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Determinants of Tax Revenue in Ethiopia: Autoregressive Distributed Lag Approach

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Abstract

Tax revenue is the main source of revenue for governments in advanced and emerging economies, which fund government spending. The main goal of this research is to look at the factors affecting tax revenue in Ethiopia from 1996 to 2020 using time series data. The impact of agricultural-to-GDP, service-to-GDP, inflation, corruption, political stability, and tax reformation on the ratio of tax revenue to GDP was investigated in this study. The short-run and long-run associations between the variables were determined using the autoregressive distributed lag (ARDL) co-integration approach. The study's outcomes reveal that inflation has a positive relationship with tax; however, agricultural GDP negatively impacted tax revenue in the short run over the study period. Political stability, service-to-GDP, and inflation, on the other hand, has a positive long-run impact on tax revenue, while corruption has a negative impact. We recommend that policymakers and governments combat corruption, maintain political stability, broaden tax bases to include more service-oriented businesses, and reduce reliance on agricultural sectors.

Keywords: *Inflation; Corruption; Political stability; Tax reformation; Tax revenue*

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1. INTRODUCTION

The revenue generated from the tax is of vibrant significance for the sustainability of development in both advanced and emerging nations. It is used to finance long-term growth, education, health, infrastructure, and other social activities. Hence, it is an extensive part of the government budget to finance these public goods and services (Macek, 2014). Advanced nations collect high tax revenue and characterized by high levels of income, large shares of nonagricultural output, large trade shares in GDP, more investment in human capital development, more developed financial sectors, more stable domestic environments (low inflation), more urbanized populations, and lower corruption (Mawejje & Sebudde, 2019). These nations do not need more resources compared to the emerging nations. Emerging nations, on the other hand, have had a multitude of challenges in producing tax revenue for their budgets. To fill basic infrastructure and public goods & services emerging nations need more resources than higher-income countries (Besley & Persson, 2014).

To finance their budgets and boost economic growth, emerging nations must progressively mobilize their internal wealth that can be largely achieved by tax revenue generation. Nevertheless, the economic disproportion between governmental income and spending has remained difficult for most emerging nations for the last period. The cause is accredited to the quick development of government spending and small tax revenue. In emerging nations, factors such as institutional variables (corruption and governance), structural variables (per capita income, trade openness, inflation, and the share of agriculture in GDP), and policy variables (tax rate and tariff rate) all influence tax revenue (Epaphra & Massawe 2017). Most of the time, it is seen that structural weaknesses and inefficient institutions with excessive corruption became the reason for the low tax-to-gross domestic product (GDP) ratio in emerging nations.

The ratio of tax to GDP in emerging nations as compared to the world is still low. Specifically, the average tax to GDP ratio is lowest specifically in African countries including Ethiopia. For instance, the world's highest tax-to-GDP ratio was 46.1 percent, while the lowest was 16.1 percent, according to the Organization for Economic Co-operation and Development (OECD). The overall average tax-to-GDP ratio of OECD countries was 34.3%. When compared to OECD countries, Africa does poorly in terms of tax revenue. African countries, for example, have the highest and lowest tax revenue -to-

GDP ratios at 34.12 percent and 6.08 percent, respectively. All African countries have the average tax revenue to GDP ratio of 16.43 percent (OECD, 2019).

Many governments in Sub-Saharan Africa (SSA) have been great problems in collecting tax revenue for public purposes. Low per capita income, an agriculture-dominated economy, a poorly designed tax system, and a weak tax and customs administration all contribute to the difficulty of obtaining tax revenues in these countries. Furthermore, low tax revenue collection as a percentage of GDP in these countries is primarily due to institutional quality, with some taxes being more affected than others (Imam & Jacobs, 2014). Although efforts have been made in these countries to increase fiscal revenue by building an efficient tax system, the economic structure, institutional capacity, and political setup, poor economic development remain the most difficult issues (Dioda, 2012). Moreover, in these countries, tax revenue as a percentage of GDP is declining, and countries are becoming increasingly reliant on foreign capital inflows as a source of government revenue (Kitessa & Jewaria, 2018). Tax revenue in these countries rose from 9.2 percent of GDP in 2010 to 11 percent in 2011, before falling to 10.2 percent in 2018 (WB, 2018). This is due to a lack of revenue collection capability, which includes extensive tax exemptions, corruption, and a deficiency in tax and customs administration ability.

In Ethiopia, government has set long-run aims to eradicate poverty, ensure long-run economic growth, and achieve middle-income status by 2021. These aims will be impossible to achieve unless tax issues are addressed, tax administration is improved, and sufficient revenue is generated. Since the recent past, Ethiopia's tax revenue has shown a promising trend, but it's shared to GDP ratio has remained low, showing that policymakers should prioritize increasing tax revenue (Gobachew et al., 2017). The discrepancy between both local revenue and government spending has widened in recent years. For instance, in Ethiopia, the tax revenue to GDP ratio was 8.08 %, 7.6%, and 7.1% in the years 2016, 2017, and 2018, respectively (WB, 2018). Ethiopia's tax-to-GDP ratio is low when compared to the average tax revenue of African countries. This implies that the Ethiopian government faced difficulties in collecting tax revenue at the required level.

The empirical evidence suggests that little research has been done in Ethiopia on the determinants of the tax revenue -to-GDP ratio. According to Gobachew et al. (2017), industry sector share to GDP,

per capita income, and trade openness as measured by the share of exports and imports to GDP have a significant positive impact on tax revenue, while the agriculture sector share to GDP and the annual rate of inflation has a negative impact on tax revenue. According to a study conducted in Ethiopia by (Kumar & Nene, 2011), import and exchange rates affect tax revenue in the short run, while per capita income, inflation, service sector GDP, agricultural GDP, and trade liberalization affect tax revenue in the long run. Moreover, the study conducted by (Ayenew, 2016) shows real GDP per capita income, foreign aid, and industrial GDP all have a positive and considerable impact on tax revenue in the long run. Inflation, however, negatively impacts the tax-to-GDP ratio.

In this paper, we study the determinants of the tax revenue in Ethiopia by employing Autoregressive Distributed Lag model using time series data from 1996 to 2020. This study aims to help the Ethiopian government plan to develop and amend tax policies in the coming period to ensure the better tax revenue and foster economic development. The empirical findings of our investigation offer new insight into the determinants of the tax revenue.

Our study differs from earlier research in the following respects. Foremost, despite the limited studies that have been conducted on the determinants of the tax revenue in Ethiopia, there is inconsistency across findings. Secondly, the variables previously used to analyze the impacts of tax revenue to GDP ratio are almost similar. Therefore, in this paper, we focus on the variables that have not yet been investigated by earlier authors such as political stability, corruption, and tax reformation. Finally, we employed ARDL model that is recommended for small sample size in time series data.

The organization of this paper is as follows. In section 2, we present a review of the literature. Section 3 then provides our method, and section 4 discusses the findings. Section 5 presents conclusion and policy recommendation.

2. REVIEW OF THE LITERATURE

2.1. Theoretical framework

Tax is a compulsory payment by citizens to the government without the anticipation of a straight and corresponding benefit (quid pro quo) from the government for the payment made by the taxpayers. One of the major sources of revenue for government infrastructure development is tax revenue. Tax revenues include both direct taxes and indirect taxes. Direct taxes are corporate profit tax or personal

income tax, and property tax while excise, value-added tax (VAT), customs fees, and so on, are examples of indirect taxes. Tax revenue is critical to the long-term viability of economies all over the world. In addition, it is vital for the sustainability of the world. According to Kesner-škreb & Kuliš (2010), taxation is the central foundation of income for the government in both developed and developing countries to finance public expenditure.

2.2. Taxation in Developing Countries

The significance of tax policy in a developing economy is especially important. The designed tax policy should: (1) boost sufficient tax revenue to support important spending without having to resort to extreme governmental debt; (2) raise tax revenue in a fair manner that reduces disincentive effects on economic activity; and (3) do so per international norms.

In practice, however, developing countries have some severe challenges in setting up effective and efficient tax systems. The first of these obstacles is the country's economic structure, which makes it hard to levy and collect some taxes. The second factor is the tax administration's limited capacity. The third factor is the system's structure and complicity. Finally, unlike advanced economies, many emerging economies' political systems are less responsive to sound tax policies. It is difficult to integrate all aspects that make for excellent tax administration because of the economy's structure, as well as poor literacy and human capital. The inefficiency of tax administration is worsened by the inadequate quality of tax administration, the taxpayer's inability to keep correct records, and restricted services. Thus, rather than developing modern and efficient tax systems, countries usually design tax systems that allow them to make use of whatever alternatives they have. As a result, many developing countries end up with many tiny tax collections, high reliance on external sources (aid and borrowing), and low use of personal income taxes.

Given the typical unstable budgetary situation of developing countries, this uncertainty could put them in considerable fiscal trouble. Even when massive structural reformation would be preferable, little modifications are often preferred. Consequently, tax policy in developing countries has often been an exercise in the art of the doable rather than the pursuit of the ideal. Therefore, it’s not unexpected that economic theory, particularly the literature on optimal taxation, has had minimal impact on the development of tax systems in developing nations (Tanzi & Zee, 2000).

2.3. Empirical Literature

2.3.1. International Empirical Review

Mawejje & Munyambonera (2016) conducted a study on the effects of sectorial growth and public spending in Uganda. They revealed that development spending, trade openness, and industrial sector growth are all linked to tax collection performance. The agricultural and informal sectors' domination is the most significant constraint on tax revenue performance. The study conducted by Sari & Haris (2020) in the South Sumatra Province of Indonesia assesses the factors influencing the local tax revenue. According to the findings of their study, the number of hotels, restaurants, and gross regional domestic product all have a positive and significant impact on the local tax revenue of cities in the province of South Sumatra. Kitessa and Jewaria (2018) used a panel data co-integration approach to empirically analyze the major determinants of tax revenue in East African countries using a dataset covering 1992 to 2015. Their findings reveal that per capita GDP, foreign aid, trade openness, and the share of agriculture, industry, and services in the economy of East African countries all affect taxable income in the long run.

Chaudhry & Munir (2010) used time-series econometric tools to examine the causes of low tax income in Pakistan from 1973 to 2009. The result reveals that trade openness; monetization, external debt, foreign remittances, agriculture share, manufacturing sector, political stability, inflation, and service sector are positively related and statistically significant while per capita income, exchange rate, foreign aid, literacy rate, and urbanization negatively influence the tax revenues. Hisali (2012) analyzed trade policy reform and international trade tax revenue in Uganda. The findings reveal that exchange rate depreciation has had a pass-through effect on import prices in the domestic market, lowering the trade tax revenue in the long run while increasing trade tax revenue in the short run.

Ahmad et al. (2016) empirically highlighted the socio-economic determinants of tax revenue from 1975 to 2012 using time series data analysis in Pakistan by employing the Auto-regressive Distributed lag (ARDL). Their findings show that a small tax base, economic activity, tax compliance, informal economy, and the government regime all affect tax collection. Among socio-economic determinants, per capita GDP and tax compliance are positive and statistically significant drivers of tax revenue. However, the informal sector and a restricted tax base are negative and substantial determinants of tax revenue.

Muibi & Sinbo (2013) used time series data analysis to investigate the macroeconomic factors of tax income in Nigeria from 1970 to 2011. According to their findings, growth in the economy has a positive impact on tax revenue, while exchange rate depreciation and inflation have a negative impact. Estrada et al. (2012) find that political stability is positively associated with tax revenue. Tax income is collected more efficiently when the government is stable, while tax collection is limited when the government is unstable. There is little doubt that any change in the political system has significant consequences on the socio-economic system. Lien (2015) examined the influence of institutional quality on tax revenue in emerging countries from 1996 to 2013, using six World Bank governance indicators to empirically analyze the impact of institutional quality on government tax revenue. The findings reveal that institutional quality has a significantly positive impact on tax revenue in the low-income and lower-middle-income groups, but it has a significant negative impact in the upper-middle-income group.

Using a panel data set for 25 developing nations from 1990 to 2005, Ajaz and Ahmad (2010) investigated the impact of institutional and structural variables (corruption and governance) on tax collection. The findings suggest that corruption has a negative impact on tax collection, but good governance helps to improve tax collection performance. It is commonly acknowledged that tax evasion and public official corruption are social phenomena that can result in large reductions in tax collection and harm economic growth and development. Corruption is a part of a larger issue of governance and public management, and it should not be considered in isolation. Through empirical research of Asian countries, Syadullah and Wibowo (2015) looked at the impact of governance indicators such as political stability, government effectiveness, and quality of regulation, law enforcement accountability, and corruption control in the tax domain. The study's findings show that corruption control, voice, accountability, and political stability variables have significant negative effects on the total tax revenue, while rule of law and regulatory quality variables have positive effects. Similarly, Epaphra & Massawe (2017) analyzed the effects of institutional variables (corruption and governance), structural variables (per capita income, trade openness, inflation, and agriculture's share of GDP), and policy variables (tax rate and tariff rate) on total tax revenues in their study. Corruption and governance are two major drivers of tax collection in Africa, according to their regression studies.

Imam and Jacobs (2014) conducted research in the Middle East on the influence of corruption on the revenue-generating ability of various tax categories. They discovered that real per capita income, the percentage of agriculture in GDP, trade openness, inflation, and corruption are the most important predictors of tax collection. Zarra-Nezhad et al. (2016) evaluated the effects of GDP growth rate, agricultural share of GDP, official exchange rate, urbanization, and democracy on tax revenue. The findings show that tax revenue is positively associated with GDP growth, trade liberalization, and democracy. Agriculture's percentage of GDP, the official exchange rate, and urbanization, on the other hand, are all inversely connected to tax revenue. Masiya et al., (2015) ascertain the determinants of tax revenue in Malawi for data covering 120 months (about 10 years) using time series data analysis. In their study, they examined the rate of inflation, broad money, exchange rates, and Gross Domestic Product. The results of their findings reveal that GDP, broad money, and inflation positively influence the tax revenue, while the exchange rate fluctuations are not significant in influencing the tax revenue. According to Gupta (2007), structural factors such as per capita GDP, agriculture's percentage of GDP, trade openness, and foreign aid influence an economy's revenue performance. Using a revenue performance index, the study showed that while many Sub-Saharan African countries are performing well beyond their potential, some Latin American economies are falling short of their revenue potential.

Ogbonna and Appah (2012) investigated the influence of tax reforms on Nigeria's economic growth. In the long run, there is a link between tax reform and economic growth. This proves that tax reforms have had a substantial affect the way the system and its agencies operation, resulting in enhanced economic growth outcomes. Addison and Levin (2011) investigated the determinants of tax revenue in Sub-Saharan Africa by using an imbalanced panel dataset of 39 nations from 1980 to 2005. Their econometric analysis considers the tax base, structural variables, foreign aid, and conflict as well as other factors that may affect tax collection. The agriculture sector's size and foreign aid have a negative impact on the direct tax GDP ratio, while VAT and a stable environment have a large positive impact. In their analysis, (Velaj and Prendi 2014) assessed GDP, inflation, income tax, unemployment, and imports. Inflation, imports, and GDP growth rate all have positive correlations with tax revenue; however, unemployment has a negative correlation.

Javid & Arif, (2012) investigated the impact of GDP per capita, trade to GDP, debt to GDP, population growth, and control of corruption and inflation on tax to GDP ratio. The GDP, population growth, agricultural share of GDP, and inflation negatively influence the tax revenue, while trade to GDP (Trade Openness), debt to GDP, and institutional quality positively affect tax revenue

Zeng et al. (2013) studied the impact of economic growth and tax reform on tax revenue and structure in China from 1950 to 2011. The findings show that tax reform affects the tax structure, whereas changes in total tax revenue have a declining impact with time. To understand regional inequalities in tax revenue, Dioda (2012) empirically examines the relevance of political and historical variables. The findings show that civil liberties, female labor force participation, population age composition, political stability, educational attainment, population density, and the size of the shadow economy all influence tax revenue. Kobyagda (2019) investigated the macroeconomic factors of tax revenue mobilization in the nations of the West African Economic and Monetary Union (WAEMU). According to their findings, while GDP per capita is positively associated with tax revenues, the degree of trade openness and agricultural has a considerable negative impact on tax revenue.

Trade liberalization, agricultural share, industrial share, government consumption, and terms of trade all have positive effects on total tax revenue, while inflation has a negative influence, according to Agbeyegbe et al. (2004). For the sixteen Arab countries, (Eltony 2002) investigated the determinants of tax revenue shares and developed a tax effort index. Per capita income, the share of agriculture in GDP, and the share of mining in GDP are the main determinants of Arab countries' tax share of GDP.

2.3.2. Ethiopian Empirical Review

Gobachew et al. (2017) study the determinants of tax revenue in Ethiopia. They found industry sector share to GDP, per capita income, and trade openness as measured by the share of exports and imports to GDP all have a significant positive effect on tax revenue, whereas agriculture sector share to GDP and inflationary pressures both have a significant negative impact.

Kumar and Nene (2015) investigated the factors that determine Ethiopian tax revenue. In their study, they investigated factors that influence tax revenue, such as per-capita income, inflation, service sector GDP, a portion of agriculture GDP, trade liberalization, imports, and exchange rate. According to their findings, while import and exchange rates affect tax revenue in the short run, per capita

income, inflation, service sector share of GDP, agriculture share of GDP, and trade liberalization are major long-run predictors of tax revenue in Ethiopia.

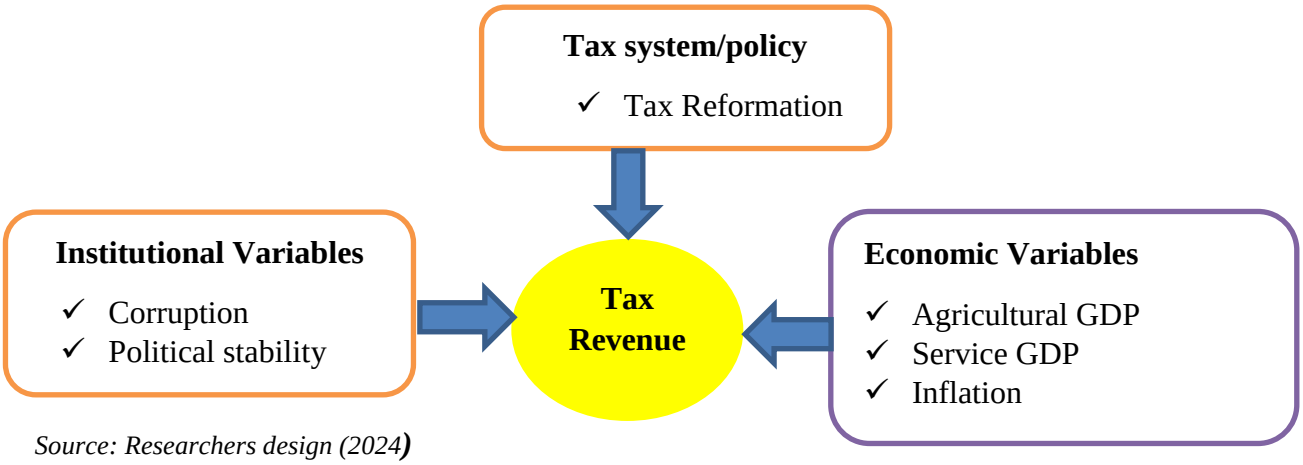
Pedro M. G. Martins (2007) used the fiscal response model to examine the influence of foreign aid on government spending revenue and domestic borrowing in Ethiopia between 1964 and 2005. Foreign aid has a positive impact on government investment, but its impact on current expenditure is less clear, according to the findings. Aid inflows boost government spending, with loans having a greater influence than grants. Both aid grants and loans have a significant negative impact on domestic borrowing, implying that aid and domestic financing are nearly interchangeable. Finally, the findings tend to back up the theory that increased aid flows eat into domestic revenue.

Ayenew (2016) investigated the determinants of tax revenue in Ethiopia using the Johansen maximum likelihood co-integration approach. The findings revealed that real GDP, per capita income, foreign aid, and the share of GDP devoted to industrial value-added all had a long-term impact on tax revenue. On the other hand, inflation had a significant negative impact. Only real GDP per capita income, the industrial value-added share of GDP, and the rate of inflation are statistically relevant in determining tax revenue as a proportion of GDP in the short run. The concerned bodies must consider an increase in per capita income growth, structural reforms, the introduction of new tax bases, and efficient use of foreign aid input to improve tax administration and revenue growth.

To sum up, the available research on Ethiopia's tax revenue determinants is almost non-existent, according to this review. As a result, the current study examines the determinants affecting tax revenue in Ethiopia, including previously unexplored factors such as institutional quality factors (corruption and political stability) and tax reformation.

2.4. Conceptual Framework

This conceptual framework describes the relationship of tax revenue to economic variables (Agriculture and Service GDP, and inflation), Institutional factors (Corruption, and Political stability), and the Tax system (Tax reformation). Based on different literature reviewed above, the following conceptual framework was developed to guide this paper.



Source: Researchers design (2024)

Figure 1: Conceptual Framework

3. RESEARCH METHODOLOGY

3.1. Research approaches and Design

The primary goal of this research is to investigate the tax revenue in Ethiopia. The study used quantitative research approaches and longitudinal explanatory research design to achieve the stated goal.

3.2. Data Type, Source, and Method of Collection

This study was conducted in Ethiopia over the period ranging from 1996 to 2020. To achieve the research aim, a time a series of 25 years of data is collected. The sampling periods were determined based on the availability of core data used in this study. Secondary data were used by the researchers to achieve the study's goal. The required secondary data were gathered from Ethiopia Revenue and Customs Authority (ERCA), Central Statistics Authority (CSA), Freedom House (FH), Ethiopian Economic Association (EEA), Ministry of Finance (MoF), National Bank of Ethiopia (NBE), World Development Indicators (WDI), World Bank (WB), and Ministry of Trade and Industry.

3.3. Model Specification

Estimation of the model is used to statistically examine the factors affecting Ethiopian tax revenue. The vector error correction model or Johansson co-integration analysis could not be employed due to the small sample size, so the autoregressive distributed lag (ARDL) model is used instead. Furthermore, there are some advantages to using the ARDL model rather than the vector error

correction model (VECM). When the order of integration of variables is mixed, for example, the ARDL model is used, and it gives more accurate and unbiased estimates than the VEC model. In addition, the ARDL model estimates both the short and long-run models at the same time. A bound test is performed in the ARDL model to determine whether there is co-integration between the outcome variable, tax revenue, and all covariates. The ARDL model is useful to separate long-run relationships from short-run dynamics. An ARDL (p, q) model with p lag of the outcome and q lag length of the covariate is given as follows.

$$y_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \, y_{t-i} + \sum_{i=0}^{q} \beta_i \, x_{t-i} + u_t \quad (1)$$

Where y_t is the outcome variable, which is tax revenue, x_t is a vector of the independent variables (Corruption, Agriculture GDP, Service GDP, Tax Reformation, Political Stability, and Inflation), u_t and is the error term, p≥1 and q≥ 0. However, the ARDL model in error correction form or ARDL model which presents both the short-run and long-run models in one equation is given as follows

$$\Delta y_t = \alpha_0 - \gamma(y_{t-1} - \theta x_{t-1}) + \sum_{i=2}^{p} \mu_i \, \Delta y_{t-i} + \sum_{i=1}^{q} \delta_i \, \Delta x_{t-i} + v_t \quad (2)$$

$$\theta = \frac{\sum_{i=0}^{q} \beta_i}{\gamma} \quad (3)$$

$$\gamma = 1 - \sum_{i=1}^{p} \varphi_i \quad (4)$$

Where θ is a vector of long-run coefficients that indicate the independent variables' equilibrium effects on the dependent variable, γ is the speed-of-adjustment coefficient, μ_i and δ_i the short-run coefficients that show the short-run fluctuations.

3.4. Variable description and hypothesis formulation

Tax Revenue: The dependent variable for the proposed study is tax revenue (Y), which is measured as the ratio of tax revenue to GDP, while macroeconomic variables (agricultural GDP, service GDP, and inflation), institutional factors (corruption and political stability), and tax system (tax reformation) are selected as the major explanatory variables.

Tax reformation

Tax reform is usually carried out to increase the efficiency of tax administration and to maximize the economic and social benefits that the tax system may provide. It can reduce tax evasion and

avoidance while allowing for more efficient and fair revenue collection to fund public goods and services. Tax reform increases revenue stability and fosters long-term independence from foreign aid and natural resource earnings. The tax reformation made by the government enhanced economic development and addressed economic inequality via wealth distribution and behavior change (Rao, 2015). The empirical investigation found that tax reformation is among the mechanisms of increasing the domestic revenue of one's country government. It is helpful in promoting economic development, and economic development is helpful in increasing tax revenue (Zeng, Li & Li, 2013).

Ha: The positive relationship between tax reformation and tax revenue is expected

Agriculture GDP

Many countries are unwilling to impose taxes on the most basic items. Because the agriculture sector is mainly unregulated, it is difficult to tax. Different researchers found a different relationship between agriculture GDP and tax revenue. Since agricultural activities are difficult to tax, a massive portion of the output is consumed rather than sold (Zarra-Nezhad et al., 2016). Kitessa & Jewaria (2018), Chaudhry & Munir (2010), and Boukbech et al. (2018) discovered a positive association between agriculture GDP and tax revenue in their research. Castaeda Rodrguez (2018), Atsan (2017), (Gobachew et al., 2017), Kobyagda, (2019), Eltony (2002), (Zarra-Nezhad et al., 2016), and Dioda, (2012), on the other hand, revealed a negative association between agriculture GDP and tax revenue. Similarly, Gupta, (2007) suggested that agriculture GDP and revenue performance had a large negative and significant link. This relationship has the potential to work on both the supply and demand sides. On the supply side, if a major portion of agriculture is subsistence, it may be difficult to tax. Furthermore, taxing the farm industry may be politically impossible. A large farm sector, on the other hand, may reduce spending on public goods and services, which are typically concentrated in metropolitan areas.

Ha: The positive association between agriculture GDP and tax revenue is a hypothesized.

Service GDP

The service sector is the dominant sector in most developed economies of the world and some developing countries. In their study, Kumar & Nene, (2011) found a positive connection between service-to- GDP and tax revenue. Despite this, Chaudhry & Munir (2010) confirmed a negative

correlation between service GDP and tax revenue. Because it encompasses such a broad range of economic activities, the service sector contributes a significant amount of tax revenue to the regime. In many emerging countries, however, the service sector is dominated by the informal sector. Although it is predicted to enhance tax revenue, the degree of tax evasion is also expected to rise due to the informal sector.

Ha: The positive association between service GDP and tax revenue is a hypothesized.

Inflation

Inflation is defined as a long-term increase in the overall value of goods and services in each economy. It is calculated using the consumer price index (CPI), which is an indicator of a country's macroeconomic stability. According to Muibi & Sinbo (2013), Kitessa & Jewaria (2018), (Javid & Arif, 2012) and Ayenew (2016), the association between inflation and the tax revenue is negative while Boukbech et al. (2018), Masiya et al. (2011), Velaj & Prendi (2014) and Chaudhry & Munir (2010) confirm a positive relationship.

Ha: The positive association between inflation and tax revenue is expected

Political Stability

Political instability is characterized by unpredictable and changeable government behavior, which impedes the implementation of long-term improvements in the system Ahmad & Ajaz (2010). According to Chaudhry & Munir (2010), political stability and tax revenues have a positive and significant association. It means that the existence of political stability increases the tax-to-GDP ratio and increases people's compliance to pay taxes. The government may face a credibility problem under less stable political regimes, making it difficult to offer adequate property rights protection (Gupta, 2007). This situation undermines public support for greater taxes and increased tax compliance. Political instability may affect the establishment of solid organizations and foster a climate in which the public is less supportive of greater taxes and less tax compliance. Furthermore, Estrada et al. (2012) discovered a positive association between political stability and tax revenue in their research. The stable government collects more tax revenue while instability poses a limitation on the collection of taxes. Tax efforts and revenue are inversely associated with an authoritarian power system and political instability (Elbahnasawy, 2020). The authority's efforts should focus on

political changes that strengthen democracy and political inclusiveness, as well as reducing political instability and conflict, to improve the tax system and mobilize income that is more domestic.

Ha: The positive association between political stability and tax revenue is a hypothesized.

Corruption

Corruption is defined as a transaction between a private individual (or group) and a public official (or official), in which the public official violates formal standards of behavior and gives something to the private individual or group that would not have been given to them otherwise (Alzola, 2018). Corruption, as well as voice and responsibility, are important factors in determining the level of tax effort in emerging and transitional countries (Bird et al., 2008). Tax compliance will increase if the government uses strong administrative standards to enforce the law and combat corruption (Castaeda Rodrguez, 2018). When authorities need to generate substantial tax income while minimizing distortions and maximizing social welfare, they should pursue changes that either reduce corruption or raise money from less corrupt tax categories (Imam & Jacobs, 2014). According to Thornton (2008), corruption has a considerable and statistically significant negative influence on overall tax revenue, owing to its negative impact on revenues from social security taxes, taxes on domestic products and services, and taxes on international trade transactions (Thornton, 2008). The impact of corruption on the tax-to-GDP ratio, on the other hand, was insignificant (Islam & Siddique 2017).

Ha: The negative association between control of corruption and tax revenue is expected

4. RESULT AND DISCUSSION

4.1. Descriptive statistics

Table 2 describes the descriptive statistics of both dependent and independent variables. The mean, minimum, and maximum value of the tax to GDP ratio of Ethiopia for the period of 1996 to 2020 shows 8.6%, 6.6%, and 11.3%, respectively. The country's highest tax-to-GDP ratio was recognized in 1998, while the lowest tax-to-GDP ratio was recognized in 2009. The country's maximum agriculture GDP is 54% and this highest value is recognized in 1997. On the other hand, the lowest agriculture GDP is 31.2%, which was recognized in 2018. Moreover, the average amount of agriculture GDP is 41.2% and this figure confirms that nearly half of the Ethiopian economy has been

dependent on agriculture. The mean, minimum, and maximum service GDP are 38%, 27%, and 43%, respectively. The minimum service GDP was recognized in 1997 while the highest value was recognized in 2003. Through using the political stability index (-2.5 to +2.5), the country's mean, the minimum, and maximum amount of political stability are -1.36262. -1.8 and -0.63, respectively. Like political stability, the control of corruption is also measured by the corruption perception index and the country mean, the minimum and maximum amount of corruption are -0.6088, -1.2, and -0.36, respectively. (See table 2 for further)

Table 2:

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax to GDP ratio	25	8.59305	1.213015	6.58118	11.2621
Service GDP	25	37.90652	3.241712	27.3694	42.7502
Agriculture GDP	25	41.19803	5.621778	31.2188	54.029
Inflation GDP deflator	25	10.63499	11.42957	-8.484249	44.39128
Political Stability	25	-1.36262	0.3566422	-1.8	-0.63
Control of Corruption	25	-0.6088	0.179938	-1.2	-0.36
Source: Authors calculation					

4.2. Model Diagnostic Test

4.2.1. Pre-estimation Test

4.2.1.1. Unit Root Test

In time series analysis, data stationarity is critical to avoid erroneous regression results. As a result, we used Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches to conduct a unit root test of the variables in this study. Except for inflation, which was measured by the consumer price index, the results show that under ADF, all variables remained stationary at the first difference (CP). The Phillips-Perron (PP) unit root test, like the ADF, shows that all variables were stationary at the first difference except for inflation. All variables of order 0 or 1 were integrated according to both ADF and PP (see Table 3 for further).

Table 3:

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Stationarity Test

Variables	**ADF Unit-Root Test Results**		**Phillips-Perron Unit-Root Test Results**	
	t-statistics	***Order of integration***	**t-statistics**	***Order of integration***
∆TGDP	-5.328776***	***I (1)***	-5.429089***	***I (1)***
∆AGDP	-3.755774***	***I (1)***	-3.775354***	***I (1)***
∆SGDP	-3.785302***	***I (1)***	-6.043830***	***I (1)***
Inflation	-3.628031**	***I (0)***	-3.627184**	***I (0)***
∆PS	-4.499058***	***I (1)***	-4.449751***	***I (1)***
∆CORRUP	-4.007701***	***I (1)***	-4.007701***	***I (1)***
∆TREF	-4.795832***	***I (1)***	-4.795854***	***I (1)***

Source: Eviews 11

*Note: ∆ is the first difference operator and Akaike information criterion (AIC) were used to choose the lag length. The symbols *** and ** represent a significance level of 1%, and 5%, respectively.*

4.2.1.2. Selection of the estimation

The unit root tests in the preceding tables show that the order of integration for all variables is not the same. The ordinary least squares (OLS) estimation method can be used to obtain econometric conclusions when all variables are stationary at a level. When all variables are stationary at the first difference, however, the (Johansen, 1988; Søren, 1991; Johansen & Juselius, 1990) approach can be used to determine whether the variables have a long-run relationship. Specifically, when dealing with variables that are integrated in a different order, I (0), I (1), or a combination of both and small sample size, the ARDL co-integration technique is preferred (Emeka & Kelvin, 2016). The underlying variables in our investigation are I (0), I (1), or a combination of both (see table 3 above). In this scenario, applying the autoregressive distributed lag (ARDL) approach to co-integration will yield realistic and efficient results. As a result, we used the ARDL co-integration method to check for the presence of a long-term relationship between the variables.

4.2.1.3. Co-integration test

As it is known that, there is co-integration if the estimated F – statistics is bigger than the critical value for the upper bound I (1). Thus, the dependent and independent variables have a long-term relationship. The null hypothesis of no long-run relationship is thus rejected based on the empirical results in Table 4 because the F-statistic of **10.18577** is greater than the upper bounds at all significance levels, confirming the existence of a long-run association among the variables.

Table 4:

ARDL bounds tests for co-integration

Test Statistic	**Value**	**k**	**Significance**	**Critical Value Bounds**	
				***I* (0)**	***I* (1)**
F-statistic	**10.18577**	6	10%	2.94	1.99
			5%	3.28	2.27
			2.5%	3.61	2.55
			1%	3.99	2.88
Source: Eviews 11					

4.2.2. Post Estimation Test

4.2.2.1. Serial Correlation Test

The Breusch-Godfrey Serial Correlation LM Test is used to determine if a serial correlation exists. No serial correlation at up to 1 lag, according to the null hypothesis. The result is in line with the rules, the Breusch-Godfrey Serial Correlation LM Test table above shows that the probability values of 0.6613 and 0.4922 are statistically insignificant at a 5% level of significance. That is, the p-values are < 5%. Thus, we reject the null hypothesis that stated the model is not free from serial correlation and therefore submit that the model is free from serial correlation.

Table 5:
Autocorrelation test

F-statistic	0.692177	Prob. F(1,11)	0.4231
Obs*R-squared	1.4208	Prob. Chi-Square(1)	0.2333
Source: Eviews 11			

4.2.2.2. Normality test

The (Jarque & Bera, 1987) normality test was used to determine if the residuals were normally distributed. The histogram should be bell-shaped if the residuals are normally distributed, and the statistics should not be significant. This means that the p-value displayed at the bottom of the normality test must be greater than 0.05 to accept the null hypothesis of normality at the 5% level. Therefore, we do not reject the null hypothesis of normality at the 5% level since the p-value (0.740336) provided in the histogram is larger than 0.05. As a result, we conclude that the error terms in the supplied model are normally distributed in this study (see figure 2 for further)

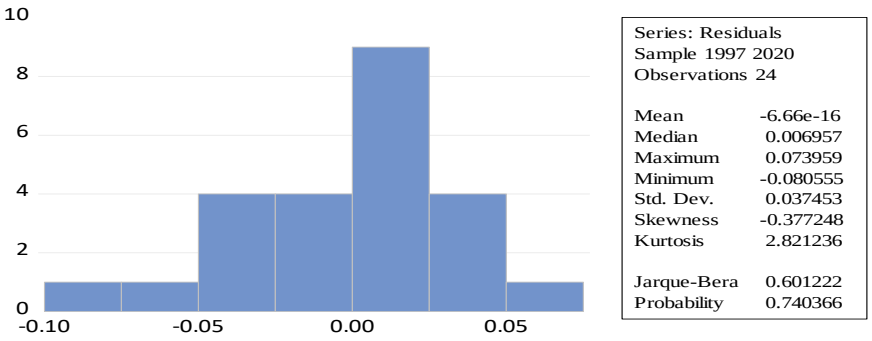


Figure 2: Normality Test

Source: Eviews 11

4.2.2.3. Linearity Test

To test for model misspecification or omitted variables, the study used the Regression Specification Error Test (RESET) established by (J. B. Ramsey, 1969). According to Ramsey, the null hypothesis stated that "the linear model functional form is correct." The result depicted in table 6 shows that the probability value of the t-statistic, F-statistic, and likelihood ratio is greater than 0.05. As a result, we fail to reject the Ramsey RESET null hypothesis at a 5% significance level.

Table 6:

Linearity Test

	Value	df	Probability
t-statistic	1.623505	11	0.1328
F-statistic	2.635768	(1, 11)	0.1328
Likelihood ratio	5.155226	1	0.0232
Source: Eviews 11			

4.2.2.4. Heteroskedasticity Test

The heteroskedasticity test of Breusch-Pagan-Godfrey and Autoregressive conditional heteroskedasticity (ARCH) below indicates that the probability values of the F-statistic and Obs*R-squared are > 5% significant level. Therefore, we cannot reject the result indicating the absence of heteroskedasticity and the presence of homoscedasticity in the models.

Table 7:

Heteroskedasticity Test:

Autoregressive conditional heteroskedasticity (ARCH)

F-statistic	0.515306	Prob. F(1,21)	0.4808
Obs*R-squared	0.550865	Prob. Chi-Square(1)	0.458
Source: Eviews 11			

Table 8:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.321203	Prob. F(11,12)	0.0818
Obs*R-squared	16.3268	Prob. Chi-Square(11)	0.1294
Scaled explained SS	3.716869	Prob. Chi-Square(11)	0.9775
Source: Eviews 11			

4.2.2.5. Stability Test

The stability test is performed to ensure that the model under consideration is stable. The model's stability was tested in this paper using approaches proposed by (Brown et al., 1975), such as Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Square Recursive Residuals (CUSUMSQ). When a blue line crosses or is out from a red line, the model is considered unstable. At a 5% significance level, the CUSUM and CUSUMSQ blue lines lie between the two red lines in both approaches, implying that both long-run and short-run coefficients are stable. (See figures 3 and 4 for further)

Figure 3: Cumulative Sum of Recursive Residuals (CUSUM

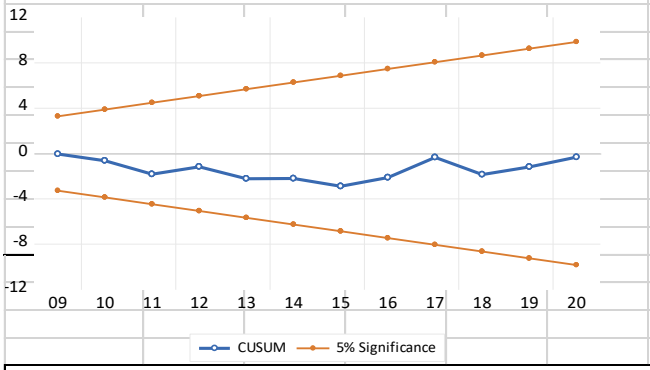
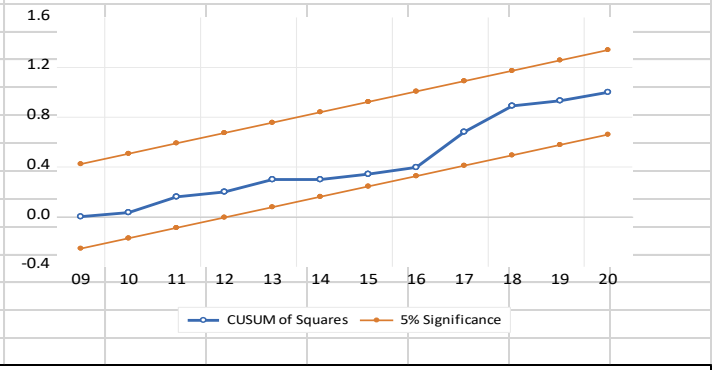


Figure 4: Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ)



Source: Eviews 11

Figure 3: Normality Test

4.2.2.6. Multi-collinearity Test

To arrive at an appropriate conclusion, the researchers conducted a multicollinearity test to discover explanatory variables with high correlation values. To see if there was any collinearity between the variables, we used the variance inflation factor (VIF). We employ the centered VIF in our research because centered variables have low inter-correlation, whereas un-centered variables have higher inter-correlation, resulting in more collinearity (Robinson & Schumacker, 2009). As a rule of thumb, a score between 1 and 10 indicates that multi-collinearity does not occur. As a result, according to the centered VIF results below, all our variables are free of multicollinearity, or multicollinearity is not a concern for this data. (see table 9 for further).

Table 9:

Multicollinearity test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
LN_TGDP(-1)	0.016518	694.038	2.903733
INFLATION	2.07E-06	4.534376	2.120179
CORRUP	0.018447	62.97244	4.594206
CORRUP(-1)	0.016403	60.47958	4.347322
LN_AGDP	0.069036	8471.534	9.225
LN_AGDP(-1)	0.055751	6885.862	8.410948
LN_SGDP	0.072158	8536.684	5.013923
LN_SGDP(-1)	0.107816	12720.5	8.186705
PS	0.009663	176.2603	9.099579
PS(-1)	0.00781	134.9089	8.436416
TREF	0.001718	8.308953	3.80827
C	0.866082	7731.062	NA
Source: *Eviews 11*			

4.3. Empirical Findings and Hypotheses Testing

Table 10 shows the findings of regressions of the impacts of corruption, agriculture GDP, service GDP, tax reformation, political Stability, and inflation on tax revenue. The percentage of dependent variability explained by the independent variables in the regression model is identified by the adjusted R-squared value. The adjusted R-squared is 0.876614 according to Table 10. As a result, the independent variables account for 0.876614 percent of the variation in tax revenue. Furthermore, the Fisher test is significant, demonstrating a substantial linear connection between the explanatory and explained variables.

The ECM (Error correction model) term, represented here by CointEq (-1), is negative, with a coefficient estimate of -0.650159. This means that around 65 percent of any disequilibrium movements are corrected within one period. The error will be corrected approximately in eight months. (See table 10 for further)

The coefficient of political stability is positive and significant. The result implies that a 1-unit increase in political stability leads to an increase in the collection of tax revenue in 0.51% long run. Therefore, we accept the hypothesis formulated in the previous section and confirm the existence of a positive association between political stability and tax revenue. The outcome of our result is in line with Chaudhry & Munir (2010); Epaphra & Massawe (2017); Dioda (2012) and Elbahnasawy (2020). According to Estrada et al. (2012), there is no doubt that any change in the political area has strong implications for the socio-economic systems including tax revenue. Added to this, the positive association between tax revenue and political stability means that political instability decreases the amount of tax revenue by affecting the working environment (Amin et al., 2014). The efforts made by the authorities enhance the tax system and mobilize greater domestic revenues by paying attention to political reforms that improve democracy and political inclusion and reduce political instability and conflict. On the other hand, our result reveals that in the short run, the connection between political stability and tax revenue is negative and insignificant. This result is consistent with (Syadullah & Wibowo, 2015) that found a negative association between tax revenue and political stability.

The coefficient of corruption is -0.79 and it is statistically significant, which implies that a 1% increase in corruption will lead to a 0.79% decrease in tax to GDP ratio in the long run. Based on our results, we accept the previously formulated hypothesis and confirm the existence of the negative association between the control of corruption and tax revenue. The prior study also confirms the negative and significant impacts of the corruption on tax to GDP ratio (Thornton, 2008); (Amin et al., 2014); Ajaz & Ahmad (2010); Syadullah & Wibowo (2015) and Epaphra & Massawe (2017). On the other hand, our results reveal a positive relationship and insignificant impact of corruption on tax revenue in the short run.

The inflation coefficient indicates that inflation has a significant positive association with tax revenue performance in both the short-run and long-run. Based on this result, we accept the formulated hypothesis and confirm the existence of the positive association between inflation and inflation. The tax changes are in line with the nominal value of the underlying transaction rather than changes in overall price levels. As a result, the tax liability's true value remains unaffected (Immervoll, 2000). The result is consistency with Chaudhry & Munir (2010); Boukbech et al., 2018); Masiya et al. (2015); (Soro, 2020); Velaj & Prendi (2014) and (Mutascu & Danuletiu, 2013). On the other hand, (Javid & Arif, 2012); Muibi & Sinbo (2013); Kitessa & Jewaria (2018); (Javid & Arif, 2012); (Murunga et al., 2016), and Ayenew (2016) revealed a negative association between tax to GDP ratio and inflation.

The coefficient of service GDP is positive and statistically significant, implying that a 1% rise in service GDP will result in a 1.12% increase in tax to GDP ratio in the long run. Therefore, we accept the hypothesis formulated in the previous section and confirmed the existence of a positive and significant relationship between service GDP and tax revenue. The outcome of this study is in line with; (Bayu, 2015); (Murunga et al., 2016); Chaudhry & Munir (2010); and Kitessa & Jewaria (2018). Specifically, our result confirms the findings of (Kumar & Nene, 2015) on the long-run positive relationship between tax revenue and service GDP in Ethiopia. Moreover, the service sector has the advantage of being simple to tax because taxpayers and industrial units are identified, and they generally use better accounting procedures, enabling profit taxation and contribution levying easier (Soro, 2020). However, unlike the long-run, in the short-run, our result reveals that tax revenue has a negative association with services as a percentage of GDP. The negative association between tax revenue and service GDP is consistent with (Daniel, 2021). In the short run, it’s hard to generate enough tax revenue from the service because in developing countries the sector is easy for tax evasion and malpractice.

The coefficient of agriculture GDP shows -1.382423, which is negative and significant in the short run. This implies that a 1% increase in agriculture GDP leads to a 1.38% decrease in tax revenue in the short run. Based on our empirical findings, we reject the hypothesis formulated in the previous section and found a negative and significant association between agriculture GDP and tax revenue. The result of our finding is consistent with prior studies such as: Castañeda Rodríguez, (2018), Atsan,

(2017), Gobachew et al. (2017), Kobyagda, (2019), Eltony (2002), Zarra-Nezhad et al. (2016), Gupta, (2007) and Dioda (2012). Even though the p-value of agriculture GDP is not significant, like short-run, the negative coefficient for the percentage of agriculture in GDP in the long-run could be explained by the fact that a big portion of agriculture is subsistence, which is difficult to tax (Soro, 2020). On the other hand, Kitessa & Jewaria, (2018), Chaudhry & Munir, (2010), and Boukbech et al., (2018) found a positive connection between agriculture GDP and tax revenue.

The results of tax reformation are positive but insignificant in both the long-run and short-run. Therefore, we accept the hypothesis stated in the previous section and confirm the existence of the positive association between tax reformation and tax revenue. The empirical investigation stated that tax reformation is among a mechanism for increasing the domestic revenue of one's country's government (Zeng, Li, & Li, 2013) and (Rao, 2015).

Table 10:

Long-run and short-run relationship

Dependent Variable: Tax-to-GDP ratio					
Short-run relationship			**Long-run relationship**		
Variable	**Coefficient**	**Prob.**	**Variable**	**Coefficient**	**Prob.**
INFLATION	0.005739***	*0.0018*	**Inflation**	0.008826***	*0.0079*
CORRUP	0.068959	*0.6208*	**CORRUP**	-0.787268**	*0.0206*
LN_AGDP	-1.382423***	*0.0002*	**Ln_AGDP**	-0.260301	*0.3011*
LN_SGDP	-0.377719	*0.185*	**Ln_SGDP**	1.116849***	*0.0072*
PS	-0.066303	*0.5128*	**PS**	0.509793***	*0.0005*
TREF	0.002851	*0.9467*	**TREF**	0.004384	*0.9467*
C	-0.567463	*0.5534*	**C**	-0.872807	*0.5531*
CointEq(-1) *	-0.650159***	*0.00000*			
R-squared	**0.935625**		**Mean dependent var**	**2.156544**	
Adjusted R-squared	**0.876614**		**S.D. dependent var**	**0.147616**	
S.E. of regression	**0.051852**		**Akaike info criterion**	**-2.773994**	
Sum squared resid	**0.032264**		**Schwarz criterion**	**-2.184967**	
Log likelihood	**45.28793**		**Hannan-Quinn criterion**	**-2.617725**	
F-statistic	**15.85514**		**Durbin-Watson stat**	**2.363814**	
Prob(F-statistic)	**0.000017**				
Source: Eviews 11					

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

The study was conducted on the determinants of tax revenue in Ethiopia by using time series data from the period of 1996 to 2020. The study employed the Autoregressive distributed lag (ARDL) estimation technique to examine the relationship among variables. The study employed the bound test to see the existence of the long-run and short-run association between variables. The outcome of the estimation shows a positive and significant connection between inflation, service GDP, and political stability while a negative association between corruptions in the long run. In the short run, while inflation is positive and significant on tax revenue, the agriculture GDP has a negative and significant impact on tax revenue. We recommend the policy to maintain peace and security to boost tax revenue. In addition to this, policymakers should widen the tax base to incorporate more service-giving businesses into the tax system. Moreover, the government and concerned bodies should take a measure that reduces corruption to collect sufficient tax revenue. Furthermore, Policymakers could also boost revenues by introducing new taxes through tax reformation. To date, the country depends on the agriculture sector, which is hard to tax. Therefore, we recommend the policymakers implement a rapid shift from this sector to the service and industrial sectors. Finally, we recommend the government act to reduce inflation and stabilize the economy.

5.1. Contribution of the study

This study contributes to Ethiopian tax income collection issues. First, it contributes to the limited number of academic studies on the determinants of Ethiopia's tax revenue. Apart from previous studies in Ethiopia, this research utilized only few variables, and it is hoped that the authority will find it helpful in analyzing the impact of different variable on tax revenue generation. Second, this study adds to the current knowledge by investigating the determinants of tax in Ethiopia by incorporating institutional quality variable. Finally, a review of the literature reveals that there are small number of the studies that analyses determinates of tax revenue in Ethiopia. Therefore, this study was considered for inclusion of the impacts of a few variables on tax revenue in Ethiopia.

5.2. Suggestions for Further Studies

A follow-up study should be conducted to improve the findings of the present current study. Instead of focusing on Ethiopia, the researcher suggests that more research should be conducted in other countries. In future, researchers may incorporate moderator issues into new research models in the

upcoming period. Other factors that influence Ethiopian tax revenue collection, such as urbanization, population growth, economic growth, and literacy rate, can be considered in future studies.

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