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Taxing in a Pandemic: An Assessment of the Impact of Covid-19 Pandemic on Tax Revenues and Revenues of Small and Medium Enterprises in Ghana.

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Abstract

This study assessed the impacts of the COVID-19 pandemic on tax revenues and small and medium enterprise (SME) revenues in Ghana using qualitative and quantitative analysis. These impacts were analyzed using autoregressive tax regressions, buoyancy, and tax elasticity formulas. A simple radon sampling was used to select 350 SMEs in Ghana's five major cities. Findings set out point to "demand" as a critical factor influencing SMEs' sales and revenue with a rating of 5.3, a p-value less than the significance level of 0.05, and a deviation of 0.864, indicating the extent of the impact on tax revenue and sales of small and medium enterprises during a pandemic. In addition, a coefficient based on the ORL model application shows a value of 0.9565 in support of the econometric model used. The study also finds that tax revenue could drop by 8% and VAT revenue could drop by 1% or more. A tax buoyancy of 0.1% or 100% in forecasting tax revenue could be observed depending on the severity and impact of the pandemic. The findings show that tax revenue in a pandemic is adversely impacted, which requires logical and coordinated approaches to improve tax compliance.

Keywords: Covid-19, SMEs, Pandemic, Tax Revenues, Ghana, SME Revenues

INTRODUCTION

The accompanying economic and financial challenges emanating from the COVID-19 global pandemic have compounded the responsibilities of many governments, and this has necessitated the need for them to source funds to aid in the provision of basic amenities.

According to the OECD [1], the impact of the COVID-19 pandemic on national and sub-national tax revenue in the initial phase was minimal. However, it confirms that some studies found that, at the peak phase of the pandemic, some countries began to record tax increases in the second half of 2020 and early 2021. Some of these studies found that tax increases were due to never-to-be-repeated measures and intended not to be permanent. Some of the tax increases represent the continuation of already existing trends, such as increases in fuel excise duties as reported by many countries.

On the contrary, some of the tax increases appear to be a departure from pre-crisis trends due to the rise in income earners (personal income tax), as reported by other countries [1]. In addition, some research suggests that the financial and economic challenges accompanying COVID-19 also affect different tax types. Therefore, there is a need to consider this before coming up with measures to mitigate the consequences of the crisis. Corporate income tax (CIT) proceeds are a typical example because they are primarily reactive to economic sequences and are more likely to fall by a fall or more in economic activity. Further, a sharp decline in wages and employment, typical of the pandemic, is expected to translate into lower personal income tax (PIT) proceeds and lower social security contributions.

Additionally, proceeds from consumption taxes, such as the value-added tax (VAT), are believed to have fallen due to the impact of lockdowns, and lower consumer confidence, as well as the potential alteration toward the consumption of staple goods that tend, are taxed at lower or zero rates [2]. However, as pandemic containment measures such as lockdowns began to ease following the first wave of the pandemic, most economies began implementing economic recoveries tax measures such as corporate tax incentives aimed at boosting investment and the SMEs sector, as well as reduced VAT rates to support other sectors most affected by the pandemic. These inducement measures continue other relief measures introduced by most governments [3].

Governments took various measures to support the citizens and SMEs, to alleviate the challenges SMEs faced during the COVID-19 pandemic. Commonest among them were exemptions or cancellations of tax payments, deferment of tax payments, tax rate reductions, extensions of filing deadlines, an expedition of refunds, waiver of interest payments, and late payment penalties. However, while most of these policies and tax measures were essential to all sizes of businesses, others explicitly targeted SMEs which had the potential to relieve them of short-term liquidity problems and compliance encumbrances considerably. As a result, most companies worldwide will become financially distressed due to COVID-19. In addition, the impact of the pandemic on SMEs believed to be fragile and lacking adequate funds to sustain business operations is particularly hard-hit. Available data show that nearly 58% of SMEs reported a reduction in sales, with over half (51%) reporting a sharp decline of more than 50%, and many could not survive [4]. SMEs play a crucial role in the global economy, particularly in developing economies, where they account for over 90% of businesses, with most having less than 300 employees, a majority classified as micro-firms, and at most ten employees [5]. This evidence creates the pandemic's impact on tax revenue directly from the revenue flow hard hit by the pandemic.

Tax evasion is a significant challenge to revenue mobilisation to support development in most developing economies, such as Ghana. Most taxpayers in developing economies, particularly SMEs, wilfully fail to meet their tax obligations by misrepresenting data relating to assessing their tax liability or other means. Taxpayers commit such offences to evade taxes or reduce tax liability [5]. Although some tax collection agencies have recently reported gains in tax revenue mobilisation, the revenue gains recorded from taxes need to be revised to support governments' annual budgets [6]. This statement is true if one considers the pandemic's impact on national economies. Tax experts have attempted to establish why individuals may want to evade tax. However, the motive behind tax evasion by SMEs, individuals or organisations varies depending on the tax administration lapses, political and socio-economic factors, and other conditions that favour taxpayers or serve as bottlenecks to taxpayers that discourage them from honouring their tax obligation [7,8].

Frequently, there appears to be a characteristic stiffness between the government and taxpayers regarding taxation. Even though citizens should be prepared and ready to pay taxes, citizens often desire a free rider's approach and try to avoid taxation as much as possible. A key observation about taxation is that it is gradually becoming more common the influence trust and social capital generally play in the performance of tax an economy [9,10]. Before the outbreak of the COVID-19 pandemic, scholars such as Feige [11], a neo-institutionalist, accentuated the significance of the relationship between informal institutions such as cultural norms, trust, behaviour, and formal institutions like laws and regulations plays in taxation. Further, Feige [11] hypothesised that more tax evasion is likely to be observed when the two institutions encounter each other. Therefore, the authors believe that during the global pandemic (COVID-19) outbreak, both informal and formal characteristics would influence SMEs' tax compliance.

Furthermore, research has shown that taxation creates an implicit contract of exchange between the citizens and the government: where the government must provide goods and services to citizens in exchange for their support through payment of taxes [12]. This description further creates a situation where taxation may play a negative part if governments tried to maximise the support of citizens during a pandemic but failed to provide the expected goods and services in the past. More importantly, the need for a well-active institution of tax inquiry is indispensable for exposing and punishing matters relating to tax fraud.

Furthermore, a practical legal framework is essential for any enforcement activity to guarantee tax compliance. Also, the nature and magnitude of adverse consequences after tax evasion have a legal framework within which tax administration operates, which is crucial in ensuring tax compliance. The lack of adequate capacities in tax administrations could aid a reduction in the probability of detection of tax evasion and, again, influence the decision of a taxpayer to evade tax or not. Above all, the full enforcement of tax laws could lead to efficiency in tax administration and reduce tax evasion [13]. This study posits that taxation in a pandemic would require a tactical approach to enforcing tax laws backed by a review of the legal framework to help determine the appropriate sanction a tax evader will face.

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THE PROBLEM STATEMENT

The COVID-19 pandemic has caused an economic recession that has taken its toll on most business sectors. Most governments in developing economies, such as Ghana and Nigeria, temporarily reduced income tax rates, cut indirect taxes, and extended the deadline for filing tax returns to ease the tax burden during the pandemic. Furthermore, certain tax types were temporarily eliminated (VAT and import duties on pharmaceutical products and equipment, and food waived for the treatment and containment of COVID-19 [14]. A study by the IMF [14] shows that predicting tax revenue in a pandemic such as the current COVID-19 is thought-provoking. However, it is also important to note that the traditional methodologies for estimating based on simple tax buoyancy or macro elasticities are more likely to lead to an underestimation of the revenue decline.

Additionally, the present economic and financial crisis caused by the COVID-19 pandemic is highly disproportionate across sectors. Therefore, depending on the business size, more credible results could be obtained if revenue estimates were scaled down to reflect the type of tax and sector and used available sector-specific data. Another challenge is the need to continually update predictions as new information about the pandemic and containment measures becomes available. In addition, as economies progressively open again and attempt to abolish COVID-19 regulations, revenue authorities are regressing to the pre-pandemic tax system and, in some cases, introducing new taxes.

In Ghana, there is an increase in fuel taxation to cater to the new COVID-19 health recovery fund. In addition, there is a swift movement over to digital platforms by revenue authorities to step up their efforts to simplify tax payment procedures. Also, domestic taxpayers in Ghana have, since mid-2021, had to pay their taxes through the tax authority's online payment platform or at one of several selected banks. In the case of Nigeria, tax authorities are encouraging taxpayers to use electronic media to file their returns. The challenge here is that even if governments succeed in restoring revenue to the pre-COVID level by applying these strategies, the government will still be under pressure to increase revenue collection to develop a tax system that will withstand future pandemic shocks and support the development agenda [15]. It is a common practice to forecast revenue by applying an aggregate tax buoyancy to GDP, a method accepted to be reasonably reliable. Greene (2014) defines this as the percentage change in total tax revenue caused by a one per cent change in GDP. However, this method is likely to overestimate the recovery pandemic.

Further, the buoyancy that shows both structural features of the tax system and policy measures taken over a cycle needs to be considered appropriate in exceptional times, such as the COVID-19 pandemic. Therefore, making tax projections based on such a relationship can led to upward and biased revenue forecasts [14, 15]. It is critical to note in this study that a significant challenge associated with taxation in a pandemic is that businesses of various sizes are exposed differently, and the experiences of large taxpayers are impacted significantly in a pandemic. As a result, many countries are taking extraordinary tax policy and administration measures in response to the COVID-19 crisis to ensure that government revenue flow continues uninterrupted. Also, these measures come at a cost that must need considering when forecasting revenue flow using tax buoyancy [1].

Studies have shown that small businesses are unlikely to diversify into a different sector. On the other hand, a firm's size elasticity estimate is less relevant than sector-specific estimates, but it does provide essential clues over aggregate forecasts in most economies; a few large taxpayers dominate tax revenue, and arrangements with them can provide timely and more reliable information. However, the impact of the pandemic differs across tax bases, which poses a significant challenge that requires forecasting all central taxes separately in a pandemic. Additionally, tax revenue varies cyclically, as in the case of profit-based taxes such as corporate income, which are more volatile than consumption and property-based taxes. This difference is typically more considerable and different in this pandemic, where consumption tax revenue that is ordinarily stable is strongly affected by social distancing measures. Some tax bases, such as import and export taxes and recreational and tourism taxes, may even collapse during a pandemic [16].

Further, the social and economic impact of the COVID-19 pandemic on tax revenue is widespread throughout the world, mainly in Africa. Most governments in Africa invested in public goods to scale up their social assistance programs to protect businesses and people during the pandemic; nonetheless, a decline in revenue mobilisation has made it difficult for governments to do this effectively (OECD, 2020). Additionally, empirical research has shown that, until the outbreak of COVID-19, tax revenues had grown progressively over the years at an average of about thirteen per cent (13%) annually. Sadly, most sub-Saharan African countries recorded negative tax revenue growth in 2020. This decline has had a significant impact not only on tax revenues (direct and indirect taxes). The study thus assesses the effects of Covid-19 on tax revenues and SMEs' revenue during a pandemic, and the lessons tax policy formulators, analysts, researchers, and administrators could learn from it.

RELATED LITERATURE

The global economy continues to experience phases of economic decline, which have caused a financial crisis because of the COVID-19 pandemic. The COVID-19 virus believed to have first appeared in Wuhan, China, in December 2019, became a global pandemic that affected the social and economic aspects of all countries where it was present. At the early stage of the pandemic's spread, affected countries mobilised revenue through fiscal and monetary policies to alleviate the impact of the pandemic on the economic decline. The first effect of the pandemic was the closure of business activities, which had a substantial negative impact on businesses (SMEs) and employees' incomes. The adverse effect of the pandemic ranges from households, individuals, and businesses up to the national level. The adverse effects of the pandemic resulted in governments coming up with fiscal policies and financing programs aimed at supporting affected companies and employees. However, the quick spread of the COVID-19 pandemic negatively affected many vital macroeconomic and microeconomic indicators [19]. In response to addressing the socio-economic impact of the COVID-19 pandemic, there was an increased need for the tax authorities to take responsive measures to alleviate the economic situation of employees and businesses through taxation: among such efforts was the approval of about 10% of the gross domestic product fiscal package used by governments in most countries [19]. The impact of the pandemic on businesses worldwide has taken a different direction, causing a decrease in business activities, customers, and suppliers. The pandemic has limited the total capacity of production and service provision within the sectors, causing the aggregate supply to suffer the same declining position. Although consumers may have had some

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interest in consuming certain goods and services during the pandemic, restrictions on movement, insecurity, and declining revenues as a result of the situation created by the pandemic caused a decrease in purchasing power.

Furthermore, restrictions on movements and some economic activity during the pandemic's peak resulted in declining demand and decreased revenues during the COVID-19 pandemic. It also resulted in lower incomes for most SMEs and, as a result, lower tax liabilities compared to regular business periods [20,18]. The situation above clearly shows the impacts of the COVID-19 pandemic on revenue from businesses and individual incomes and the direct effect on tax revenue.

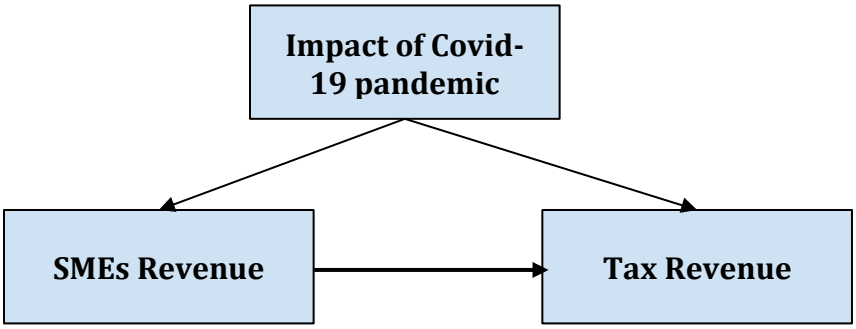
Governments across the globe do consider tax revenues as the primary source of government revenue. As a result, a reliable tax revenue forecast is critical in the government's budget process [21]. As governments experience sharp declines in tax revenues during the pandemic, Eun-Joo [22], observed the forecasting of the pandemic's impact on government revenues has become the highest priority for governments worldwide, particularly in Africa. It is a bare fact that COVID-19 affected economies and businesses, so tax authorities in most economies during the pandemic quickly responded by changing how they operate. A common observation is that one of the critical measures employed by tax authorities is the quick introduction of more digital services to protect the health of both taxpayers and the employees of tax authorities. Also, governments in most countries took further measures by approving fiscal packages valued at about 10% of the gross domestic product [23]. The pandemic's revenue challenges have been stated further against other business classes. Globally, tax authorities confront situations where unregistered and registered businesses need to declare the correct income when declaring to the tax authority. For instance, a study by Colin et al. [24] revealed that most unregistered businesses, self-employed individuals and smaller businesses, could not access the financial package that most governments provided because they either had no idea or were not known to tax authorities. As a result, these businesses could not access government financial packages during the pandemic. A further observation is that registered businesses that do not correctly declare all their transactions and revenue will be able to access support following their declared stated level and the number of employees they present to tax authorities.

Further, the COVID-19 pandemic has decreased business turnover and employee redundancies, leading to job losses. In addition, the decline in liquidity has pushed most businesses to finance expenditures and liabilities through bank loans. Consequently, the reduction in business turnover and job losses has caused tax revenues to register a negative trend compared to previous periods [25].

The COVID-19 pandemic has made taxation challenging, as observed by most studies [26]. According to the IMF [27], the pandemic has challenged forecasting tax revenue. The traditional approaches to forecasting tax revenue based on simple tax buoyancy or macro elasticities will likely lead to an underrepresentation of the revenue decline: this is because the current economic shock caused by the pandemic is exceedingly irregular across sectors of the economy and business forms. As a result, more probable results are possible if revenue forecasts on tax type, sector, and use of sector-specific information are available. Also, a study by Guo and Chen

[21] on the accuracy of tax revenue forecasts at the state level in the US showed that a combination of qualitative and quantitative forecasting methods leads to better approximations of tax revenues. On the other hand, their study revealed that using very complex systematic forecasting methods only sometimes leads to greater accuracy.

It is important to note that the technical hitches in forecasting tax revenues emanate from various sources: thoughtfulness of the tax structure, limited econometric tools, and challenges with data, as in the case of most developing economies to assess the impact of recessions [28]. More importantly, estimating government revenue during a pandemic is challenging and critical: the forecast uncertainty is inevitable, judging from the level of unknowns during and after the pandemic, the length of containment measures, and the ambiguity in the predictions of vital economic variables. In forecasting revenue, tax administrators and the government make complete and unswerving use of assumptions about the impact of the pandemic and economic growth and desist from adding needless prejudices or relying on foreseeably unsuitable methods [27]. Despite all these challenges, the authors of this study believe that taxation and the forecasting of tax revenue are central to containing the pandemic, protecting, and promoting SMEs, economic development, budget planning, and fiscal policy reforms. In light of these observations, this study could help close the knowledge gap and add to the few existing works on taxation during a pandemic and its countermeasures to boost tax revenue and business growth. The conceptual framework below presents the relations and associations between the dependent and independent variables (Covid-19) and the dependent variables (tax revenue and SMEs' revenue). Figure 1 below presents the conceptual framework of this study.



Source: This study, 2022

Figure1. A conceptual framework Covid-19 on SMEs and tax revenue.

METHODOLOGY

This study assesses the COVID-19 pandemic impacts on government tax and small and medium enterprises (SMEs) revenues. The study uses Ghana's economy and Ghanaian SMEs as a case study to analyse the economic predicament caused by the COVID-19 pandemic to SMEs and tax revenue use. It uses a more complex forecasting model for data analysis, such as autoregressive regressions. We used a simple random sampling to select 350 SMEs operating in five major cities in Ghana: Accra, Kumasi, Koforidua, Cape Coast, and Tamale [29]. This model uses past economic indicators and events to predict future trends. It is important to note that the current financial crisis caused by the COVID-19 pandemic is likely to be something the world's economy has never experienced. Therefore, comparing the impact of Covid-19 and an economic recession caused by a regular economic downturn cycle or a natural disaster with a relatively

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short duration, its long time does not fit well with the current ongoing financial crisis. Judging from these facts, a simple time-trend regression model appears more appropriate in the current situation [17]. Accordingly, this study uses the prediction method, where the collected data is analysed to predict the impact of COVID-19 on SMEs and tax revenues. We used a simple radon sampling to select 350 SMEs operating in five major cities in Ghana: Accra, Kumasi, Koforidua, Cape Coast, and Tamale [29]. The Ghana Revenue Authority provided the data in the above five cities in Ghana.

DISCUSSION AND ANALYSIS OF COVID-19 IMPACT ON SMES REVENUE.

The primary source of SME revenue data was generated through questionnaires administered to 350 SME businesses; however, only 300 out of the 350 respondents returned their responses. The questionnaires were administered face-to-face, via email, WhatsApp, mobile text messages, and direct phone calls. In addition, interviews were carried out with different business categories given by the National Board for Small-Scale Industries (NBSSI) in Ghana [32]. Businesses may be categorised differently based on their gross turnover, fixed assets, number of employees, and others. However, this study used categorisation based on the number of employees, fixed assets, and gross annual turnover based on the categorisation of the National Board for Small Scale Industries (NBSSI) and the Ghana Enterprises Agency (GEA) Act 2020, Act 1043 [31], as shown in Table 1 below.

Table I. Businesses Categorization

Categories Enterprises	**Number of Employees**	**Fixed Assets Value US$**	**Annual Turnover US$**
Micro	1-5	≤ 10,000	≤ 11000
Small	6-29	> 10,000, 100,000	1,100,000 up to
Medium	30-99	100,000≥	1,110,000> ≤5,500,000

Source: This study, using data from GEA

Table 2 below shows the total number of participants, the number of questionnaires administered, and the number of responses received.

Table II. Questionnaires Responses Received and Number of Participants

Questionnaires Processing Summary						
	No. of Responses Received		No. of Responses not Received		Total	
	N	Per cent	N	Per cent	N	Per cent
	300	85.7%	50	14.3%	350	100%

Source: This study

Table 3 below also shows the category of participants who provided the responses received based on the classification of businesses.

Table III. Category of Participants and Responses Received

Categories Enterprises	**Number of participants**	**Valid Percentage responses %**	**Cumulative Valid percentage responses %**
Micro	120	40	40
Small	100	33	73
Medium	80	27	100
Total	**300**	**100**	

Source: This research

The questionnaire was divided into two parts: testing which factors significantly contribute to SMEs' revenue and how the COVID-19 pandemic affected sales and revenue. The literature reviewed showed that business solvency, demand, and supply were the key factors influencing most businesses' income tax revenue during the COVID-19 pandemic [15]. Using a Likert scale, SME owners were asked SME to indicate the extent to which they agree that these factors-solvency, demand, and supply were affected and led to a decrease in revenue. The questions were formulated with multiple answers in five categories: 1 (not at all), 2 (not sure), 3 (less), 4 (high), and 5 (very high). Data were analysed using SPSS software and the ORL model to help test the hypotheses and explore how the independent variables impact the dependent variable of this research's chosen model. Data was collected from SMEs to reaffirm the factors that affect their revenues and to assess the effect of COVID-19 on their business activity, which has also affected their ability and willingness to pay taxes. Against this background, a hypothesis was raised, assuming a substantial linkage between consumer demand and business turnover.

Testing the hypothesis, the ORL model is used to independently assess the impact of each independent variable on the dependent variable and to determine the most significant factor. The results from the analysis will be presented through quantitative and qualitative assessments and in tabular form. In addition, a hierarchical regressive econometric model is used in the formula below:

$SMEsR = \beta_0 + \beta_{1z1} + \beta_{1z2} + \beta_{1z3} + \sigma$
SMEsR = SMEs Revenue

Where the dependent variable is SMEs revenue, β0 represents the constant which indicates the value of SMEsR if all of the other factors remain constant (this may not make much economic case). For example, Z_1 – is the demand for goods and services; Z_2 - represents the supply of goods meant for sales; and Z_3 – is an indication of SMEs' solvency, thus the ability to meet immediate financial obligations such as taxes, rent, supplies, salaries, etc.; and σ – likelihoods. Table 4 below shows the impact of independent variables on the dependent variable.

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Table IV. Impact of Independent Variables on the Dependent Variable

SMEs Revenue Factors	Median	Mean	Variance	St. Deviation	Observation
Solvency	4.8	5	1.722	1.355	300
Demand	5.3	5	0.7822	0.864	300
Supply	4.2	4	1.230	1.203	300

Source: This research

Table 4 above shows the descriptive statistics of the data collected. Clearly, the variables describe the major trend and primary deviation from the factor "Demand" the majority of respondents have a rating of 5.3, an indication of the impact of demand on their revenue/sales. On the other hand, a deviation of 0.864 evaluation points was observed on the variable. In addition, table 5 presents the results of the hypothesis test.

Table V. Hypothesis Test

SMEs Revenue Factors	Coefficient	St. Error	t value	df	p-value	95% Confidence level	
						Upper	Lower
Solvency	0.7544	0.1987	2.98	278	0.0721	6.7885	0.8455
Demand	0.9565	0.158	1.278	278	0.0458	3.2324	3.2322

The SMEs' revenue had high coefficients from the above-projected factors s' revenue had high coefficients based on the ORL model application. Also, demand for goods had the highest indication value of 0.9565, indicating that this dependent variable best elucidates the applied econometric model in this study. This means that the factor with the highest impact on SMEs' revenue is demand, followed by the supply of goods and services for sale or production, and then solvency—the ability to pay taxes and other financial obligations. Further, the literature reviewed, and data collected revealed that the COVID-19 pandemic in many countries, particularly Ghana, caused consumers to cut down on the consumption of goods, which caused elasticity of demand as a result of some containment measures in place by the government. This directly reflects the decrease in SME revenue, which also caused a reduction in the supply of goods. A consequential result of this situation is that SMEs will end up paying less or no taxes to the revenue authorities due to low turnover. In addition, low revenue for SMEs means lower tax liabilities. Furthermore, judging from a statistical perspective, the results of this study showed that the most critical variable is the demand for goods because it had a p-value value lower than the significance level of = 0.05 in each of the tests with a 95% confidence level.

ANALYSIS AND DISCUSSIONS OF COVID-19 IMPACT ON GOVERNMENT TAX REVENUE

According to Guo and Chen [21], using qualitative and quantitative methods to analyse tax data leads to more excellent tax revenue estimation and assessment accuracy. This came to light in their study on measuring the accuracy of tax revenue forecasts at the state level in the USA. This study adopted these approaches because a further analysis by Guo and Chen (2021) revealed that using extremely complex analytical methods for tax analysis does not automatically result in greater accuracy. Additionally, Hannon et al. [32] believe that conducting a thorough review

of the processes and assumptions used in taxation would improve the forecasts rather than spending all the energy trying to improve revenue forecasts from previous years or other essential indicators. There are many critical studies in the literature on budgetary and fiscal forecasting. However, there needs to be more agreement on which tax revenue assessment methods give the best forecast results. Some scholars favour using simple econometric methods, while others prefer using a more complex model or auto techniques [33, 34]. An attempt to find a suitable tool to analyse the COVID-19 impact on government revenue revealed another need for more agreement among scholars on the best method to forecast tax revenue during the pandemic. A study by IMF [27] on challenges in forecasting tax revenue revealed that "forecasting tax revenue during the current COVID-19 pandemic is a challenging task." The study further revealed that "traditional approaches to forecasting, based on simple tax buoyancy or macro elasticities, will likely lead to an underestimation of the revenue decline." On the other hand, the World Bank affirms the use of buoyancy or macro elasticities to forecast tax revenue and recommends the use of a GDP Base Estimate Model for predicting aggregate tax revenues as a function (dependent variable) of tax bases (independent variable). This method further estimates revenues by considering the aggregate tax base and using regression analysis to forecast future revenues.

The buoyancy is expressed as:
Change in Tax Revenue ---- $\%\Delta T = (T_1 - T_0)/T_0$
T_o = Tax Revenue from the previous year
T_1 = Tax Revenue in the current year.
Change in tax rate ----- $\%\Delta Y = (Y_1 - Y_0)/Y_0$
Y_0 = Tax Revenue in the previous year
Y_1 = Tax Rate in the current year.

To calculate tax elasticity as the ratio of percentage change in tax revenue, not considering any flexible changes in tax rate or tax base, to the percentage change in GDP is expressed as Tax Elasticity = $\%\Delta T^1/\%\Delta Y$.

Data collected revealed that the Ghana government took many tax measures to lessen the impact of the COVID-19 pandemic on government tax revenue. This includes a waiver of VAT on donations of goods and equipment for alleviating the COVID-19 pandemic impact, a release of taxes on selected withdrawals from pension funds, allowing for remote filing by businesses and institutions via email and a direct transfer payment system to the various Ghana Revenue Authority (GRA) offices and allowing deductions against income tax for private sector contributions and donations made towards addressing the pandemic, waiving penalties on principal tax liabilities owed by taxpayers who redeem their outstanding liabilities by June 30, 2020, and granting an extension of the due date for filing tax returns from the standard four months to six months. The consequential impacts of COVID-19 on Ghana's government tax revenue are shown in Table 6 of tax collections over three years.

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Table VI: Ghana's Government Tax Revenue on Domestic Goods and Services

Indicators	Year		% Change	Year		% Change	Year		% Change
	2018	2019		2019	2020		2020	2021	
Tax Revenue	15,030.38	17,151.66	12%	17,151.66	17,792.09	4%	17,792.09	24,733.52	28%
VAT Revenue	8,892.69	9,330.10	5%	9,330.10	9,207.49	-1%	9,207.49	12,480.08	26%
Average Tax Rate	24.6%	24.6%	0%	24.6%	24.6	0%	24.6%	24.6%	0%
Tax to GDP Ration	13.7%	13%	-5%	13%	13.4$	3%	13.4%	12.5%	-7%
GDP	67.3	68.34	2%	68.34	The 70.04	2%	70.04	77.59	10%

Source: This study's data. Retrieve from Bank of Ghana economic Table of Government presents. 2022. Revenues are in US$ millions and GDP in US billion

Table 6 above represents data on all five key indicators for measuring the Covid-19 impact on taxation in a pandemic - Tax presents VAT Revenue, Average Tax Rate, and Tax to GDP Ratio. Figure 1 below presents the s graphical summarisation of data collected on all five indicators for measuring the Covid-19 impact on taxation during a pandemic.

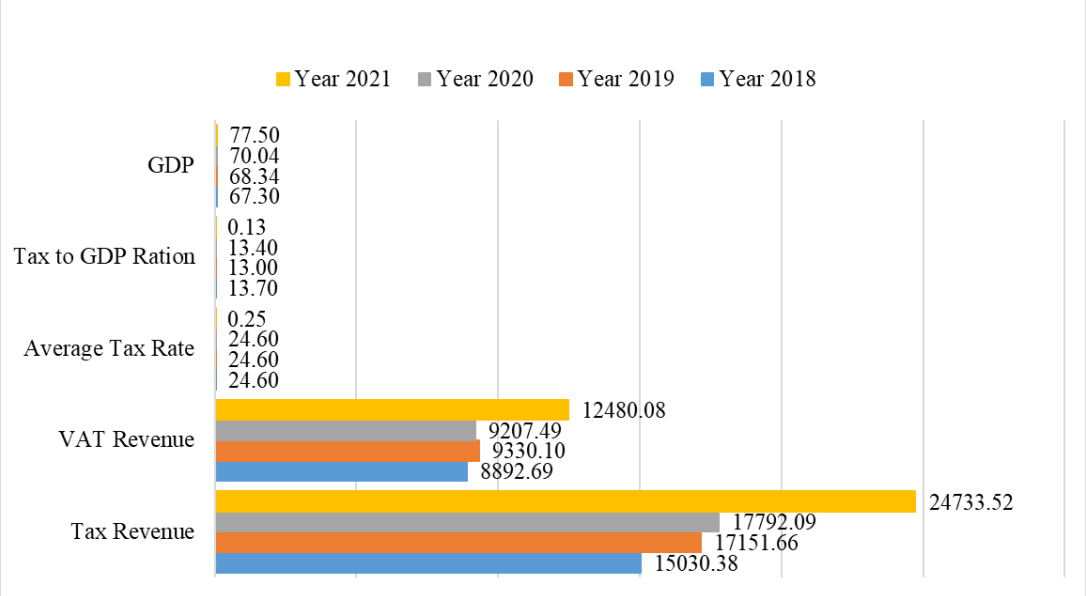


Figure I. Summarization of Taxation Indicators Values of Years Under-review

From the above figure, the indicators registered a marginal increase in values which, if not analysed further, could lead to an error in the analysis of the Covid-19 impact on taxation. Table 7 below summarises the changes in the values of the indicators on a year-to-year basis.

Table VII. Changes in Values of Indicators on a Year-to-Year Basis.

Indicators	2018-2019	2019-2020	2020-2021
Tax Revenue	12%	4%	28%
VAT Revenue	5%	-1%	26%
Average Tax Rate	0%	0%	0%
Tax to GDP Ration	-5%	3%	-7%
GDP	2%	2%	10%

Table 7 above revealed that tax revenue recorded a 12% increase in 2019 compared to 2018. However, only 4% of the tax revenue increase recorded in 2019 was realised in 2020, when the COVID-19 pandemic peaked in Ghana, indicating COVID-19's impact on taxation. The results for 2020 further indicate a decrease of 8% (12%–4%) in projected tax revenue growth. Comparatively, Ghana's tax revenue growth doubled after the pandemic in 2021, registering a 24% tax revenue growth against 12% in 2019 and 4% in 2020, respectively. Furthermore, VAT revenue increased by 5% in 2019. Unfortunately, during the pandemic, there was a -1% VAT revenue in 2020. However, VAT saw a sharp 26% increase in revenue collected. On the other hand, the average tax rate has since not increased, registering a 0% change. Further, the tax-to-GDP ratio in 2019 was -5% compared to 2018. However, a 3% tax-to-GDP ratio was recorded in the pandemic year of 2020. This could be attributed to the closure of borders and restrictions on importation, which led to mass local production and consumption of local produce in Ghana. Interestingly, this trend could not be maintained, as a -7% GDP ratio was recorded in 2021.

Analysis of the buoyancy of tax revenue in 2019 and 2020:
To = Tax Revenue in Year 2019 = $ 17,151.66 million
T1 = Tax Revenue in Year 2020 = $17,792.09 million
Y0 = GDP in Year 2019 = $68340 million
Y1 = GDP in Year 2020 = $70040 million

$\%\Delta T = (17792.09 - 17151.66)/17151.66 = 4\%$
$\%\Delta Y = (70040 - 68340)/68340 = 2\%$. Therefore, tax buoyance = 0.1%. This means that during a pandemic, an increase in severity/impact of the pandemic could trigger a 0.1% (100%) buoyancy in tax revenue for the recast. Tax Elasticity = $\%\Delta T^1/\%\Delta Y$ === (4-0.1)/2 = 1.95%. Also, a 1.95% or 195% tax elasticity is recorded, indicating that in a pandemic such as the Covid-19, tax revenue could experience a 195% elasticity.

CONCLUSIONS AND RECOMMENDATIONS

This study shows that reliable tax revenue is difficult to forecast during a pandemic. The descriptive analysis and variables described in this study have a rating of 5.3 and a deviation of 0.864; evaluation indicates the extent of demand impact during a pandemic. In addition, based on the ORL model application, demand for goods had the highest indication value of 0.9565, indicating that the dependent variable best elucidates the applied econometric model in this study. These observations directly reflect the decrease in SME revenue, and lower tax revenues due to low turnover, as supported in other studies such as [25, 27]. Furthermore, statistically, the results of this study show that the essential variable is demand for goods, as it had a p-value value less than the significance level of equals t 0.05 in each test: implying that the hypothesis

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raised with a 95% confidence level is accepted, that is, that demand for goods and services in a pandemic had a significant impact on SMEs' revenue and a consequential effect on tax revenue [18, 27]. More so, the challenges of taxation in a pandemic came to light in this study through data analysis, which shows that tax revenue could drop by 8% in a pandemic, and VAT revenue could drop by 1% or more. Also, a tax buoyancy of 0.1% indicates that any increase in the severity or impact of the pandemic could trigger a 0.1% (100%) buoyancy in tax revenue forecasts and a 1.95% or 195% elasticity in tax revenue could be experienced, and this is supported by: [27,28]. As a result, taxation during a pandemic goes with high tax buoyancy and uncertainty. This study's results proved that taxation in a pandemic is negatively impacted and requires a tactical approach to forecasting, enforcement of tax laws, determining appropriate sanctions that tax evaders will face, and collecting taxes to help raise tax revenue.

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