IMPLICATIONS OF FOREST TAXATION AND FEES IN THE DEVELOPMENT OF SMALLHOLDER FOREST PLANTATIONS IN TANZANIA: A CASE OF MUFINDI DISTRICT

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

The booming of forestry sector in the country in recent years has seen resources depleting at an increasing rate over time due to the supply gap of about 42.8 million m^3 of wood. Initiatives including fiscal measures such as forestry taxation and fee imposition are employed to ensure their regulation. Forest taxes and fees have impacts in the forestry sector development; However, no actual study was conducted on their actual implications. This study analyses the implications of forest taxes and fees at both micro and macro level of the forestry sector. For micro level, the study focused on the smallholder forestry farmers sawn timber value chain (SFFSTVC) in Mufindi district, whereby forms of and influence of forest taxes and fees on the incentive of the actors to continue with forestry businesses were analysed, their implication on the income of the actors in the value chain was identified, and for macro level, the long-run relationship of forest taxes and GDP was analysed. Proportionate stratified sampling method identified a sample of 267 respondents for the micro level of the study. Questionnaires, key informant interviews, FGD and observation were used in data collection; macro-economic data was obtained from relevant institutions. Quantitative data was analysed with aid of SPSS, MS Excel and R softwares. Results show that the actors in the SFFSTVC are liable to few taxes and fees and their compliance is low due to poor enforcement of the agencies, also 64% of all respondents are willing to continue with business despite the taxes and fees, and that the taxes and fees on the value chain to be on average of 15% of their total revenue. In macro level, forest taxes were found to have a bi-directional granger causality and long run equilibrium. Finally, forest taxes and fees have an observable implication, the study recommends that nation's forestry taxation policies to be improved by the MoFP to stimulate investment in the forestry sector so as to ensure sustainable supply of the forestry resources.

DECLARATION

I, Sadiki Hamza Sadiki, do declare to the Senate of Sokoine University of Agriculture that, this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

_____ _____

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(MSc. Candidate)

The above declaration is confirmed by:

_____ _____

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(Supervisor)

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LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS

ADF	Augmented Dickey-Fuller
AU	African Union
AUC	African Union Commission
FAO	Food and Agriculture Organization of the United Nations
FBD	Forestry and Beekeeping Division
FDT	Forest Development Trust
FORT	Forest Taxes Revenue
GAI	GAI
GDP	Gross Domestic Product
ha	Hectare
HQ	Headquarters
LGA	Local Government Authority
LMDA	Logging Miscellaneous Deposit Account
m^3	Cubic metres
MNRT	Ministry of Natural Resource and Tourism
MoFP	Ministry of Finance and Planning
NAFORMA	National Assessment Resources Monitoring and Assessment
NBS	National Bureau of Statistics
NFC	New Forest Company
NOFIA	Northern Forestry Industries Association
PFP	Private Forestry Programme
PWBIs	Primary Wood Based Industries
REA	Rural Electrification Agency

SDG	Sustainable Development Goals
SHFFSTVC	Small Holder Forest Farmers Sawn Timber Value Chain
SHFP	Sao Hill Forest Plantation
SME	Small and Medium Enterprises
SPSS	Statistical Package for Social Science
STGs	Small Tree Growers
TANESCO	Tanzania Electric Supply Company
TANWAT	Tanganyika Wattle Company
TFS	Tanzania Forest Service Agency
TMA	Tanzania Meteorological Agency
TRA	Tanzania Revenue Authority
TTPs	Tropical Timber Products
TZS	Tanzania Shillings
UAE	United Arabs Emirates
UN	United Nations
URT	United Republic of Tanzania
USD	United States Dollars
VAT	Value Added Tax

CHAPTER ONE

1.1 INTRODUCTION

1.2 Background information

Tanzania is well-endowed with different natural resources, including forest lands. The total area of forest and woodlands in Tanzania mainland is estimated to be 48.1 million Hectares (ha) which is about 55% of the total land area of Tanzania mainland (MNRT, 2015). The forestry industry is a substantial sector in the country's economy contributing about 4% of the national income (MNRT, 2018). The Agriculture and Fisheries sectors combined with the forestry sector contributes to about 75.9% of the total work force in Tanzania (MNRT, 2015). The forestry industry provides both direct and indirect livelihoods to local communities (Nyamoga and Solberg, 2019). According to Ngaga (2011), about 90% of Tanzania's energy needs are met through the use of wood fuels. Apart from timber as the main forest product, the forestry industry in Tanzania provides other important forest products such as honey, wild fruits, charcoal and firewood, as stipulated in a study by Monela *et al*. (2000).

Sustainability of the forestry resources at global level have been reflected in the UN's Sustainable Development Goals (SDGs) and that forestry plays a dual role, i.e., forestry can achieve positive sustainability effects especially for SDG 15 which deals with sustainable forestry and combating desertification (Baumgartner, 2019). Sustainable forest sector in Tanzania is also an important part of the vision of the African Union's Agenda 2063 which stipulates that Africa will be a prosperous continent with the means to drive its own development through the sustainable, long-term stewardship of its resources (AUC, 2020). The forestry Sector in Tanzania has been booming in recent years (Abdallah and Masaka, 2018; Arvola *et al*., 2019; Mankinen *et al*., 2017; Moore *et al*.,

2016). However, forest resources have been depleting at a fast rate due to the increase in population pressures which leads to a constant increase in demand for forest products. The National Forest Resources Monitoring and Assessment (NAFORMA) showed that the annual demand for wood in Tanzania is estimated at 62.3 million m^3 mainly for household energy (MNRT, 2015). This consumption exceeds the sustainable supply for wood which is about 42.8 million m^3, causing an annual wood deficit of 19.5 million m^3 (MNRT, 2015). Sustainable harvesting of wood and extraction of the forest products is necessary for ensuring the longevity of the forest resources to ensure its supply to future generations. One of the methods for ensuring efficient and sustainable exploitation of forest resources is the use of fiscal regulatory measures such as forest taxes and fees imposed by the government to forest products (Heaps and Helliwell, 1985).

1.3 Problem statement and justification of the study

Different forest products in Tanzania are charged with several taxes imposed by the government (GAI, 2014), in order to have sufficient revenue for ensuring long term sustainability of the forest resources (Makoye, 2017). Taxation of forest products is one of the ideal measures by the government to ensure sustainable harvesting of forest products especially timber (Heaps and Helliwell, 1985). However, in doing so, these taxes can have significant impacts in the development of the forestry industry in the country. Imposition of forest taxes may influence the level of production for forest products; significantly alter the incomes of small- and large-scale forest owners; and ultimately affect the level of the country's national income (Gray, 1983; Stiglitz and Rosengard, 2015). Despite these observations, the studies concerning the implication of forest taxation and fees to development of the forestry sector especially for smallholder forest plantations in Tanzania appear to be non-existent. Studies by GAI (2014) and Ngaga (2011) outlined the types of taxes and other charges imposed in forest products in Tanzania. On the other hand a study

by Forestry and Beekeeping Division (FBD) (2011) stipulated that centrally fixed royalty fees, will raise prices and profits but keep small scale operators out of business. According to Kobb (1998) there are several means of improving the efficiency of forestry revenue collection. Therefore, the aim of this study is to cover the research gap on how the forest taxes and fees can influence the production of wood forest products, how they affect the income of farmers, and their long run dynamics and contribution to the economic growth in Tanzania by focusing mainly on sawn-wood timber products in smallholder farmers' value chain in Mufindi District as the micro level of this study.

The study findings provide pertinent information to policy makers, making them able to design a fair and efficient taxation system for forest products to warrant sustainable management of the forests at the same time ensuring that the forestry industry contribute significantly to the national income through efficient means of revenues collection which can in turn be used to support economic development.

1.4 Objectives of the study

1.4.1 Overall objective

The overall objective of this study was to assess the implication of the forest taxes and fees in the smallholder farmers' value chain and their long run contribution to the economy of the country.

1.4.2 Specific objectives

The specific objectives for this study were to:

(i) identify forms of forest taxes and fees imposed to the wood forest products in the value chain,

(ii) show how forest taxes and fees can influence the incentive to continue producing sawn-wood forest products in the value chain,

(iii) determine the implication of forest taxes and fees in the income of those engaged in the forestry business along the sawn timber value chain,

(iv) assess the long run contribution of forest taxes to the national income (GDP).

1.5 Research questions

The operationalisation of the specific objectives has been based on the following research questions:

(i) What are the forms of forest taxes and fees imposed by the government, and how are they charged to the forest products (in this case sawn timber)?

(ii) Is there any potential influence of the forest taxes and fees to the locals' incentive to invest in the sector?

(iii) How do the forest taxes and fees affect the profit margin of the small-holder forest actors along the sawn timber value chain?

(iv) Is there any long-run relationship between the forest taxes revenue to the government revenue?

1.6 Conceptual framework

The conceptual framework for this study was built on the basis that in the micro level, forest taxes and fees affect the smallholder forestry sawn timber value chain via the implementing institutions which include LGAs, TFS and TRA. The value chain actors are producers (tree growers), brokers, saw millers, timber traders (Wholesalers and Retailers) and furniture makers. The framework shows that there may be some influence of the forest taxes

and fees in the income of the actors and their incentive to continue investing in the forestry sector. This in turn affect the forestry sector and economic development in general. The framework also shows that there is some kind of economic relationship between the forest taxes and fees and the economic development. Figure 1 shows the illustration of the conceptual framework for this study.

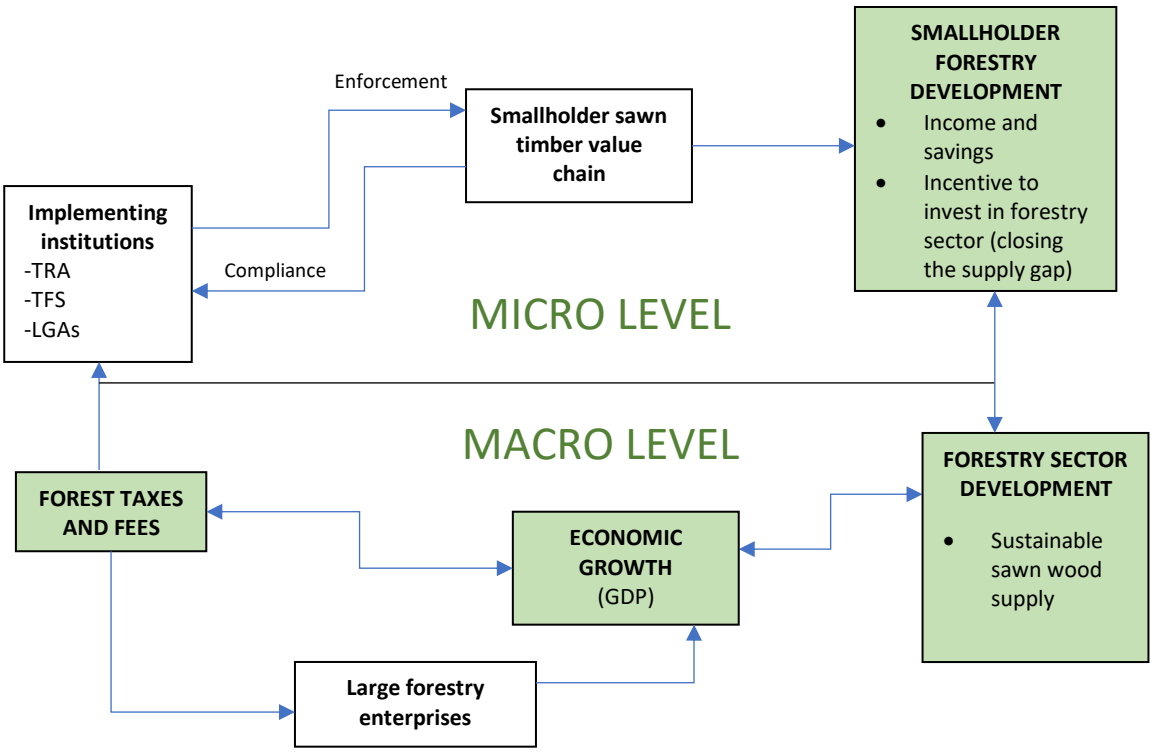

Figure 1: Conceptual framework for the study showing implications of forest taxes and fees on the forestry sector and economic development.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Smallholder forestry

2.1.1 Overview of smallholder forestry in the world

Smallholder farmers maybe defined as those farmers owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour (DAFF, 2012). Governments own about half of the productive forest plantations in the world (Byron, 2001; Indufor, 2017). Therefore much attention is garnered towards the government owned forest plantations rather than smallholder plantations (Byron, 2001). However, the scale of smallholder forestry has increased significantly in recent years (Arvola *et al*., 2019) and are increasingly becoming important producers of timber, pulpwood and environmental services, (Bertomeu, 2006; Dubey, 2008; Versteeg *et al*., 2017). The boom may be caused by increased profitability of smallholder forest plantations which have been established taking advantage of declining natural forest supply of timber due to deforestation and ever increasing demand of the forest products like timber and sawn wood (Bertomeu, 2006).

2.1.2 Smallholder forestry ownership in Tanzania

The increasing demand for forest products in Tanzania (Mankinen *et al.,* 2017; MNRT, 2015; Nyamoga and Solberg, 2019) resulted into the observed rise in smallholder forest plantations especially in the Southern Highland regions (Held *et al.,* 2017; Arvola *et al.,* 2019). According to MNRT (2015), cultivated land takes about 24.4% of the total land area in Tanzania mainland. However, 7.8% of the growing stock is from the cultivated lands which mainly comprise of woodlots. In the Southern Highlands, the dominant

vegetation type is cultivated land which accounts for 24.4% of the total land area in the region. Since 2007, smallholder forestry in the Southern Highlands has strongly emerged as a means for farmers to diversify their livelihoods against economic shocks (Arvola *et al*., 2019). The driving force for these farmers to engage in small-scale forestry is the nationwide forest products scarcity derived from excess demand of the construction timber (Abdallah and Masaka, 2018; Arvola *et al.*, 2019; MNRT, 2015).

2.1.2.1 Smallholder forestry as a key supply source for the forestry sector

According to Held *et al*. (2017), it is estimated that in 2016, 174 000 ha were owned by small and medium scale tree growers, 54% of the total, with the balance consisting of 100 000 ha of TFS plantations (31%) and 51 000 ha of large private plantations (15%), owned by five major actors. The small-scale grower segment is also the one segment with strong potential to make future gains in both productivity and area.

This shift in the supply base has major implications for the sector, as small and medium scale tree growers typically use local low-quality seed, observe poor silviculture and practice short rotations.

2.1.2.2 Value chain of sawn wood from smallholder farmers

The value chain refers to a framework responsible for coordinating information on how inputs and services can be integrated to grow, transform or manufacture a product and then transported physically from producers to consumers (Alemu and Auch, 2016). Moore *et al*. (2016) outlines a market-based approach to the steps forest value chain in producers' side in Southern Highlands (Nyamoga and Solberg, 2019) Tanzania as commencing from forest resources to wood harvesting to forest products (logs, poles and pulpwood) to wood transportation to industries (sawmilling, poles, pulp and paper), to wood products

(sawn timber, poles, pulp, veneer) then finally to final consumers (construction, joinery and furniture and pallets). Study findings by Kallabaka (2018) in Mufindi District revealed that sawn timber value chain has the complex networks with multiple of actors including producers (tree growers), processors, timber businessmen both wholesalers and retailers as well as business support service providers such as forest officers and government officers.

2.2 Principles behind taxation

Various principles have been put forward by economists regarding a fair taxation system and distribution of tax burdens. Among them is the ability-to-pay principle and the benefit principle by Adam Smith. The idea that there should be some equivalence between what the individual pays and the benefits he/she subsequently receives from governmental activities.

2.2.1 The ability-to-pay principle

This principle requires that the total tax burden will be distributed among individuals according to their capacity to bear it, taking into account all of the relevant personal characteristics. In this case, most suitable taxes are personal levies i.e., income tax, consumption and inheritance taxes. Initially income was thought to be the best indicator of ability to pay but modern philosophers such as John Locke believe that equity should be measured in consumption (Koritnik and Podlipnik, 2017).

Indirect taxes such as VAT, excise, sales, or turnover taxes can be adapted to the ability-to-pay criterion, but only to a limited extent—for example, by exempting necessities such as food or by differentiating tax rates according to “urgency of need.” Such policies are generally not very effective; moreover, they distort consumer purchasing patterns, and their complexity often makes them difficult to institute (Crespo, 2009).

2.2.2 The benefit principle

Under the benefit principle, taxes are seen as serving a function similar to that of prices in private transactions; that is, they help determine what activities the government will undertake and who will pay for them. If this principle could be implemented, the allocation of resources through the public sector would respond directly to consumer wishes (Oakland and Testa, 2000).

2.2.3 Economic efficiency

This is based on the fact that tax policy should generally refrain from interfering with the market's allocation of economic resources (Jorgenson and Kun-Young, 2013). That is, taxation should entail a minimum of interference with individual decisions, which in the case of this study is that taxation should not negatively affect the forest farmer's decision on when to cut trees for income. However, this does not mean, of course, that major social and economic goals may not take precedence over these considerations. For instance, it may be desirable, to impose taxes on pollution as a means of protecting the environment. Economists have developed techniques to measure the "excess burden" that results when taxes distort economic decision making. A more nearly neutral tax system would result in less distortion.

2.2.4 Ease of administration and compliance

There are four general requirements for the efficient administration of tax laws: clarity, stability (or continuity), cost-effectiveness, and convenience. Administrative considerations are especially important in developing countries such as Tanzania, where illiteracy, lack of commercial markets, absence accounting information, and inadequate administrative resources in implementing institutions i.e., TRA, TFS and LGAs may hinder both compliance and administration in the forestry sector. Under such circumstances the

achievement of rough justice may be preferable to infeasible fine-tuning in the name of equity.

2.2.5 Shifting and incidence

The incidence of a tax rests on the person(s) whose real net income is reduced by the tax (Marion, 2013). It is fundamental that the real burden of taxation does not necessarily rest upon the person who is legally responsible for payment of the tax (Ross, 1893). Taxes may be shifted in several directions. Forward shifting takes place if the burden falls entirely on the user, rather than the supplier, of the commodity or service in question—e.g., an excise tax on luxuries that increases their price to the purchaser. Backward shifting occurs when the price of the article taxed remains the same but the cost of the tax is borne by those engaged in producing it—e.g., through lower wages and salaries, lower prices for raw materials, or a lower return on borrowed capital. Finally, a tax may not be shifted at all—e.g., a tax on business profits may reduce the net income of the business owner (Entin, 2004).

2.3 Taxation and fees for forest products

2.3.1 Basis behind forest taxation and other charges

The government as a sole custodian for the forest reserves in the country, plays a dual fiscal role in management of forest reserves. As the sovereign tax power, the government is responsible for ensuring that the forest sector makes its due contribution to public revenues (Dzingirai and Tambudzai, 2014). The government must determine when to harvest its forest resources as well as setting an appropriate price for its resources at the same time ensuring that the distribution of the benefits of these resources are efficient and effective to promote sustainable economic growth and development (Schwidrowski *et al.*, 2005; Whiteman, 2005).

Forest taxes are charges that can be structured in a variety of ways, such as: flat-rate charges per cubic metre of round wood cut or taken from the forest; annual charges on the area of forest in a concession; percentage tariffs on the value of forest products produced or exported; or as a combination of such charges (Gray, 1983; Whiteman, 2005). On the other hand, forest fees are charges imposed for the use of forest resources, they include application fees, stumpage fees, royalty fees, and forestry business registration fees (GAI, 2014).

2.3.2 Overview of forest taxes and fees in Tanzania

2.3.2.1 Forest taxes

According to GAI (2014), government obtains revenue from forest resources through taxes and other charges. Taxation of forest products is through direct taxes as governed by the Income Tax Act 2004 and are administered by the Tanzania Revenue Authority (TRA) which includes corporate income tax, individual income tax (personal income tax and presumptive income tax), pay-as you-earn (PAYE) tax, withholding tax and skill development levy (SDL) tax. The taxation is also done through indirect taxes where the major indirect tax categories are Value Added Tax (VAT) and excise duty. These taxes are levied under the Value Added Tax Act, 2014. As with direct taxes, these taxes are administered by the domestic revenue and large taxpayer Departments of TRA.

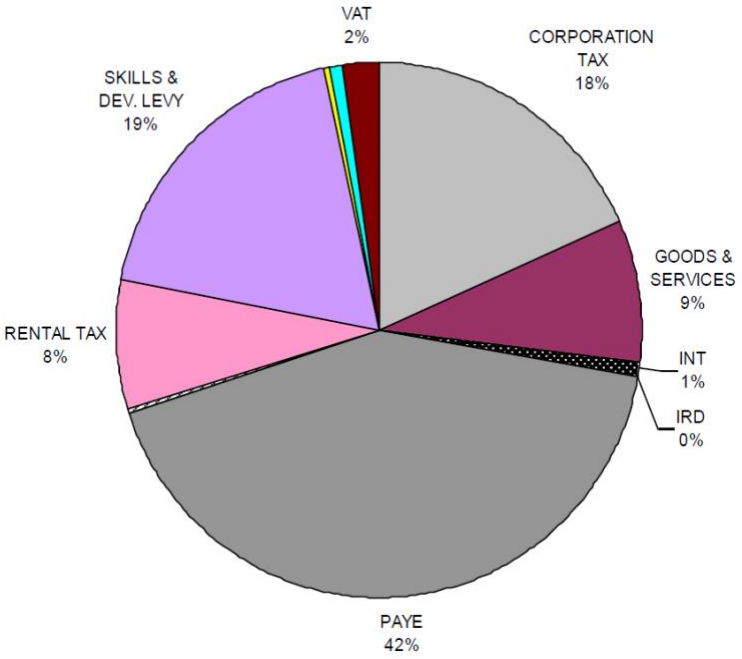

Figure 2: Distribution of tax revenue from Tanzania forestry sector.

Source: TRA (2014)

2.3.2.2 Forest fees and other charges

Forest fees and other charges are administered by Tanzania Forest Services Authority (TFS) and Tanzania Forest Fund (TaFF) under the local or central government authorities. Most of the revenue collected by TFS are from royalties, penalties or fines and confiscations generating only about 2% of the total revenue (GAI, 2014): The largest revenues are collected from royalty payments for harvesting. TaFF charges generated an additional 19% of revenues. Logging and Miscellaneous Account (LMDA), collected from plantations, contributed to 5% of the total revenue (GAI, 2014).

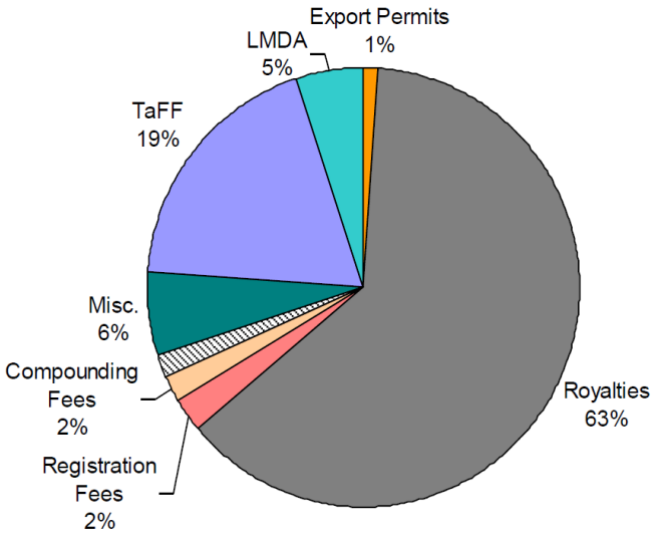

Figure 3: Distribution of forest fee revenue.

Source: TFS (2014)

Revenue collection involves registration of traders, licensing, assessment and the actual collection, accounting and reporting both for FBD or LGAs. The process involves the Headquarters, Regional and District Offices. Although checkpoints are used for inspection of forest products but some of the checkpoints are also used as revenue collection centers (Ngaga, 2011).

2.3.3 Enforcement of forest taxes and fees in the forestry sector

Tanzania revenue collection on economic sectors faces many challenges. This arises mainly from institutional limitations for the collecting agencies. In case of forest taxes and fees in Tanzania, TRA and TFS who are the main revenue collecting agencies face various limitations which limit the level of enforcement for the forest taxes and fees. For instance, for VAT collection, TRA does not have the capacity to monitor VAT registrations (GAI, 2014; TRA, 2012). This also arise from the fact that, the forestry businesses do not keep accurate records of all sales and purchases made during the accounting period.

2.4 Profitability and forest sector development

The phenomenon of profitability and economic development stems from the Ricardian theory of economic development whereby David Ricardo assumes that capital accumulation is a result of profits obtained from production. Capital accumulation depends on capacity to save and the will to save (Boivin *et al.*, 2010). Capacity to save depends on the net income of a society, the larger the net income the larger the capacity to save (Gale and Samwick, 2014). Taking this into consideration, a tree farmer's capacity to save depends on his/her net income for which is a function of many factors including forest taxes and fees. For the farmer to accumulate enough capital to reinvest into the forest sector, he/she should also save enough from his/her net income (Kupčák and Šmída, 2015). One of the ways to analyse the income of a farmer in response to forest taxes and fees is by after-tax profit margin analysis as seen in Section 4.3 of this study.

2.5 Relationship between forest tax revenue to GDP growth

Growth Domestic Product (GDP) is the market value of all final goods and services produced within a country in a given period of time (Mankiw, 2018). Tax is an important fiscal policy for the states and its economy. The developed countries aim of the fiscal policy is to achieve the economic stability. However, the developing countries use taxes to achieve the economic development. The governments use taxes to raise the economic and productive efficiency of the state, by monitoring the economic resources and to exploit these recourses in full (Hijazi, 2001). Studies such as that by Muibi and Sinbo (2013), analyse the level of economic growth that has impacted positively on tax revenue in Nigeria. The general conclusion is that macroeconomic instability and degree of economic activities are the main drivers of tax buoyancy and tax effort in Nigeria. The paper found that taxation is an important instrument to improve economic growth. Canicio and Zachary (2014) show that there is an independence between the economic growth and government tax revenues.

The study finds that 30% speedier relationship of adjustment in the short run towards equilibrium level in the long run.

Among several methods of measuring GDP is the income approach which measures the total income earned by the factors of production, that is, mostly labour and capital within the domestic boundaries of a country. Therefore; GDP (as per income method) = GDP at factor cost + Taxes – Subsidies (TET, 2019). From the income GDP equation, it can be clearly seen that taxes are a significant component of GDP growth. Therefore, from this economic relation, it is safe to assume that revenue collected from forest taxes and fees has a relationship to the GDP growth of a country. One way to analyse the nature of the relationship is by using co-integration analysis which analyses the long-run equilibrium between variables (Awe and Idumah, 2017). Two variables will be cointegrated if they have a long-term, or equilibrium, relationship between them (Gujarati and Porter, 2009). In order to observe the long-run relationship between forest taxes and fees revenue with the GDP growth, both variables must be stationary for them to have any meaningful relationship. Therefore, unit root test such as the Augmented Dickey-Fuller (ADF) tests are done to the residuals of the co-integrating equation to determine their stationarity (Alam, 2011; Awe and Idumah, 2017; Gujarati and Porter, 2009; Revelian, 2016).

2.6 Chapter summary

The literature review has shown that the boom of the smallholder forestry in Tanzania and global level has been increasing, and that the distribution of the forest taxes and fees indicates that most of the revenue comes from the PAYE and royalty fees despite the enforcement of the forest taxes and fees being minimal. Therefore, there is still the need for investigation the implications of the forest taxes and fees on the smallholder forestry sector in Tanzania.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study area

The study was carried out in Mufindi District in Iringa Region. Mufindi District is one of the seven Districts in Iringa Region located in Southern Highland of Tanzania. The district lies between latitude 8°.00‘– 9°.15‘South and longitude 34° 35‘–35° 55‘East. The district is situated about 80 km from Iringa Municipality and bordered by Iringa Rural District to the North, Morogoro region to the East, Njombe Region to the South, and Mbeya region to the West, Kilolo District to the North East and Kilombero District to the South East. Mufindi District was selected purposively because it is leading in woodlot farming in Tanzania (Singunda, 2010) and is the district in which Sao Hill plantation is located which is the largest government forest plantation in Tanzania (Ngaga, 2011).

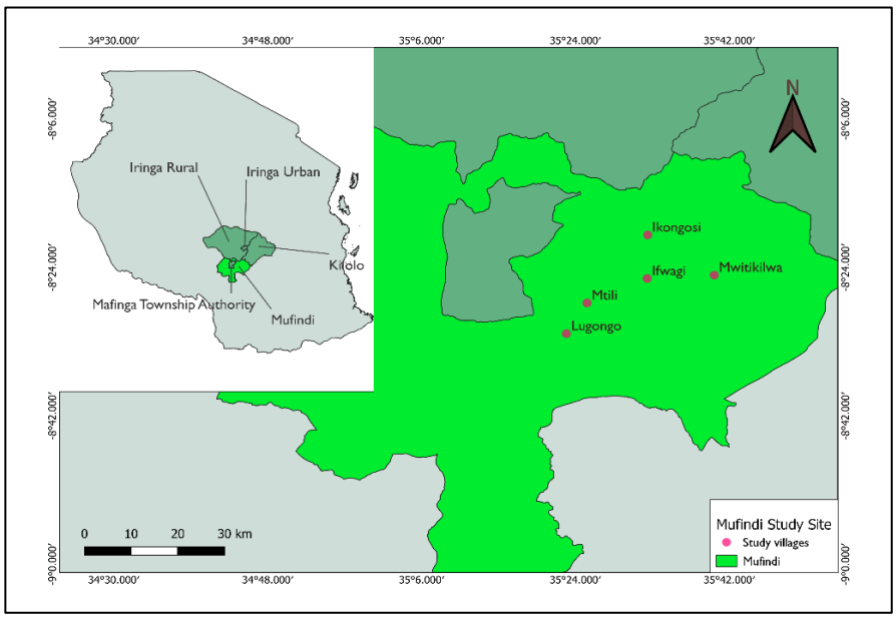

Figure 4: Map of the study area

3.2 Research design

The study was designed to obtain results from micro and macro levels. In micro level, the study observed the implications of forest taxation and fees in the development of small-holder forestry in Mufindi district, while at macro level, the implication of the forest taxation and fees in the economic growth of the country was observed. The micro level part of study employed cross-sectional research design, while for the macro level, correlational research design was implemented. The cross-sectional research design provides a snapshot of outcome and the characteristics associated with it at a specific point in time (Levin, 2016). This study design was chosen because it is cost-effective, less time consuming and tends to allow collection of in-depth data from respondents at one point in time and suitable for descriptive analyses as well as the determination of relationships between variables under study (Rubin and Babbie, 2009).

3.3 Sampling procedure

In micro level, the sample frame for this study followed the value chain map developed by (Kallabaka, 2018) which described that the sawn timber value chain actors in Mufindi district are spread across five main strata namely tree growers, sawmill enterprises, timber marketing, furniture making enterprises and brokers. The value chain map was adapted to reflect the nature of this study by including only the production side of the value chain and accessibility. This study utilized four strata namely small-scale tree growers, sawmillers, timber marketers and furniture makers. The list of individuals from the four strata spanning five (5) purposively selected villages of Ifwagi, Mtili, Lugongo, Ikongosi and Mwitikilwa was requested from the Mufindi district council, hence constituting the sampling frame.

3.4 Sample size determination

The sample size of the value chain actors in each village was in the study was determined using the following formula developed by Naing *et al.* (2006) and results are presented in Table 1.

$$n = \frac{NZ^2p(1-p)}{d^2} \quad \text{..... (1)}$$

Where,

n = Sample size

N = Population size

Z = Z statistic (Z): for the level of confidence of 95%, Z = 1.96

P = expected prevalence (proportion) or standard deviation *p=0.2*

d = precision or error *d=0.05.*

Table 1: Selected respondents from study villages

S/n	Village	Target population of actors	Number of selected respondents
1	Mtili	1 880	99
2	Lugongo	680	34
3	Mwitikilwa	600	30
4	Ifwagi	1 564	78
5	Ikongosi	522	26
	Total	**5 246**	**267**

Due to varying strata size, proportionate stratified sample size determination method was used to select respondents from each stratum (Kothari, 2004). The method was selected to increase precision on the sawmillers, timber marketers and furniture makers strata which had relatively smaller size compared to the tree growers' stratum. Sample sizes for each stratum were obtained by using the following formula

$$P_i = \frac{nS}{M} \quad \text{..... (2)}$$

Where,

P_i = Number of respondents in a sample for each stratum.

n = Sample size

M= Population size (population of study)

S = Sample size of the strata.

Table 2: Strata population and sample sizes

S/n	Stratum	Stratum population	Stratum sample size
1	Tree growers	4895	230
2	Saw millers	189	13
3	Timber traders	216	11
4	Furniture makers	201	13
	TOTAL	**5501**	**267**

Furthermore, snowballing sampling method was used to select 10 respondents for the Focus Group Discussion (FGD) in Mtili village.

3.5 Data collection

This study employed the use of both secondary and primary data. The methods used for collecting primary data included semi-structured questionnaires used on the selected respondents in Mufindi district for the micro level of this study, and key informant interviews. The data collection tools were designed to capture both qualitative and quantitative data. Qualitative data included opinions of the actors on the taxes and fees imposed on sawn wood, reasons for the fall in prices for smallholder farmers, efficiency of the harvesting equipment for sawmillers, and incentive to continue on smallholder forestry business. On the other hand, quantitative data included the total amount of sawn wood moved at each node of the value chain, costs incurred by the value chain actors and income obtained from the sale of trees, sawn wood and furniture. A pilot study was conducted for one day on eight (8) respondents to test the feasibility and efficacy of the questionnaires.

The pilot study results showed that the questions were well understood and respondents did not face a hard time answering them.

Focus Group Discussions (FGD) of 10 respondents grouped into two, were conducted in Mtili village to obtain general opinions regarding forest taxes and fees on respondents, especially small holder forest farmers. Key informant interviews were used on TRA-Mufindi district officials, TFS-Mufindi DFM, Mufindi district forest officers, VEOs and village chairmen, who provided their opinions and also answered questions that supported the results for this study.

Secondary data was collected from various sources including district reports, published and unpublished research papers and other relevant materials. The secondary data collected included forest tax revenue from TRA and GDP from BOT which were used for analysis in objective 4.

3.6 Data analysis

The data collected were analysed using quantitative and qualitative techniques. The quantitative data were analysed by using Statistical Package for Social Sciences (SPSS) to compute descriptive statistics so as to obtain mean and percentage distribution of the responses for objective 2. Content analysis was also used to analyse and summarise qualitative field data which included opinions, justifications and incentives in respect to the forest taxes and fees faced by the SFFSTVC value chain actors in objective 2.

3.6.1 Profit margin analysis for objective 3

The data on selling and buying prices and total costs incurred by the SFFSTVC actors was collected using questionnaires in which together with the quantity of sawn wood produced

was used to estimate the profit margins of actors per each node by making the use of the following linear model modified from Kallabaka (2018) to estimate the profit margins based on the data.

$$Profit\ Margin\ = \mu_i X_i - Y_i X_i - C_i \quad \text{..... (3)}$$

Where: -

μ_i = Selling price/unit

Y_i = Buying Price/unit

X_i = Quantity of product in respective units

C_i = Other costs of the product/unit

i = actor

The obtained profit margin was used to compute/estimate an after-tax profit margin by using Microsoft Office-Excel, which is basically the profit margin after deduction of taxes from the total revenue. The model changes to become:

$$After\ tax\ Profit\ Margin\ = \mu_{ij} X_{ij} - Y_{ij} X_{ij} - C_{ij} - T_{ij} \quad \text{..... (4)}$$

Where: -

μ_{ij} = Selling price/unit

Y_{ij} = Buying Price/unit

X_{ij} = Quantity of output in respective units

C_{ij} = Other costs of the product/unit

T_{ij} = Total taxes and fees imposed for

i = actor

j = stratum

3.6.2 Co-integration analysis for objective 4

3.6.2.1 Data collection

The quarterly data used from this study were obtained from 2 different sources. Tanzania GDP data was obtained from quarterly financial reports published by the Bank of Tanzania

(BOT). The data obtained was GDP at constant 2015 prices adjusted for inflation from the first quarter of the year 2012 to the fourth quarter of the year 2020.

Moreover, the forestry tax revenue data was obtained from quarterly sectoral revenue reports published by the Tanzania Revenue Authority (TRA). This data was also obtained from the first quarter of the year 2012 to the fourth quarter of the year 2020. However, the forest tax revenue data consisted of a gap in the fourth quarter of the year 2018. The value of this data point was estimated using moving average (MA) method for the sake of analysis. Both data constitute a time series data frame of 36 quarterly observations for GDP and 35 observations for forest tax revenue data. The open-source R software was used for the advanced time series analysis in this objective.

3.6.2.2 Model specification

The aim of this objective was to show the contribution of forest taxes imposed on the forest sector to the GDP of the country. The study observed the short run and long run relationship of the forestry tax revenue with GDP from 2012 to 2020, distributed in quarterly form. An econometric tool of cointegration was used to establish the nature of the relationship between GDP (*GDP*) and both forestry tax revenue variables (*FORT*). As explained by Awe and Idumah (2017), the process is of three categories for both sets of cointegrations i.e. The first category involves the conventional regression analysis to capture the effect of forestry tax revenue on Tanzania's economy (GDP). This would only analyse one direction of a possible bidirectional relationship. Generally, the model specification for this relationship will be as follows:

$$lnGDP_t = \beta_1 + \beta_2 lnFORT_t + \mu_t \quad \text{..... (5)}$$

Where $lnGDP_t$ is the natural log of Tanzania GDP for a time period of 36 quarters from 2012 to 2020, β_1 is the intercept coefficient of the cointegration equation, β_2 is the co-integrating parameter, which is basically the rate of change of GDP based on the change in forestry revenue, $lnFORT_t$ is the natural log of forestry tax revenue over a time period of 36 quarters from 2012 to 2020, and μ_t is the error term assumed to be serially uncorrelated, constant variance and zero mean.

3.6.2.3 Unit root testing for stationarity

The variables were tested for stationarity, using the Augmented Dickey-Fuller (ADF) test for unit root. Both variables were transformed to the first differences of their natural logarithmic forms. The ADF was conducted on the following forms of variables.

For *GDP*,

$$\Delta lnGDP_t = c + \rho lnGDP_{t-1} + \sum_{j=1}^{k-1} \gamma \Delta lnGDP_{t-j} + \beta T + \varepsilon_t \quad \text{..... (6)}$$

For *FORT*,

$$\Delta lnFORT_t = c + \rho lnFORT_{t-1} + \sum_{j=1}^{k-1} \gamma \Delta lnFORT_{t-j} + \beta T + \varepsilon_t \quad \text{..... (7)}$$

Whereby hypothesis tested were

H_0: $\rho = 0$, the series is not stationary

H_1: $\rho \neq 0$, the series is stationary

3.6.2.4 Johansen cointegration test

After the variables were found to be stationary. Cointegration test was conducted by using the following Vector Auto Regressive (VAR) model as specified by Johansen *et al*. (1992).

$$\Delta lnGDP_t = \Pi lnGDP_{t-1} + \sum_{j=1}^{k-1} \gamma \Delta lnFORT_t + \omega_t \quad \text{..... (8)}$$

And

$$\Delta lnFORT_t = \Pi lnFORT_{t-1} + \sum_{j=1}^{k-1} \gamma \Delta lnGDP_t + \omega_t \quad \text{..... (9)}$$

Where, GDP_t and $FORT_t$, are vector columns of GDP and forest taxes revenue collected in the period of time, which are integrated of order *I* (1), the Π, γ, and Φ, forms the parameter matrix. And also, ω_t is a vector of random error follows Gaussian white noise process. The model tests the rank of matrix (Π), which contains long-run information of the variables. If rank Π = r = k, (where k is the number of endogenous variables) the variables in level are stationary meaning that no cointegration exists and if rank Π = r =0, meaning that all the elements in the adjustment matrix have value zero, therefore, none of the linear combination is stationary (Alam, 2011).

The Granger representation theorem by Engle and Granger (1987) states that, when 0 < rank (Π =r) < k, there are r cointegrating vectors. A rank of Π = r = 1, implies that there is a single cointegrating vector or one linear combination which is stationary and that the Π can be shown as $\Pi = \alpha\beta'$ where, α is the adjustment vector and β is the cointegrating vector and both $\beta'\ln GDP_{t-1}$ and $\beta'\ln FORT_{t-1}$ are integrated at order *I* (0). The Johansen method was used to estimate the Π matrix from an unrestricted VAR model and to test whether the restriction implied by the reduced rank of Π can be rejected. The trace test for testing reduced rank (r) from coefficient matrix Π is as follows:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \ln (1 - \hat{\lambda}_i^2) \quad \text{..... (10)}$$

Where $\widehat{\lambda_i}$ is the estimated values of the ordered eigenvalues obtained from the estimated matrix and T is the number of usable observations. The trace statistic tests the following hypotheses

H_0: the number of distinct cointegrating vectors (r) ≤ r

H_1: the number of distinct cointegrating vectors (r) > r

3.6.2.5 Granger causality between GDP and forest taxes revenue

The existence of a bivariate cointegrating relationship led to the third category which involved the use of Granger Causality based tests on forestry tax revenues and the GDP to observe their direction of influence. The standard Wald test observes the underlying principle that if an α matrix in cointegration matrix Π has a complete column of zeros, then no causal relationship exists, because there is no cointegrating vector that appears in that particular block. For pair-wise causal relationships, equations (8 and 9) can be re-written in the following equation.

$$\begin{bmatrix} \Delta lnGDP_t \\ \Delta lnFORT_t \end{bmatrix} = \sum_{i=1}^{k-1} \begin{bmatrix} \gamma_{i,11} & \gamma_{i,12} \\ \gamma_{i,21} & \gamma_{i,22} \end{bmatrix} \begin{bmatrix} \Delta lnFORT_{t-i} \\ \Delta lnFORT_{t-i} \end{bmatrix} + \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} [\beta_1 \quad \beta_2] \begin{bmatrix} lnGDP_{t-k} \\ lnFORT_{t-k} \end{bmatrix} + \begin{bmatrix} \omega_{1t} \\ \omega_{1t} \end{bmatrix} \quad \text{..... (11)}$$

Where, $\Delta lnGDP_t$ and $\Delta lnFORT_t$ represent the first differences of GDP and forest taxes revenue over time respectively. Analysing equation (11), there are three possible cases associated with testing for long-run causality, (a) $\alpha_1 \neq 0$, $\alpha_2 \neq 0$ (b) $\alpha_1 = 0$, $\alpha_2 \neq 0$ and (c) $\alpha_1 \neq 0$, $\alpha_2 = 0$. Case a) implies bi-directional causality, while cases b) and c) imply unidirectional causality.

To test for short-run Granger causality, i. e., GDP does not Granger cause forest taxes revenue the short-run (or forest taxes revenue does not Granger cause GDP in short-run), the statistical significance of the lagged dynamic variable changes is examined by testing the null hypothesis using a standard wald test.

H_0: $\sum_{i=1}^{k} \gamma_{i(lnVAR)} = 0$, where *VAR* represent either *GDP* or *FORT*

Failure to reject the null hypothesis (H_o), implies the variable tested does not Granger cause the other variable.

3.6.2.6 Vector error correction model (VECM) specification

The final category is the estimation of the VECM to explore the short-run dynamic relationships and the speed of adjustment for the long-run equilibrium between both forestry taxes revenue and GDP (Awe and Idumah, 2017; Streimikiene *et al*., 2018).

The following are the model specifications for the VECM.

$$\Delta lnGDP_t = \alpha_1(ECT_{t-1}) + \sum_{i=1}^{p-1} \gamma_i \, \Delta lnGDP_t + \sum_{j=1}^{q-1} \psi_j \, \Delta lnFORT_t + \omega_{1t} \qquad \text{..... (12)}$$

$$\Delta lnFORT_t = \alpha_2(ECT_{t-1}) + \sum_{i=1}^{p-1} \gamma_i \, \Delta lnFORT_t + \sum_{j=1}^{q-1} \psi_j \, \Delta lnGDP_t + \omega_{2t} \qquad \text{..... (13)}$$

Where the one period lagged error correction term ECT_{t-1} is the lag of estimated residuals from the cointegrating regression and estimated from Johansen model specified in equations 8 and 9. The p and q are the number of lags which were chosen through Schwarz Criterion (SC), Hannan Quinn (HQ) and Final Prediction Error (FPE), lag selection criterion. The size and statistical significance of α_1 and α_2 parameters measure the rate of adjustment of the variables to the disturbance from the long-run equilibrium relationship.

3.6.2.7 Parameter estimation

Since the tax revenue and GDP data are expressed in their logarithmic forms, the cointegration vector (β) estimated from the Johansen (VAR) model specified in equations (8 and 9) measures the long-run marginal rate of the forest tax revenue on the GDP and vice

versa for each model. Short run marginal rates are estimated by the parameter (φ) in equations (12 and 13). Specifically, it represents percentage adjustment of the GDP or forest tax revenue following a period change in forest tax revenue and GDP respectively. Furthermore, the parameter vector (γ), is an autoregressive term, measuring the effect of each period change on the change of the current period of both variables depending on the direction of the relationship.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Forms of forest taxes and fees imposed on smallholder forest farmers' sawn timber value chain

The Tanzania Income Tax Act revised in 2019 stipulates that every individual who is a permanent resident earning a specified amount of annual income is liable to the income tax (URT, 2019). Furthermore, the Tanzania Value Added Tax Act of 2014 specifies that all taxable supplies made in Mainland Tanzania by suppliers are liable to be levied the VAT (URT, 2014). Forest fees are imposed on forest products under the jurisdiction of the TFS and the local government given such power by the Tanzania Forest Act of 2002 (URT, 2002). Table 3 shows the various forms of taxes and fees imposed on the smallholder forest farmers' sawn timber value chain in the study area.

Table 3: Forms of forest taxes and fees imposed on smallholder forest farmers' sawn timber value chain

		Tree Growers	Sawmillers	Timber traders	Furniture makers
Forest taxes	Income tax	Not enforced	Low enforcement	Low enforcement	Low enforcement
	PAYE	Not formalized	Not formalized	Not formalized	Not formalized
	VAT	Not enforced	Enforced	Enforced	Enforced
	Property tax	Not enforced	Not enforced	Not enforced	Not enforced
Forest fees and other charges	Registration Fees	Not enforced	Enforced	Enforced	Enforced
	CESS	Not applicable	Enforced	Enforced	Enforced

Studies from GAI (2014) reveal that 42% of tax revenue from the forestry sector comes from PAYE tax on employees. But this is noted only for large forestry enterprises.

Unformalized smallholder forestry sector in the study area brings about losses to the government revenue because of the untapped revenue which could be obtained from the smallholder forest farmers' sawn timber value chain. This is also stipulated in the study by Schwartz (2021) who argued that centralized private woodlots are potential sources of government revenue.

4.1.1 Forest taxes imposition, administration and compliance on primary producers

The primary producers in the SFFSTVC are required to pay the income tax if the income earned from the sale of forest products meets the taxable threshold specified by the government in the Income Tax Act (2004), and they are also required to pay the VAT on their forest products because they fall under the category of domestic (Tanzania mainland) suppliers.

A TRA approved assessment is required to be performed on the tree farms for each tree grower to estimate the quantity of sawn wood produced in m^3. A product of the quantity and the estimated price per each m^3 of sawn wood for the specific year is calculated and profit is estimated. The taxable income is the net income or profit obtained by the tree grower after deducting all the expenses incurred during production.

The tax compliance goes hand in hand with tax enforcement. According to an official at TRA Mufindi District, Tax enforcement at primary producer category in SFFSTVC is very low. This is due to institutional difficulties in reaching the small-scale primary producers which was also rectified in a risk assessment study by TRA (2012) which said there is significant challenge for SMEs to be enforced, especially so since returns must be made monthly. However, the TRA official reiterated that measures are being undertaken by TRA

research and policy department to widen the tax base in the forest sector by increasing the level of tax enforcement on primary producers in the SFFSTVC.

4.1.2 Forest fees imposition, administration and compliance on primary producers

The only fee faced by only primary producers in Mufindi district is the land rent, however if the primary producer is also a saw miller and marketer, he/she will face other fees and charges as well. This land rent charge is administered by the village government. The level of enforcement and compliance of this fees depends on the village government commitment to charge the fee.

Table 4: Stratum percentage to compliance of forest taxes and fees

Strata	Forest Taxes		Forest Fees	
	Income Tax (%)	VAT (%)	Forest business registration fee (%)	CESS (%)
Tree growers	0.0	0.0	0.0	0.0
Sawmillers	0.0	0.0	64.3	100
Sawn timber traders	16.7	75.0	100	100
Furniture makers	0.0	35.7	42.9	0.0

4.1.3 Forest taxes imposition, administration and compliance on sawmillers

Sawn timber processors are mainly sawmillers. In Mufindi district study villages, small scale tree growers either sell their trees to saw-millers or brokers during harvesting, but most of the primary producers have their own saw milling machines which they use to process sawn timber after harvesting. Those who do not possess a saw milling machine normally rent from those who possess them and a price for each size of timber is charged by the machine owner. Consequently, those who rent their machines to the tree growers are offering a service in which the income obtained is taxable if it meets the threshold specified in the Tanzania Income Act revised in 2019. Likewise, according to the Value Added Tax

Act of 2014, they are liable to the VAT because, they offer a service supplied in Tanzania mainland.

According to key informant interviews conducted on village and TRA officials. The level of compliance and enforcement of these types of taxes is non-existent. This is partly due to institutional difficulties in reaching the small-scale timber processors in villages who tend to be using portable micro-mills such as the ding-dong saw (GAI, 2014).

4.1.4 Forest fees imposition, administration and compliance on sawn timber processors

Small-scale saw millers liable to registration fees. All the small scale saw millers in the selected study villages fall under the production category of under 5 000 m^3 per year according to the Forest (Amendments) Regulations (2017). The saw millers under this category are required to pay a fixed forestry business registration fee collected by the TFS which is TZS 200 000 per year. A CESS fee is also paid by the saw millers to the local government. According to regulations, this fee is 5% of the value of trees felled. This was also found to be true by (GAI, 2014) who said that LGAs are entitled to charge cess on forest produce harvested in their respective areas, in accordance with Local Government Act No. 9 of 1982. But as far as the study villages are concerned, this fee is fixed by the village government and ranges from TZS 150 to TZS 300 per each fallen tree. This fee tends to fluctuate from year to year. This was also corroborated in a study by (Mbwambo, 2015) who said that the fee charged over and above the royalty, rather than being deducted from it. The village governments retain 100% of the revenues collected from the local government forest reserves. The field data shows that all saw millers responded that they are aware of the registration fees, and 64.3% of them paid the fee. However, 100% of them paid the CESS fee. This implies that the level of compliance by the sawn timber

processors to the registration fees is high which is complimented by answers from the TFS Mufindi DFM who noted that the effort made by the TFS and local government officials to enforce the collection of the registration fees and the CESS fees respectively was strong.

4.1.5 Forest taxes imposition, administration and compliance on sawn timber traders

Sawn timber traders are mainly wholesalers and retailers of sawn timber. As from previous strata, all timber marketers are required to pay income taxes if they meet the minimum threshold of the taxable income, moreover they are required to possess a business licence provided by the TRA, and also pay VAT. Income tax and business licence costs are paid yearly to the TRA office in Mufindi district.

The timber traders in Mufindi district are subject to presumptive tax system for the income tax because most of them do not keep records that can be audited. The field data revealed that only two (2) out of 12 timber traders responded that they paid their income tax. While 75% claimed they had the EFD machines and therefore paid their VAT. The TRA Mufindi Tax Management Officer (TMO) explained that the level of enforcement for income tax collection was still low on their side, but enforcement for VAT collection was relatively high. He also stated that the level of VAT enforcement on sawn timber traders has increased since 2016 due to reforms in tax collection made by TRA.

4.1.6 Forest fees imposition, administration and compliance on sawn timber traders

Similar to sawmillers, all sawn timber wholesalers and retailers owning a timber yard, are required by the Forest Regulations to pay a registration fee of TZS 200 000 per each year of operations and also pay 5% of the value of sawn timber sold as CESS fee to the local government. However, the 5% CESS fee is not strictly charged as required. Village governments have set a fixed price ranging from TZS 150 to TZS 300 for each piece of

timber sold. The Lugongo village chairman explained that most traders are not completely honest on the value of sawn timber sold, hence it becomes difficult to estimate the fee for each timber trader. Therefore, a fixed amount had to be put forward for each timber piece so as to properly enforce the collection. The fee changes from year to year, with the chairman noting that for Lugongo village the fee had risen from TZS 200 in the year 2018 to TZS 300 in the year 2021.

The compliance to registration fee payment is high as 100% of surveyed timber traders paid their registration fees to TFS. Likewise, compliance to the CESS fee is the same, with 100% of the respondents aware of the fees and 100% of them paying the fees. However, 45% of the surveyed respondents admitted to evade the CESS fee on some transactions.

4.1.7 Forest taxes imposition, administration and compliance on furniture makers

The furniture industry in selected study villages mainly consists of furniture makers and carpenters. They act as the final link in the supply side of the smallholder forest farmers sawn timber value chain. As from preceding strata, all furniture makers are required to pay income taxes if they meet the minimum threshold of the taxable income, moreover they are required to possess a business licence provided by the TRA, and also pay VAT. Income tax and business licence costs are paid yearly to the TRA office in Mufindi district.

Similar to the timber traders' stratum, the furniture makers in Mufindi district are subject to presumptive tax system for the income tax because most of them do not keep records that can be audited. The field data revealed that none of the furniture makers paid their income tax. This is because the profit margin which is the taxable income for the surveyed furniture makers did not meet the required threshold of TZS 4 000 000. Whereas 35.7% of the surveyed respondents claimed they had the EFD machines and therefore paid their VAT.

The TRA Mufindi Tax Management Officer (TMO) explained that they don't impose income tax for those who have not reached the specified taxable income threshold, which is the prevailing characteristic for most small-scale furniture makers in Mufindi district who are found in the villages. However, he insisted that the enforcement level for VAT collection was relatively high. He also stated that the level of VAT enforcement on forestry sector in Mufindi district has been in an upward trend since 2016 due to reforms in tax revenue collection made by TRA. Moreover, the researcher's observation showed that the furniture makers who responded that they have EFD machines are those located on main roads where they are easily accessible by the tax officials.

4.1.8 Forest fees imposition, administration and compliance on furniture makers

Similar to sawmillers and timber traders, all furniture makers owning a yard, are required by the Forest Regulations to pay a registration fee of TZS 200 000 per each year of operations and also pay 5% of the value of furniture sold as CESS fee to the local government. However, due to the extremely small-scale nature of the furniture business, the 5% CESS fee is not charged at all in all the study villages visited. The compliance to registration fee payment is medium as only 42.9% of surveyed timber traders paid their registration fees to TFS. Similar to the tax compliance, it was observed that the respondents who paid their registration fees were those located on main roads where they are easily accessible by the TFS officials.

4.2 Implications of forest taxes and fees to sawn timber production and the locals' incentive to invest on Smallholder forestry

4.2.1 Respondents' comprehension of forest taxes and fees

To assess the implications of the forest taxes and fees on the SFFSTVC, inquiry on the respondents' understanding of the forest taxes and fees was necessary. Respondents were

asked about their awareness of the forest taxes and fees in which they were obligated to pay by the law, which included the Income Tax and the Value Added Tax (VAT) for forest taxes, with forestry business registration fees and CESS fees for the forest fees. Required responses were “Yes” or “No”.

4.2.1.1 Income Tax awareness

When respondents were asked if they knew that they are required by law to pay the Income Tax, 10.9% of all respondents answered “Yes”, while 89.1% of the total respondents answered “No”. The largest proportion of the respondents who were not aware of the Income Tax were the tree growers accumulating a proportion of 81.6% of total respondents. These results are attributed to the fact that there is low level of enforcement of Income Tax especially on the primary producers in the SFFSTVC.

Table 5: Strata Income Tax awareness

			Stratum				
			Tree Growers	**Sawmillers**	**Timber Traders**	**Furniture Makers**	**Total**
Income Tax awareness	No	f	218	9	6	5	238
		%	81.6	3.4	2.2	1.9	89.1
	Yes	f	12	4	5	8	29
		%	4.5	1.5	1.9	3.0	10.9
Total		**N**	**230**	**13**	**11**	**13**	**267**

4.2.1.2 Value Added Tax (VAT) awareness

The respondents were also asked about their awareness of their legal requirement to pay the VAT. Responses varied across strata. All respondents who answered “No” were tree growers who amounted to 79% of all respondents. The remaining 21% of the respondents were aware of the VAT were distributed across the remaining strata as presented in Table 6. Similar to the Income tax, the basis for these results stems from the level of enforcement which is much higher on the later stages of the SFFSTVC.

Table 6: Strata VAT Awareness

			Stratum				
			Tree Growers	**Sawmillers**	**Timber Traders**	**Furniture Makers**	**Total**
VAT Awareness	No	f	211	0.0	0.0	0.0	211
		%	79.0	0.0	0.0	0.0	79.0
	Yes	f	19	13	11	13	56
		%	7.1	4.9	4.1	4.9	21.0
Total		N	230	13	11	13	267

4.2.1.3 Forestry business registration fees awareness

For the registration fee awareness, 87.3% of the total respondents answered "No" of which 86.1% are tree growers, 0.4% are sawmillers and 0.7% are furniture makers. This is due to the fact that there is relatively high level of enforcement of the registration fees by the LGA and TFS officials on the later stages of the SFFSTVC. According to the Mufindi DFM, the TFS has relaxed the level of enforcement on the primary producers such as the tree growers so as to incentivise them to continue with the smallholder forestry business. The summary of responses on the registration fee awareness is presented in Table 7.

Table 7: Strata Forestry business registration fees awareness

			Stratum				
			Tree Growers	**Sawmillers**	**Timber Traders**	**Furniture Makers**	**Total**
Forestry business registration fees awareness	No	f	230	1	0	2	233
		%	86.1	0.4	0.0	0.7	87.3
	Yes	f	0	12	11	11	34
		%	0.0	4.5	4.1	4.1	12.7
Total		N	230	13	11	13	267

4.2.1.4 CESS fee awareness

The respondents from the sawmillers, timber traders and furniture makers strata were asked about their CESS fee awareness, 97.3% of the total respondents answered "Yes" of which

35.1% are sawmillers, 29.7% are timber traders and 32.4% are furniture makers. These results are due to the fact that there is relatively high level of enforcement of the registration fees by the LGA officials. This is also influenced by varied required amount of CESS fees paid by the actors due to different policies in different villages. The summary of responses on the CESS fee awareness is presented in Table 8.

Table 8: Strata CESS fee awareness

			Stratum			
			Sawmillers	**Timber Traders**	**Furniture Makers**	**Total**
CESS fee awareness	No	f	0	0	1	1
		%	0.0	0.0	2.7	2.7
	Yes	f	13	11	12	36
		%	35.1	29.7	32.4	97.3
Total		N	13	11	13	37

4.2.2 Implications of the forest taxes and fees to the local incentive to invest on Smallholder forestry

Respondents in the study villages were asked about the implications of the forest taxes and fees facing their incentive to continue investing in small holder forestry. The respondents were asked about their willingness to continue with smallholder forestry business with answers measured in a five-point Likert scale with values “definitely unwilling”, “unwilling”, “indifferent”, “willing”, and “definitely willing” to continue with the business. In conjunction to the willingness, the respondents were asked based on their responses, on the factors that influenced their choices.

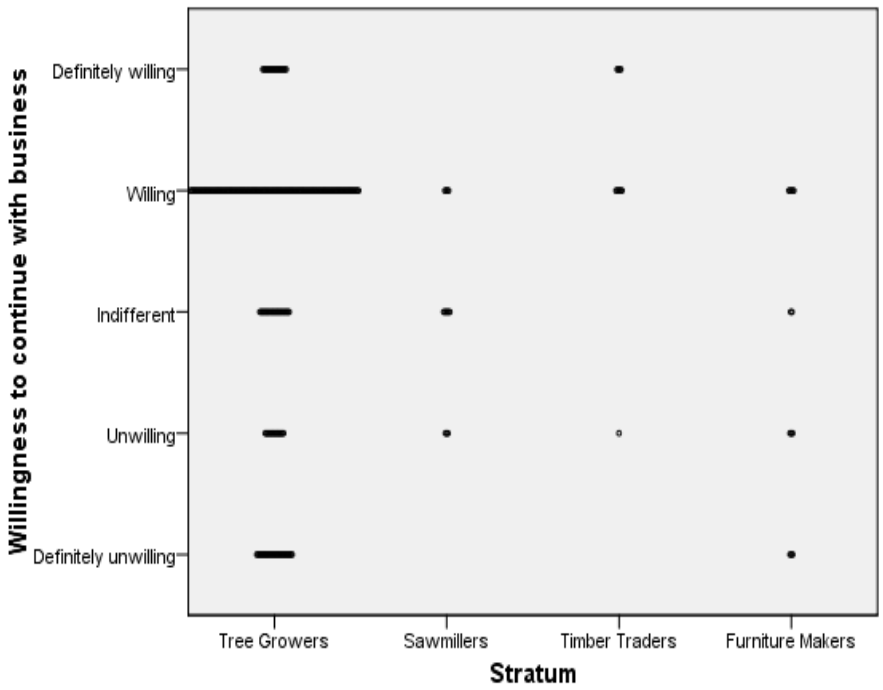

Figure 5: Willingness to continue with smallholder forestry business across strata

According to FGDs and Key Informant interviews, the factors that influenced those who were unwilling to continue with forestry business were limited to raising taxes and fees, influence of brokers, climate change, market availability, lack of capital, and lack of cooperative unions. While those willing cited that the reason for their willingness to continue with the forestry business was that it was the most prominent source of livelihood in the study site. The responses for unwillingness to continue with business are summarized on the following subsections.

4.2.2.1 Implications on primary producers

Despite the varying responses across the stratum, the general responses from the tree growing stratum are averaging on the positive side of the Likert scale, with 139 out of 230 tree growers (60.4%) responding with “willing”. This also counts to 52.1% of the total respondents as shown in Table 9**.**

When the respondents were asked about the reasons for the responses given, 20% of the tree growers faring on the negative side of the Likert scale ("definitely unwilling" and "unwilling") cited raising taxes and fees as the factor for their unwillingness, while the 22% cited influence of brokers, 40% cited lack of funds to start the business and 18% cited lack of cooperative unions as their main drive.

These responses from the percentage that cited taxes and fees as their main drive towards abandoning the forestry business corresponds with the poor forest taxes and fee awareness in the tree growers' stratum. As most of the tree growers don't actually know how those taxes and fees really affect them as shown in results in Table 6.

Table 9: Reasons for unwillingness to continue with business for tree growers' stratum

Reasons for unwillingness		Responses	
		N[a]	Percent
Multiple Responses	Poor availability of initial capital	28	40.0
	Raising taxes and fees	14	20.0
	Influence of brokers	16	22.0
	Lack of cooperative unions	13	18.0
Total		**71**	**100**

a. Dichotomy group tabulated at value 1

4.2.2.2 Implications on sawn timber processors

According to the study results, 46% of the sawmillers were "indifferent" to the willingness to continue with business, but the percentage of those "willing" to continue with forestry business is greater (30.7%) than of those who are "unwilling" (23%). Those who were unwilling and indifferent were asked about the reasons for their responses and 30% cited raising enforcement on collection of taxes and fees, while others mentioned lack of capital, poor market availability, lack of trade unions and influence of brokers as their main reasons

which were confirmed in the study by Kallabaka (2018). Results in Table 10 show that the increased level of forest taxes and fees enforcement have prompted most of the respondents to not continue with business. This is especially true for the Value Added Tax (VAT), which is enforced through the use of EFD machine issued receipts throughout the value chain.

Table 10: Reasons for unwillingness to continue with business for sawmillers' stratum

Reasons for unwillingness		Responses	
		N[a]	Percent
Multiple Responses	Poor availability of initial capital	2	22.0
	Raising taxes and fees enforcement	3	33.0
	Poor market availability	2	22.0
	Influence of brokers	1	11.0
	Lack of cooperative unions	1	11.0
Total		**9**	**~100**

a. Dichotomy group tabulated at value 1.

4.2.2.3 Implications on sawn timber marketers

Most responses from the timber traders' stratum lie on the positive side of the Likert scale, with 54% said they were "willing" to continue with the forestry business and 36% said they were "definitely willing" to continue with forestry business. Whereas 10% of the respondents said they were "unwilling" to continue with forestry business. Furthermore, the unwilling respondent was asked about his reasons for his response and most cited raising enforcement on collection of taxes and fees, followed closely by influence of brokers and poor market availability. These results correspond to those of Kallabaka (2018), who showed that brokers had a significant influence to the raising prices of sawn timber. Moreover, as this study is concerned, increased Value Added Tax (VAT) enforcement, from the use of EFD machine issued receipts throughout the value chain led to most of the unwilling respondents to justify his choice.

4.2.2.4 Implications on furniture makers

Contrary to results from other strata, most furniture makers' responses lie on the negative side of the Likert scale. With 23% of respondents responding with "definitely unwilling" and also 23% of the respondents answering "unwilling". Only 38% said they were "willing" leaving 16% who said they were "indifferent". Furthermore, those unwilling and indifferent were asked about their reason for their choices and most of them argued about low profits accrued from the business in which they believe they are caused by increased enforcement of forest taxes and fees in previous nodes in the value chain which led to high price of inputs. This, compounded with poor market availability and availability of timber substitutes such as aluminium made them think about switching their livelihood. These results correspond to those of Habib (2020) who said that presence of other substitutes of sawn timber cause their sales to decrease.

Table 11: Reasons for unwillingness to continue with business for furniture makers stratum

Reasons for unwillingness		Responses	
		N[a]	Percent
Multiple Responses	Poor availability of initial capital	1	12.5
	Raising taxes and fees enforcement	4	50.0
	Poor market availability	2	25.0
	Influence of brokers	1	12.5
Total		**8**	**100**

a. Dichotomy group tabulated at value 1

4.2.2.5 Overall strata implications of forest taxes and fees to local incentive to continue with business

Looking at the broader strata level, results show that most respondents were willing to continue with business as 66.7% of all respondents across the strata answered "willing" and "definitely willing" to continue with their forestry business. Whereas 21% were unwilling

to continue with business – this includes both who were "unwilling" and "definitely unwilling", leaving only 12.4% of the total respondents who were indifferent.

Table 12: Willingness to continue with business across strata

		Stratum									
		Tree Growers		**Sawmillers**		**Timber Traders**		**Furniture Makers**		**Total**	
		f	%	f	%	f	%	f	%	N	%
Willingness to continue with business	Definitely unwilling	30	13.0	0	0.0	0	0.0	3	23.1	33	12.4
	Unwilling	16	7.0	3	23.1	1	9.1	3	23.1	23	8.6
	Indifferent	25	10.9	6	46.2	0	0.0	2	15.4	33	12.4
	Willing	139	60.4	4	30.8	6	54.5	5	38.5	154	57.7
	Definitely willing	20	8.7	0	0.0	4	36.4	0	0.0	24	9.0
Total		230	100	13	100	11	100	13	100	**267**	**100**

Most respondents who were unwilling to continue with business cited poor availability of funds as the main drive towards abandoning the smallholder forestry business. Followed closely by raising taxes and fees. This, however varies greatly across strata as each stratum had a different reason among those listed as the main drive for not willing to continue with the forestry business. As shown from the results, most sawn timber marketers (timber traders) not willing to continue with business cited the rising taxes and fees and their enforcement in general as the main reason for not continuing with business.

Most of them said that they initiated the business before the taxes and fees were heavily enforced and therefore, they thought the business will be highly lucrative instead they were bombarded with a series of taxes and fees. These results are backed by the ability-to-pay principle of taxation as stipulated in a study by Koritnik and Podlipnik (2017) which

requires that the tax burden should be distributed among individuals according to their capacity to bear it. Therefore, if the smallholder forest farmers can not bear the total taxes and fees imposed on them, they won't be willing to continue with forestry business.

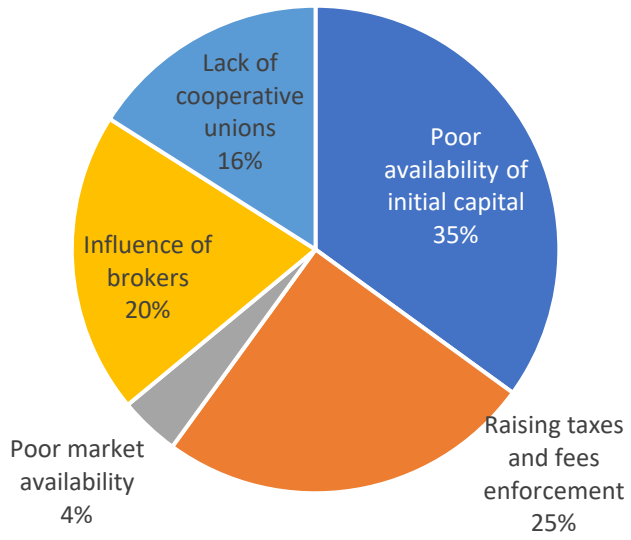

Figure 6: Reasons for respondents' unwillingness to continue with business

4.2.3 Tax incidence and shift of tax burden in the SFFSTVC

Studies have shown that out of the 25% of the respondents who claimed that forest taxes and fees were the main drive towards them abandoning their forestry businesses, 55% of that proportion who were mostly sawmillers and timber traders claim that there is shift in tax burden from the timber traders to them. Most stated that as the level of enforcement of tax and fee collection is high in the later stages of the value chain especially from the timber traders, the actors compromise the effect the taxes had on their businesses to the offer prices they give to the initial stages of the value chain i.e., primary producers and sawmillers.

This lead to lower revenues for the primary producers hence making them abandon the forestry businesses and others are changing their land uses to general agriculture instead of forestry. These findings have been shown to be true by Schwartz (2021) who said shifting tax burdens to the small-scale forestry primary producers have a negative impact on forestry sector development. These results are reflected by Ross (1893) who stipulated that it is fundamental that the real burden of taxation does not necessarily rest upon the person who is legally responsible for payment of the tax.

4.3 Impact of forest taxes and fees to the income of the small-holder forest actors along the SFFSTVC

4.3.1 Profit margin analysis for actors along the SFFSTVC

Since sawn timber production and other plantation forest products businesses are major means of livelihood in the study villages, they are a source of employment opportunities as well as income to the large proportion of rural people in the study area and Mufindi district as whole. To observe the impact of the forest taxes and fees on the income obtained from the forestry business, firstly after-tax profit margin analysis was conducted for each stratum in the value chain. The study results revealed that the after-tax Profit margin/year of the SFFSTVC actors tend to vary across strata.

4.3.1.1 After-tax Profit Margin analysis for tree growers

The study results revealed that the majority of tree growers in the study site plant an average of 6 acres of trees. The small holder farmers plant an average of 4 acres of pine tree species (*Pinus patula*) and an average of 2 acres of eucalyptus tree species (*Eucalyptus spp.*). The results show that average total overall costs/acre prior to harvesting included the costs of the following farm purchasing and preparation costs, cost of seedlings, planting, weeding and pruning as well as fire lines maintenance costs. These costs range from TZS 100 000

per acre to TZS 850 000 per acre with an average of TZS 407 696 per acre. The after-tax profit margin for tree growers were calculated as shown in Table 13 which is expected to be acquired by smallholder farmer after waiting for an average of 10 years. This implies that smallholder plantation farmers have expected overall annual after-tax profit margin of TZS 716 443 for which is equivalent to USD 311.23.

Table 13: Average After-Tax profit margin (AT-PM) for tree growers

		Qty	Unit	Amount (TZS)	Total (TZS)
A: Revenue	Selling price-Pine	1672	Trees	3 855	6 632 717
	Selling price-Eucalyptus	460	Trees	5 744	5 265 822
	Total Revenue				**11 898 539**
B: Costs	Cost/acre	6	Acres	407 696	2 680 522
	Total Cost				**2 680 522**
C: Taxes and Fees	Income tax				-
	VAT				-
	Total taxes				-
	Registration				-
	CESS				-
	Total fees				-
NPM(A-B)					**9 218 017**
AT-PM(A-B-C)					**9 218 017**
AT-PM/Year		10	Years		**716 443**

4.3.1.2 After-tax Profit Margin analysis for sawmillers

The study results revealed that the average costs used by sawmillers to process sawn timbers included costs of purchasing plots of standing trees in which had an average of TZS 4 071 731 per plot. Also, there were harvesting costs which included tree felling and logs collection cost which was found to average TZS 467 per tree. Also, sawmilling costs per plank to average TZS 292 per piece whereas transportation cost of one piece from sawmilling site at farm to the consolidation area accessible to buyers averaged TZS 388 per piece. In this analysis forest fees incurred by sawmillers included government CESS fee and forestry business registration fees. The CESS fee averaged TZS 188 per piece for development activities in the district which varies per each village. While registration fees

have a fixed rate of TZS 200 000 per year, for the sake of the value chain analysis, an average of TZS 123 077 was found to be paid by the strata, this stems from the fact that some respondents did not pay the registration fees. Furthermore, the study findings revealed the after-tax profit margin of sawmillers per year to be TZS 6 209 458 equivalent to USD 2 698 per year as shown in Table 14.

Table 14: Average annual After-Tax profit margin (AT-PM) for sawmillers

		Qty	Unit	Amount (TZS)	Total (TZS)
A: Revenue	Selling price	26218	Timber	2 904	76 344 923
	Total Revenue				**76 344 923**
B: Costs	Plot purchase	11	Plot	4 071 731	45 639 423
	Harvesting	4370	Trees	467	2 003 004
	Sawmilling	26218	Timber	292	7 494 808
	Transport	26218	Timber	388	10 015 038
	Total Cost				**65 152 273**
C: Taxes and Fees	Income tax				-
	VAT				-
	Total taxes				-
	Registration				123 077
	CESS	26218	Timber	188	4 860 115
	Total taxes and fees				**4 983 192**
NPM(A-B)					**11 192 650**
AT-PM(A-B-C)					**6 209 458**

4.3.1.3 After-tax Profit Margin analysis for timber traders

Study results found that the average total cost incurred by a timber trader included cost of buying sawn timber of various sizes, transportation costs and truck loading and unloading costs. Stratum results show that on average 14 264 pieces of timber are purchased by the traders for an average of TZS 2909 per piece annually and are sold at an average rate of TZS 4856 per piece annually. In addition to that forest taxes and fees incurred amount to an average of TZS 14 459 607 per year which includes income tax, VAT, forestry business registration fee and CESS fee. The study results revealed that the average after-tax profit margin of TZS 7 409 313 is earned annually by the stratum which is equivalent to 3218 USD/year as shown in Table 15.

Table 15: Average annual After-Tax profit margin (AT-PM) for timber traders

		Qty	Unit	Amount (TZS)	Total (TZS)
A: Revenue	Selling price	14 264	Pieces	4 856	71 463 920
	Total Revenue				**71 463 920**
B: Costs	Timber purchase	14 264	Pieces	2 909	41 750 000
	Transport	14 264	Pieces	250	3 565 909
	Loading/unloading	14 264	Pieces	300	4 279 091
	Total Cost				**49 595 000**
C: Taxes and Fees	Income tax				250 000
	VAT				11 139 607
	Total taxes				**11 389 607**
	Registration				200 000
	CESS	14 264	Pieces	200	2 870 000
	Total fees				**3 070 000**
	Total taxes and fees				**14 459 607**
NPM(A-B)					**21 868 920**
AT-PM(A-B-C)					**7 409 313**

4.3.1.4 After-tax Profit Margin analysis for furniture makers

Moreover, the study findings revealed that for furniture makers production cost included cost of purchase of sawn timber, costs of materials which mostly includes carpentry items such as glue, varnish, wood paint, nails, etc., other production costs i.e., electricity costs, and transportation cost of materials from timber traders and other input markets to their sites. The study findings also revealed annual production cost to be on average of TZS 1 054 780 whereas the revenue for furniture makers average TZS 1 919 407 per annum and their after-tax profit margin averaging TZS 591 207 as shown in Table 16. The study findings are found to be quite different to that of REPOA, (2012) which reported that average annual income for furniture makers in cluster location recorded to be TZS 1 309 134.25 per year.

Table 16: Average annual After-Tax profit margin (AT-PM) for furniture makers

		Qty	Unit	Amount (TZS)	Total (TZS)
A: Revenue	Selling price	35	Furniture	54 606	1 919 407
	Total Revenue				**1 919 407**
B: Costs	Timber purchase	147	Pieces	4 577	673 865
	Transport	147	Pieces	413	61 223
	Materials (Varnish, glue, etc.)				270 000
	Other production costs				49 692
	Total Cost				**1 054 780**
C: Taxes and Fees	Income tax				-
	VAT				181 112
	Total taxes				**181 112**
	Registration				92 308
	CESS				-
	Total fees				**92 308**
	Total taxes and fees				**273 420**
NPM(A-B)					**864 627**
AT-PM(A-B-C)					**591 207**

4.3.2 Impacts of the forest taxes and fees on the profit margin of the actors in the SFFSTVC

To observe the potential impacts of the forest taxes and fees on the income of the forest actors on the SFFSTVC, the percentage of the total taxes and fees on the total revenue obtained by the actors in value chain was observed for each stratum. This was compared to the percentages of total costs and the after-tax net profit margin which acts as a disposable income left for the actors in the value chain to spend.

Study results have revealed that the extent of the forest taxes and fees on the total revenue varies across the strata. The results have shown that the percentage of total fees and taxes on the total revenue for small holder tree growers to be 0%. This implies that their income obtained from the forestry business is not directly affected by the forest taxes and fees. Meanwhile for the next actors in the value chain, the forest taxes and fees have some impact

on the revenue obtained by the actors from their respective forestry businesses. Results have revealed that the percentage of tax and fees on the total revenue are 6.5% for sawmillers, 20.2% for timber traders and 14.2% for furniture makers. This is compared with the percentages of the disposable income on the total revenue which are 8.1%, 10.4% and 30.8% respectively. This implies that the effect of taxes and fees on the profit margins for timber traders is larger than those of other actors in the value chain.

The Ricardian model specifies that in order to have economic development in a sector, the actors in that specific sector must have the capability to save. The implication of forest taxes and fees on the value chain actors is that it affects the ability of the actors to save in order to stimulate development within the sector and the country in general. From the study results, it is shown that the tree growers have a higher disposable income left over because they never incurred neither forest taxes or fees. Therefore, they have a much higher propensity to save more than other actors in the value chain as found in the study by Gale and Samwick (2014).

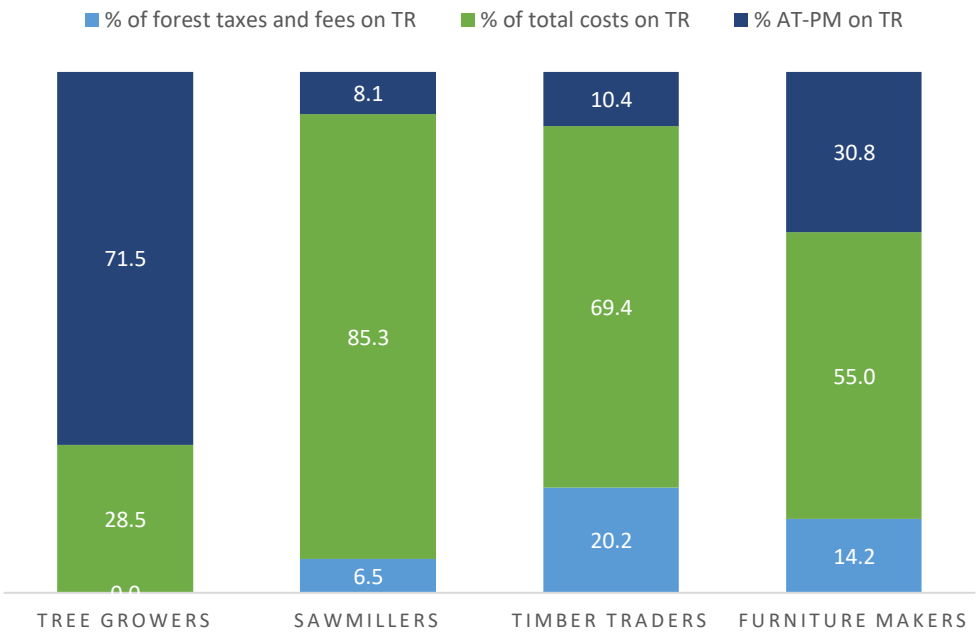

Figure 7: The extent of forest taxes and fees on the revenue obtained by actors in the SFFSTVC

Furthermore, these results show that most of the government revenue contributors from the SFFSTVC are timber traders who contributes a larger amount compared to other actors in the value chain. This arises from the fact that there is a high level of enforcement for forest taxes and fees for the timber traders in the study area compared to other strata. To correspond with the findings in section 4.2.3 which observed the directional shift of tax burdens, the noticeably lower after-tax profit margin by the furniture makers compared to timber traders implies that they have been purchasing timber at a marked-up price to cover for the effect of the tax and fees imposed on the timber traders. Therefore, the tax burden also shifts to the final consumer of the sawn timber, who in the case of this value chain, is the furniture maker. These observations are supported by (Marion, 2013; Schwartz, 2021).

Table 17: Percentage contribution of the forest taxes and fees to the SFFSTVC

Strata	Total revenue (TR) (TZS/Year)	Total costs (TZS/Year)	Total Taxes and fees (TZS/Year)	Net Profit Margin (TZS/Year)	% Of forest tax and fee on TR
Tree growers	1 001 469	285 025	-	716 443	0.0
Sawmillers	76 344 923	65 152 273	4 983 192	11 192 650	6.5
Timber traders	71 463 920	49 595 000	14 459 607	21 868 920	20.2
Furniture makers	1 919 407	1 054 780	273 420	864 627	14.2

4.4 Contribution of the Forest Taxes to the Government Revenue

4.4.1 Trends of forest tax revenues and GDP

4.4.1.1 Sectoral revenue collection by TRA

Study results also show a predominantly upward trend of the revenue collection by the TRA in the forestry sector. This revenue is mostly obtained from receipts from large forest enterprises and VAT on forestry products. The data obtained shown in is quarterly data from 1st Quarter 2012 to 4th Quarter 2020 which shows the forest tax revenue to have a general increasing trend and a data gap found on the 4th quarter of the year 2018. The series is shown to contain some fluctuations – stochastic processes, and seasonal patterns due to the quarterly nature of the data. This is common in econometric time series data whereby underlying fluctuations are linked to the stages of the business cycle (Canova and Ghysels, 1994). The business cycle directly influences the rate of total output (GDP) which also affects the rate of taxation revenue due to the ad valorem nature of most types of taxes (Mankiw, 2018). Moreover, the general increasing trend can be attributed also to the rise in the GDP and also including the level of national enforcement of taxation in forestry products.

The results show that during the span of 36 fiscal quarters, from 2012 to 2020, the maximum revenue collected was TZS 4.94 billion on the second quarter of the year 2019. This is mainly due to few registered forestry companies and the low level of enforcement of VAT by TRA (GAI, 2014; TRA, 2012). This amount is 38.3 percent increase to that found by GAI (2014), who found that the annual forestry tax revenue reached a maximum of TZS 3.6 billion in 2014.

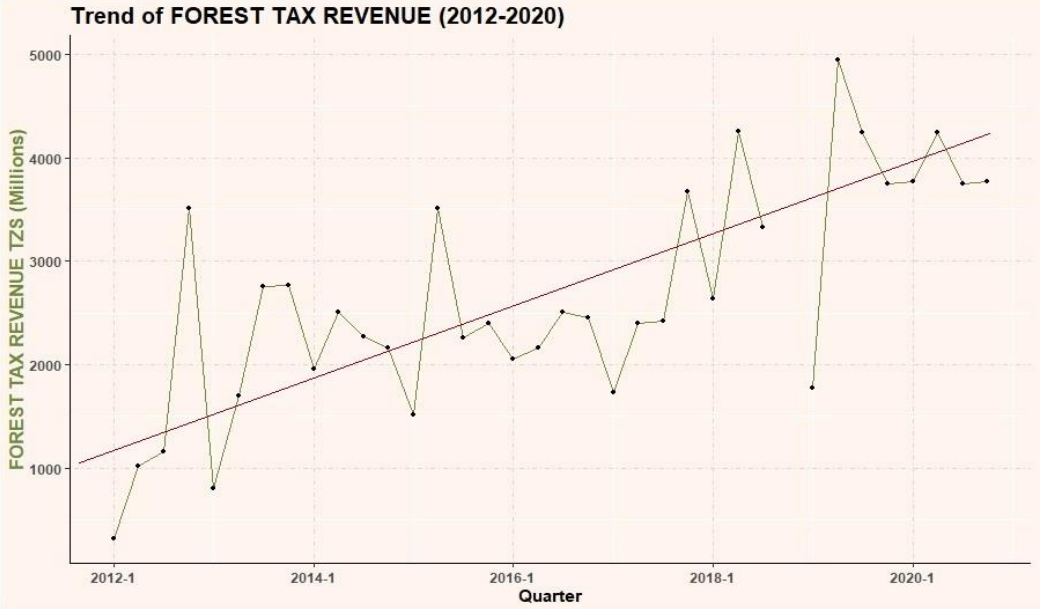

Figure 8: The trend of quarterly forestry sector tax revenue from 2012 to 2020. Source of data (TRA, 2021)

4.4.1.2 GDP growth in Tanzania from 2012 to 2020

Quarterly GDP in Tanzania has grown steadily thereby establishing a general increasing trend. As depicted in Figure 9, the series is shown to have seasonal fluctuations which is normal for quarterly GDP data (Canova and Ghysels, 1994). Because the Tanzania economy is agriculture driven, it can be expected that the seasonal changes in GDP are corresponding to the agricultural seasons in the country (Laudien *et al.,* 2020).

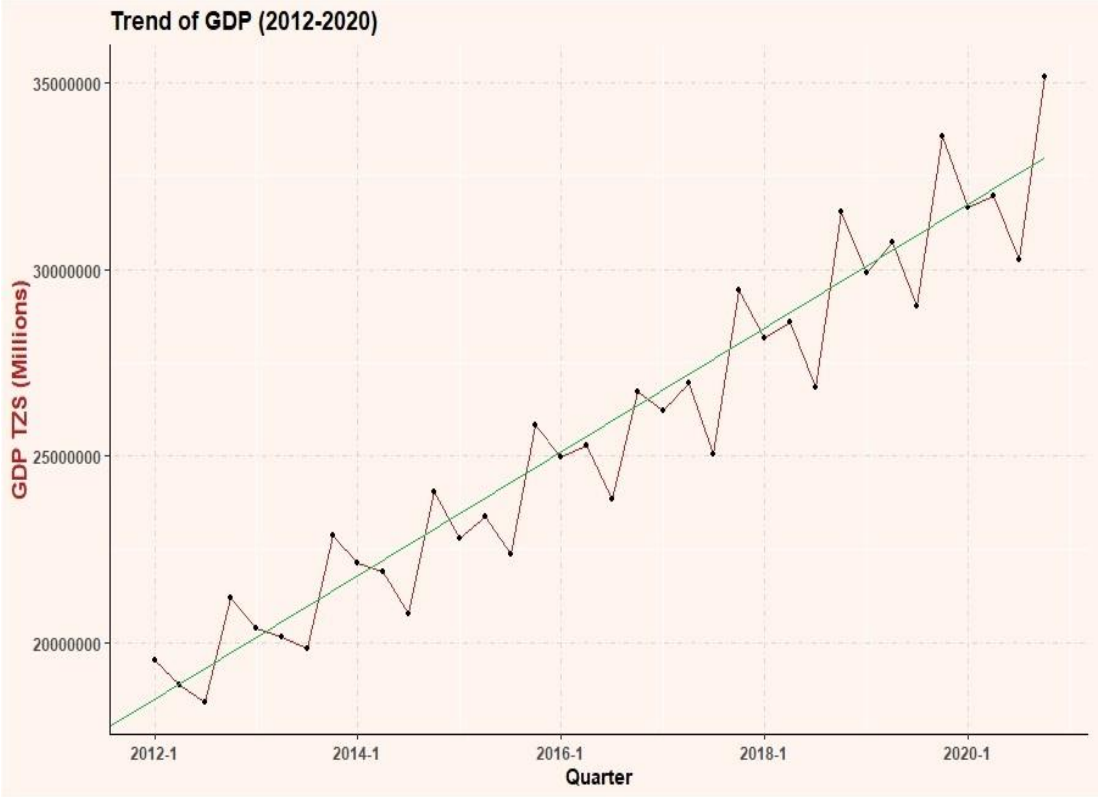

Figure 9: The trend of quarterly Gross Domestic Product (GDP) from 2012 to 2020. Source of data (BOT, 2021)

4.4.2 Relationship between forest tax revenue and GDP

Graphical presentation in Figure 10, indicates that forestry tax revenue increases proportional to the increase of GDP. This depicts an indication of presence of some economic relationship among the forest tax revenue and GDP variables. Nevertheless, more analysis was conducted using Johansen test for co-integration to observe the presence of the long run relationship.

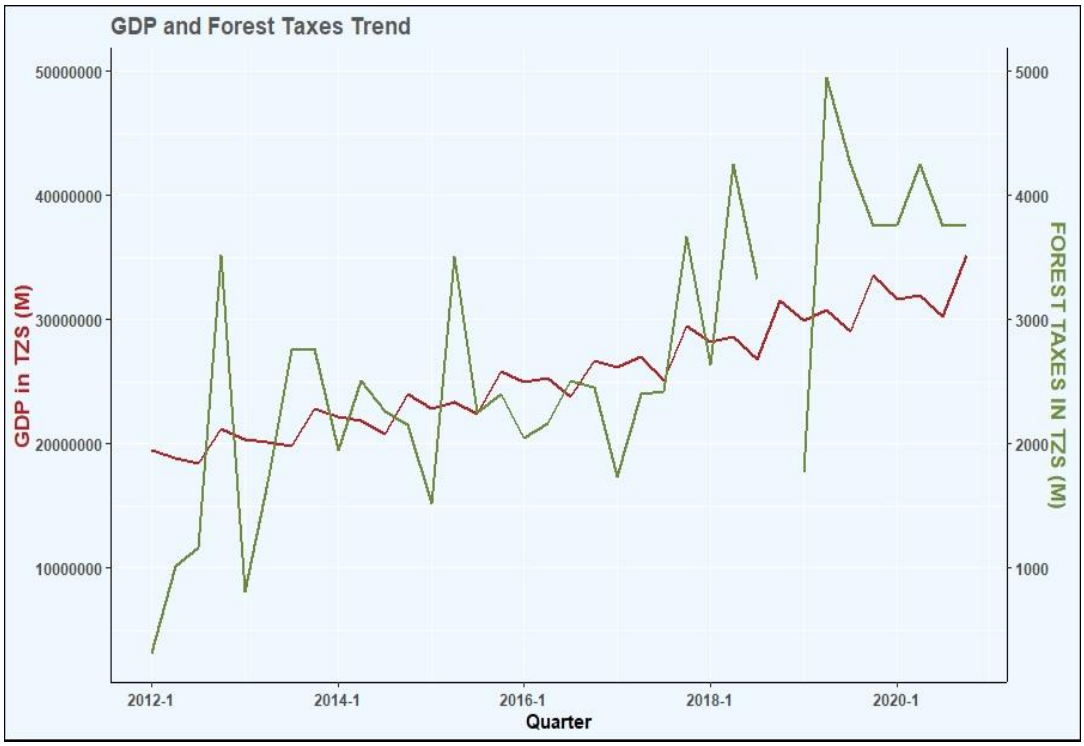

Figure 10: Trends of forest tax revenue and GDP

4.4.2.1 Testing for stationarity of the forest tax revenue and GDP variables

Before observing and analysing time series variables for a long run relationship, the time series variables should be checked for stationarity which implies that the variables will not have a unit root (Rath and Akram, 2021). Stationarity also refers that the mean and variance of the variables do not change specifically due to time.

However, most time series econometric variables including GDP and tax revenue are non-stationary i.e., they contain a unit root, due to seasonality, cyclicality, and trends (Shrestha and Bhatta, 2018). This is reflected to the Tanzania GDP (GDP) and forestry sector tax revenue (FORT). By looking at their respective graphs (Figure 8 and Figure 9), these variables show a strong presence of unit roots at level i.e., without differencing, due to the trend and fluctuations over time. Therefore, augmented Dickey-Fuller (ADF)

and Phillips-Perron (PP) tests for stationarity were conducted at level, logarithmic level form, and first differences of their logarithmic transformations with the following results.

Table 18: ADF tests results for stationarity of variables

Variable	Transformation	DF test statistic	p-value	Decision
GDP	Level	-1.7443	0.6726	Not stationary
	Log	-1.6486	0.7099	Not stationary
	1st Log difference	-29.187	<0.01***	Stationary
FORT	Level	-2.0754	0.5438	Not stationary
	Log	-2.3696	0.4293	Not stationary
	1st Log difference	-29.187	<0.01***	Stationary

***Statistically significant at 1% significant level

From the results in Table 18, of ADF for GDP at level indicates that absolute test statistics value of (-1.7443) is less than absolute critical value at 5% significance level. Also, the p-value (Z(t) = 0.6726) is not statistically significant than p-value of 0.05. Moreover, ADF for FORT at level indicates that absolute test statistics value of (-2.0754) is less than absolute critical value at 5% significance level. Also, the p-value (Z(t) = 0.5438) is not statistically significant than p-value of 0.05. This concludes that the null hypothesis that claims the presence of unit root cannot be rejected for both level and their level natural logarithmic transformations. Due to that the ADF test for both GDP and FORT series at level concludes the presence of a unit root which can lead to spurious correlation (meaningless correlation) if the analysis will be conducted without removing the unit root (Awe and Idumah, 2017; Revelian, 2016; Streimikiene *et al.*, 2018).

The variables were in a stationary state by differencing their natural logs to the 1st order before further analysis. ADF test was redone at first difference of the natural logarithm of the variables, where the test statistics rejected the null hypothesis therefore concluding the elimination of the unit root in both series.

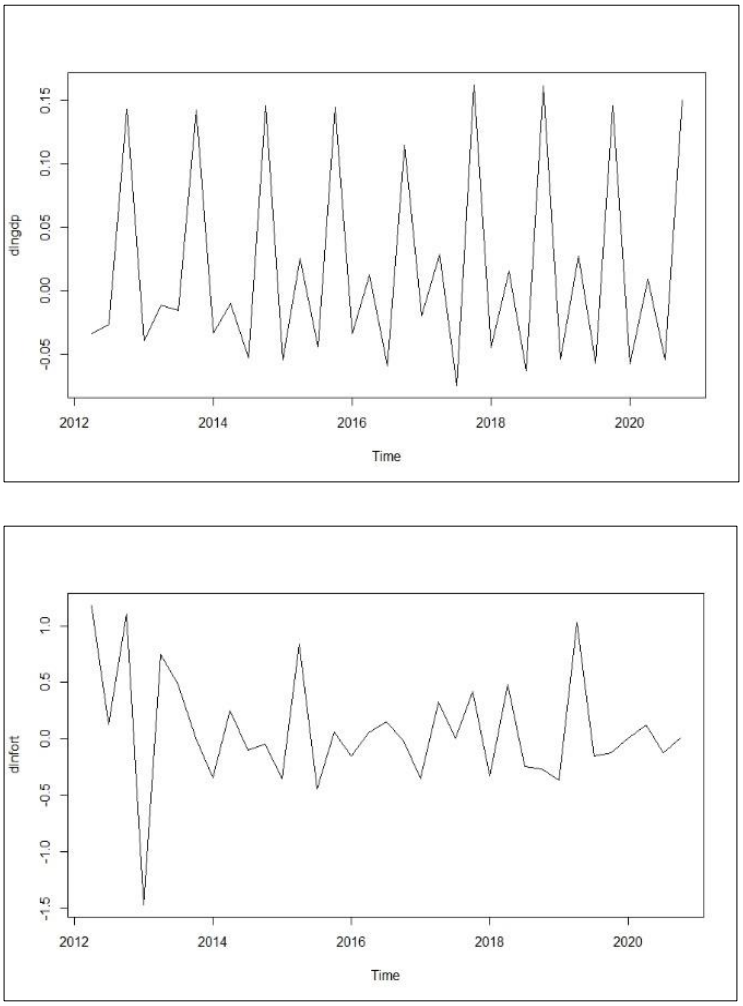

Figure 11: Plots of first differences of lnGDP and lnFORT showing elimination of trends

4.4.2.2 Cointegration test results between forest taxes revenue and GDP

The Johansen test for cointegration was conducted with the following test results. A VAR specification of three (3) lags was chosen based on Schwarz Criterion (SC), Hannan Quinn (HQ) and final prediction error (FPE) lag selection criterion. The trace statistics for cointegration are presented in Table 19 which indicate that the null hypothesis of no presence of a cointegration relationship is rejected at the 5% significance level for both the model without trend and model including the trend. Estimating two different models is suggested by Harris and Sollis (2003). Thus, the Johansen cointegration model confirms

that the Tanzania GDP exhibit a long-run cointegrating relationship with the forest tax revenues (FORT).

Table 19: Multivariate cointegration rank test

		No linear trend			Linear trend		
Test and H_0: rank(Π)=r		Test statistics	Critical Values ($\lambda_{0.95}$)	Decision	Test statistics	Critical Values ($\lambda_{0.95}$)	Decision
Trace statistic (λ_{trace})	$r \leq 1$	37.4	7.52	Rejected	36.68	12.25	Rejected
	$r = 0$	145.08	17.85	Rejected	144.98	25.32	Rejected

4.4.2.3 Granger causality test results

The granger causality results show that both GDP and forest tax revenue Granger cause each other in the short-run, i.e., there is a bi-directional relationship between GDP and forest tax revenue. This implies that the variables are helpful in forecasting one another (Aslan and Topcu, 2018; Awe and Idumah, 2017). The economic implications of this relationship are true as increase in tax revenue generally causes the level of GDP to increase (Streimikiene *et al.,* 2018). This was also proved to be true by Dzingirai and Tambudzai (2014) who also concluded that there is a bi-directional relationship between tax revenue and the GDP. However, Iriqat and Anabtawi (2016) found that the tax revenues do not Granger cause the GDP of Palestine during the period of the country's stagflation. Moreover, the increase in GDP can have an impact in the rate of forest tax revenue collected because GDP increase encourages investment in several economic sectors including the forestry sector which leads to rise in forest tax revenue collected (Dzingirai and Tambudzai, 2014; Iriqat and Anabtawi, 2016). The Granger causality results are presented in Table 20.

Table 20: Wald test results for short-run directional causality

Variables		**Causality test (likelihood ratio)**			**Causality decision**
		Hypotheses	F-test	p-value	
Dependent Variables	ΔlnGDP	$H_0: \sum_{i=1}^{k} \gamma_{i(lnGDP)} = 0$	1.1386	0.344	Bi-directional causality
		$H_1: \sum_{i=1}^{k} \gamma_{i(lnGDP)} \neq 0$			
	ΔlnFORT	$H_0: \sum_{i=1}^{k} \gamma_{i(lnFORT)} = 0$	0.75009	0.5282	
		$H_1: \sum_{i=1}^{k} \gamma_{i(lnFORT)} \neq 0$			

4.4.2.4 Vector error correction model (VECM)

From the estimated VECM, the long run cointegrating equation was found to be

Δln*GDP* = -0.049Δln*FORT*

This long run relationship shows that a 5 percent decrease in the forest tax revenue will increase the GDP by 1 percent in the long run. Furthermore, from the same VECM, the ECT_{t-1} which is the error correction term represent the variable deviation from the estimated long-run cointegration relationship. The empirical estimates of the short run dynamics and the ECT coefficient are presented in Table 21. The results show that the GDP short run relationship with the values of the previous quarter of the forest tax revenues and its own values of the three preceding quarters are statistically significant. This relationship includes a statistically significant positive constant and a statistically significant negative error correction term coefficient (α_1). The coefficient of the error term is -2.08 which signifies rapid and oscillating convergence to long run equilibrium after short run disturbance between GDP and forest tax revenue (Loayza and Ranciere, 2005). This is due to the fact that the forestry sector in Tanzania is still developing, hence the speed of recovery between forest tax revenue and GDP in the long run.

Table 21: Results of the vector error correction model (VECM)

Regressors	$\Delta \ln GDP_t$		$\Delta \ln FORT_t$	
	Parameter estimates	S. E	Parameter estimates	S. E
ECT_{t-1}	-2.0875*	0.8085	8.8738	13.0244
Intercept	0.0305*	0.0122	-0.1329	0.1970
$\Delta \ln GDP_{t-1}$	0.5251	0.6114	-8.5521	9.8498
$\Delta \ln FORT_{t-1}$	-0.0540*	0.0220	-0.5643	0.3548
$\Delta \ln GDP_{t-2}$	0.0806	0.4191	-3.8666	6.7511
$\Delta \ln FORT_{t-2}$	-0.0283	0.0154.	-0.4643	0.2477.
$\Delta \ln GDP_{t-3}$	-0.4493*	0.2080	-1.6825	3.3513
$\Delta \ln FORT_{t-3}$	-0.0044	0.0087	-0.1423	0.1408

*Statistically significant at 10% significance level, S.E is the standard error of the coefficients

4.4.2.5 Generalized impulse response functions

Impulse response functions were observed from the relationship between GDP and forest tax revenue. The aim of these functions is to observe mainly graphically, the effect of one variable from the shock induced by the other variables. The GIRF indicates that the GDP positive shocks will drive down the tax revenue rates below their mean for about two quarters before starting to rise up again and become stable. Whereas the positive shocks of the forest tax revenue to the GDP will increase the GDP for and achieve general stability around its mean. The GIRF of both GDP and forest tax revenue data are depicted in Figure 12. .

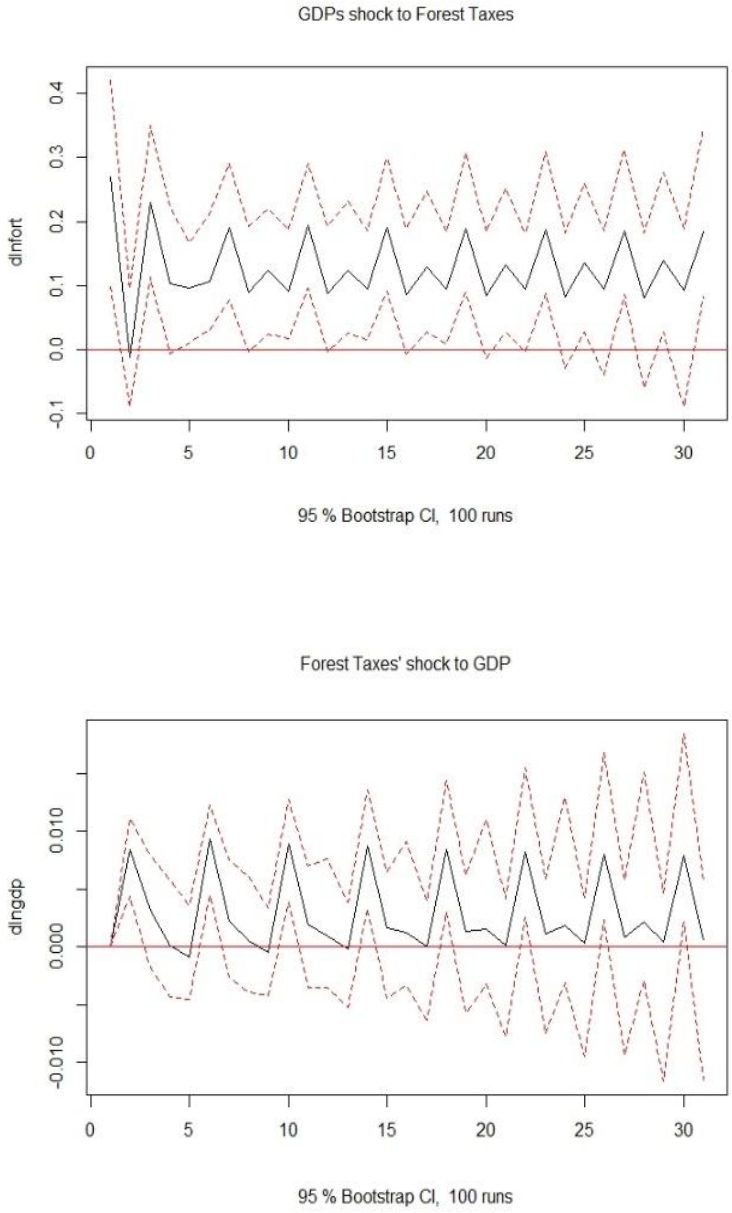

Figure 12: Generalized impulse response functions (GIRF) between GDP and forest tax revenue to a one standard deviation (S.D) shock

CHAPTER FIVE

5.0 CONCLUSION AND RECOMENDATIONS

5.1 Conclusion

The study has managed to meet to an extent the objective of observing the implications of forest taxes and fees in the development of smallholder forest plantations and in the development of the forestry sector in general in Tanzania. The study results have shown that the primary producers of the SFFSTVC don't have to pay any forest taxes and fees, although they are liable to the income taxes, PAYE and VAT and forestry business registration fees. The enforcement level on primary producers is low in such a way the forest taxes and fees do not have a direct impact to their disposable income. However indirect effects can be observed as the tax incidence shifts from the next actors in the value chain to the primary producers i.e., the tree growers when the next actors in the value chain i.e., sawmillers offer less price to counter for the effect of taxes. The level of compliance and enforcement of taxes and fees increases as one moves across the value chain. It has been found that most sawmillers and timber traders comply to the VAT (35% and 75% respectively) more than the Income tax.

The effect that forest taxes and fees have on the capacity to continue with forestry business varies across strata. The results have shown that most respondents 57% were willing and 9% were definitely willing to continue with forestry business despite the effect the taxes and fees have on their businesses. The remaining 36% who were indifferent, unwilling and definitely unwilling to continue with their respective forestry businesses cited the poor availability of initial capital as their primary motivation to abandoning the forestry business. Furthermore, the research has shown that the after-tax profit margins of the value chain actors range from an average of TZS 7 409 313/year for timber traders to TZS 591 207/year for furniture makers. However, findings have shown that the share of forest taxes and fees

on the average annual total revenue to range from 0.0% for smallholder tree growers to 20.2% for timber traders.

The forest tax revenue data has been shown to exhibit both short run and long run relationship with the Tanzania GDP. Although the error correcting term (ECT) coefficient which measures the long run dynamics was found to be negative, implying that the series are moving away from the equilibrium as time moves on.

The GIRF indicates that the GDP positive shocks will drive down the tax revenue rates below their mean for about two quarters before starting to rise up again and become stable. Whereas the positive shocks of the forest tax revenue to the GDP will increase the GDP for and achieve general stability around its mean.

5.2 Recommendations

Based on the preceding research results and discussions. The following recommendations are made:

(i) As the TRA are considering on widening their tax base by enforcing the collection of revenue, necessary consideration should be made so as not to distort the level of investment in the forestry plantations, as this will lead to change in land usage hence compromising the sustainability of forestry resources. Furthermore, Initiatives by the MNRT should be directed to formalization of the smallholder forestry sector so as to capture lost revenue from the PAYE tax, which is not collected due to informalization of the employment in the smallholder forestry sector.

(ii) As most actors in the value chain consider the forestry sector to be a means of subsistence, policy programs should be initiated so as to encourage investment in the smallholder forestry business. This will also ensure the supply of wood and sustainable forestry resources conservation.

(iii) Relevant authorities should consider looking into distortionary effects of the incidence of taxation and shifting of the tax burden on from the later stages of the value chain to the first stages of the value chain i.e., the primary producers as they are the most crucial stage in the value chain to sustainable forestry sector development.

(iv) Due to the bi-directional relationship between forest tax revenue and the GDP in Tanzania, one variable can be used to predict the other. Therefore, policy makers i.e. MNRT, LGAs, TRA and TFS should use the relationship to set efficient forest tax programs, to optimize for both sustainable economic growth of the country and the sustainable development of the forestry sector.

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APPENDICES

Appendix 1: Questionnaire for Primary Producers

A: General Information

Date…….

1. Name of producer _____Gender_____
2. Address_____
3. Number of farms_____
4. Type of producer: Tree grower_____ Nursery _____ Other_____
5. Date when production started _____

B: Production

6. Type of farm (mixed, only tree?) _____, Size of Farm, (Ha)_____
7. Types of crops produces (for mixed farms) _____
8. Tree species _____
9. Average wood harvest/year (m^3) _____

C: Finances and Yield

10. Overall cost incurred/year (including any fees and other charges incurred) (TZS)_____
11. Average selling price/m^3 of wood harvested (TZS)_____
12. Average Income from the harvest (TZS)_____
13. Are you liable to any forest fees and other charges including taxes (Yes/No/ I don't know) _____?
14. If yes, name the type of the charges you face and estimation (in TZS)
    _____
    _____
    _____
15. Are you aware of the following taxes and fees (yes/no)?
    Income tax.....
    VAT.....
    Forestry registration fees.....
    CESS fee.....
    Transport permit.....
16. Source of capital_____

D: Producers' opinions on taxes and other charges

17. How much do you know about forest taxes and other fees?
    _____
    _____

18. (a) Do you think that the taxes, fees and other charges incurred by your business affect your rate of production? (Yes/No) _____
    (b) If yes, name the ways these charges affect your production:
    _____
    _____

19. What are your opinions on tax reforms and reviews? Does increases/decreases in the rates of the forest taxes, charges and other fees affect your incentive to continue with your business? (*Please clarify how*).

E: Willingness to continue with forestry business

- Definitely willing
- Willing
- Indifferent
- Unwilling
- Definitely unwilling

  Kindly explain the reasons as to why

Appendix 2: Questionnaires for Sawmill enterprises

A: General Information

Date…….

1. Name of proprietor _____Gender_____
2. Address_____
3. Number of proprietors_____
4. Date when production started _____

B: Production

5. Type of sawmill_____
6. Source of raw materials_____
7. Wood species _____
8. Average sawn timber produced/year (m^3) _____

C: Finances and Yield

9. Overall cost incurred/year (including any fees and other charges incurred) (TZS)_____
10. Average buying price/m^3 of wood (TZS)_____
11. Average selling price/m^3 of sawn timber (TZS)_____
12. Average Income from the wood processed (TZS)_____
13. Are you liable to any forest fees and other charges including taxes (Yes/No/ I don't know) _____?
14. If yes, name the type of the charges you face and estimation (in TZS)
    _____
    _____
    _____
15. Source of capital_____

D: Producers' opinions on taxes and other charges

16. Are you aware of the following taxes and fees (yes/no?
    Income tax.....
    VAT.....
    Forestry registration fees.....
    CESS fee.....
    Transport permit.....

17. How much do you know about forest taxes and other fees?
    _____
    _____

18. (a) Do you think that the taxes, fees and other charges incurred by your business affect your rate of production? (Yes/No) _____
    (b) If yes, name the ways these charges affect your production:
    _____
    _____

19. What are your opinions on tax reforms and reviews? Does increases/decreases in the rates of the forest taxes, charges and other fees affect your incentive to continue with your business? (*Please clarify how*).

E: Willingness to continue with forestry business

- Definitely willing
- Willing
- Indifferent
- Unwilling
- Definitely unwilling

Kindly explain the reasons as to why

Appendix 3: Timber Marketers' Questionnaires

A: General Information

Date…….

1. Name of trader _____Gender_____
2. Address_____
3. Number of traders_____
4. Type of trader: (Wholesale/Retailer/other) _____
5. Date when business started _____

B: Production

6. Timber species _____
7. Average sawn timber moved/year (m^3) _____

C: Finances and Yield

8. Overall cost incurred/year (including any fees and other charges incurred) (TZS)_____
9. Average selling price/m^3 of timber (TZS)_____
10. Average Income from the sawn timber sales (TZS)_____
11. Are you liable to any forest fees and other charges including taxes (Yes/No/ I don't know) _____?
12. If yes, name the type of the charges you face and estimation (in TZS)
    _____
    _____
    _____
13. Source of capital_____

D: Producers' opinions on taxes and other charges

14. Are you aware of the following taxes and fees (yes/no
    Income tax.....
    VAT.....
    Forestry registration fees.....
    CESS fee.....
    Transport permit.....

15.
16. How much do you know about forest taxes and other fees?
    _____
    _____

17. (a) Do you think that the taxes, fees and other charges incurred by your business affect your rate of production? (Yes/No) _____
    (b) If yes, name the ways these charges affect your production:
    _____
    _____

18. What are your opinions on tax reforms and reviews? Does increases/decreases in the rates of the forest taxes, charges and other fees affect your incentive to continue with your business? (*Please clarify how*).

    _____

E: Willingness to continue with forestry business

- Definitely willing
- Willing
- Indifferent
- Unwilling
- Definitely unwilling

  Kindly explain the reasons as to why

Appendix 4: Questionnaire for Manufactures (Furniture and carpentry enterprises)

A: General Information

Date…….

- Name of producer _____Gender_____
- Address_____
- Number of employees_____
- Type of manufacturer (carpentry/furniture making) _____
- Date when production started _____

B: Production

- Type of outputs (name a few)_____
- Source of raw materials_____
- Preferred species_____
- Average sawn timber used/year (m^3) _____

C: Finances and Yield

- Overall cost incurred/year (including any fees and other charges incurred) (TZS)_____
- Average selling price/m^3 of sawn timber used (TZS)_____
- Average Income from the sales (TZS)_____
- Are you liable to any forest fees and other charges including taxes (Yes/No/ I don't know) _____
- If yes, name the type of the charges you face and estimation (in TZS)
  _____
  _____
- Source of capital_____

D: Producers' opinions on taxes and other charges

- Are you aware of the following taxes and fees (yes/no?
  Income tax.....
  VAT.....
  Forestry registration fees.....
  CESS fee.....
  Transport permit.....

- How much do you know about forest taxes and other fees?
  _____
  _____

- (a) Do you think that the taxes, fees and other charges incurred by your business affect your rate of production? (Yes/No) _____
  (b) If yes, name the ways these charges affect your production:

_____
_____

- What are your opinions on tax reforms and reviews? Does increases/decreases in the rates of the forest taxes, charges and other fees affect your incentive to continue with your business? (*Please clarify how*).

  _____
  _____

E: Willingness to continue with forestry business

- Definitely willing
- Willing
- Indifferent
- Unwilling
- Definitely unwilling

Kindly explain the reasons as to why

Appendix 5: Key informant interview questions guideline

1. Number of individual participating in small holder forestry activity in their area
2. What is the average farm size for the tree grower?
3. What is the average harvesting volume per year?
4. What are the average costs of preparing and maintaining tree farmer prior to harvesting?
5. What is the average transportation cost of the raw materials?
6. What is the average selling price of one m^3 of harvested logs in TZS?
7. What is the level of awareness for forest taxes, fees and other charges?
8. What is the level of enforcement for collecting forest fees and taxes (TRA and TFS)
9. What is the level of compliance of the actors in the small holder forestry business for payment of taxes and fees? (TRA and TFS)
10. How are tax reviews affecting the actor's response to tax paying? How is the rate of compliance and evasiveness changing?
11. Is the collection rate for forest taxes and fees increasing or decreasing per time? (TRA and TFS)
12. How do the forest, taxes, fees and other charges affect the income of the small holder forest farmers?
13. Do the forest taxes, fees and other charges affect the actor's incentive to grow his/her business?
14. Do the forest taxes, fees and other charges affect aspiring entrepreneurs to start engaging in small holder forestry business?
15. What are your recommendations/opinions?

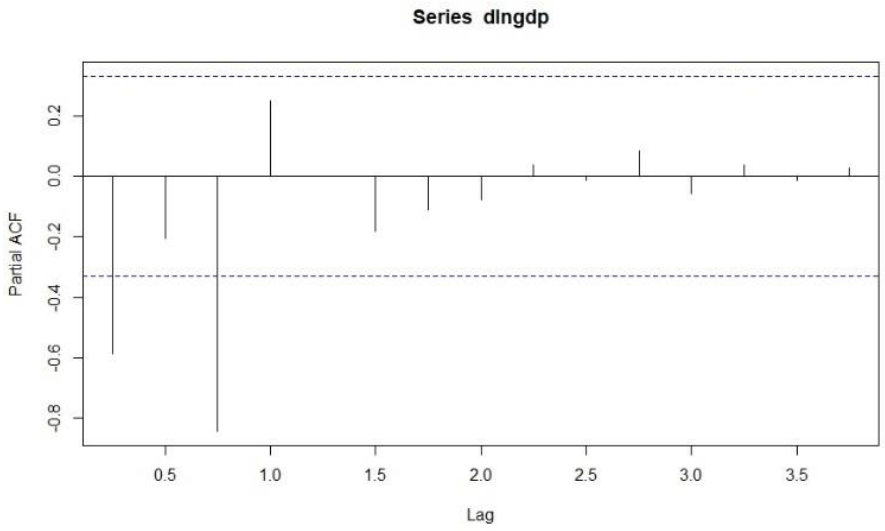
Appendix 6: Institutional data checklist

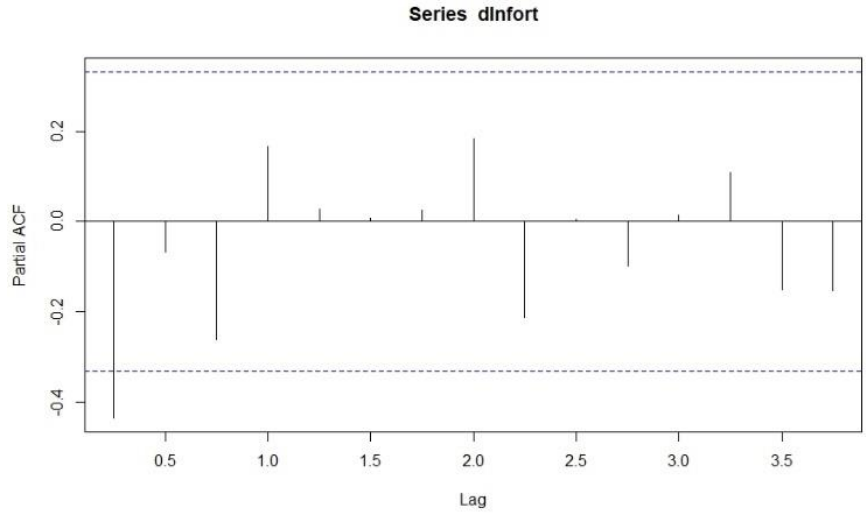
No	DATA REQUIRED	INSTITUTION	LOCATION
1.	Quarterly forest tax revenue	TRA	Dar es Salaam
2.	Annual forest fees and other charges revenue	TFS	Dar es Salaam/Mafinga
		MDC	Mafinga
3.	Quarterly GDP of Tanzania	BOT	Dar es Salaam

Appendix 7: Forestry tax revenue and GDP collected from 2012 Q1 to 2020 Q4

QUARTER	GDP TZS (M)	FORT TZS (M)
2012 Q1	19 521 081.00	313.40
2012 Q2	18 873 279.00	1 019.10
2012 Q3	18 378 797.00	1 162.60
2012 Q4	21 206 689.00	3 515.80
2013 Q1	20 391 553.00	807.80
2013 Q2	20 156 062.00	1 696.33
2013 Q3	19 843 868.00	2 750.20
2013 Q4	22 876 634.00	2 768.00
2014 Q1	22 128 918.00	1 954.00
2014 Q2	21 906 577.00	2 506.99
2014 Q3	20 783 948.00	2 265.30
2014 Q4	24 054 668.00	2 157.60
2015 Q1	22 777 583.00	1 520.30
2015 Q2	23 366 848.00	3 508.00
2015 Q3	22 366 026.00	2 254.70
2015 Q4	25 838 859.00	2 396.20
2016 Q1	24 979 343.00	2 050.40
2016 Q2	25 288 296.00	2 166.10
2016 Q3	23 835 662.00	2 509.70
2016 Q4	26 725 092.00	2 458.30
2017 Q1	26 203 060.00	1 733.00
2017 Q2	26 972 929.00	2 396.70
2017 Q3	25 036 850.00	2 419.10
2017 Q4	29 444 565.00	3 670.30
2018 Q1	28 165 574.00	2 641.30
2018 Q2	28 596 687.00	4 250.80
2018 Q3	26 840 057.00	3 322.99
2018 Q4	31 539 011.00	
2019 Q1	29 898 327.00	1 769.33
2019 Q2	30 721 508.00	4 948.90
2019 Q3	29 011 765.00	4 243.40
2019 Q4	33 565 136.00	3 751.50
2020 Q1	31 675 720.00	3 766.33
2020 Q2	31 965 474.00	4 243.40
2020 Q3	30 277 240.00	3 751.50
2020 Q4	35 177 410.00	3 766.33

Appendix 8: Partial autocorrelation functions of econometric variables





Appendix 9: R script file and output

```
library(urca)
library(dplyr)
library(forecast)
library(tidyverse)
library(tseries)
library(vars)
library(ggplot2)
library(tseries)
library(ARDL)
library(dLagM)
library(zoo)
library(strucchange)
library(tsDyn)
library(lmtest)
library(patchwork)
library(stargazer)
setwd("C:/Users/Sadeek Hamza/Desktop/Masters Thesis/Taxes/Analysisnew/")
#Load dataset
library(readxl)
finaltimeseriesdata <- read_excel("finaltimeseriesdata.xlsx")
View(finaltimeseriesdata)
#Declare quarterly time variable
attach(finaltimeseriesdata)
date <- as.Date(as.yearqtr(format(finaltimeseriesdata$QUARTER), "%Y%q"))
GDP <- finaltimeseriesdata$GDP
FORT <- finaltimeseriesdata$FORT
#Create data frame
data <-data.frame(date, GDP, FORT)
head(data)
#Declare time series variables
gdp <- ts(data$GDP, start = c(2012, 1, 1), frequency = 4)
fort <- ts(data$FORT, start = c(2012, 1, 1), frequency = 4)
#Test for stationarity using ADF
adf.test(gdp) #not stationary
adf.test(fort) #not stationary
#transform the variables into their natural logarithm form
lngdp <- log(gdp)
lnfort <- log(fort)
plot(lngdp)
plot(lnfort)
#test transformed variables for stationarity using ADF
adf.test(lngdp)#not stationary
adf.test(lnfort)#not stationary
```

```
#transform to first differences of log
dlngdp <- diff(lngdp)
dlnfort <- diff(lnfort)
plotdlngdp <- plot(dlngdp)
plotdlnfort <- plot(dlnfort)
plotdlngdp + plotdlnfort
#test for first differences of log of variables for stationarity using ADF
plot(pacf(dlngdp))
adf.test(dlngdp, k = 2)
adf.test(dlnfort, k = 2)
#Lag selection criteria (k-1)
dset <- cbind(dlngdp,dlnfort)
view(dset)
lagselect <- VARselect(dset, lag.max = 7, type = "const")
lagselect$selection
#Johansen testing (trace)
ctest1t <- ca.jo(dset, type = "trace", ecdet = "const", K = 3)
summary(ctest1t)
ctest2t <- ca.jo(dset, type = "trace", ecdet = "trend", K = 3)
summary(ctest2t)
#Johansen testing (Max Eigenvalues)
ctest1e <- ca.jo(dset, type = "eigen", ecdet = "trend", K = 3, season = 4)
summary(ctest1e)
#Granger Causality Tests
grangercausality <- grangertest(dset, order = 3)
grangercausality
grangertest(ctest1t, order = 3)
#Build VECM model
Model1 <- VECM(dset, 3, r = 1, estim = ("2OLS"))
summary(Model1)
VECMtable <- stargazer(Model1[["model.specific"]], type = "text")
VARModel <- VAR(dset, 3, type = "const", season = 4)
summary(VARModel)
GrangerGDP <- causality(VARModel, cause = "dlngdp")
GrangerFORT
causality(VARModel, cause = "dlnfort")
#Convert VECM to VAR
Model1VAR <- vec2var(ctest1t, r = 1)
Serial1 <- serial.test(Model1VAR, lags.pt = 4, type = "PT.asymptotic")
Serial1
#ARCH Effects
Arch1 <- arch.test(Model1VAR, lags.multi = 9, multivariate.only = TRUE)
Arch1
#Normality of residuals
```

```
Norm1 <- normality.test(Model1VAR, multivariate.only = TRUE)

Norm1

#Impulse response functions

GDPirf <- irf(Model1VAR, impulse = "dlnfort", response = "dlngdp", n.ahead = 30, boot = TRUE)

FORTirf <- irf(Model1VAR, impulse = "dlngdp", response = "dlnfort", n.ahead =30, boot = TRUE)

plot(FORTirf, ylab = "dlnfort",  main = "GDPs shock to Forest Taxes")
```