students (NUGS), Ghana Bar Association (GBA), and Association of Registered Professional Bodies (ARPB). The pressure and labour groups were concerned about the negative implications of the IMF policies for the Ghanaian economy (Gyimah-Boadi, 1993; Azindow, 2005). The enormity of the challenges inherited by the Dr. Limann-led government affected her ability to turn around the economic fortunes at an accelerated pace. Macroeconomic indicators such as inflation were not favourable. Statistics in figure 2 indicate that the rate of inflation in 1980 was 50.07%. Despite the relatively high inflation rate (50.07%), it remained an improvement over the 54.44% recorded during the previous fiscal year. However, the rate recorded during 1981 was 116.50%, the second-highest during the last 55 economic years. Over the two-year economic management period (1980 and 1981), the country recorded an annual average inflation rate of 83.29%. This remained the highest annual average rate recorded by any political administration from 1965 through 2020.

4.7. PNDC's Economic Approach

The Military described Dr. Limann's government as "dull" and incompetent. Therefore, it came as a little surprise when, on 31st December 1981, the PNP government was ousted from power by the Provisional National Defence Council (PNDC) led by Flt. Lt. Rawlings. A section of Ghanaians described the 1981 coup as the "2ndComing of J.J." The Military described the takeover as a "Revolution" culminating in the formation of the Provisional National Defence Council. As of 1981, Ghana was heavily dependent on international trade and highly dependent on foreign aid for economic survival.

As of 1983, the nation's coffers were virtually empty; the country was in disarray; Ghana's economic ranking in the world had shrunk considerably; the nation did not have the economic and political muscle to be independent of the Western economies; Ghana's economic conditions were worsened further by the Nigerian government's decision to repatriate over one million Ghanaians during January 1983. The preceding factors subjected Ghana to the dictates of external forces, especially the industrialised (now called advanced) economies. The foregoing economic challenges culminated in an inflation rate of 122.87% during the 1983 fiscal year, the highest over the last 55 economic years, as depicted in figure 2.

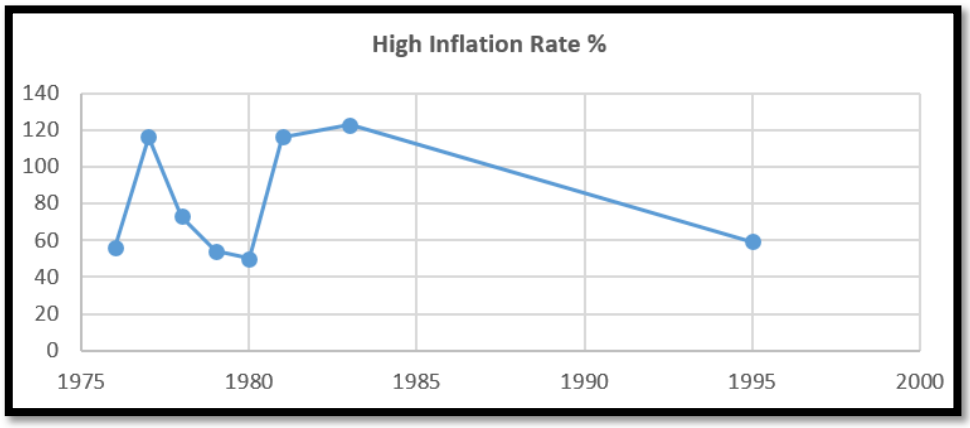

Figure 2: High Inflation Periods in Ghana (1965 – 2020)
Sources: World Bank (2021g), MacroTrends (2020b)

4.7.1. Second Major Economic Reforms – SAP

The second major reform in the economic archives of Ghana's history was the introduction of the Structural Adjustment Programme (SAP) under the leadership of Flt. Lt. Rawlings. Ghana's SAP had two dimensions: ***political,*** which required government machinery to be structured on democratic lines. Thus, the PNDC was tasked to ensure a transition from military rule to democratic rule. The second dimension was *economic.* This stressed the need for the government to embrace market-oriented policies, including privatisation, trade liberalisation, and fiscal discipline, among others.

The SAP is a generic phrase used by the International Bank for Reconstruction and Development (World Bank) and the IMF. Adaption and implementation of the SAP vary from one economy to the other. In Ghana, SAP was launched and implemented under the caption *Economic Recovery Programme (ERP)*. The ERP was launched in Ghana in 1983 under the guidance of the World Bank and IMF. The overarching objective of the ERP was to create an enabling environment for capital creation within the Ghanaian economy. ERP sought to improve Ghana's trade position within the international market while reducing debt to an appreciable level.

Further, ERP was designed to curb inflation through stringent monetary, fiscal, and trade policies; increase Ghana's foreign exchange inflows; direct the foreign exchange inflows to prioritised sectors of the Ghanaian economy; restore incentives for production within the economy; restructure economic institutions; rehabilitate infrastructure to increase production and export; and to increase supply of essential goods in the Ghanaian market. The foregoing was intended to shore up national revenue and significantly reduce the total national debt to help improve the debt-to-GDP ratios in subsequent financial and fiscal years. The debt-to-GDP ratio during 1982 was 105.7% (Issahaku, as cited in Azindow, 2005).

- *4.7.1.1 ERP I (1983 - 1986)*: During phase I of the ERP, emphasis was on the creation of incentives for private production, reduction in government expenditures, improvement in tax collection, reduction in the budget deficit (6.3% of GDP during 1982; 0.1% of GDP by 1986); and easing government's pressure on the banking system.
- *4.7.1.2 ERP II (1987 - 1989)*: Phase II of the ERP was characterised by the divestiture of state assets through privatisation, the introduction of more stringent foreign exchange reforms, which led to further devaluation of the cedi, and the introduction of foreign exchange bureaus during 1987 to minimise, if not eliminate, the activities of black market operators.
- *4.7.1.3 ERP III (1990 - 1991)*: During Phase III of the ERP, Ghana witnessed a reduction in private corporate tax, private sector growth, more monetary reforms, improvements in repayments of international debt, improved economic reputation within the international community, and first entry into the international market after over two decades of exit. Under the ERP, about US$4.2 billion was sourced for infrastructure projects within the country. More than half of the funding was obtained from external sources. The agricultural sector's share of the government's budget during 1983 equalled 10%; in 1986, it was 4.2%; and in 1988, it equalled 3.5%. The foregoing excluded foreign projects. Cocoa's contribution to GDP was less than that of food crops. However, cocoa received 9% of capital expenditures during the 1980s.

Due to its value, cocoa received about 67% of the recurring expenditures within the agricultural sector. The Programme of Action to Mitigate the Social Cost of Adjustment (PAMSCAD) was introduced by the PNDC government to minimise the barrage of criticisms against its policies. PAMSCAD involved US$85 million. PAMSCAD was introduced to create 40,000 jobs within two years (1988 – 1990), improve the living conditions of artisans, small-scale miners, and poor individuals, and to assist communities execute labour-intensive self-help projects (Ahiakpor, 1991; Azindow, 2005; Bawumia, 1998; Boafo-Arthur, 1999a; Brydon, 1999; Donkor, 1997; Gyimah-Boadi, 1993; Nugent, 1995; Shillington, 1992). The average annual inflation rate recorded over the eleven-year period (from 1982 to 1992) was approximately 34.68%. This remained the fourth-highest rate recorded by any government over the fifty-five-year period (1965 through 2020).

4.8. The Fourth Republic

Under the fourth republic spanning from 1993 till date, one could affirm, with substantial evidence, the development of new infrastructural facilities to accelerate the pace of national development and growth. For instance, the

current political administration enumerated about 17,334 projects over a four-year period (2017 through 2020). The statistics revealed that 8,746 projects, equivalent to 50.5% of the total projects, had been completed, while the remaining 8,588 projects, representing 49.5%, were ongoing and at various stages of completion. This plethora of projects adds up to other projects completed by previous political administrations. The quantum of infrastructural projects initiated and completed during the fourth republic is unheralded in the chronicles of Ghana's political and economic history.

Evidence suggests on paper that Ghana is officially sixty-four years old (from 1957 to 2021). However, in real economic terms, the country is actually twenty-eight years (1993 through 2021) since most of her steady, tangible and intangible development projects are traced to this period. Moreover, the economy's lower middle-income status was achieved within the last twenty-eight years. Actually, it was attained about eleven years ago (in November 2010) when government Statisticians discovered the nation was undervalued by over 60% (MacDougall, 2011).

The discussions suggest accelerated development and growth thrive in a stable democratic environment. If the foregoing is a truism, it affirms the need for all stakeholders within the country to eschew negative political trajectory and complacency and to guard "jealously" against the current democratic dispensation and economic gains to guarantee the nation of rapid development and growth to facilitate her transition from lower middle income to upper middle-income economy within the shortest possible period. Data on public expenditure and inflation under the various political regimes or stewardships during the fourth republic are presented in tables 1 and 2 and figures 3 to 8 and discussed in subsequent sections.

4.9. Descriptive Statistics

This section presents summaries of Ghana's annual inflation rates from the fiscal year 1965 through 2020 and annual public expenditure values from the fiscal year 1983 through 2020. The foregoing data formed the basis of analysis in this section. Data in figure 3 represent a statistical summary of Ghana's annual inflation rates from 1965 to 2020. Statistics in the figure are drawn essentially on data in table 1, column 4 and figure 4. Statistical distribution in figure 3 depicts the respective values for sample variance (0.072679239) and skewness (2.277181695).

The value for Skewness (2.277181695) explains the distortion or asymmetry of the random variable around the mean in the distribution, whereas the sample variance's value (0.072679239) is indicative of the expectation of squared deviation of the research random variable from its mean. Statistical data in the figure depict respective Kurtosis, standard error and mode values of 5.472011015, 0.036025596 and #N/A. The standard error value (0.036025596) tells us the extent to which the coefficients are significantly different from zero, while the value for mode (#N/A) in the statistical distribution affirms no value for inflation rate was repeated or recorded more than once during fiscal years 1965 through 2020.

Mean	0.268575
Standard Error	0.036025596
Median	0.17565
Mode	#N/A
Standard Deviation	0.269590873
Sample Variance	0.072679239
Kurtosis	5.472011015
Skewness	2.277181695
Range	1.3129
Minimum	-0.0842
Maximum	1.2287
Sum	15.0402
Count	56
Largest(1)	1.2287
Smallest(1)	-0.0842
Confidence Level (95.0%)	0.072196907

Figure 3: Statistics on Annual Inflation Rates (1965 – 2020)

The value for Kurtosis (5.472011015) indicates the extent to which the tails of the distribution in figure 3 differ from the tails of a normal distribution. Stated in different terms, Kurtosis facilitates our determination of whether or not some extreme values or outliers are contained in the tails of the distribution. The minimum or smallest value in figure 3 is -0.0842. This represents the rate of inflation recorded within the Ghanaian economy during 1967 (-8.42%), one of the fiscal years under the political administration of the National Liberation Council. The value for standard deviation (0.269590873) tells us the extent to which the observations were dispersed around the central tendency or the extent to which the probability distribution is tight.

The maximum or largest value (1.2287) is representative of the inflation rate recorded during 1983 (122.87%) under the political stewardship of the Provisional National Defence Council led by the late Flt. Lt. Rawlings. The range explains the difference between the largest and smallest values in the distribution. Value for the *range* (1.3129) in figure 3 explains the substantial difference (131.29%) between the respective minimum and largest inflation rates recorded

during 1967 (-8.42%) and 1983 (122.87%). The value for sum (15.0402) in the figure depicts the total value of annual inflation rates recorded during the period (1,504.02%) and included in the analysis.

The statistical output in figure 4 summarizes Ghana's annual public expenditure values for the fiscal years from 1983 to 2020. The analysis was based essentially on data in table 1, column 2. Similar to figure 3, the data of figure 4 depict the respective values for sample variance (24211994781067800000) and skewness (1.376811854) in the distribution.

Mean	3363700294
Standard Error	798221621.7
Median	452062000
Mode	#N/A
Standard Deviation	4920568542
Sample Variance	2.4212E+19
Kurtosis	0.584661975
Skewness	1.376811854
Range	17005148864
Minimum	1006667
Maximum	17006155531
Sum	1.27821E+11
Count	38
Largest(1)	17006155531
Smallest(1)	1006667
Confidence Level (95.0%)	1617350634

Figure 4: Statistics on Annual Public Expenditure (1983 – 2020)

As stated in the preceding section, the value for Skewness (1.376811854) explains the distortion or asymmetry of the random variable around the mean in the distribution, whereas sample variance (24211994781067800000) affirms the expectation of squared deviation of the research random variable from its mean. Statistics in the figure depict respective values for standard error (798221621.72953) and Kurtosis (0.584661975). The extent to which the coefficients are significantly different from zero is explained by the standard error value (798221621.72953).

Figure 4 depicts the minimum or smallest value of 1006667. This value is representative of Ghana's public expenditure value during 1983 (US$1,006,667), the period of Phase One of the Economic Recovery Programme implemented under the political administration of the Provisional National Defence Council. The value for sum (127820611156) in the figure depicts the total value of all public expenditures during the period (1983 to 2020) and is included in the analysis (US$127,820,611,156). The value for standard deviation (4920568542) indicates the extent to which the probability distribution is tight or the extent to which the observations were dispersed around the central tendency. The maximum or largest value (17006155531) indicates Ghana's public expenditure during the 2020 fiscal year (US$17,006,155,531). The range explains the difference between the largest and smallest values for the distribution. Value for the *range* (17005148864) in figure 4 affirms the substantial difference (US$17,005,148,864) between the respective public expenditure values recorded during 2020 (US$17,005,148,864) and 1983 (US$1,006,667).

4.10. Results

The purpose of this research was to test the underlying hypothesis. That is, to measure the extent to which annual public expenditure significantly influences the annual inflation rate. Data in tables 1 and 2 and figures 1 to 8 proved useful to the analysis in this section. Column 2 in table 1 presents historical data on Ghana's annual public expenditure values for fiscal periods from 1983 to 2020. Data in column 3, table 1 and figure 5 depict annual public expenditure values expressed as a percentage of GDP from 1983 through 2020. Data on Ghana's annual GDP values over the period of 1960 to 2020 were accessed from the database of the World Bank (2021d) and MacroTrends (2020a) as presented in figure 3. Further, data on annual public expenditure were accessed from the database of the Bank of Ghana (2021), while data in column 5, table 1, on various political administrations within Ghana's economy from 1983 to 2020, were compiled by the researcher.

Secondary data accessed from the World Bank on annual GDP values related to the Ghanaian economy during the research period were stated in United States dollars. However, original data on annual public expenditure accessed from the Bank of Ghana were valued in Ghana cedis. To ensure uniformity in currency usage and application to data in the tables and figures, annual public expenditure values in Ghana cedis were converted into United States dollars using the annual average cedi-dollar exchange rate. Nonetheless, annual average cedi-dollar exchange rates were accessed from Netcials (2021) for limited fiscal periods: 2020 (5.668561:1); 2019 (5.304788:1); 2018 (4.663604:1); 2017 (4.382731:1); 2016 (3.938439:1); 2015 (3.77105:1); and 2014 (3.200231:1).

To facilitate the computation process and to ensure complete coverage of the research period (1983 through 2020), an annual average cedi-dollar exchange rate of 2.9000:1 was assumed and applied to fiscal years 2010 to 2013, while an assumed annual average cedi-dollar exchange rate of 2.500000:1 was applied to fiscal years 2000 through 2009. For fiscal years from 1990 to 1999 and from 1983 to 1989, respective annual average cedi-dollar exchange rates of 2.000000:1 and 1.500000:1 were assumed and applied. The foregoing implies that we could derive the Ghana cedi equivalents of annual public expenditure values through the multiplication of annual average cedi-dollar exchange rates outlined in this section by the respective annual public expenditure values enumerated in column 2, table 1.

Year	Public Expenditure US$	Public Exp. As % of GDP	Annual Inflation Rate	Political Administration
2020	17,006,155,531	25.25%	9.95%	
2019	12,791,483,844	19.10%	7.18%	
2018	12,478,966,911	19.03%	7.81%	
2017	11,861,542,495	20.10%	12.37%	NPP
2016	12,981,041,474	23.60%	17.45%	
2015	9,902,966,017	20.39%	17.15%	
2014	9,987,469,655	18.61%	15.49%	
2013	9,405,610,345	15.07%	11.67%	NDC
2012	7,222,317,241	17.50%	7.13%	
2011	4,613,755,172	11.73%	8.73%	
2010	3,976,624,138	12.35%	10.71%	
2009	3,299,286,000	12.67%	19.25%	NDC
2008	3,203,928,000	11.17%	16.52%	
2007	2,249,812,000	9.06%	10.73%	
2006	1,603,768,000	7.85%	10.92%	
2005	1,188,248,000	11.06%	15.12%	NPP
2004	1,016,648,000	11.45%	12.62%	
2003	759,252,000	9.95%	26.67%	
2002	511,032,000	8.28%	14.82%	
2001	393,092,000	7.40%	32.91%	NPP
2000	302,584,000	6.08%	25.19%	
1999	248,250,000	3.22%	12.41%	
1998	219,160,000	2.93%	14.62%	
1997	188,210,000	2.73%	27.89%	NDC
1996	127,155,000	1.84%	46.56%	
1995	85,725,000	1.33%	59.46%	
1994	57,480,000	1.06%	24.87%	
1993	41,080,000	0.69%	24.96%	NDC
1992	25,535,000	0.40%	10.06%	
1991	17,580,000	0.27%	18.03%	
1990	13,200,000	0.22%	37.26%	
1989	13,613,333	0.26%	25.22%	
1988	9,993,333	0.19%	31.36%	
1987	7,126,667	0.14%	39.82%	
1986	4,886,667	0.09%	24.57%	
1985	3,193,333	0.07%	10.31%	
1984	1,833,333	0.04%	39.67%	
1983	1,006,667	0.03%	122.87%	PNDC

Table 1: Annual Public Expenditure and Inflation Rates (1983 – 2020)
Sources: World Bank (2021d), MacroTrends (2020b), Bank of Ghana (2021), Netcials (2021); & Researcher's Compilation

Data in figure 3 facilitated our computation of values presented in table 1, column 3. That is, available data in figure 3 proved useful to the measurement of annual public expenditure as percentage of annual GDP values. The available statistics in table 1 and figure 4 depict Ghana's inflation rates and annual changes over a 56-year period, spanning from 1965 to 2020. The double rule in table 1, column 5, indicates each political administrative term during the research period. Periods under the First, Second and Third Republics and Military Rule were fairly estimated and applied to the discussion in the preceding section.

The annual change values in figure 4 represent the difference between the inflation rates for current and previous fiscal periods. Thus, the annual change value for 2020 (2.77%) is representative of the difference between the respective annual inflation rates for 2020 (9.95%) and 2019 (7.18%). A positive annual change value, such as the 2.77% for 2020 in figure 4, connotes an increase in the inflation rate during the current fiscal period relative to the previous period. Conversely, a negative annual change value, such as -0.63% for 2019 in figure 4, implies a decline in the inflation rate during 2019 (7.18%) relative to 2018 (7.81%). Respective inflation rates recorded during 2012 (7.13%) and 1995 (59.46%) remained the lowest and highest during the fourth republic and, more specifically, from 1993 to 2020.

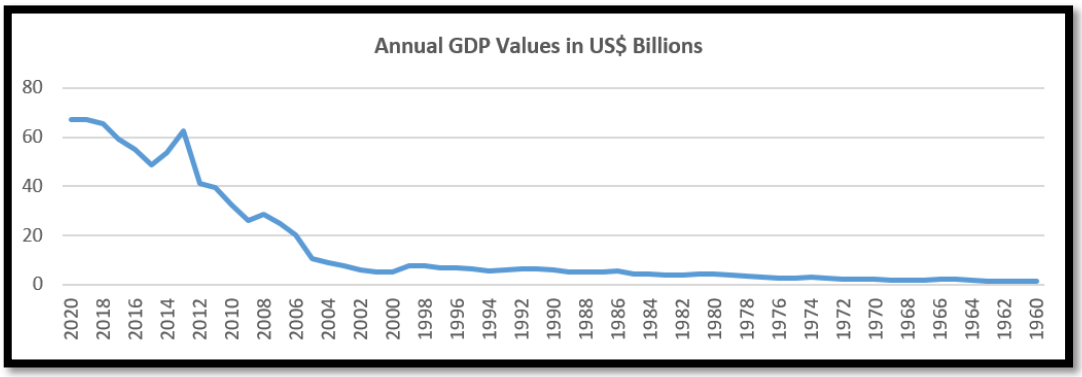

Figure 3: Trends in Annual GDP Values (1960 – 2020)
Source: MacroTrends. (2020a)

Fernando and Boyle (2021) argued that inflation rates that are easily predictable, low and stable are often described as optimal. However, they could pose serious threats to the economy depending on where, when and how new money is introduced into the economy. Generally, new money and credits introduced into an economy find their way into the hands of particular corporate bodies or individuals or both. The price level adjustment process of the new money supply continues as the corporate bodies and individuals spend the new money, and this new money circulates from one account to the other and from one hand to the other within the economy.

Ghana has recorded ten single-digit inflation rates from 1965 through 2020. These included 1967 (-8.42%), 1968 (7.89%), 1969 (7.32%), 1970 (3.03%), 1971 (9.56%), 2011 (8.73%), 2012 (7.13%), 2018 (7.81%), 2019 (7.18%) and 2020 (9.95%). The first three single-digit inflation rates (1967 = -8.42%; 1968 = 7.89%; 1969 = 7.32%) were recorded invariably under the regime of the National Liberation Council. The subsequent two single-digit inflation rates were recorded by the administration of the Progress Party in 1970 (3.03%) and 1971 (9.56%). Thus, single-digit inflation rates were recorded during five consecutive fiscal periods from 1967 to 1971. The annual average rate of inflation over the 5-year period was equivalent to 3.89%. However, it took the Ghanaian economy 40 years (1971 – 2011) to record another single-digit inflation during 2011 (8.73%). The annual average inflation rate from 2011 through 2019 was equivalent to 7.71%.

The highest inflation rate (122.87%) during the period under review was recorded in 1983. 1983 remained the highest inflation period (122.87%) in Ghana's economic history, owing to several factors including the repatriation of over one million Ghanaians from Nigeria during January 1983 and the country's heavy dependence on international trade and foreign aid, among other significant economic challenges. Respective inflation rates recorded in 1981 (116.50%) and 1977 (116.45%) remained the second and third highest during the research period. Available statistics in figure 4 related to the inflationary trend within the Ghanaian economy affirm inflation rates ranging from 10% to 19% have been recorded during 23 fiscal periods; rates between 20% and 49% have been recorded during 16 fiscal years; while inflation rates from 50% and over have been recorded during 8 fiscal periods.

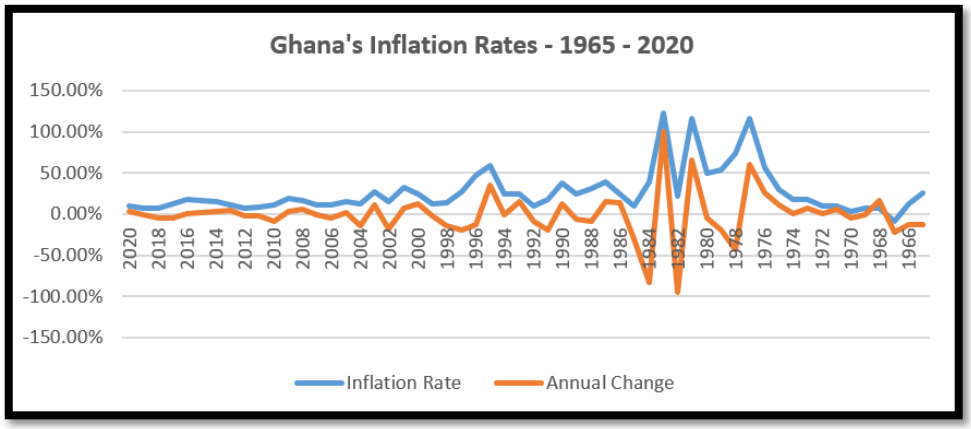

Figure 4: Trends in Inflation Rates and Annual Changes (1965 – 2020)
Sources: World Bank (2021d), MacroTrends (2020b)

Fernando and Boyle (2021) asserted that in order to stimulate spending to the mild neglect of savings, an artificial level of inflation is often promoted within the economy. A persistent decrease in the purchasing power of a nation's fiat currency induces greater spending in the current period other than saving now to spend in future. The increase in spending has the tendency to stimulate economic activities and boost growth. The decision to keep inflation value in an optimum and desirable range reflects a balanced approach. Economies could be burdened with significant costs by variable and high inflation rates.

The annual average inflation rate recorded within the Ghanaian economy from 1966 through 1969 was approximately 5.01%. This rate was 1.29% and 41.96% superior to or better than the respective annual average rates recorded from 1970 to 1971 (6.30%) and from 1972 to 1979 (46.97%). During the 1980 and 1981 fiscal periods, the annual average inflation rate of 83.29% was recorded. This rate was about 2.4 times the annual average recorded from 1982 to 1992 (34.68%), nearly 1.8 times the annual average recorded from 1972 to 1979, and approximately 2.1 times the annual average recorded from 1993 to 1996.

Available data in figure 4 and table 1 affirm comparatively low and fairly stable inflation rates from 2010 (10.71%) to 2020 (9.95%), with respective inflation rates recorded during 2014 (15.49%), 2015 (17.15%) and 2016 (17.45%) being outliers. The annual average rate of inflation during the eleven-year period (from 2010 to 2020) was equivalent to 11.42%. This was 0.96% better than the 12.38% annual average recorded over the eight-year period (2013 through 2020) and 2.09% short of the annual average (9.33%) recorded during the four-year period (from 2017 to 2020). The 11.42% suggests a monthly average inflation rate of approximately 0.95% (11.42% ÷ 12) from 2010 to 2020. This rate remained better than the monthly average (1.03%) recorded over the eight-year period (from 2013 to 2020), but a far-cry of the monthly average (0.78%) was recorded over the four-year period (from 2017 to 2020).

Exponents of surging public expenditure argue that despite the increasing levels of funding for public infrastructure in countries such as the United States, United Kingdom, and Japan, among others, it is rare for one to feel a whimper of inflation within their respective economies. However, opponents of increasing public expenditure, including Shultz et al., contended that the reasoning of the foregoing submissions remains dangerous; it smacks economic short-sightedness and is not well-grounded in arguments supporting basic economic laws. Further, uncontrolled public expenditure could culminate in harmful economic consequences for the implied economies.

Figure 5 affirms the graphical presentation of the data presented in column 3, table 1. Thus, this figure illustrates annual public expenditure values expressed as percentages of annual gross domestic product values. The derived values were applied to test the underlying hypothesis in the current research. Trends in figure 5 indicate a fairly flat distribution of public expenditure-to-GDP ratios from 1983 to 1992. Though there were increases, they were marginal during the period. The distribution depicts a steep rise in public expenditure-to-GDP ratios from 1993 to 1999, a tremendous increase from 2000 to 2004 and a decline in ratios from 2005 to 2008 compared to 2004. Further increase in public expenditure-to-GDP ratios from 2007 to 2010 could not be sustained; we observe fluctuations in the ratios from 2011 to 2020, with intermittent stability and steady increase in ratios from 2014 to 2016 and 2018 to 2020.

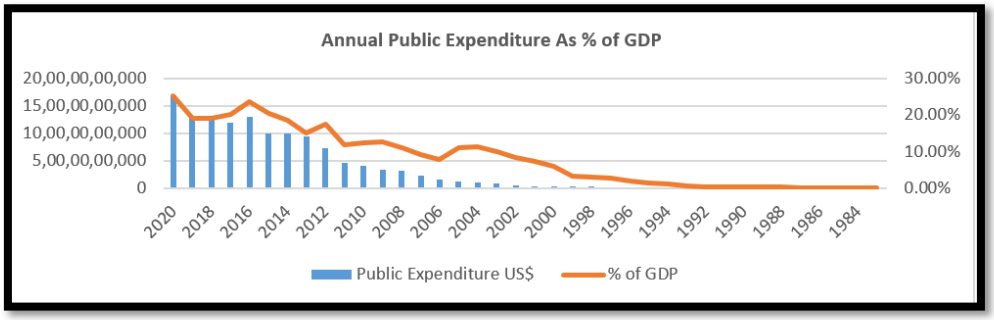

Figure 5: Public Expenditure as % of GDP Values (1983 – 2020)
Sources: World Bank (2021d), MacroTrends (2020b), Bank of Ghana (2021), Netcials (2021)

Table 2 and figure 6 outline some macroeconomic indicators related to performance of the Ghanaian economy under various political administrations and their respective economic management teams during the fourth republic. Statistics in table 2 and figure 6 drew essentially on data in table 1 and figure 4, implying available data in the table and figure proved useful to the analysis in this section. Data in table 2 and figure 6 cover the period 1993 to 2020 and reflect the respective annual average performances of each political administration term during the period.

As noted in prior works, the Republican Constitution of Ghana allows for four-year two presidential terms. Column 1 in table 2 presents the years' interval (four years) for each elected government's administrative term in office during the fourth republic. Column 2 in table 2 sheds important light on the average annual public expenditure under each political administration from 1993 to 2020, while columns 3 and 4 indicate the average annual inflation rate and average accumulated public debt during the period. These indicators fairly reflect the stewardship, direction of Ghana's economy, and general performance of each elected government in terms of economic management during the period under review.

Data in table 2 and figure 6 reveal that the respective highest and lowest annual average inflation rates were recorded during fiscal periods 1993 through 1996 (38.97%) and 2017 through 2020 (9.33%). However, these two distinct economic periods maintained the reverse pattern of average accumulated public debt during the period: 1993 through 1996 depicts the least average accumulated public debt (US$2,933,216,750), while 2017 through 2020 shows the highest average accumulated public debt (US$42,612,757,000). Although the annual average inflation rate recorded during 2017 through 2020 (9.33%) was 29.64% (9.33% - 38.97%), superior to the annual average recorded during 1993 through 1996 (38.97%), average accumulated public debt during 2017 through 2020 (US$42,612,757,000) remained nearly 1,352.77% more than the average accumulated public debt during 1993 through 1996 (US$2,933,216,750).

Year	Annual Average Public Expenditure US$	Annual Av. Inflation Rate	Average Accum. Public Debt
1993 - 1996	53,696,552	38.97%	2,933,216,750
1997 - 2000	172,132,104	20.03%	3,672,438,750
2001 - 2004	523,404,405	21.76%	3,643,519,750
2005 - 2008	1,610,382,970	13.32%	5,062,243,500
2009 - 2012	4,226,652,701	11.46%	11,301,567,000
2013 - 2016	10,348,674,063	15.44%	28,110,536,750
2017 - 2020	13,534,537,195	9.33%	42,612,757,000

Table 2: Average Public Expenditure, Inflation Rate and Public Debt (1993 – 2020)
Source: Computed & Compiled by the Researcher

Statistics in column 4, table 2 and figure 6 depict a steady increase in average accumulated public debts during the preceding four intervals (1993 – 1996; 1997 – 2000; 2001 – 2004; and 2005 - 2008) and very sharp increases during the last three intervals (2009 – 2012; 2013 – 2016; and 2017 - 2020). However, increases in annual average inflation rates did not follow a similar pattern; some administrative periods characterised by high average accumulated public debt recorded low annual average inflation rates, and vice versa. Some comparative periods in this context include 2005 through 2008 (US$5,062,243,500;13.32%) and 1997 through 2000 (US$3,672,438,750; 20.03%). The macroeconomic variants during the periods affirm differences in strategies and policies adopted for implementation by the various economic management teams through their respective elected governments.

Shared data in table 2 and figure 6 affirm a progressive surge in annual average public expenditure values during the period. Statistics in the table reveal a steady increase in annual average public expenditure from one political, administrative term to the other, albeit the quantitative and percentage increase varied from one administration to the other. To illustrate, annual average public expenditure during fiscal periods 2009 through 2012 amounted to US$4,226,652,701. However, this value (US$4,226,652,701) represented less than half (40.84%) of the annual average recorded during fiscal periods 2013 through 2016 (US$10,348,674,063); and represented only 31.23% of the annual average recorded during 2017 through 2020 (US$13,534,537,195); but remained higher comparative to prior political administrative periods. For instance, the annual average public expenditure during fiscal periods 2009 through 2012 (US$4,226,652,7012005) was equivalent to 262.46% of the annual average recorded during 2005 through 2008 (US$1,610,382,970); and remained approximately 807.53%, 2,455.47% and 7,871.37% of the respective annual average public expenditure values recorded from 2001 to 2004 (US$523,404,405); 1997 to 2000 (US$172,132,104) and from 1993 to 1996 (US$53,696,552).

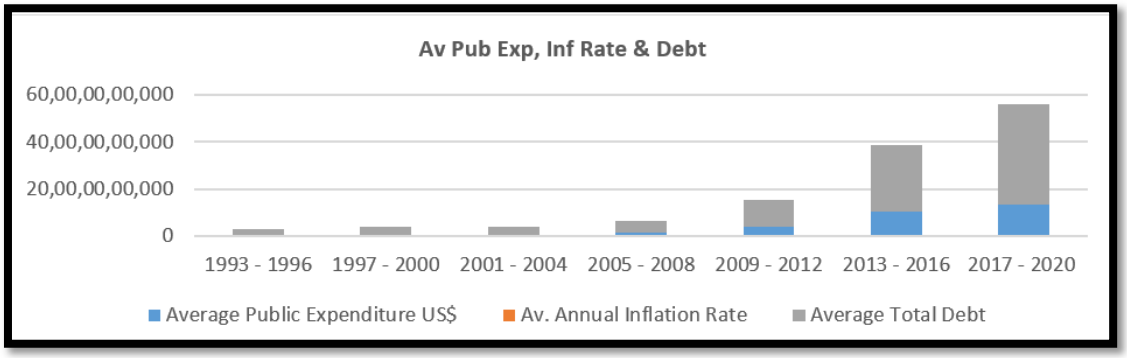

Figure 6: Average Public Expenditure, Inflation Rate and Public Debt (1993 – 2020)
Source: Computed & Compiled by the Researcher

Further analysis of data in figure 4 affirmed that an annual average inflation rate of 29.50% was recorded over an eight-year period, spanning from 1993 to 2000, whereas the rate recorded from 2001 to 2008 was approximately 17.45%. The annual average inflation rate recorded during fiscal periods 2009 through 2016 was equivalent to 13.45%. This remained 4.0% and 16.05% better than the respective annual average inflation rates recorded during fiscal periods 2001 through 2008 (17.45%) and 1993 through 2000 (29.50%). However, analysis of the four-year period as outlined in table 2 indicates that fiscal periods from 2017 to 2020, from 2009 to 2012 and from 2005 to 2008 recorded the respective best (9.33%), second-best (11.46%) and third-best (13.32%) annual average inflation rates. The respective annual average inflation rates recorded from 2013 to 2016 (15.44%), from 1997 to 2000 (20.03%), from 2001 to 2004 (21.76%) and from 1993 to 1996 (38.97%) were successive in terms of ranking to the preceding three fiscal periods.

Statistics in table 2 and figure 6 suggest that with the exception of 2013 to 2016, the performance of the Ghanaian economy in relation to annual average inflationary control improved during the second political and administrative terms compared to the first terms. This development tends to have an impact on the annual average inflation rate when the analysis is extended to eight fiscal periods. To reaffirm, although the annual average inflation rate from 1993 to 1996 was 38.97%, the annual average dropped to 29.50% when the period was extended to include 1993 through 2000. Similarly, the annual average inflation rate decreased from 20.03% to 17.45% when the fiscal period was extended from 2001

through 2008. The best annual average inflation rate over an eight-year period during the fourth-republic was recorded from 2009 to 2016 (13.45%).

Management of Ghana's economy from 1972 through 1992 was integrally under the stewardship of Military governments, interspersed with barely two-and-quarter years (24th September, 1979 – 31st December, 1981) of stable democratic governance. The annual average rate of inflation recorded during the twenty-one-year period (1972 through 1992) was equivalent to 43.99%. However, the annual average recorded over the twenty-eight-year period (from 1993 to 2020) was 18.61%. Comparatively, the annual average recorded from 1972 to 1992 (43.99%) was 2.36 times the annual average recorded from 1993 to 2020 (18.61%). The latter economic period constituted an integral part of the fourth republic during the research period. The macroeconomic performance, in terms of inflationary control, lends strong credence to the argument, which suggests the development success of an economy is more assured in a political environment characterised by democratic governance than in an environment dominated by Military rule and dictatorship.

4.10.1. Test of Hypothesis

The economy of Ghana was randomly selected among the approximately two hundred and eighteen (218) global economies officially recognised by the World Bank (2021b) for conducting the current research. These global economies, with recognition by the World Bank (2021b), comprise sovereign states or countries, dependencies and territories (Worldometer, 2021b). Computed data on Ghana's annual public expenditure expressed as a percentage of annual GDP and annual inflation rates from 1983 through 2020 were used to test the alternative hypothesis under the set of hypotheses in sub-section 3.4.1 which predicted annual public expenditure has a strong effect on annual inflation rate. To facilitate testing of this hypothesis, the researcher drew on data in table 1 and figures 6 and 7. The table and figures present historical data on annual public expenditure values, annual inflation rates, and data on annual public expenditure expressed as a percentage of annual GDP values for the fiscal years from 1983 to 2020. Results from the statistical analysis are presented in the ensuing section.

4.10.2. Model Summary

Outputs from the regression analysis on the research hypothesis are presented in tables 3 to 6 and figures 9 to 11. As noted in prior works, summary constitutes an important aspect of the regression model. To this end, an overall description of the regression model is presented in table 3. The data in the table indicates that 38 values were observed during the analysis. Values for R (0.46154076), R^2 (0.213019873), and adjusted R^2 (0.191159314) are displayed in the table. Value for the multiple correlation coefficients between the independent variable (annual public expenditure) and the dependent variable (annual inflation rate) is presented in the R row (0.46154076).

Further, the extent to which variability in the dependent variable is accounted for by the independent variable is explained by the R^2 value (0.213019873). Thus, the R^2 value in table 3 implies an annual public expenditure accounts for about 21.30% (0.213019873 x 100% = 21.3019873 % = 21.30%) of the variation in annual inflation rate. The results suggest that more than 78% (100% - 21.30% = 78.70 %) of the outcome is explained by external random factors. To wit, more than 78% of the variation in an annual inflation rate is explained by other determinants essential to an effective computation of annual gross domestic product, including personal consumption, gross private domestic investment and net exports (total exports minus total imports).

Regression Statistics	
Multiple R	0.46154076
R Square	0.213019873
Adjusted R Square	0.191159314
Standard Error	0.184621163
Observations	38

Table 3: Summary Output

Analysis of the statistical outcomes suggests the existence of a direct relationship between public expenditure and inflation rate. That is inflation surges in response to increases in public expenditure. Thus, the statistical results confirm the influence of public expenditure on inflationary hikes, confirm the need for monetary and fiscal policies related to inflation control to be strategically reviewed and strengthened to improve implementation outcomes and confirm the potential of rising public expenditure to undermine the rigidity and robustness of economic fundamentals through an unexpected surge in inflationary levels. In essence, the analysis confirms the strong influence of public expenditure on the determination of the rigidity and robustness of Ghana's economy through potential influence on distortions in inflationary levels. Analysis in the following section would help accentuate or otherwise the significance of the relationship between the independent variable (public expenditure) and the dependent variable (inflation rate).

Shultz et al. argued that the perception of many public officials is that governments could engage in uncontrolled or limitless expenditure without any harmful effects on their respective economies. However, it is an erroneous impression. Further, the authors argued that a consistent increase in public expenditure has the potential to plunge the implied country into serious national security and economic risks. Thus, excessive public expenditure requires second "thought" or careful consideration by economies that whet their national development appetite with increased public infrastructure projects.

The outbreak of COVID-19 was identified as the basis of increased public expenditure in most economies during the 2020 fiscal year. Further, due to the surge in public expenditure, economies such as the United States were conditioning their populations to appreciate socialism, a concept Shultz et al. asserted has consistently had a negative impact on the well-being of the people. However, in sharp contrast to Shultz et al.'s argument, this researcher is of the firm opinion and belief that the surge in public expenditure during the intensity of COVID-19 and post-COVID-19 periods was not restricted to the United States; virtually all economies that were impacted, severely or mildly, by the outbreak of the pandemic were impelled to expend beyond their economic means in order to save lives; and to redirect their respective economies from the path of recession towards stimulation and strong growth in the medium- and long-term.

Moreover, the federal government's resolve to increase public expenditure during the said period was an ample demonstration of "corporate social responsibility" at the highest level since each country remains the largest corporate body within the global economy. Further, in as much as we admit to the fact that each government across the globe, whether elected or otherwise, is burdened with the responsibility of providing the basic and essential needs of the people, including public and merit goods, it is quite difficult to identify any economy as either outright capitalist-driven or outright socialist-driven.

Rather, a blend of the two protagonist economic ideologies (capitalism and socialism) drives most, if not all, global economies in contemporary periods, evidently, however, with strong leanings towards capitalism. Thus, any attempt to neglect public expenditure in the face of a growing national population and surge in the occurrence of uncontrollable internal and external natural disasters would amount to shirking vital social responsibility to the population. In essence, increased public expenditure in response to the growing needs of the population is crucial. What requires moderation, however, are the gross inefficiencies inherent in the management of funds allocated to public expenditures, a nemesis identified by economists among global countries at all levels of economic development – advanced, emerging and developing.

Fernando and Boyle (2021) revealed that the identified channels through which an increase in money supply could trigger inflation are categorised into three. These include cost-push inflation, built-in inflation and demand-pull inflation. It is possible for internal and external factors to contribute to increases in the costs of production inputs. The increase in price owing to the foregoing is known as cost-push inflation. Moreover, it is likely for money supply and credit to be channelled into commodities or other asset markets. Further, it is likely that this initiative will result in a negative shock to the economy, including a limited supply of essential commodities, a surge in costs of all forms of intermediate goods, and increased costs for the finished products. Consumer prices would rise when the production costs for the finished goods are factored into the determination of price per unit. The concern here is that expansion in public infrastructure through increased public expenditure could lead to a speculative boom in the prices of goods and services and cause a surge in final consumer prices, which could reflect in varied measures of inflation.

The adjusted R^2 remains one of the measures that determine the generalisability of the regression model. An ideal adjusted R^2 value is closer to zero or the R^2 value. The equation used to determine the adjusted R^2 value (0.191159314) generated by the Microsoft Excel analytical software in table 3 is not specified. In order to test the uniqueness and ability of the equation in the Microsoft Excel analytical software to predict different sample data selected from the same population, Stein's equation was applied. This equation illustrates the effectiveness of the regression model in cross-validating. Stein's formula is given as:

$$\text{Adjusted } R^2 = 1 - \left[\frac{(n-1)}{(n-k-1)}\ \frac{(n-2)}{(n-k-2)}\ \frac{(n+1)}{n}\right](1 - R^2)$$

Where:

R^2 = Unadjusted value

n = Number of cases or participants in the study

k = Number of independent variables in the regression model

To cross-validate our regression model, we computed the adjusted R^2 value using Stein's equation:

$$\text{Adjusted } R^2 = 1 - \left[\frac{(38-1)}{(38-1-1)}\ \frac{(38-2)}{(38-1-2)}\ \frac{(38+1)}{38}\right](1 - 0.213019873)$$

$$= 1 - [(1.0277777777777)\ (1.0285714285714)\ (1.0263157894736)]\ (0.786980127)$$

$$= 1 - (1.0849624060148)\ (0.786980127)$$

$$= 1 - 0.8538438520757$$

$$= \textit{0.1461561479243}$$

The above computations depict an adjusted R^2 value of 0.1461561479243. This value is not too distinct from the adjusted R^2 value (0.191159314) in table 3. In that, both values are positive and close to zero. Further, the adjusted R^2 value (0.191159314) in the table is not significantly different from the observed value of R^2 (0.213019873); the difference between these two values is 0.021860559 [(0.213019873 – 0.191159314 = 0.021860559]; while the value for either the R^2 value (0.213019873) or adjusted R^2 value (0.191159314) is close to zero. The foregoing implies that the cross-validity of the regression model is good; the model could accurately predict the same dependent variable from the given independent variable in a different group of participants (Field, 2009, p. 221).

Similarly, the R^2 significance was computed to cross-validate the value for the F-ratio (9.7444842) in table 4 using an F-ratio formula. The ideal F-ratio formula for measuring R^2 significance is:

$$F = \frac{(N-k-1)}{k(1-R^2)}R^2$$

Where:

R^2 = Unadjusted value

N = Number of cases or participants in the study
k = Number of independent variables in the regression model
Value for the F-ratio was determined as follows:

$$F = \frac{(38 - 1 - 1)\ 0.213019873}{1\ (1 - 0.213019873)} = \frac{7.668715428}{0.786980127} = 9.7444842187228$$

Our computations affirm that the change in the variance that can be explained gives rise to an F-ratio of 9.7444842, equivalent to the F-value (9.7444842) in table 4. This F-ratio is significant ($p = 0.004$, $p < 0.05$), as presented in tables 4 and 5.

A consistent rise in population numbers is analogous to an increasing demand for public goods and merit goods. Since the private sector is noted for minimal investments in these areas of national development, governments are always compelled to make budgetary allocations and ensure these goods and services are within the reach of the people (Shultz et al.). For advanced economies such as the United States, United Kingdom, Germany, Japan, China and France, to mention a few, we observe a positive relationship between increasing population and steady increases in public infrastructure projects. In other words, as populations expand, governments are compelled to increase allocations to public expenditure to minimise any incidental lags between the two important variables: public infrastructure and population.

As of 2019, the infrastructure gap within the Ghanaian economy was estimated at US$37 billion. However, the completion of certain key projects, including major interchanges and highways, rehabilitation of feeder and trunk roads, expansion of the two major seaports and construction of a new seaport, among other essential projects in recent periods, are likely to narrow the public infrastructure gap. This notwithstanding, the growing population size implies that more projects would be required to close the gap in the population-to-public infrastructure ratio.

Lumen (n.d.c) averred the incremental amounts of expenditure that result in increased consumption expenditure, higher income and additional consumption expenditure are influenced by the multiplier. Due to the foregoing condition, the initial incremental expenditure amounts tend to be less than the overall national income. It is stated differently that changes in aggregate supply and changes in the aggregate income that the changes in supply create may be influenced by the initial shift in aggregate demand. The changes in aggregate supply and income serve as a multiplier of the initial change in aggregate demand.

Generally, the multiplier effect measures one's values. However, there are instances where multipliers less than one are measured. The implication is that various forms of public expenditure have the potential to crowd out consumer expenditures or private investments that could otherwise occur in the absence of government expenditures. To illustrate, it is feasible for the initial increase in public expenditures to result in a surge in price levels and hikes in interest rates. The foregoing economic situations could lead to a crowding-out effect on private investment or household consumption or both (Lumen, n.d.c).

Weber (as cited in Shultz et al.) emphasised that excessive public expenditure could "resurrect" inflation with its attendant devastating effect on the economy. Besides, profligate public expenditure has the potential to increase the national debt burden. The latter has the potential to crowd out the private sector in terms of investments and, in turn, slow down job creation opportunities and the growth of the economy. The author further asserted that governments' continued maintenance or record of deficit expenditure has the tendency to ignite inflation within the economy. Another major economic downturn may loom as financial markets are exposed to more internal and external challenges. Results from the statistical outputs affirmed the strong contribution of public expenditure to inflationary levels within the Ghanaian economy.

A belief commonly held among some policymakers is that budget deficits and debts do not really matter. However, this notion has been a major contributor to the extended downward slide in fiscal responsibility of governments in recent fiscal periods. For instance, the balanced budget norm of the United States was strictly complied with and upheld from 1789 to the 1930s, with fiscal deficits recorded only during periods of economic recession and wars. Governments recorded modest surpluses during favourable economic times, and these surpluses proved useful in reducing total national debt through partial settlements or payments (Skidelsky as cited in Shultz et al.). However, the narratives in contemporary periods are quite different.

The foregoing notwithstanding, some central banks have decided to be monetarily disciplined by fixing the exchange rate. That is, taking proactive measures to link the value of their respective currencies to that of another economy, say the American dollar. However, the success story of this implementation strategy varies from one economy to the other. When developments in the external environment other than domestic factors drive inflation, the success story of the fixed exchange rate strategy becomes very slim. To illustrate, the inflation recorded across global economies during 2008 owing to increasing food and fuel prices was borne out of external factors. To address this phenomenon, many countries permitted high global prices to pass through their domestic economies (Oner, n.d.).

Alternatively, policymakers may set prices directly to mitigate the effects of inflation occasioned by external development on the economy. A case in point was the price-setting strategy adopted by some economies during 2008 to moderate the direct effect of high fuel and food prices experienced at the global level on their respective economies. However, these administrative price-setting mechanisms have the tendency to increase public debt through accrual of subsidies intended to compensate producers for lost income (Oner, n.d.).

4.10.3. ANOVA

Our ability to determine whether or not regression analysis provides a better and significant prediction of the outcome than the mean is facilitated by the analysis of variance (ANOVA). Data in table 4 show degree of freedom (between) of 1 (2 - 1 = 1); degrees of freedom (within) of 36 (38 - 2 = 38); total degrees of freedom (df) of 37 (38 - 1 = 37), and an F-value of 9.7444842.

	df	SS	MS	F	Significance F
Regression	1	0.33214049	0.33214	9.7444842	0.003537173
Residual	36	1.227059056	0.034085		
Total	37	1.559199546			

Table 4: ANOVA

Further, statistics in table 4 depict values for the model sum of squares (SSM), represented by *Regression*; the residual sum of squares (SSR), represented by *Residual*; the total sum of squares (SST), represented by *Total*; and the degrees of freedom (df) for each group of squares. The degree of freedom for the SSM is 1, comprising one independent variable (annual public expenditure). The mean squares (MS) values in the table were obtained by dividing the sum of squares by the degrees of freedom. That is, 0.33214049 (0.33214048989964) ÷ 1 = 0.33214 (0.33214048989964); and 1.227059056 (1.22705905562668) ÷ 36 = 0.034085 (0.0340849737674077).

4.10.4 Model Parameters

A normal probability plot on the relationship between annual public expenditure (APE) and annual inflation rate (AIR) is presented in figure 7. The figure depicts a steady rise in comparative values over the thirty-eight-year period. That is, from the 1.32nd percentile through the 72.37th percentile to the 98.68th percentile. The foregoing notwithstanding, a flat distribution of comparative values over a twenty-three-year period is observed from the 1.32nd percentile through the 27.63rd percentile to the 59.21st percentile. Further, the distribution depicts a steep rise in comparative values over the remaining fifteen-year period. That is, from the 61.84th percentile through the 90.79th percentile to the 98.68th percentile for the normal probability.

Viewpoints of individuals and rates of change allow inflation to be perceived positively or negatively. Prices for goods and services surge as currency loses value, and the implied currency could effectively purchase fewer of these products and services than in prior periods. This phenomenon depicts a general loss of purchasing power and has the potential to affect the costs of living of the wider population, as well as to stymie the growth of the economy. A consensus view commonly held among economists is that a consistent increase in the national supply of money over the growth of the economy leads to sustained inflation. However, countermeasures adopted for implementation by central bankers tend to minimise the adverse effects of increasing the money supply while ensuring the smooth functioning of the economy (Fernando & Boyle, 2021).

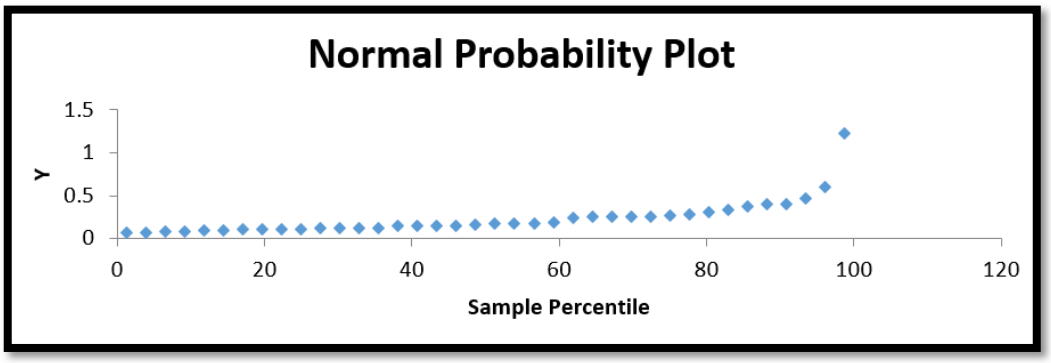

Figure 7: Normal Probability Plot for APE and AIR (1983 – 2020)

Results on parameters of the regression model are presented in table 5. Data on the coefficients, standard error, test statistic, significance, and confidence intervals for the coefficients are shared in the table. The coefficients in the table hint at the contribution of the independent variable (annual public expenditure) to the regression model. Generally, a positive coefficient connotes a positive relationship between the independent and dependent variables, whereas a negative value indicates a negative relationship between the two variables. Results in table 5 show positive coefficient value, implying positive relationship exists between annual public expenditure and annual inflation rate.

	Coefficients	Standard Error	t-Stat	P-value	Lower 95%	Upper 95%
Intercept	0.330612563	0.043608388	7.581398	5.757E-09	0.242170652	0.419054473
X Variable 1	1.2004653	0.384565379	-3.12162	0.0035372	-1.980400043	-0.420530566

Table 5: Model Parameters

Further, the relationship between the two variables is significant ($p = 0.004$, $p < 0.05$). This implies that annual public expenditure has a significant influence on the annual inflation rate. However, a consensus view of most economists is that a consistent increase in public expenditure has the potential to spur sustained inflation, though increased public expenditure could ensure economic stimulation through increased money supply and credit. The significant value ($p = 0.004$, $p < 0.05$) asserts the valuable contribution of annual public expenditure to the determination of the annual inflationary level.

From the foregoing analysis, it is evident that results from the statistical output validate the influence of public expenditure on inflationary hikes, the need for monetary and fiscal policies related to inflation control to be strategically reviewed and strengthened to improve implementation outcomes, and the potential of rising public expenditure to undermine the rigidity and robustness of economic fundamentals through an unexpected surge in inflationary levels. In summary, the statistical outcomes lend strong credence to the clarion call for managers of Ghana's economy and other global economies to be fiscally disciplined, apply due diligence and not perceive every fiscal space as an opportunity to increase public expenditure without recourse to cogent analysis on the economic implications for rising inflationary levels.

The magnitude of the t-test ($p = 0.004$, $p < 0.05$) in table 5 avers that the independent variable (annual public expenditure) has strong effect on the dependent variable (annual inflation rate). A standard error is identified with the coefficients in the table. The standard error affirms the extent to which the coefficients would vary in different research samples (Field, 2009). The probability that a parameter would fall between a pair of values around the mean is measured by the confidence interval. It is stated differently that confidence interval values affirm the extent or level of uncertainty or certainty in a method of sampling (Hayes, 2021). Shared data in table 5 depict the respective lower and upper 95% confidence interval values for the *Intercept*(0.242170652 and 0.419054473) and *X Variable 1* (-1.980400043 and -0.420530566).

As mentioned earlier, the consensus held among economists is that relative price distortions away from their economic equilibrium are not healthy for global economies; these distortions have the tendency to drive economies into periods of recession. Thus, it remains the responsibility of the financial regulators of each economy to put the necessary measures in place to keep surging inflation rates under control. Implementation of measures related to monetary policy inches the financial regulators closer to the realisation of this objective.

Hyperinflation is a rare economic event among global economies. However, it has been recorded in Germany, China, Hungary, Argentina, Russia and Zimbabwe. Further, hyperinflation may be encouraged by the excessive printing of national currency notes, general economic challenges and wars. During periods of hyperinflation, basic goods such as food, clothing and fuel become relatively scarce in the markets. Ceteris paribus, price hikes are encouraged by the shortage in supply relative to aggregate demand. Although it remains a rare economic event, the ability to control hyperinflation when it occurs may be quite challenging (Kenton & Potters, 2021; Fernando & Boyle, 2021). The analysis suggests significant influence of public expenditure on inflation ($p = 0.004$, $p < 0.05$). Therefore, it is imperative for managers of the Ghanaian economy to consistently monitor the applied monetary policy tools to tame the adverse effects of inflation on the economy. Such proactive financial management initiatives would be economically productive by ensuring inflation does not spiral into uncontrollable limits or degenerate into hyperinflation.

4.10.5. Test of Assumptions

Statistical tests were conducted to determine the linearity of the relationship between the independent variable (annual public expenditure) and the dependent variable (annual inflation rate) and to measure the variance in residual values. Minimising the level of residuals or errors underlies the objectives of regression models. Due to the foregoing, residual diagnostics tend to play a critical role in diagnostics tests related to economic modelling. Generally, ideal error terms are expected to be white noise, implying they must be *independent and identically distributed (iid)*. Fortunately, residual diagnostics facilitate our determination of whether or not the error terms in a given set of variables are independent and identically distributed (Shrestha & Bhatta, 2018).

The statistical outputs on residuals are presented in figures 10 and 11 and table 6. The plots in figure 8 depict the residuals scattered around the predicted variable on a horizontal or straight line. This asserts that the relationship between the independent variable and dependent variable is linear; it implies the linear regression model fits the analysis.

Moreover, the residual plot in figure 10 depicts the independent variable (annual public expenditure) on the horizontal axis and the residuals on the vertical axis. The residual plots in the figure show a random pattern. That is, the points are randomly dispersed around the horizontal axis, affirming the appropriateness of the linear model for the research data. Stated differently, the scatter plots in Figures 10 and 11 affirm the fitness and appropriateness of the linear regression model for the current research.

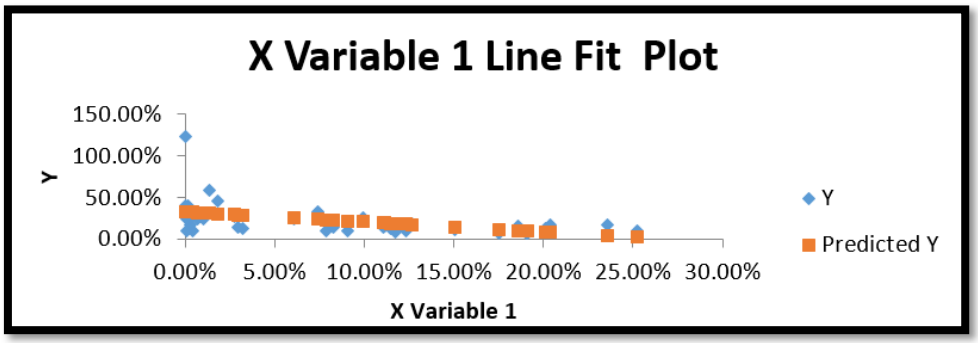

Figure 8: Linear Relationship between X and Y Variables

Homoscedasticity tests remain one of the major test methods for residual diagnostics. Generally, residual diagnostic tests provide reliable information, which facilitates our ability to determine the robustness of estimated coefficients. The *residual* values in table 6 allow us to test the *homoscedasticity* of the model. That is, whether or not the residual values at each level of the independent variable depict constant or homogeneity of variance. Residuals in the table show constant variance values. This implies that the assumption of homoscedasticity is met.

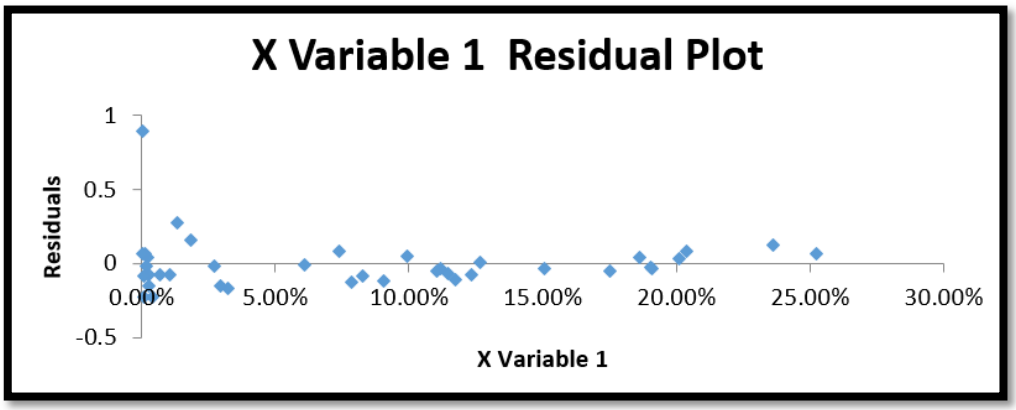

Figure 9: Linear Relationship between X (APE) and Y (AIR) Variables

Further, data in figures 10 and 11 indicate relationship between the X and Y variables were measured at the interval level and beyond; while variability of the dependent variable (annual inflation rate) was not constrained. The foregoing analysis indicates that most of the assumptions have been met; this renders the regression model fit and appropriate for the research.

Predicted Y	***Residuals***	***Standard Residuals***
0.027495073	0.072004927	0.395394
0.101323689	-0.029523689	-0.16212
0.102164015	-0.024064015	-0.13214
0.089319036	0.034380964	0.188793
0.047302751	0.127197249	0.698467
0.085837687	0.085662313	0.47039
0.107205969	0.047694031	0.261898
0.149702441	-0.033002441	-0.18122
0.120531134	-0.049231134	-0.27034
0.189797982	-0.102497982	-0.56284
0.182355098	-0.075255098	-0.41324
0.178513609	0.013986391	0.076802
0.196520588	-0.031320588	-0.17199
0.221850406	-0.114550406	-0.62902
0.236376036	-0.127176036	-0.69835
0.1978411	-0.0466411	-0.25612
0.193159285	-0.066959285	-0.36769
0.211166265	0.055533735	0.304947
0.231214035	-0.083014035	-0.45585
0.24177813	0.08732187	0.479503
0.257624272	-0.005724272	-0.03143
0.29195758	-0.16785758	-0.92174

Predicted Y	*Residuals*	*Standard Residuals*
0.295438929	-0.149238929	-0.8195
0.29783986	-0.01893986	-0.104
0.308524001	0.157075999	0.862537
0.314646374	0.279953626	1.537284
0.31788763	-0.06918763	-0.37992
0.322329352	-0.072729352	-0.39937
0.325810701	-0.225210701	-1.23668
0.327371306	-0.147071306	-0.8076
0.327971539	0.044628461	0.245064
0.327491353	-0.075291353	-0.41344
0.328331679	-0.014731679	-0.08089
0.328931911	0.069268089	0.380366
0.329532144	-0.083832144	-0.46034
0.329772237	-0.226672237	-1.24471
0.330132377	0.066567623	0.365537
0.330252423	0.898447577	4.933565

Table 6: Predicted Y Values and Residual Values for Variable X

4.10.6. Report on P -Value and Confidence Interval

Data in table 5 depict a respective *P*-value of 0.004 and a coefficient value of 1.2004653. These values are significant at Alpha level α = 0.05. Data in the table further show a confidence interval of -1.980400043 and -0.420530566. The Alpha level, a priori, for this study is α = 0.05. The inference is that there is a 5% probability that we would be wrong, and there is a 5% likelihood that the population mean would not fall within the interval (Ashley et al.; Bowerman & O'Connell, 1990; Frankfort-Nachmias & Nachmias, 2008). However, we are 95% (100% - 5%) certain that our conclusions would be right. Again, the Microsoft Excel output in table 4 shows that the degree of freedom (between) of 1 (2 - 1 = 1), degrees of freedom (within) of 36 (38 - 2 = 36), total degrees of freedom (df) of 37 (38 - 1 = 37); and F-ratio of 9.7444842. These values could be interpreted as:
F (1, 36) = 9.7444842, p < 0.05, two-tailed.

4.10.7. Interpretation and Rejection of Null Hypothesis

Results from the foregoing analysis indicate that public expenditures significantly impact the inflation rate. Therefore, we reject the null hypothesis (Ho: μ1 = μ2), which states that annual public expenditures have no strong effect on the annual inflation rate, and accept the alternative hypothesis (H1: μ1 ≠ μ2), which states that annual public expenditures have a strong effect on the annual inflation rate.

5. Recommendations

The significance of public expenditure is exemplified in its crucial role in the computation and determination of annual gross domestic product values. Discussions throughout the preceding sections revealed the relevance of public expenditure funding in the stimulation of economies. However, the economic relevance was advanced with caveats: excessive public expenditure without the requisite checks and balances could lead to damaging consequences on the economy. Moreover, the perceived threats inherent in increased public expenditure funding extend to countries at various levels of economic development, including developed, emerging, developing and least developed economies.

The research findings revealed a positive and significant relationship between public expenditure and inflation. This affirmed a strong effect of public expenditure on inflation and the need for effective counter-measures to mitigate the potential adverse impact of increased public expenditure on the economy through rising inflationary levels. Further, the current research underscored the need for managers of various economies across the globe to be keen on "economic" public expenditure and not on profligate public expenditure, so the socio-economic derivatives from investments in public infrastructure would add to, rather than subtract from national development and growth efforts. In view of the foregoing and other pertinent factors outlined in the preceding sections, the following recommendations are proffered. The economy of Ghana remained the unit of analysis in the current research. This notwithstanding, recommendations outlined in this section are applicable to all economies dotted across the globe.

- It is imperative for global governments, through their respective central banks or relevant financial regulatory bodies, to ensure the monetisation of debts accumulated during relief efforts of the COVID-19 pandemic outbreak so the effect on national debt stock would lessen. *It is difficult to measure the economic benefits of increasing public expenditure, especially when a chunk of its allocations is appropriated to non-development sectors with minimal accountability to the funds by public officials responsible for these sectors*. This becomes quite worrying when the appropriations to these non-development sectors are recurring, and it remains difficult to measure the level of progress to limit future funding in those sectors. For instance, a country would embark on an economic exercise in futility if annual public expenditures on welfare benefits are not effectively measured and accounted for to determine the level of progress and to fairly estimate future allocations to this sector of the economy. *Economic utilisation of and accountability to funds allocated to public expenditure is analogous with accelerated development*

and positive growth of implied economies. In essence, the qualitative attributes, economic utilisation and accountability, should form an integral part of implemented policies and programmes related to public expenditure funding, allocations and appropriations across global economies.

- During periods of economic uncertainty and recession, managers of various global economies could rely on the multiplier effect as a strategic tool to ensure effective stimulation of aggregate demand within their respective economies. Increased public expenditure in the form of higher government investments would prove pivotal to enhancing job creation efforts. This would, in turn, cause a surge in household and other GDP components' expenditures to enhance economic stimulation. *The underlying objective of this economic strategy would be to ensure that a net increase in disposable income is eventually higher than the original investment*. Further, *the objective would be to assist the implementation of global economies emerging from the lax monetary policies identified as the root cause of consistently high inflationary rates over considerable periods, which remain a strong contributor to the weak purchasing power of many national fiat currencies*.
- Disinflationary policies adapted for implementation should be contingent on the causes of inflation. In other words, the causes of a particular type of inflation should determine the mitigating measures to be adopted and implemented. To illustrate, *when the economy is determined to be overheated, the central bank or relevant government agency could initiate and implement policies that would ensure the contraction of the economy through a decrease in aggregate demand. The latter could be made feasible through interest rate hikes to assure stability in the prices of goods and services. Ceteris paribus, raising interest rates would discourage borrowing, which would, in turn, limit the quantity and increase the value of money supplied into the economy through banks and other financial institutions*.
- The current research affirmed zero-coupon inflation swap (ZCIS) as one of the derivatives useful to hedge against inflation significantly. It remains a bilateral contract that is useful for the provision of hedges or protection against inflation. At the national level, *it could be useful to economies with fiat currencies inherent in strong volatilities, which would require or need investment protection to secure payments in the future. The economic usefulness of this derivative to global governments would manifest in its facilitation of fixed-rate payments on notional amounts in exchange for payments at an inflation rate. In essence, a zero-coupon inflation swap has the potential to ensure effective mitigation of countries' exposure to changes inherent in the purchasing power of their respective fiat currencies. Payoffs on zero-coupon inflation swaps at maturity dates are contingent on the rate of inflation realised during a given time period, as measured and affirmed by an inflation index*.
- Inflation may be triggered by pressures from either the demand or supply side of the economy. Supply shocks such as increased costs of production, including surging prices of oil, and natural disasters such as drought, outbreak of COVID-19, torrential and prolonged rainfall, among others, could cause disruption in production and affect the total supply of finished goods and services within the economy. *The foregoing affirms that disruption to supply has the potential to induce cost-push inflation. However, this economic challenge could be avoided through the application of novel strategies, including improvements on the current initiatives of the government of Ghana to establish buffers to mitigate shortage in food supply and to ensure the availability of raw materials relevant to the production of capital and merit goods within the economy. The strategy of Ghana's current political administration is to limit the gap between the productive capacity of the economy and aggregate demand and to enhance economic stimulation and growth*.
- Inflation targeting has remained on the economically balanced scorecard of many countries for considerable financial and fiscal periods. That is, the primary policy objective of the implied countries through their respective central banks is to maintain stable and low inflation rates. The positives of this strategy include the country's ability to recover quickly from economic shocks occasioned by both external and internal developments. *Given that countries have minimal control over demand and supply shocks necessitated by external factors, maintenance of low and stable inflationary levels would mitigate the adverse effects of the imbalance between excessive aggregate demand and limited supply on the economy. Limited total supply, which is the end-product of low production capacity attributable to strain on national resources, requires constant attention so the gap between aggregate demand and supply would not be widened to spur inflation*.
- The economic management teams of global countries, including Ghana, through their respective central banks, may decide to increase the money supply through printing and issuing more notes to the general public, remitting more money to individuals, legally devaluing or reducing the value of the national fiat currency or legal tender; and by deciding to loan new money into existence as reserve account credits, usually through the banking or broader financial systems. The latter strategy may be implemented through periodic purchases of government bonds from financial institutions on the secondary market. This notwithstanding, *the purchasing power of money is reduced when either of the foregoing measures is applied to ensure an increase in money supply to promote economic stimulation. The foregoing affirms the inherence of inflation risk in increasing money supply and the need for such monetary policy journey to be pursued with utmost due diligence to forestall any damaging effects of inflation on the economy*.
- Usually, when the anxiety of public officials in relation to the consistent increase in the provision of public goods and services ameliorates, it opens the floodgates for public expenditure. Stated differently, *the relaxation of public officials on the possible consequences of unbridled public expenditure often culminates in a rapid surge in budget and fiscal deficits, and the growth in deficits may be so rapid to the extent that growth recorded in total national income would not equal growth in national debt*. Nonetheless, *one of the significant lessons gleaned from the current*

research is that persistent inflation requires the utmost attention and consideration of key policy-makers to effectively mitigate its detrimental effects on consumers and economic growth.

- Demand shocks triggered by expansionary policies, including the decision of central banks to lower policy rates or governments' decision to increase expenditure, and other factors, such as a rally of the stock market, have the tendency to result in a temporary boost of overall demand and economic growth. This notwithstanding, *it is possible for the increase in demand occasioned by the foregoing factors to result in excess aggregate demand over the productive capacity of the economy. That is, the increasing demand could cause a strain on available production resources, leading to demand-pull inflation, which would reflect in the prices for the limited supply of goods and services*. *To effectively mitigate the effects of these demand shocks, it is imperative for the actions of policy-makers to be geared toward striking a balance between economic growth and an increase in demand as and when necessary without triggering inflation; and without over-stimulating the economy*.
- One of the measures adopted by the United States Federal Reserve and other central banks across the globe to prevent deflation during the financial crisis that erupted in 2007 was to keep interest rates low for extended financial periods. Further, other monetary policies were formulated to ensure the availability of more liquidity through the financial systems. *In order to lessen the ominous effect of COVID-19 on the redevelopment and restructuring efforts of global economies in the post-COVID-19 era, the foregoing measures ensured rapid recovery of the implied economies from liquidity traps and set them on the path of strong and positive economic growth are recommended for adaption and implementation*. *Invariably, the foregoing measures have the potential to increase the amount of money available to individuals and businesses within the economy. This would lead to economic stimulation through increased spending by individuals, increase in investments by businesses in the immediate- and medium-term, and chart the economy on the positive path of desired growth*.
- *A cautious approach to economic stimulation by managers of global economies through their respective policy-makers has the potential to ensure the much-needed balance between increasing demand and growth of the economy is struck without triggering inflation*. *Thus, tactfully couching strategies that would enhance economic stimulation while taming inflation is pivotal to the maintenance of a strong and vibrant economy characterised by rigid and robust fundamentals*. A cautious approach in this context implies *rolling out and exacting policies and measures that would assure moderation rather than over-stimulation of the economy. Over-stimulation has proven to be a major driver of inflation in many global economies, hence the need for it to be relaxed or for its implementation to proceed with due diligence and careful consideration*.
- *Non-monetary factors have proven helpful in determining maximum employment. However, these factors fluctuate over time and are subject to change*. *Due to the fluctuating nature of these maximum employment-induced factors, policy-makers could decide not to set specific goals to that effect. Rather, they could allow employers' assessments to largely influence maximum employment within the economy*.
- *Unfettered public expenditures have the potential to resurrect high inflationary levels and cause a surge in public debts within the economy. Major threats of higher rate of inflation and increasing public debt include the tendency to crowd out the private sector in terms of investments, slow down job creation opportunities, and stymie economic growth*. Nonetheless, *taking proactive measures to stem the tide of growing public expenditure on inflation is crucial to the sustenance of a healthy and vibrant economy through the meaningful contribution of public expenditure to total economic output*.
- The current study revealed *the application of measures such as treasury inflation-protected securities (TIPS), treasury inflation-protected securities-based exchange-traded funds (ETFs), or treasury inflationary protected securities mutual funds by some central bankers across the globe, such as the United States Federal Reserve to be strategically useful to taming the adverse effects of inflation on investments within their respective economies*. *Global economies with challenges to the application of measures to ensure efficiency and effectiveness towards inflation control are entreated to consider the adaption and implementation of the foregoing special financial instruments. However, the content and mode of application could be reviewed and tailored to synchronise with the socio-economic realities of each country and in tandem with globally acceptable methods of combating inflation challenges*.
- *Policy-makers could decide to temporarily maintain low economic activity as a strategic way of curbing inflation. The overarching objective in this context would be to influence expectations on inflation and to effectively contract components of built-in inflation within the economy*. Evidence suggests reliance on the ability to influence expectations on inflation as an inflation-mitigation technique is increasingly implemented by policy-makers in some economic jurisdictions. However, *pronouncements on inflation expectations would have a strong influence on the general public and on the economy as a whole when central bankers have strong credibility. Nonetheless, the ability to maintain strong credibility is predicated on the precision or near-precision of inflation forecasts by global central banks* (Oner, n.d.).
- Stable, low and predictable inflationary levels have been identified as useful to the health of global economies. It is relatively easier for low and predictable rates of inflation to be captured in price-adjustment contracts. *This initiative has the potential to lessen the distortionary impacts of inflation on price-adjustment contracts. Further, consumers may be encouraged to increase spending during current financial periods if they are aware of future price increases*. *Moreover, stable and low inflationary rates could have minimal adverse effects on real inflation-adjusted income or purchasing power of consumers' nominal income and could assure stability in nominal income or purchasing power over considerable financial periods*. *Consumers' motivation to increase spending during current financial periods could lead to economic stimulation and chart the economy towards the path of positive growth. The*

fundamental objective of the monetary policy committee in each global economy should be pivoted around three cardinal functions: creation of maximum employment, moderation of long-term interest rates, and ensuring price stability.

- Extant literature affirmed a positive relationship between the growing population and surging public infrastructure projects among developed economies, including the United States, China, Japan, Germany, United Kingdom and France, among others. To wit, *as populations expand, governments of the foregoing economies deem it obligatory and are encouraged to increase allocations to public expenditure to mitigate any incidental lags between the two significant variables. That is public infrastructure and population. However, the spontaneity of increasing public infrastructure to mitigate social needs and demands of increasing population sizes in most developing economies, including Ghana, is deficient; the lag between infrastructure provision and population size in most developing economies is enormously pervasive*. As of 2019, Ghana's infrastructure gap was estimated at US$37 billion, relative to an estimated total population of 30.418 million people (MacroTrends, 2021), implying an infrastructure deficit of US$1,216.39 (US$37,000 ÷ 30.418) per head during the period.
- To effectively stem the tide of the foregoing phenomenon, *it is imperative for developing economies such as Ghana to emulate the glittering examples of the above-listed developed economies in the acceleration of infrastructure provision to effectively mitigate the infrastructure gap; to assure rapid development of their respective economies through increased foreign and local investments; and to enhance the competitiveness of their respective business environments*.
- Views held among some economists are externalities, including unsustainable resource depletion, social consequences, and environmental degradation, which are likely to be neglected when governments duel extensively on fiscal multipliers. Moreover, *overreliance on fiscal multipliers could lead to profligate government expenditure on activities and programmes that have the potential to create negative externalities other than positive externalities*. Examples of negative externalities include resource depletion, pollution and climate change, whereas public health, higher educational standards and social cohesion constitute examples of positive externalities.
- Due to the foregoing socio-economic possibilities, *public expenditures should be geared strategically towards the creation of positive externalities to enhance the economic significance of government expenditure as a useful component and contributor to total economic output*. It is worth emphasising that a persistent surge in inflationary rates could have dire implications for exchange rates, while volatilities inherent in national fiat currencies could be worsened by the new development. *The situation would be exacerbated when an import-driven economy maintains weaker currency and significant volume and value of goods and services are imported. The resultant effect would be the issuance of more local currency notes in payment for the purchased items in the currency of the foreign trading partner or partners. In essence, formulating and implementing policies that birth positive externalities while closely monitoring negative externalities should be rigorously pursued to enhance the contribution of fiscal multipliers to economic stimulation and growth*.

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