Chapter 6
The Impact of COVID-19 Pandemic on the Incidence of Poverty, Economic Growth and Development: Evidence from Ghana

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6.1 Introduction

Despite the difficulty to present the exact economic impact of the COVID-19 coronavirus pandemic, it has resulted in adverse impacts on the global economy. According to the [1], the emergence of COVID-19 sent shock waves through the world economy with heightened concerns about the high levels of private and public sector debts. As expected, the initial impacts of the pandemic were felt most directly by households and firms; thus, there was a sharp decline in household income and business revenue. Taken as a whole and/or aggregately, such a decline had repercussions for the macro economy through several integrated re-enforcing means and pipe channels that connect the financial status of households, firms, financial institutions, and the government at large. The financial status of households is connected to the wider economy through the household-financial sector nexus and household-government nexus. The ability of banks to issue new loans to creditworthy borrowers is reduced when the financial health of households deteriorates, through a rise in loan defaults and an increase in loan provisioning requirements [1]. Moreover, economic activity is depressed when the financial status of banks deteriorates as banks supply households with less credit and charge higher interest rates. Similarly, Governments' reliance on households as a source of tax revenue declines when incomes are low, unemployment is high, and household incomes are under stressed [1].

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The corporate-financial sector nexus and corporate-government nexus equally, exhibited stress and ill-health during the COVID-19 pandemic. The financial status of the corporate sector affects banks and non-bank financial institutions directly through insolvency and loan defaults. When there is stress on the financial sector, bank's ability to extend credit is reduced and instead, charge more for such services [2]. The government-financial sector nexus is directly connected when banks are exposed to government's default risk if they hold government securities; deterioration in government's financial position negatively affects financial institutions balance sheets, increasing borrowing costs and reducing the ability to supply credit.

On the other hand, banks are an important source of funding for the government through the purchase of government bonds; when the financial sector is stressed, funding costs increases, thus, making it difficult and expensive for governments to refinance existing short-term debt and to finance new expenditure's __ rollover risk [2]. In developing economies, the interconnected risks of households, firms, and the financial sector and that of government are worsened by exogenous variables within the global economy. The depression of local currencies due to the worsening global economic situation relative to the COVID-19 pandemic, results in more expensive and often unsustainable debt servicing. Furthermore, global shocks such as the COVID-19 crisis often coincide with a decline in commodity prices within the world economy resulting in the deterioration of government revenue and henceforth, adversely impacting the government ability to counteract the crisis through expansionary fiscal policy (higher government spending and/or tax reduction) [2]. As experienced in Ghana, the result is a decline in household incomes, increase in poverty, increase in the rate of inequality and reduced growth of the wider economy and real Gross Domestic Product. It was in the face of such debt challenges that the government of Ghana, reached a staff-level agreement of Special Drawing Rights (SDR) of 2.242 billion or 3 billion United States dollars as part of economic policies and reforms to be supported by a three-year arrangement under the Extended Credit Facility (ECF) by the International Monetary Fund (IMF) [3]. At the end of the IMF mission to evaluate Ghana's economy as part of the processes of securing the bailout, it was agreed that "the Ghanaian authorities have committed to a wide-ranging economic reform programme, which builds on the government's Pos-COVID-19 Programme for Economic Growth (PC–PEG) and tackles the deep challenges facing the country" [3]. The bedrock of the reforms is to ensure the sustainability of public finances while protecting the vulnerable as a result of the adverse impact of COVID-19. Therefore, the fiscal strategic programme depends on frontloaded measures intended to increase domestic resource mobilization and hence, streamline expenditure. Furthermore, the programme is intended to strengthen already existing social safety nets, including a re-enforcement of existing targeted cash-transfer programmes for vulnerable households and thus, improve the coverage of and efficiency of social spending as part of the Post-COVID-19 economic recovery policies [3].

The presented chapter involves six integrated sections and/or headings. Apart from the abstract, section one of the chapter introduces the study and lays the foundation for subsequent sections. Section two thus, brings forth, the relevant literature reviewed

and the theoretical framework underpinning the chapter. This is followed by section three which details the adopted research design and data requirements in meeting the goal and objectives of the chapter. Section four, on the other hand, presents well-integrated results and analysis of the chapter, and section five focuses on the noted limitations of the chapter. The last part of the study, which is section six, provides the conclusions and policy implications of the chapter.

6.2 Literature Review and Theoretical Framework

The World Health Organization (WHO) first announced a global health emergency in January 2020 and on March 11, 2020, it declared the viral COVID-19 outbreak an official pandemic which is the highest level of health emergence. This brought to the fore, the highly interconnected nature of the global economy, and in consonance with John Donne's poem: "No Man is an Island" [4]. Since its inception, the global public health and economic crisis affected about 90 trillion dollars of the global economy [5].

The *World Economic Outlook* report in October 2021, presented a sober reflection of the global economic growth that had fallen to an annualized rate of around -3.2% in 2020, with a recovery of 5.9% progression for 2021 and 4.9% for the subsequent year of 2022 respectively [6]. By the close of 2020, the total number of confirmed COVID-19 cases had surpassed more than 40 million worldwide. Although many countries were relatively unaffected during the first wave, the situation was different as subsequently, they experienced dramatic increases in fatalities [7].

Apart from its impact on public health, COVID-19 has led to major economic shock within world economies including that of Ghana. In accord with this, the United Nations framework for the immediate socio-economic response to the COVID-19 crisis warned: "the COVID-19 pandemic is far more than a health issue as it is affecting societies and economies at their core. Whilst the impact of the pandemic will vary from country to country, it will most likely increase poverty and inequalities at a global scale, making achievements of the Sustainable Development Goals even more urgent" [8].

The African continent's openness to international trade is thus, not immune from the adverse effects of COVID-19. The internal effects are because of the rapid spread of the virus in many African countries. They are associated with and linked to morbidity and mortality which lead to a disruption of economic activities. It resulted in a decline in domestic demand in tax revenue due to the loss to commodity prices in the face of increased public expenditure to safeguard human health and support economic activities relative to growth and development [9]. On the other hand, the exogenous effects result from direct trade links between the continents of Europe, Asia, and the Americans. Decrease in Foreign Direct Investment (FDI) and Official Development Assistance, decline in remittances from African Diaspora, and illicit financing flows and domestic financial market tightening have contributed to the negative growth rates in African economies [7].

After adjusting for the effects of gender, employment status, marital status, religion, level of education and occupation. Multivariable Analysis of Factors of the impact of COVID-19, revealed that the location and region of residence was the main factor associated with any impact of the virus sampled respondents [10]. Thus, those from the Eastern part of the African continent (Adjusted Odds Ration [AOR] with 95% Confidence Interval [CI] and 1.95 Z value: 1.42–2.69; Southern African (AOR 1.46 M 95%, CI: 1.09 -1.1.96) and Central Africa (AOR 1.47, 95% CI: 1.06–2.03) had much higher odds of any adverse impact of COVID -19 than the West African sub-region [10]. Furthermore, the study reported that older adults thus (> 49), were more likely to have closed down their respective businesses at the height of the COVID-19 pandemic [10].

It's reported that out of the over 30, 000 firms that closed at the height of the COVID-19 pandemic, nearly half (15,179) are fully open; close to half (14,162) are still closed suggesting more support is needed in helping such businesses to fully recover and hence, economic growth and development [11].

As of January 2023, Ghana had recorded 171, 070 COVID-19 cases with 1456 Coronavirus deaths. The number of Coronavirus recovered cases stood at 932, 69. The country administered a total of 21,400,939 vaccine doses [12].

There was a large drop in Ghana's non-residential electricity consumption after the lockdown as commercial activities froze up; compared to 2019, non-residential electricity consumption fell by 3.9% in April and 12.7% in May 2021. By contrast, there was a notable increase in the rate of electricity consumption by residential consumers [13]. Despite budget constraints, the Government of Ghana, in April 2020, announced an electricity subsidy programme; providing free electricity for three months to lifeline consumers: those who consumed less than 50 kWh in the month of March. Those who consumed more than the threshold of 50 kWh were presented with a 50% reduction in their cost of electricity consumption under Ghana's Coronavirus Alleviation and Revitalisation of Enterprises Support (CARES) Obaatanpa Programme. Although the Government removed the 50% absorption of the cost of electricity, it extended the programme for those with a threshold of 50 kWh [13].

In a study conducted in South Africa, it revealed that male farmers were in the majority as opposed to female counterparts. The low rate of female participation in agriculture was attributed to inequalities experienced by women within the sub-Sahara Africa. Women in agriculture face difficulties with access to land, land rights, inputs, credit facilities, and extension services [14]. COVID-19 lockdown and restrictions further exacerbated agricultural inputs limitations. These resulted in reduced crop yields such as cereal maize and legumes that constitute staple foods in the region.

Although governments as part of national policies to mitigate the adverse effects of COVID-19 in their respective countries, containment measures including stay-at-home and travel restrictions meant that farmers and traders were logistically challenged, leading to supply delays and post-harvest losses. Furthermore, the requirements for COVID-19 tests for long-distance truckers, for instance, resulted in a shortage of food truck drivers and delays in the delivery services across international borders in Eastern Africa (Rossi, 2020) in [15].

Although African indigenous vegetables (AIVs) are a very important source of food security and nutrition as well as the income of the poor farm households, COVID-19 negatively, impacts the production and distribution of AIVs. Farmers within this sub-sector recorded a 75% drop in production resulting from reduced access to input, farm labour and output market. During the first phase of the pendemic, farmers' production and sales volumes declined by 39 and 65% [16].

Moreover, in the East African region, COVID-19 lockdown measures including reduced access to markets resulted in the loss and reduction of employment opportunities and thus, adversely affecting those within the lower income bracket earning opportunities and hence, reduced purchasing power. The concomitant effect was to resort to negative coping strategies and widening of the poverty gap. The negative effect and impact were equally felt within the non-farming labour-supporting sector including transport operators, petty traders, market vendor and rural-based loan and credit operator [15].

Ironically, recent data shows that agriculture continues to be the main source of livelihoods for smallholder households in sub-Saharan Africa. The share of households involved in and/or moving into the agricultural sector has increased since the start of the pandemic. Before the outbreak of the COVID-19 pandemic, 76% of households were directly involved in the agricultural sector either as crop or livestock farmers. However, this figure has increased to 84%. Similar observations have been made in Malawi and Uganda, respectively. The former recorded 91% and the latter, recorded 79% of households are involved in the agricultural sector as compared to the pre-pandemic levels of 84 and 76% respectively [15].

The negative impact of COVID-19 on Ghana's economy is felt in the country's agricultural sector which happens to be the backbone of the economy contributing tremendously to its Gross Domestic Product (GDP) year on year. It employs over 60% of the country's population [17]. Sub-Saharan African countries including Ghana, the majority of farmlands practice rainfed agriculture. Lockdown and restricting people's movement adversely affected the availability of farm inputs as well as other farm-related services. For instance, farmers couldn't access tractor service centers and this adversely affected food production, resulting in reduced farm income and thus, increased spatial inequalities within the agricultural sector. The poultry industry suffered as a result of disruption in international shipping; feed ingredients mostly imported weren't available. There was an increase in prices of the few available feed ingredients [18]. Gender inequality increased during the period under review relative to COVID-19 and its impact on the agriculture sector. Patrilineal inheritance in Ghana, limits women's accessibility to land acquisition and therefore, being able to expand farm acreage and production. COVID-19 negatively, affected women farmers and traders as they were restricted from accessing farm implements and bringing their farm produce to locked-down city centers [19].

It's well noted that an estimated number of agribusiness employment fell from 51.111 at the height of the COVID-19 lockdown to 78.412 in the post-lockdown period. Furthermore, reduced wages of workers within the agribusiness sector increased from 175,255 to 267.211 in the post-lockdown period [20]. In addition, an estimated 124,364 workers had their working hours reduced within the agribusiness.

In a nutshell, more than 55.2% of the total workforce in the agribusiness and the agricultural sector lost their respective employment. About 44.7% of the total workforce across the agribusiness sector were laid off because of the COVID-19 lockdown. This translated into an estimated 22,873 workers and a wage reduction for 63,167 workers [20].

The imposition of a lockdown by the Government during the COVID-19 pandemic led to labour migrant crisis for the first time in Ghana's history. There was a reverse migration from the southern part of the country to the northern part of the country. The labour crisis affected fish processing activities, infrastructure development, manufacturing, construction activities adversely affected the country's economic growth and development [21].

By July 2020, over 400,000 businessmen and women had lost their businesses; 42,000 small traders, daily workers and wage-laborers lost their jobs [21]. The slowdown in the manufacturing sector has led to a downward trend in Ghana's economic growth from 5.8 to 1.5%. The impact of the COVID-19 pandemic led to a wide gap in the official fiscal deficit to 11.7% of GDP thus, driving up the public debt to 76% of GDP; interest expenditure further increased to 44.6% of total revenue. Henceforth, at the end of the 2020 fiscal year, the government embarked on an urgent fiscal consolidation agenda from 2021 onwards [22].

The Markov processes and in particular Markov chains have been applied to study different phenomena in different disciplines and/or fields [23]. In the discipline of economics, Hamilton developed the Markov process as a tool to study and analyse the switches of observable variables between different regimes [24]. Therefore, memoryless stochastic processes could be applied in such models in which the future is thus, conditioned only on the current state of the system [20, 23]. Applied the model for analyzing the switches of observables between different regimes and/or time periods, between high and low levels of time series as the Markov switching model allows for an analysis of how a non-stationary series transitions thus, drawing the probability distribution of the switches between regimes. Nevertheless, the applied method has been criticized on the grounds that few of the real-world growth rates are non-stationary, it has relevant implications for the understanding of this phenomenon. To overcome the perceived weakness of the Markov model, the application of the Hidden Markov Model (HMM) and in addition, of the stayer model are refined versions of the basic Markov model to enhance its robustness and application [20].

The applied Markov model thus, led to the conclusion that national policy to address inequalities relating to the spread of unemployment should not only depend on the efficiency of local initiatives but rather complemented with extended partnership. This should exceed the traditional forms and institutions of cooperation. Rather, the partnership should include local, national institutions with ties to national or regional administrative institutions, the private sector, civil society organizations and/or chambers. To reduce regional inequalities, especially in the developing world, it is the development of infrastructure that has a dominant role as increases demand side of employment based on Keynesianism [25].

The application of the Markov model provided relevant information relating to growth-path forecasts of the cycles of the American economy. Indeed, the model

provided good predictions of the duration of cycles in the economy of the United States of America [26]. As a statistical system modelling technique, the Hidden Markov Chain allowed for the study and analysis from one state in this case, confirmed cases, recovered, and active or death of COVID-19 pandemic in Morocco. The application of the Hidden Markov Chain model enabled the forecast for a cumulative number of cases that helped the Moroccan authorities to set up adequate protocols for managing the post-confinement due to COVID-19 [27].

To achieve the goal of this chapter, a basic discrete Markov chain model is presented; time and space are discrete. This construction demonstrates how to simulate a discrete-time Markov chain model in the study and analysis of the intent of the chapter which is a focus on the ramifications of the Coronavirus disease (COVID-19) pandemic on Ghana's Gross Domestic Product (GDP) since its inception in 2019.

Let $\boldsymbol{X_n}$, $\boldsymbol{n} = 0, 1, 2 \ldots$ which is discrete-time stochastic process with a discrete state with space $\boldsymbol{S}$.

$\boldsymbol{S}$ = a discrete variable that is either finite or countably infinite; always assume that S is either $\{1, \ldots, N\}$ or $\{0, \ldots, N\text{-}1\}$ relative to a finite case/state, and could either be $\{0,1, \ldots\}$ or $\{1, 2, \ldots\}$ in the infinite case/state [28, 29].

To comprehend the process, it is valuable to know and understand the values of:

$$P\{X_0 = i_0, X_1 = i_1, \ldots, X_n = i_n\} \tag{6.1}$$

Note that for each n and finite sequence of states $i_0, \ldots, i_n$ Ɛ S. Therefore, finite-dimensional distribution enables the calculation of a path probability. Henceforth, the axioms of probability could be applied [29, 30]:

$$P\,X_0 = i_0, X_3 = i_3 = P\,X_0 = i_0, X_1 \varepsilon S, X_2 \varepsilon S, X_3 = i_3 \tag{6.2}$$

$$= \sum_{j1 \in S} \sum_{J1 \in S} P\{X_0 = i_0,\ X_1 = j_1,\ X_2 = j_2,\ X_3 = i_3\} \tag{6.3}$$

From Eq. 6.3, the rule of second equality holds when the related events are mutually exclusive [29]. Accordingly, the Markov chain to a degree, describes a sequence of the probability of events of a given case/state resulting from the preceding event. Thus, depending on the nature of the inquiry being undertaken, the stochastic model could either be presented in a discrete-time model or as a continuous-time model [31]. Consequently, for the purposes of this chapter, it is assumed that the Markov Chain is a countable case/state space of a discrete-time model.

Similar to the modelling of the impact of COVID-19 on the economy of Kenya, this chapter applies Markov Chain model, and henceforth, simplifies the socio-economic statutes of the Ghanaian economy relative to the most relevant five sectors that contributes to the processes of economic growth and development. These noted sectors include agriculture, tourism, building and construction, infrastructure development and manufacturing sectors, respectively [32]. Relatively, the applied probability transition matrix, $p_{x,t}^{ij}$ is presented as:

$$PC_{x,t}^{ij} = \begin{matrix} p_{11} & p_{12} & p_{13} & p_{14} & p_{15} \\ p_{21} & p_{22} & p_{23} & p_{24} & p_{25} \\ p_{31} & p_{32} & p_{33} & p_{34} & p_{35} \\ p_{41} & p_{42} & p_{43} & p_{44} & p_{45} \\ p_{51} & p_{52} & p_{53} & p_{54} & p_{55} \end{matrix} \tag{6.4}$$

$$P_{x,t}^{ij} = \begin{array}{c|ccccc} & s_1 & s_2 & s_3 & s_4 & s_5 \\ \hline s_1 & p_{11} & p_{12} & p_{13} & p_{14} & p_{15} \\ s_2 & p_{21} & p_{22} & p_{23} & p_{24} & p_{25} \\ s_3 & p_{31} & p_{32} & p_{33} & p_{34} & p_{35} \\ s_4 & p_{41} & p_{42} & p_{43} & p_{44} & p_{45} \\ s_5 & p_{51} & p_{52} & p_{53} & p_{54} & p_{55} \end{array}$$

where

S_1 = Poor

S_2 = Lower class

S_3 = Middle class

S_4 = Upper class

S_5 = Wealthy class

Source: [33].

From the applied probability transition matrix, five simultaneous equations are presented:

$$\pi_1 = \pi_1 p_{11} + \pi_2 p_{21} + \pi_2 p_{31} + \pi_2 p_{41} + \pi_2 p_{51} \tag{6.5}$$

$$\pi_2 = \pi_1 p_{21} + \pi_2 p_{22} + \pi_2 p_{23} + \pi_2 p_{24} + \pi_2 p_{25} \tag{6.6}$$

$$\pi_3 = \pi_1 p_{31} + \pi_2 p_{32} + \pi_2 p_{33} + \pi_2 p_{34} + \pi_2 p_{35} \tag{6.7}$$

$$\pi_4 = \pi_1\, p_{41} + \pi_2\, p_{42} + \pi_2\, p_{43} + \pi_2\, p_{44} + \pi_2\, p_{45} \tag{6.8}$$

$$\pi_5 = \pi_1\, p_{51} + \pi_2\, p_{52} + \pi_2\, p_{53} + \pi_2\, p_{54} + \pi_2\, p_{55} \tag{6.9}$$

Source: [33].

The noted values of π_1, π_2, π_3, π_4, π_5, are assumed to be proportional to GDP contributions of these five economic variables/sectors at a given equilibrium in the long run. This is intended to present relevant information on how COVID-19 has impact Ghana's processes of economic growth and development relative to the incidence of poverty and inequality during the time period under review.

Empirical estimates of the effect of epidemics and thus, pandemics for instance, on income inequality and the spread of poverty are investigated, calculated, and analyzed via:

$Gini_{it} = \alpha + \beta EpiPan_{it\text{-}1} + X_{it\text{-}1}\gamma + \delta_i + \mathfrak{E}_t + \mu_{it}$.

where

$Gini_{it}$ = Gini coefficient in country i in year t.

$\beta EpiPan_{it\text{-}1}$ = an indicator for epidemics and/or pandemics in country *i in year t -1*.

$X_{it\text{-}1}$ = vector of control variables of income inequality in country *i in year t -1*.

δ_i = denotes country dummies

$\mathfrak{E}_t$ = represents the full set of time effects

μ_{it} = error term for all omitted factors/variables

$E\ (\mu_{it}) = 0$ for i and t

Source: [34].

Related to the statistical model of the Gini coefficient is the Neoclassical economy model of long-run equilibrium of income within the theory of convergence. As more nations formulate and implement principles underpinning the free market system of economic growth and development, in the long run, incomes will increase and converge. Thus, with shocks like the COVID-19 pandemic, which results in a disequilibrium, there are natural forces that will return the economy back to its equilibrium as humans are rational beings [9, 35]. The neoclassical theory of convergence henceforth implies that in the very long term, the incidence of poverty as experienced under COVID-19, will demise if not eliminated. Among others, the theory assumes that people have full access to information; process information; are rational; people are price takers; capital exhibits a diminishing return; intend to maximize profit and/

or utility (satisfaction); and moreover, technology thus, exhibits constant returns to scale [36–38].

6.3 Research Design and Data Requirements

This section of the chapter presents the research design involving the methodology, method and/or data requirements in attaining the goal of the study. Research design involves the overarching plan for connecting the research problem statement, conceptual framework to the achievable empirical research; it thus, provides the specific direction for observed procedures in the research [39]. In a nutshell, research design advance the type of analysis to be carried out in arriving at a conclusion. It therefore, espouses what data is required, the methodology and methods to be applied in the collection and analysis of the data in meeting and answering the research goal, questions and objectives [40]. Research is considered a careful and thus, a systematic means of solving noted problems and therefore, gaining new knowledge [41]. In addition, the discipline of research is said to be a systematic process of discovering the advancement of human knowledge [42–44].

The chapter adopts and applies a quantitative research methodology/approach with the Discrete-Time Marko Chain model as the main statistical technique or method in the analysis of the COVID-19 pandemic on Ghana's Gross Domestic Product (GDP). Quantitative approach/methodology/strategy involves the collection and analysis of statistical/numerical data in the description, explanation, prediction or control of variables and phenomena of interest (Daniel, 2016). A cardinal philosophy of quantitative methodology is the underlying belief that the world is relatively stable and hence, could be measured as well as infer broad generalizations of sample data [45].

Within the methodology of quantitative research, the chapter adopted and applied Discrete-Time Marko Chain statistical technique in modelling the ramifications of the Coronavirus disease (COVID-19) pandemic on Ghana's Gross Domestic Product (GDP). The discrete-time Marko chain (DTMC) involves the sequence of random variables, known as a stochastic process. The value of the next variable, therefore, depends on the value of the current variable and not variables in the past [46].

The required datasets are obtained from the Ghana Ministry of Finance (https://mofep.gov.gh), Ghana Statistical Service (https://www.statsghana.gov.gh), Ghana Ministry of Health (https://ghs.gov.gh), World Health Organization (https://www.who.int), the World development indicators from the World Bank (https://databank.worldbank.org/source/world-development-indicators), and Statista (https://statistia.com) respectively.

The chapter employed Excel Xlstat version 2023 via the application of the Discreet-Time Make Chain model relative to the five variables/sectors and their impact on the Ghanaian economy.

6.4 Results and Analysis

The purpose of this section of the chapter is to present and analyze the data relative to an investigation of the impact of the COVID-19 pandemic on the incidence of poverty, economic growth, and development. Specifically, the chapter investigates the impact of the COVID-19 pandemic on the top five key sectors (agriculture, tourism, building and construction, infrastructure, and manufacturing) of the Ghanaian economy: research into the proportion of their contributions to GDP at a steady state. The implications of the COVID-19 pandemic have had an adverse impact on the incidence of poverty, in all economic sectors of Ghana as a case study of the processes of economic growth and development. The economic sectors contribution to GDP in Ghana is summarized and presented in Table 6.1.

Table 6.1 confirms the observation in other studies that agriculture continues to play a major role in Ghana's economy. It's the most single employer in the country. The share of households involved in and/or moving into the agricultural sector has increased since the start of the pandemic. Before the outbreak of the COVID-19 pandemic, 76% of households were directly involved in the agricultural sector either as crop or livestock farmers. However, this figure has increased to 84%. Similar observations have been made in Malawi and Uganda respectively. The former recorded 91% and the latter, recorded 79% of households are involved in the agricultural sector as compared to the pre-pandemic levels of 84 and 76% respectively [15].

The weighted index per GDP contribution of each of the noted five sectors based on the equation:

$\sum_{i=1}^{n} \pi_i$ is presented in Table 6.2.

Henceforth, the vector of the economy under review is written and presented as a vector:

$$\Pi = (\pi_1, \pi_2, \pi_3, \pi_4, \pi_5)$$

$$= (0.33, 0.01, 0.24, 0.24, 0.17)$$

Table 6.1 Economic sector variable proportion to GDP in Ghana

Economic sector	Percentage (%) contribution to GDP
Agriculture $= X_1$	22.1
Tourism $= X_2$	6.2
Building and Construction $= X_3$	15
Infrastructure Development $= X_4$	15
Manufacturing $= X_5$	10.7

Source Author's construction, (2022)

Table 6.2 Weight index per GDP contribution

Economic sector	Weighted index
Agriculture $= X_1$	0.33
Tourism $= X_2$	0.01
Building and Construction $= X_3$	0.24
Infrastructure Development $= X_4$	0.24
Manufacturing $= X_5$	0.17

Source Author's construction, (2022)

The model and analysis indicators that the proportion of tourism (X_2) to GDP has reduced remarkably as compared to the other sectors of the economy as a result of the COVID-19 pandemic. Spatially, this is observed in Ghana's major cities and, along the country's coastlines where ancient and historical forts are located. As the cities serve as magnets for immigration from the hinterlands and overseas, the lockdown reversed in-bond travel as airport and transport terminals were restricted. As the number of tourists visiting the country dwindled, the number of restaurants and associated workers drastically reduced. Similarly, the manufacturing sector suffered as imports from overseas serving as inputs reduced due to distortion in global shipping lines. The average Gini index for sub-Saharan Africa is one of the highest in the world. However, economic reforms and high commodity prices before COVID-19 led to a significant reduction in inequalities in education and health [47]. Between 1991 and 2011, the region recorded a Gini index in the range of 0.40 to 0.529 [48]. Due to the pandemic, poverty level increased to 54.3% and living standards fell by 61.4% respectively [8].

As noted in the preceding pages, by July 2020, over 400,000 businessmen and women had lost their businesses; 42,000 small traders, daily workers and wage-laborers lost their jobs [21]. Furthermore, the slowdown in the manufacturing sector has led to a downward trend in Ghana's economic growth from 5.8 to 1.5%. The impact of the COVID-19 pandemic led to a wide gap in the official fiscal deficit to 11.7% of GDP thus, driving up the public debt to 76% of GDP; interest expenditure further increased to 44.6% of total revenue. Henceforth, at the end of the 2020 fiscal year, the government embarked on an urgent fiscal consolidation agenda from 2021 onwards [22].

6.5 Conclusions and Policy Implications

It is important to note that COVID-19 had an adverse effect on the Gross Domestic Product of Ghana. It negatively affected all noted sectors of the economy and thus, increased the incidence of poverty particularly, within the southern urban centers of the country. Apart from a reduced growth rate in tourism including the arts and entertainment, the manufacturing sector suffered a reduced contribution to the country's

GDP. As income levels fell among the general population, those in the urban centers recorded a sharp decline in their respective incomes and as such, increased the levels of poverty and inequality due to the COVID-19 pandemic. Policies including free water supply and reduced rate of the price of electricity consumed by individual households, instituted during the lockdown period mitigated against the adverse effect of the COVID-19 pandemic. However, the economy as a whole suffered high levels of debt due to reduced productivity as the government continued to pay workers who had to stay home during the period of lockdown and labour restrictions across the length and breadth of the country.

The research in this chapter has shown that there is a need for the government to reduce its fiscal and monetary expansionary policies under the IMF programme in order to reverse the slowdown in the economy. Notwithstanding the short-comings of the theory of convergence, the intention is to put the economy back on a path of sustained growth and development as espoused by the neoclassical economists. Henceforth, in the long-run, it is hoped the economic policies and reforms to be supported by the three-year arrangement under the Extended Credit Facility (ECF) by the International Monetary Fund as part of the Post-COVID-19 recovery measures, will reduce the incidence of poverty and income inequality.

6.6 Limitations of the Study

The novel coronavirus is noted to be part of a general series of infectious diseases worldwide that includes i. Avian influenza ii. Ebola iii. Middle East respiratory syndrome coronavirus and iv. Influenza A [34]. However, this chapter focused on COVID-19 and its impact on the economy of Ghana especially, as it relates to the incidence of poverty and inequality during the period under review. As such, there are two basic limitations of the study that are noteworthy. The first is due to data constraints [11]; obtaining data for testing the intensity of the relationship between COVID-19 and its impact on the economy is very difficult. The data is spread in many domains and the chapter therefore, had to collate such data with its many different forms of measurement into one standard format to enable modelling and thus, statistical analysis. The second most important constraint stems from the short—time span to undertake such an investigation and analysis. The standard decade of panel data sets wasn't available henceforth, this could have affected the power and intensity of generalizations as is expected of such a study.

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