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Ethiopian Civil Service University

College of Finance, Management, and Development

Department of Development Economics and Management

Development Economics Master Program

The Contribution of the Textile and Clothing Industry to Economic Growth of Ethiopia: An Autoregressive Distributed Lag (ARDL Bounds) Testing Approach

By

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ID: ECSU1902264

Advisor

Mr. Mezid Nasir (PhD Candidate)

June, 2023

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A Thesis Submitted to the Development Economics Master's Program, Ethiopian Civil Service University, in partial fulfillment for the Award of Master Degree in Development Economics

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Declarations

I Alemu Dea, Registration Number/I.D. Number ECSU1902264, do hereby declare that this thesis is my original work and that it has not been submitted partially; or in full, by any other person for an award of any degree in any other university/institution.

Name of Participant: _____ Signature: _____

Date: _____

This Thesis has been submitted for examination with my approval as college supervisor.

Name of Advisor: _____ Signature: _____

Date: _____

Approval

The undersigned certify that they have read and hereby recommend to the Ethiopian Civil Service University to accept the thesis submitted by Alemu Dea, entitled "The Contribution of Textile and Clothing Industry to Economic Growth of Ethiopia: An Autoregressive Distributed Lag (ARDL Bounds) Testing Approach," in partial fulfillment of the requirements for the award of a Master Degree in Development Economics.

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Date: _____

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List of Acronyms/ Abbreviations

ADF	Augmented Dickey- Fuller
AGOA	African Growth and Opportunity Act
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Square
DFGLS	Dickey-Fuller Generalized Least Square
ECM	Error Correction Models
EPRDF	Ethiopian People's Revolutionary Democratic Front
ESS	Ethiopian Statistical Service
ETIDI	Ethiopian Textile Industry Development Institute
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
GEI	Government Effectiveness Indicator
GTP	Growth and Transformation Plans
IDS	Industrial Development Strategy
IMF	International Monetary Fund
MoI	Ministry of Industry
NBE	National Bank of Ethiopia
OLS	Ordinary Least Squares
RGDP	Real GDP
RMG	Ready-Made Garments
SSA	Sub-Saharan Africa
TCI	Textile and Clothing Industry
VAR	Vector Autoregressive
VIF	Variance Inflation Factor
WB	World Bank
WITS	World Integrated Trade Solution
WTO	World Trade Organization
XM	Net Export

Abstract

In Ethiopia, there is a notable scarcity of national research on the topic. Because of this, further in-depth scientific investigation was needed to ascertain how the TCI industry fits into the country's overall economy. Thus, the main objective of this study was to better understand how the TCI sector contributes to Ethiopia's economic growth by examining the relationships between real GDP growth and the sector's employment opportunities measured in terms of pay adjusted for the annual inflation rate, fixed capital formation adjusted for constant prices in 2015, the net exports of TCI, and control variables: the size of the working-age population (aged 15 to 64), total exports (percentage of GDP), and the nation's government effectiveness indicator. Using annual time series data from the period 1996 to 2021, the ARDL estimation method was used to determine how the long-run and short-run correlations among the variables interacted. The empirical findings indicated that, in the existence of a long-run relationship between the variables, fixed capital formation and employment opportunities have both a significant and positive relationship to real GDP growth, while net exports have a significant but negative relationship. The size of working-age population (aged 15 to 64), the total export of the country (percentage of GDP), and the government effectiveness indicator have a significant and positive relationship with the real GDP. In the short-run ECM, only the net export and government effectiveness index have significant contribution to economic growth. The study suggests that the government should seek to attract significant inflows of FDI to progress in fixed capital formation, and implement export-oriented development policies to improve the sector's export performance, and implement realistic employment regulations in order to increase the number of jobs available in the industry that pay well.

Keywords: TCI sector contributes, ARDL estimation, fixed capital formation, GDP, government effectiveness indicator, short - run ECM.

CHAPTER ONE

1. INTRODUCTION

1.1.Background of the Study

One of the most contemporary, complex, and difficult areas of study of economics is the study of economic growth (Todaro & Smith, 2015, p. 9). Economic growth has been characterized by a planned change in the composition of employment and production such that agriculture's share of both decreases and that of manufacturing and services rises. Rapid industrialization has therefore always been the main objective of development initiatives, usually at the expense of agricultural and rural development. Due to its association with high levels of production and income, industrialization has historically been a sign of modernity and the increase of a nation's economic strength (Todaro & Smith, 2015, p. 17). It is no surprise that the majority of developing-country governments have made industrialization a top national priority, with several notable success stories in Asia (Todaro & Smith, 2015, p. 66).

The beginning of contemporary economic expansion can be attributed to the 18th - century British industrial revolution, which was largely confined to Britain (Broadberry, 2021). According to Stearns (2020), the first industrial revolution began in Britain in 1764 with the invention of weaving machines, most notably the spinning jenny for the textile industry. As a result, Britain improved its position relative to the rest of Europe and the leading Asian economies. The second industrial revolution occurred in Britain, Europe, North America, and Japan between the middle of the 19th and the beginning of the 20th centuries. The Textile and Clothing Industry (TCI) was a very important industry for the early industrialization of today's developed economies such as the United Kingdom (UK), the United States (US), Japan, etc. (Yürek et al., 2019, p. 256-277).

With the exception of Japan, Roy (2018) observed that almost other Asian countries were latecomers to the industrial revolutions. Japan joined the first industrial revolution significantly later than other countries and had a much bigger role in the second (Roy, 2018). However, China, South Korea, Singapore, Hong Kong, Taiwan, India, Indonesia, and Malaysia had made considerable advancements by the end of the third industrial revolution (Roy, 2018). This paper argues that during the third industrial revolution, the four Asian Tigers—Hong Kong, Taiwan, Singapore, and South Korea—

emerged as extraordinarily prosperous economies, vying with and exceeding Japan. The TCI is the primary basis of development in most Asian countries like China, Vietnam, Bangladesh, etc. (Chen et al., 2017; Gereffi, 1999). For instance, Bangladesh, Sri Lanka, Pakistan, and China have a TCI sector value added share to Gross Domestic Product (GDP) of 11.8%, 5.6%, 3.4%, and 2.8%, respectively (World Bank (WB), 2018). The trade-led industrialization of emerging and developing economies is also being strongly fueled by the TCI sector (Kabir et al., 2019). The TCI is the typical 'starter' industry for countries engaged in export-oriented industrialization (Gereffi, 2002). China, Viet Nam, Bangladesh, and India are the top four cloth exporters in the international market in the Asian area, and they have export market shares of 38%, 4.9%, 3.7%, and 3.6%, respectively, of the $779 billion global TCI market in 2020, and the proportion of TCI exports to their GDP is 11%, 7.8%, 4.4%, and 2% to Vietnam, Bangladesh, Pakistan, and China, respectively (World Trade Organization (WTO), 2020). This shows that the economies of these nations have successfully undergone transition, and the sector is significantly enhancing these economies (Roy, 2018).

In comparison to other rapidly expanding regions, structural change—the shift of employees from lower to higher productivity employment—has far less of an impact on growth in Africa (McMillan et al. 2014; de Vries et al. 2015). According to Mendes et al. (2014), the process of industrialization in Sub-Saharan Africa (SSA) took place in 2 stages: a first stage began very early during the colonial regime, around the 1920s, and ended in the late 1940s; a second stage of industrialization began in the late 1950s and gained momentum in the 1960s when import substitution was implemented more widely. Despite the fact that the history of the African TCI dates back to pre-colonial times, according to Traub-Merz & Jauch (2006), the USAID CASE STUDY (2014) claims that Africa's participation in the modern TCI is largely due to international trade agreements, particularly the Multi-Fiber Arrangement (MFA) and the African Growth and Opportunity Act (AGOA), which have made it possible for lower-income countries to join the global value chain. Most SSA nations utilized import substitution-driven policies to establish the sector, but they struggled to maintain it in the face of fierce international competition until AGOA was implemented in 2000, opening the continent's markets to unprecedented levels of trade. The duty-free advantages of the Generalized System of Preferences (GSP) scheme were increased under AGOA to include a number of TCI items. Because of AGOA's preferential access to the American market, several Asian investors—primarily from China and Taiwan—were inspired to

build garment factories in SSA. After all, industrialization in Africa has, in Rodrik's (2014) opinion, been disappointing. In SSA, manufacturing accounted for 10% of GDP on average in 2014, a level that has not altered since the 1970s. The manufacturing sector's value added to the GDP of SSA countries reached 11.6% in 2021 (WB, 2021). According to data from TexPro (2021), SSA countries' exports of TCI grew by 25% to $5.14 billion in 2021 from $4.11 billion in 2020.

In Ethiopia, the first integrated textile mill built was Dire Dawa Textile Mill, established in 1939 (Ethiopian Textile Industry Development Institute (ETIDI), 2014), and served as the basis for contemporary textile industry in the country. In the 1960s, five integrated textile companies were established. The socialist regime (1974-1991) nationalized the private TCI while building four additional factories to expand the industry, meet domestic demand for conventional textiles, and crowd out imports (ETIDI, 2013). After the fall of the socialist regime in 1991, the Ethiopian People's Revolutionary Democratic Front (EPRDF) regime came to power and tried to transform the economy from a centrally planned structure to one based on free market principles. To manage the industry and enhance the performance of the sector, some tasks were performed, including the adoption of the Agricultural Development-Led Industrialization (ADLI) strategy in 1994, the adoption of the Industrial Development Strategy (IDS) in 2003 (Federal Democratic Republic of Ethiopia (FDRE), 2002), the establishment of the ETIDI, the Growth and Transformation Plans (GTP), the eco-industrial parks, and the Ethiopian Industrial Parks Development Corporation (IPDC). After the current government came to power, the 10-year development plan for Ethiopia (2021-2030) was set. Along with preserving the current plants, the strategy gave careful consideration to raising output and productivity. All regimes have given the TCI sector a considerable amount of attention to reap its economic and social benefits. The growth of the TCIs' is essential for nations like Ethiopia due to strong comparative advantages. Addisu (2013) suggests that the TCI sector acts as a bridge for development as it integrates agriculture and industry. It is labor-intensive, employing large numbers of people in everything from growing cotton to making fashion clothing. The TCI sector continues to contribute to the economic growth of countries with a lack of capital with an abundance labor (Karaalp & Yilmaz, 2012). TCI is a typical industrial sector, representing a global flow of capital, chemicals, processing machinery, finished products, and ideas. TCI was the very first to embrace the industrial revolution, which emerged as innovative and high-tech industries, and many world economies depended

on its evolution for their political dominance for a very long time (Loo, 2002; Shishoo, 2012). By using the TCI sector for their development, there may be several empirical results that demonstrate where the rest of the globe stands.

Internationally, there are numerous studies on the subject, but there are few domestic ones. In Ethiopia, there is a notable scarcity of national research on the subject. Therefore, determining how Ethiopia's TCIs have affected the country's economic progress is the main goal of the article. This study is conducted to comprehend how the TCI fits into the overall picture of the country's economic growth and to ascertain the genuine GDP contribution of Ethiopia's TCIs in terms of exports, fixed capital formation, and employment opportunities.

The study used the autoregressive distributed lag (ARDL) estimation approach to empirically analyze the relative influence of the TCI sector on economic growth in Ethiopia, which adds to the paucity of literature on the topic. The long-run relation that exists in series was done using the ARDL bound test, which was developed by Pesaran et al. (2001). Accordingly, the ARDL is used to determine the variable integrations, which is also a strong fit for data from small samples. As a result, the study used the ARDL model to determine the short- and long-run effects of the TCI sector on Ethiopia's economic growth.

The results show that fixed capital formation has a significant and positive relationship to long-term economic growth, while the sector's net exports have a significant and negative relationship. In a similar vein, employment opportunities in the sector in terms of wages and salaries paid that are adjusted for the annual inflation rate have a significant and positive relationship to long-term economic growth.

1.2.Statement of the Problem

There is a significant lack of information about how the TCI is contributing to the economic growth of the country in terms of its job creation opportunities indicated in salaries and wages paid that are adjusted for the inflation rate, fixed capital formation adjusted for 2015 constant prices, and net exports.

The country's TCI is still in its early stages, despite multiple efforts made over the course of time by various governments to advance it. The strategies put in place to acquire the best performance possible from the industry have not yet yielded results that are even marginally acceptable. For instance, it was planned to generate 1 billion USD from exports in the TCI sector at the end of GTP I (2010/20II to 2014/15), while the performance stood at only 98.1 million, or 9.81% of the planned target. The 1 billion USD plan, which was expected to be achieved by the end of GTP I, had not been achieved even by the end of GTP II (2015/16 to 2019/20), which is around 168.9 million USD (16.89% of 1 billion). This is only around 0.1% of the GDP (at the current price) of the country (National Bank of Ethiopia (NBE), 2019).

In addition to the goals set by various regimes, the favorable natural conditions, such as the climate for growing cotton (the industry's raw material), the large number of easily-trained youth, the size of the population for local consumption, the opportunities for access to regional and global markets, etc. for the sector in the country, are very encouraging. Despite all these comparative advantages, the industry’s export performance is does not go beyond 0.1% of the GDP share of the country, according to the WITS data (2020).

Although the sector has several comparative advantages and the potential to be more researchable, there aren't many academic articles on it in the nation. There are very few papers—nearly none, in fact—on the subject of the contribution of Ethiopia's TCI to economic progress. The majority of sector publications focus more on performance depiction than scholarly advice. There are very few empirical examples of how the industry is contributing to the country's economic growth. For this reason, additional scientific research was required to determine how the sector fits into the overall economy of the nation. It also needed reviewing and assessing more empirical literature on the sector from international benchmarks to enable me to produce constructive recommendations with a scholarly attitude to promote the industry in the country.

Considering all of these factors, the study has used both descriptive and econometric data analytic methodologies to analyze the contribution of Ethiopia's TCI to its

economic growth. The study made use of a time-series performance evaluation of the GDP growth of the country. Using a time-series econometric analysis method, the main research question, which is to determine the economic impact of the TCI, is addressed. Annual time series data from 1996 up to 2021 is used for both descriptive and econometric data analysis techniques. The econometric method employed is the ARDL-bounds testing approach.

1.3.Research Question

Based on the above discussions, the two main research questions are:

1. What is the relationship between real GDP growth and each of net export, fixed capital formation adjusted for 2015 constant prices, and job opportunity in terms of wages and salaries paid adjusted for the inflation rate in the industry? If the is any relationship, what is the extent of each?
2. What is the trend in the real GDP growth of the country?

1.4.Objectives of the Study

1.4.1. Main Objective

The main aim of this research is to understand how the textile and clothing industry sector is contributing to the economic growth of Ethiopia.

1.4.2. Specific Objectives

The study has attempted to meet the following specific objectives based on the above general objective.

- To ascertain the long- and short-run effects of the textile and clothing industries on Ethiopia's economic growth;
- To determine the textile and clothing industries sector real fixed capital formation contribution to the real GDP of the country;
- To estimate how much the textile and clothing industry sector employment opportunities—measured in terms of earnings and salaries that have been adjusted for inflation each year—contribute to the real GDP of the nation;

1.5.Research Hypothesis

Under this investigation, the following hypotheses are tested:

1. In terms of fixed capital formation, the TCI significantly contributes to Ethiopia's economic growth.
2. Ethiopia's economic growth is negatively impacted by the sector's net exports.

3. The employment opportunities in the TCI sector in terms of wages and salaries paid adjusted for yearly inflation rate have no appreciable influence on Ethiopia's economic growth.

1.6. Significance of the Study

How much does the TCI sector actually contribute to Ethiopia's real GDP in terms of job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), fixed capital formation of the sector adjusted for the 2015 constant price, net export of the sector, government effectiveness indicator of the country, the size of the working-age population (15 to 64), and total export of the country (% of GDP)? was investigated in this study. The histories of the industrial revolution in numerous nations demonstrate how the TCI sector served as a catalyst for industrialization. Because the vast majority of studies demonstrate its beneficial influence, the TCI sector has been recognized as an essential driver of economic growth and structural transformation. It can stimulate capital formation, increase employment, and raise exports. It might also be considered a sector that will aid in the country's fight against poverty. Ethiopia, with a population of more than 117 million, is the second-most populated nation in Africa, according to the World Bank (2020). Due to the two main comparative advantages of the sector in the country: the abundance of an abundant, easily trainable labor force and the suitable soil and climate for cotton growth (the main raw material for the TCI sector), the study's findings are important to users by providing more information on how Ethiopia's TCI sector operates.

1.7.Scope of the Study

The large and medium-sized TCIs in Ethiopia are the exclusive subject of this study, which is concentrated on the performance and growth of the textile industry's export-oriented category. Additionally, despite the structural distinctions within the TCI sector, this study has assessed them as a whole because there is a paucity of precise and comprehensive data. The study's only source of information is secondary data. The study is more inclined to use data from international organizations, like WB, WTO, WITS, etc., and Ethiopian Statistical Service (ESS) time series data from 1996 up to 2021 for both descriptive and econometric data analysis techniques. The econometric method employed is the ARDL-bounds testing approach.

1.8.Research Limitations

The primary research limitation at first was a problem with the data, and this was because the study employed secondary data and general inferences were taken from those sources of data. The study's choice of a limited number of variables related to the TCI sector is the second drawback. Additionally, there are cottage and small TCI sectors that have a big impact on the nation's economy and are excluded because of data availability limitations. The majority of the study's attention has been given to enterprises in the sector that operate in export markets and use particular, moderate, and exclusive sector characteristics that have an impact on the economic growth of the country within considering control. To elaborate, the study used large and medium-scale TCI performance only. To summarize, the study has encountered the following main limitations:

- ✓ the study employed secondary data, and general inferences were drawn from those sources of data;
- ✓ the study's choice of a limited number of variables related to the TCI sector;
- ✓ the study used large and medium-scale TCI performance only.

1.9.Organization of the Thesis

As specified by the university, this thesis consists of five chapters. The background of the study, the statement of the problem, the objectives of the study, the research hypothesis, the significance of the study, the scope of the study, and the research limitations are all covered in Chapter 1. Chapter 2 presents a review of the literature on economic growth and its relationship to the primary variables taken into account by the TCIs for the country. The third chapter covers data analysis methodologies, sources, model definition, and estimation methods. The findings of the empirical analysis are presented in Chapter 4, and the conclusion and recommendations are covered in Chapter 5.

CHAPTER TWO

2. LITERATURE REVIEWS

2.1.Introduction

This chapter attempts to review studies on the contribution of the TCI to economic growth. Historical background of the TCI sector of the country is discussed. In addition, a discussion of some of the characteristics of the TCI sector in the different nations is evaluated. However, the general growth theory is covered first.

2.2.Theoretical Literature Review

2.2.1. Economic Growth Theories

The Solow-Swan growth model, commonly referred to as the neoclassical growth model or exogenous growth model, is a long-run economic growth model (Todaro & Smith, 2015). It looks at capital accumulation, labor or population expansion, and advances in productivity that are primarily fueled by technological advances to explain long-run economic growth. At its core, the model's ability to "make contact with microeconomics" is provided by an aggregate production function, which is frequently defined to be of the Cobb-Douglas type (Acemoglu, 2009, p. 26). This model replaced the Keynesian Harrod-Domar model (Harrod, 1939) and was independently created in 1956 by American economist Robert Solow and Australian economist Trevor Swan (Wikimedia Foundation, 2014).

According to the Wikimedia Foundation (2014) and Todaro & Smith (2015), the Solow-Swan model enhanced the Harrod-Domar model by integrating labor as a factor of production and capital-output ratios that are not fixed, as they are in the Harrod-Domar model. These improvements make it possible to separate the growing capital intensity from technological progress. According to the Solow-Swan model, the fixed proportions production function is a "crucial assumption" for the instability results in the Harrod-Domar model (Wikimedia Foundation, 2014; Todaro & Smith, 2015). The model goes one step further by investigating the implications of various specifications, such as the Cobb-Douglas and the more inclusive Constant Elasticity of Substitution (CES) (Solow, 1956). Therefore, the key modification from the Harrod-Domar growth model is that the Solow-Swan model allows for CES between capital and labor. One central criticism is that Harrod's original piece (1939) was neither mainly concerned with economic growth nor explicitly used a fixed proportion production function (Besomi, 2001; Halsmayer & Hoover, 2016).

According to the Wikimedia Foundation (2014), and the classic Solow-Swan model's long-term predictions state that economies eventually reach steady-state equilibrium and that the only ways to sustain growth are through technological progress and/or capital development. Both shifts in saving and population growth cause only level effects in the long run (i.e., in the absolute value of real income per capita).

The fundamental result of the neoclassical growth model is that it is not possible to sustain long-term growth without technological progress due to the principle of diminishing marginal productivity (Todaro & Smith, 2015). Therefore, technological progress that increases the productivity of the capital/labor ratio is a must for maintaining long-run economic growth, according to this model.

The fascinating conclusion of Solow's model is that poor countries should expand more quickly and eventually catch up to rich countries (Wikimedia Foundation, 2014; Todaro & Smith, 2015). Romer (2006) claims that this convergence is the result of delays in the knowledge-diffusion process. As a result, real income disparities may decrease as poorer countries gain access to better technology, information, and an efficient distribution of international capital flows, since the rate of return on capital should be higher in these nations.

To sum up, Solow and Swan (1956) introduced an economic environment with a level of labor L and a capital stock K and defined the production function Y = F (K, L) as a positive, increasing, concave function with constant returns to capital and labor as well as constant total factor productivity. The concave shape represents an increasing rate at a decreasing rate and reflects diminishing return capital per worker, according to Todaro & Smith (2015). Based on fundamental Solow-Swan assumptions, the Cobb-Douglas production function introduces steady exogenous technological progress A > 0, which requires labor augmentation to ensure the presence of a steady state with an allocated exponential rate of increase in the production function Y=F (K, L, A). What matters is that the total productivity factor is no longer constant, which enables the model to provide a positive long-term increase in GDP per person. The typical cobb-Douglass production function is represented by, $Y_t = AK_t^{\alpha} L_t^{1-\alpha}$, $0 < \alpha < 1$, where Y_t is Gross Domestic Product (GDP) at time t, K_t is the stock of capital at time t, L_t is labor at time t, A_t identifies the point at which a society's technological progress began as well as the labor force's productivity, which increases through time at an exogenous pace, and α is a symbol for the output elasticity of capital, or the percentage increase in

GDP brought on by a 1% increase in capital. This formulation of the neoclassical growth theory results in diminishing returns for both labor and capital since α is assumed to be less than 1, and private capital is supposed to be paid its marginal product in the absence of external economies (Todaro & Smith, 2015, P.138).

Therefore, the Solow-Swan growth model was used as a theoretical basis for this study by using the Cobb-Douglas production function as depicted above.

$$Y_t(L_t, K_t) = AL_t^{\alpha} K_t^{1-\alpha} \quad \text{---------- (1)}$$

By taking the natural logarithm, equation (1) can be rewritten as:

$$ln\mathrm{Y_t} = \beta_0 + \beta_1 ln\mathrm{K_t} + \beta_2 ln\mathrm{L_t} + u_t \quad \text{----------(2)}$$

In addition, Solow's sources-of-growth model is used by contemporary economists to evaluate the individual impacts of technological advancement (commonly referred to as the Solow residual), capital investment, and labor on economic growth (Haines & Sharif, 2006). The Solow model is one of the economic theories that is most frequently employed to explain economic growth (Frey, 2017).

2.3.Historical Background of TCI Sector Growth in Ethiopia

The production of cotton, ginning, spinning, weaving, knitting, dyeing, finishing, and clothing are all included in the textile and clothing industry sector. Ethiopia has a long history of traditional cottage textile subsectors, but the introduction of modern integrated textile mills in Ethiopia was initiated by Italians during the Second World War. Dire Dawa Textile Mill was the first textile industry established by foreign capital in 1939. This has marked the starting point of the textile sub-sector in Ethiopia (ETIDI, 2014).

Alemayehu (2001) asserts that Ethiopia's economic growth is closely related to changes in the country's political system. Determining how the TCI sector's history aligns with the national political process is crucial.

2.3.1. TCI Sector in Ethiopia (1930-1974)

The first textile factory built with foreign investment was Dire Dawa Textile Mill, which was built in 1939 under the monarchy regime (ETIDI, 2014). This served as the catalyst for Ethiopia's textile industry to get off the ground. Five significant integrated textile businesses were founded in the 1960s, mostly with private funding (ETIDI, 2014). During this time, domestic consumption was primarily the focus.

2.3.2. TCI Sector in Ethiopia (1974-1991)

According to the information from ETIDI (2014), the socialist government, in power from 1974 to 1991, nationalized private textile and clothing companies and built four additional integrated textile mills to boost the industry and meet domestic demand while substituting imports.

The socialist economy eventually had a negative impact on the sector. The industry was unable to satisfy standards set by the global market due to neglect, a lack of competition, and antiquated technology. As a result, the cotton farming, textile, and apparel industries were operating significantly below capacity.

2.3.3. TCI Sector in Ethiopia (1991-2019)

The EPRDF, which came to power in 1991 following the overthrow of the socialist administration, made an effort to move away from a command economy or a centrally planned framework and toward a market-based economy.

The EPRDF developed "The Sustainable Development and Poverty Reduction Program (SDPRP)" in 2002, which named development and poverty reduction as its main goals and "ADLI" as its main strategy. This tactic has significantly fueled the TCI's growth.

Along with these duties, additional efforts were made to manage the industry and improve the performance of the sector, such as the implementation of the ADLI strategy and the IDS in 2003 (FDRE, 2002), as well as the creation of the ETIDI, the setting of GTPs, the building eco-industrial parks, and the establishment of Ethiopian Industrial Development Cooperation (IPDC). According to data from ETIDI (2014), the number of large and medium-scale TCIs peaked during this regime at more than 189.

2.3.4. TCI Sector in Ethiopia (2019 onward)

The 10-year development plan for Ethiopia (2021-2030) was established after the present government took office (MoF, 2020). The strategy carefully considered increasing output and productivity in addition to maintaining the existing situation. In addition, a significant restructuring of the government organizations in charge of sector development is taking place currently.

In conclusion, even if the sector's historical record in Ethiopia during the discussed regimes demonstrates great attention paid from their perspective, it has not yet reached the established targets.

2.4.Empirical Literature Review

The literature review focuses on prior research that has been done on the subject in general as well as on related topics that explore how the TCI sector has impacted the economic growth of several countries in Asia, Africa, and the study area, Ethiopia in particular.

In the case of Ethiopia, the impacts of the TCI sectors on economic growth and development have not been sufficiently investigated. Even if most of the research done on the topic has revealed a positive influence of the industry on economic growth, for instance, a study by Keane and te Velde (2008) on the role of TCIs in growth and development strategies suggests the potential of the TCIs to contribute to long-run growth and development may not happen or will be negative if the quality and effectiveness of government policies and institutions in developing countries to build on this investment is no good. Therefore, the study argues for the need and influence of World Governance Indicators (WGI) to get the best out of the sector.

The other study by Yared (2010), which looks at the economic effects of Ethiopia's TCI sector using descriptive analysis and spans the years 1999-2009, indicates that the industry's effects are relatively minimal. The study's conclusions stated that the industry's limited capacity to contribute to GDP development is mostly caused by the government's policy orientation, which exclusively supports those who participate in export markets.

The other study conducted by Veselinova and Samonikov (2013) on Macedonia’s textile industry suggests that more than one-third of the total exports, as well as more than one-third of the employed population in the manufacturing sector, accounted for the textile industry, but this industry creates only 3% of the national GDP. The argument about great work but a small amount of GDP share is due to the very low level of additional value among all the products that consist of this industry’s exports. As a result, this study emphasizes the value addition rather than volume approach to extracting significant value from the industry for economic importance.

Makinde et al. (2015) conducted a study that examined factors that are responsible for the dwindling and near extinction of the textile industry in Nigeria and its implications for national growth and development, which focuses on the viability of the industry as an alternative for revenue generation and a tool for economic empowerment. The study uses an art historical methodology based on interviews, archival materials, print, and digital media. The data was then critically examined, utilizing the modernization and

dependency theories of development. Results show that trade liberalization, Nigeria's policy on textile imports, a preference for imported rather than domestic textiles that results in poor consumer spending, neglect of the agricultural sector, unstable power supplies, a lack of technical expertise, and other factors are to blame for the industry's slow demise. According to the study, a well-established and well-managed textile sector has a good impact on the economy of the country and assures the sustainability of the Nigerian textile industry. In addition, it will significantly lower the rate of unemployment in Nigeria.

According to Habibur and Ahmed (2015), Bangladesh's Ready-Made Garments (RMG) industry is trying to strengthen its human resources as well as the country's economy. Gender equality, female empowerment, and the socioeconomic progress of women are all profoundly impacted by it. The RMG industry made up more than 13% of Bangladesh's GDP in the fiscal year 2013-2014. By providing jobs to both sexes to increase GDP and generate 80% of all export revenues in foreign currency, the RMG sector aids in the reduction of poverty in Bangladesh. Here, female garment workers play a crucial role. In the fiscal year 2013–2014, Bangladesh's exports were 24.59 billion dollars, and between July 2014 and February 2015, they reached 16,551.49 million dollars, or 81.49% of the country's total exports (by the export promotion bureau of Bangladesh). 4 million people are employed overall in the RMG sector, with 3.2 million of those working an average of 11.12 hours a day in the apparel manufacturing sector. At this time, the GDP is growing at 6.12%. Likewise, Hasan et al. (2016) looked at Bangladesh's textile industry's impact on the nation's economic growth. The authors did this by utilizing information from 2004 to 2014. According to the study's findings, the textile industry of the nation significantly contributes to the economic growth of the nation by raising export revenues by 85% and creating 1.5 million jobs.

In his work, Tadese (2016) examined the long-term performance (impact) of exports and their volatility on GDP growth in Ethiopia. He employed an extended Cobb-Douglas production growth model with an ordinary least squares econometric technique to tackle this research topic. Five different variables have been employed in the study: export of goods and services, gross capital creation as a proxy for capital stock, export volatility index, Hirschman concentration index, labor, and real GDP as a dependent variable. The time series data were covered from 1980 to 2012. The paper's empirical findings indicate that in the case of Ethiopia, the long-term impact of exports appears to have a statistically significant positive impact on output growth. The research

further argues that in areas where it has competitive advantages, the nation should be required to diversify its export products. The country should also diversify the range of its trading partners.

In another way, Vu and Pham (2016) investigated Vietnam's textile industry and its comparative advantage over the fiercely competitive Chinese textile industry. The results of the generalized double-diamond approach, which focused on the factor environment and associated industrial conditions, highlighted that Vietnam's industrial sector is less globally competitive than the Chinese industrial sector. The improved export of textiles and clothing as well as the ease of doing business, however, corroborate the findings and the comparative advantage of Vietnam's textile industry. The study concluded that the Vietnamese textile industry could significantly contribute to the country's economic growth if it was able to maintain its competitiveness and overcome the accompanying industrial challenges and factor environment disadvantages.

The other researchers, Iqbal Hussain et al. (2020), investigated the non-linear impact of textile and clothing manufacturing on economic growth using the case of top-Asian economies. Quantile on Quantile regression is a special methodology with a propensity to establish the relationship between variables that are non-linear across different quantile distributions. Additionally, the methodology outlined contributes to the explanation of the asymmetric response in the quantiles of economic growth observed in the examined nations and caused by the quantiles of the TCIs. The findings from the quarterly statistics, which span from 1990 to 2018, support the existence of a favorable relationship between the TCI and economic growth in all Asian countries under study. Finally, the report makes the case that the relevant governmental entities must put in place several programs to attract and incentivize potential investors, reducing the rivalry for new entrants into the TCI sector. According to Mabeleng's (2020) study, which used secondary time-series data from 1994 to 2018 and Error Correction Models (ECM) analysis to evaluate the role of the TCI in the South African economy, both employment and exports have a positive short-term impact on the country's economy.

2.5.Summary of Literature Reviews

As can be observed from the reviewed literature too, there are very few papers—nearly none, in fact—on the topic of Ethiopia's TCI's contribution to economic growth, and just one indirectly connected piece of research was examined. This research gap is a

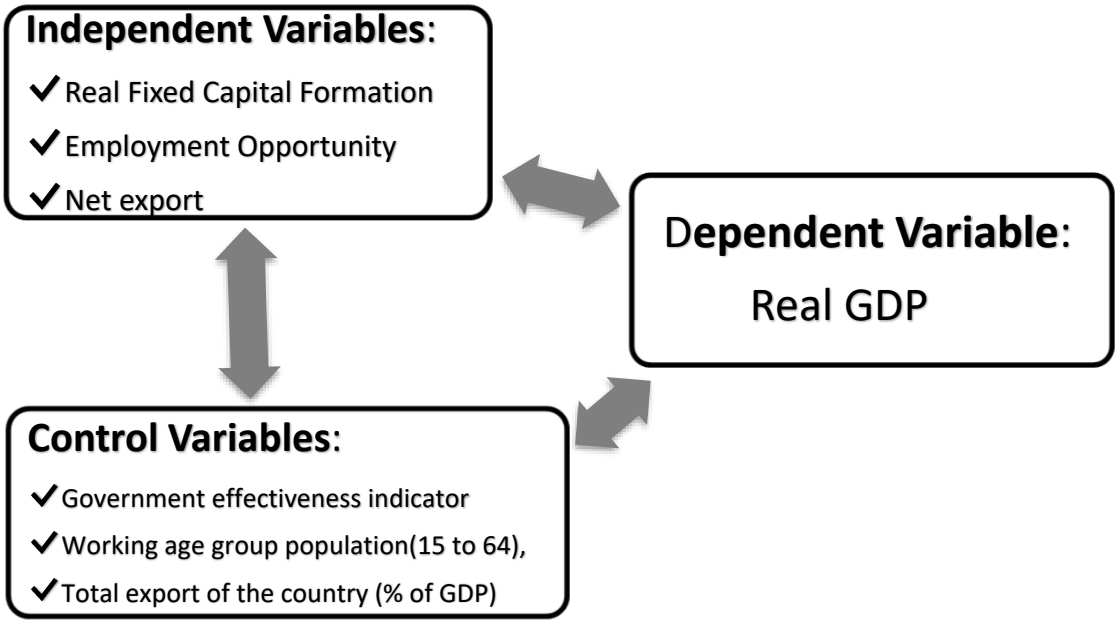
domestic one. Apart from this domestic research gap, the majority of the reviewed international literature has shown that TCIs have a positive impact on a nation's economic growth. They are a very important sector to transform a country's economy. Besides this, the majority of authors vehemently support the need for governance issues because they have an impact on the performance of the sector and, as a result, have an impact on a nation's economy. As a result, it makes sense to include the GEI, one of the best-known WGIs, in the model as a control or supplementary variable. For this reason, GEI was included in the model.

2.6.Conceptual Framework

Based on the literature studies reviewed, trends of economic growth discussed, historical background of TCI assessed, and TCI sector performance evaluated to achieve the research goal, the study created a conceptual framework to show how the TCI industry contributes to the country's economic growth. In order to determine how much the TCI sector contributes to the country's economic growth, real GDP is used as the dependent variable, fixed capital formation by the sector adjusted for the 2015 constant price, job prospects measured in terms of wages and salaries paid adjusted for each annual inflation rate, and net export of the sector at current prices are used as the explanatory variables, while a government effectiveness indicator ranging from -2.5 to +2.5, with -2.5 denoting the least effective government, the size of the working-age population (15 to 64), and total export of the country (% of GDP) are used as the control variables.

The TCI sector serves as the catalyst for industrialization or economic structural transformation. Therefore, the vitality of the TCI sector on the economic growth of a nation can be best expressed by the main variables: job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), fixed capital formation of the sector adjusted for 2015 constant price, net export of the sector, government effectiveness indicator of the country, the size of the working-age population (15 to 64), and total export of the country (% of GDP). Hence, the way these variables in the sector interact with economic growth is very vital. Figure 1 below provides a graphic representation of this conceptual framework.

Figure 1: Conceptual Framework



Note: The bidirectional sign in the conceptual framework is used to take into account the pairwise causality effect that may exist between variables under consideration.

CHAPTER THREE

3. METHODS OF DATA ANALYSIS

3.1.Introduction

The evaluation of pertinent literature in the preceding chapter assisted this study in better understanding the issue and developing a suitable research strategy to address it. This section discusses the research design and the rationale for the methodological choice.

3.2. Definition of Variables

3.2.1. Dependent Variable

GDP (constant 2015 US$) (Real GDP) (RGDP): GDP at purchaser's prices is calculated as the total of all resident producers' gross value added, plus any applicable product taxes, minus any subsidies not reflected in the price of the goods. It is calculated without making deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources. The data are in constant 2015 prices, expressed in U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2015 official exchange rates. *Source*: World Bank national accounts data and Organization for Economic Co-operation and Development (OECD) national accounts data files.

3.2.2. Explanatory Variables

New Capital Expenditure (Fixed Capital Formation) (K): is the cost of new or used capital equipment bought, the cost of building, and other capital goods produced or built by the establishment during the reference period. The data are in constant 2015 prices, expressed in U.S. dollars. *Source*: ESS.

Wages and Salaries (L): Includes all payments in cash or kind made to employees during the reference year in connection with the work done for the establishments. The data are adjusted for the inflation rate and expressed in U.S. dollars. *Source*: ESS.

Net Export of TCI Sector (XM): Net export in the TCI sector is derived by offsetting imports of textile and clothing materials the country is making from the rest of the world against exports of the TCI sector of the country. Exports and imports of the TCI sector comprise all transactions involving a change of ownership of the TCI sector between residents of one country and the rest of the world. The data are in current U.S. dollars.

Source: International Monetary Fund (IMF), Balance of Payments Statistics Yearbook, and data files.

3.2.3. Control Variables

Government Effectiveness Indicator (GEI): The government efficiency indicator created by Kaufmann et al. (2008) at the World Bank is used in this study as one of the control variables. The indicator is a special variable of how effective the government is, and it reflects opinions on the effectiveness of the civil service, the effectiveness of public services, the credibility of the government's commitment to its policies, the quality of policy formulation and implementation, and the degree of political independence of the civil service (Kaufmann et al. 2008). The indicator's range is from -2.5 to +2.5, with -2.5 denoting the least effective level of governance and +2.5 denoting the most effective level.

The Size of Working Age Group Population (15 to 64) (POPU): total population between the ages 15 to 64 or those aged 15 to 64 of a country, in this case the number of populations aged between 15 to 64 of Ethiopia. *Source*: WB.

The Total Exports of the country (% of GDP) or Exports of goods and services (% of GDP) (TEX): represent the value of all goods and other market services provided to the rest of the world expressed as a percentage of the GDP of a country. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services, expressed as % of GDP. They exclude compensation for employees, and investment income (formerly called factor services), and transfer payments. *Source*: WB

A brief explanation of the variables being taken into consideration is shown in Table 1 below.

Table 1: Summary of Description of the Variable and Data Source

Variables	Descriptions	Type	Measurement Unit	Source
RGDP	Real GDP	Dependent	US Dollar	WB
K	Fixed Capital Formation by TCI sector	Independent	US Dollar	ESS
LI	Employment Opportunity by TCI sector in terms of Wages and Salaries Paid adjusted for annual inflation rate		US Dollar	ESS
XM	Net Export of TCI Sector		US Dollar	WB
GEI	Government Effectiveness Indicator of the country	Control	Range from -2.5 (Least effective) to +2.5 (Most effective)	WB
TEX	Total export of the country (% of GDP),		%	WB
POPU	Size of working age group population (15 to 64)		Number	WB
BREAK	Structural Break Dummy Variable for IDS (2003)	Dummy	BREAK= 1 for 2003 and zero otherwise	Created

3.3.Research Design

According to Creswell & Creswell (2017) Research designs are plans and procedures for research that spans the decision from broad assumptions to detailed methods of data collections, analysis and interpretation.

3.3.1. Data Sources and Types

All of Ethiopia's large and medium-sized TCI sector data, particularly the data of the TCIs that engaged in export markets, were used and examined by the research by employing key industry-specific elements that have a significant impact on Ethiopia's economic growth. The entire analysis was based on secondary data that spans the years 1996–2021. The span of the years used for the study is small (26 years). The data sources are: quantitative information was gathered from the ESS, the World Bank Database, and the IMF. Books, conference proceedings, journals, working papers, reports, directives and guidelines, rules, and other published and unpublished works on the subject were also used.

3.3.2. Descriptive and Econometric Data Analysis

The study used both descriptive and econometric data analysis methodologies to address the research issues. For the descriptive, time-series performance assessment was applied to evaluate job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), fixed capital formation of the sector adjusted for 2015 constant price, net export of the sector, government effectiveness indicator of the country, the size of the working-age population (15 to 64), and total export of the country (% of GDP) in a visual way (in tables and graphs). The study also used a time-series performance evaluation of the nation's real GDP growth. The goal of the study was to determine the economic impact of the TCI industry, and this was done by using the time-series econometric analysis method: the ARDL-bound test model.

3.3.3. Estimation Procedure

The detailed estimation processes of the econometric approach for the inquiry were carried out as follows after having the data type from the specified sources and doing descriptive analysis.

The main aim of this research is to understand how the TCI sector is contributing to the economic growth of Ethiopia. The ARDL bound test model was used to ascertain how the long-run and short-run relationships among the variables interacted. Following is the order in which the streamlined estimation procedures are completed.

First, to determine the time series qualities (stationarity properties) of all the variables, two innovative tests have been presented recently: the Ng-Perron test (Ng and Perron, 2001) and the Dickey-Fuller Generalized Least Square (DFGLS) de-trending test (Elliot et al., 1996). Elliot et al. (1996) optimize the power of the Augmented Dickey-Fuller (ADF) test by de-trending, and assuming to test the order of integration of the variable. As a result, DFGLS was chosen as the final method in the study to look for unit root tests.

Second, the typical unit root test did not indicate a break in a series, which is mainly caused by several macroeconomic and policy changes that affected the nation's industrial sector and caused biases in the regression results. As a result, the breakpoint unit root test was conducted to see whether there was a structural break or not. Statistical software EViews 12 has a feature called “breakpoint unit root test” to conduct the test, and the results depict a sound structural break in 2003. The dummy variable “BREAK”

was created to handle this issue, and the analysis was conducted by incorporating this variable.

Third, after stationarity tests, the optimal lag selection by the Vector Autoregressive (VAR) model's optimal lag order setting method was used in the study to determine the proper lag order.

Fourth, the ARDL bound test for cointegration and the Johansen cointegration test are then conducted to ascertain the presence of cointegration or long-run relationships between the variables after the ARDL model has been processed through regression.

Fifth, following this, ARDL long-run and short-run parameter estimations are carried out, and then ARDL short-run parameter estimations for the ECM.

Sixth, after conducting co-integration and knowing the existence of the long-run relationship, the causal relationships between variables and the direction of causality have been identified using the Granger causality test (1969).

Seventh, then Model Stability and Diagnostic Tests were conducted: the main diagnostic tests, such as autocorrelation, heteroscedasticity, normality, and multicollinearity, and the model stability tests, using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests, were also conducted.

The following can be used to describe each of the steps in more depth:

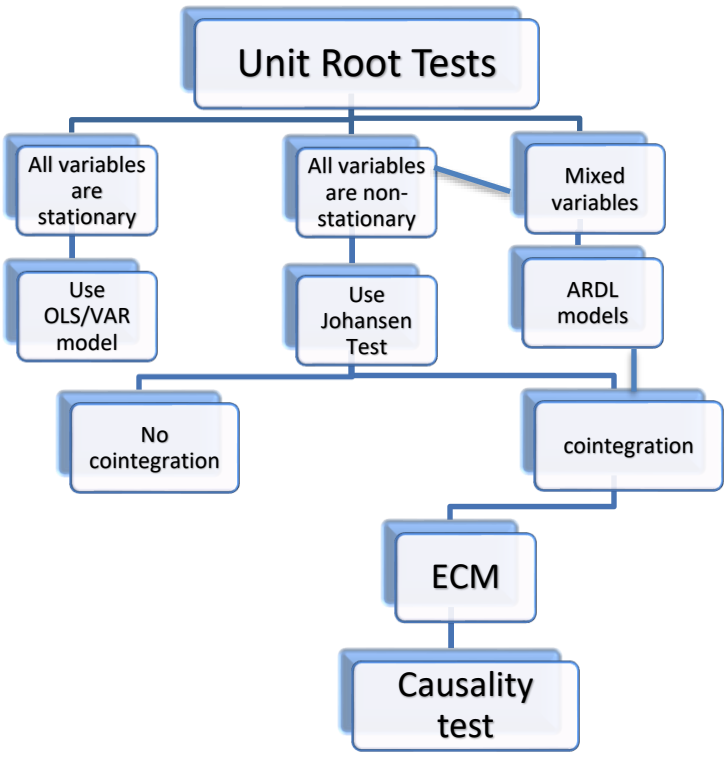
3.3.4. Unit Root Test

Before using the proposed ARDL-bound test, it is critical to verify the unit root of each variable. In order to determine the bound F-statistic test, all variables must be stationary at I (0), I (1), or both. Therefore, to verify the existence of the unit root and determine their order of integration, the well-known ADF (1981) tests (Dickey and Fuller, 1979) and Philip and Peron (PP) tests (Phillip, 1987; Phillips and Peron, 1988) are used. However, due to their weak size and power qualities, which tend to over-reject the null hypothesis when it is true and under-reject it when it is false, these tests are often unreliable with small samples (Dejong et al., 1992; Harris, 2003). Recently, two unique tests have been put out to address these problems: the Dickey-Fuller generalized least squares (DFGLS) de-trending test, created by Elliot et al. in 1996, and the Ng-Perron test, created by Ng and Perron in 2001. Elliott et al. (1996) assumed to test the order of integration of the variable and used de-trending to increase the ADF test's power. Hence, the study used this method to check for the unit root test, and the model selection based on the unit root test was performed as follows:

The unit root test results, which establish the stationarity of the variable, are the primary factor used to pick the method for time series analysis (Shrestha & Bhatta, 2018). According to the scholars, non-stationary time series cannot be analyzed using methods that are frequently used for stationary time series. The process is simple if all of the significant variables are stationary. According to Shrestha & Bhatta (2018), in this case, unbiased estimates can be generated using VAR or Ordinary Least Squares (OLS) models. Consequently, if all the pertinent variables are non-stationary, OLS or VAR models may not be appropriate to study the relationship. Similar to the previous issue, another one occurs when the variables employed in the study are of mixed type, meaning some are stationary and others are not. The OLS-based models that were used for both non-stationary and mixed-order integration time series of the study are known as ARD models. All nonstationary variables can also be used with ARDL models.

Here is the most fundamental time series analysis methodology framework for selecting the model based on the unit root test only, which was conducted and depicted in Figure 2 below for method selection. This is because time-series models take other factors into account.

Figure 2: Method Selection for Time Series Data



Note: OLS: Ordinary least squares; VAR: Vector autoregressive; ARDL: Autoregressive distributed lags; ECM: Error correction models.

In addition to the standard unit root test method, the unit root test method described in the next section was also used to strengthen the model's findings.

3.3.5. Structural Break Unit Root Test

In econometrics and statistics, a structural break is an unanticipated shift over time in the regression model's parameters, which can result in significant forecasting mistakes and general model unreliability (Antoch et al., 2018; Kruiniger, 2008; Hansen, 2001). According to Shrestha & Bhatta (2018), a structural break is a sudden jump or fall in an economic time-series that occurs due to a change in regime, policy direction, or external shocks, among others. A structural break may occur in an intercept, trend, or both. Structural breaks can create difficulties in unit root tests. Structural stability, i.e., the time-invariance of regression coefficients, is a central issue in all applications of linear regression models (Ahmed et al. 2017). According to Perron (1989), when there is a structural break, conventional unit root test methods may indicate that a time series is stationary when it is non-stationary. Standard unit root tests are unable to show a break in a series, which frequently comes from macroeconomic and policy changes and distorts the findings of regression. According to Perron (1997), the majority of macroeconomic variables have a structural break and are trend-stationary. Perron (1997) asserts that there may be a break in the intercept. Therefore, in addition to the traditional unit root test, breakpoint unit root testing was used to strongly address the stationarity issue. The remedial method recommended by some scholars was applied.

3.3.6. Lag Selection Criteria

After conducting the stationarity test, it is crucial to choose the correct lag order of the variable before applying the ARDL bound test to determine whether cointegration between real GDP, job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), fixed capital formation of the sector adjusted for 2015 constant price, net export of the sector, government effectiveness indicator of the country, the size of the working-age population (15 to 64), and total export of the country (% of GDP) exists or not. The VAR model's optimal lag order was used in the study to determine the proper lag order. The polynomial graph is also used to ensure that the lag length obtained by the VAR approach is the proper length.

3.3.7. Model Specification

3.3.7.1.Theoretical Framework

As Shrestha & Bhatta (2018) suggest, the first step in putting an econometric approach into practice is selecting an appropriate econometric model and creating the model with an appropriate set of variables.

In analyzing how the TCI sector is contributing to the economic growth of Ethiopia, the researcher employed an augmented Solow's (1956) growth model, as stated in the theoretical literature review section.

The Solow-Swan economic growth model is used as the theoretical framework for this study, but this approach ignores the various components of sources of growth (Todaro & Smith, 2015, p. 138). The Solow model takes into account the Solow residual as technological progress only. But several economists Denison (1962), Kendrick (1961), Jorgenson and Griliches (1967), and others-have tried to quantify and break down the residual into several components.

According to Chirwa and Odhiambo (2016), foreign aid, foreign direct investment, fiscal policy, investment, trade, the development of human capital, demographics, monetary policy, natural resources, reforms, as well as geographic, regional, political, and financial factors, are among the key macroeconomic determinants of economic growth in developing countries.

Hence, it is important to include additional combination variables in the model that should be a proxy for technology rather than using the entire unexplained variable in technology, which is exogenously determined, as it makes the model more predictable and appropriate to know the precise effects these variables have on economic growth (Imoughele et al., 2013).

Therefore, by assuming these limitations as a base to connect theory with empirical analysis, this empirical analysis incorporated net exports (XM) from the TCI sector, the government effectiveness indicator (GEI) of the country, the size of the working-age population (15 to 64), and the total exports of the country (% of GDP) as new factors influencing economic growth in Ethiopia. Due to resource constraints, only these variables, which are a few of the many factors' contributing to the economic growth of a nation, are selected for the study.

Therefore, $u_t = XM_t + GEI_t + TEX_t + \text{POPU}_t + \varepsilon_t$, and the model employed was derived using a general production function (empirical model) of the following type:

$$\mathrm{LNRGDP_t} = \mathrm{f}\,(\mathrm{K_t}, \mathrm{L_t}, \mathrm{XM_t}, \mathrm{GEI}_t, \mathrm{TEX_t}, \mathrm{POPU}_t\ ) - - - - - - - - - - - - - (3)$$

Finally, the above equations (2) and (3) can be rewritten as below, and the following form was used for the study analysis when additional or control variables are included.

$$\mathrm{LNRGDP_t} = \beta_0 + \beta_1 ln\mathrm{K_t} + \beta_2 ln\mathrm{LI_t} + \beta_3\mathrm{XM_t} + \beta_4\mathrm{GEI_t} + \beta_5\mathrm{TEX_t} + \beta_6\mathrm{LNPOPU_t} + \varepsilon_t - (4)$$

Where:

- β_0 *is the constant/intercept,* $\beta_1 to\ \beta_6$ *are the parameters of the model, and*
- ε_t *is the error (unobserved) term*

Description of the variables:

- $LNRGDP_t$: $Log\ of\ the\ aggregate\ real\ out\ put\ of\ Ethiopia\ at\ time\ t$
- lnK_t: $Log\ of\ the\ fixed\ capital\ formation\ by\ TCI\ at\ time\ t$
- $lnLI_t$: $Log\ of\ job\ opportunities\ in\ terms\ of\ wages\ and\ salaries\ paid\ in\ the\ TCI\ at\ time\ t$
- XM_t: $the\ net\ export\ of\ the\ TCI\ at\ time\ t$
- GEI_t: $the\ government\ effectiveness\ index\ of\ the\ country\ at\ time\ t$
- TEX: $the\ total\ export\ of\ goods\ and\ services(\%\ of\ GDP)\ of\ Ethiopia$
- $LNPOPU$: $Log\ of\ the\ working\ age\ group\ population\ of\ Ethiopia(15-64)$

In addition to having the mentioned theoretical and empirical model basis, to allow for causality and dynamics, and given that not all of our time-series variables are stationary to the same order (some are I (0) while others are I (1)), the cointegration technique suggested by Pesaran et al. (2001) (as cited in Udoh et al., 2015) the ARDL bounds testing approach was used.

The justifications for using the ARDL bounds testing model were because of the following three distinct benefits of the model, which help in alienating some of the study limitations:

I. The ADRL model, following Johansen and Juselius (1990) (as mentioned in Udoh et al., 2015), does not have the order of integration issue that the other approaches have. This means that the ARDL can be employed whether the regressors are I (1) and/or I (0), whereas other cointegration approaches require that all of the regresses to be integrated in the same order. As a result, it does not have the pre-testing issues that come with normal cointegration,

which calls for variables to be I (1) or I (0) classified according to Pesaran et al. (2001),

II. The ARDL model technique is appropriate for small sample size studies, in contrast to the majority of standard multivariate cointegration procedures, which are valid for large sample sizes (Pesaran et al., 2001), and

III. Even when some of the regressors are endogenous, it offers valid t-statistics and unbiased estimates of the long-run model (Harris and Sollis, 2003, as cited in Udoh et al., 2015). It estimates the short- and long-run dynamics and provides robust estimates.

✔ Therefore, the ARDL-bounds testing approach based on (4) was given by:

$$\Delta \mathrm{LNRGDP_t} = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \mathrm{LNRGDP_{t-i}} + \sum_{i=0}^{n} \beta_{2i} \Delta ln\mathrm{K_{t-i}} + \sum_{i=0}^{n} \beta_{3i} \Delta ln\mathrm{LI_{t-i}} + \sum_{i=0}^{n} \beta_{4i} \Delta \mathrm{XM_{t-i}} + \sum_{i=0}^{n} \beta_{5i} \Delta \mathrm{GEI_{t-i}} + \sum_{i=0}^{n} \beta_{6} \mathrm{TEX_{t-i}} + \sum_{i=0}^{n} \beta_{7} \mathrm{LNPOPU_{t-i}} + \gamma_1 LNRGDP_{t-1} + \gamma_2 ln\mathrm{K_{t-1}} + \gamma_3 ln\mathrm{LI_{t-1}} + \gamma_4 \mathrm{XM_{t-1}} + \gamma_5 \mathrm{GEI_{t-1}} + \gamma_6 \mathrm{TEX_{t-1}} + \gamma_7 \mathrm{LNPOPU_{t-1}} + u_t --(5)$$

Where:

- ✓ $LNRGDP$: $Log\ of\ the\ aggregate\ real\ output\ of\ Ethiopia$
- ✓ lnK: $Log\ of\ the\ fixed\ capital\ formation\ by\ TCI$
- ✓ lnL: $Log\ of\ job\ opportunities\ in\ terms\ of\ wages\ and\ salaries\ paid\ in\ the\ TCI$
- ✓ XM: $the\ net\ export\ of\ the\ TCI$
- ✓ GEI: $the\ government\ effectiveness\ index\ of\ the\ country$
- ✓ TEX: $the\ total\ export\ of\ goods\ and\ services(\%\ of\ GDP)\ of\ Ethiopia$
- ✓ $LNPOPU$: $Log\ of\ the\ number\ of\ working\ age\ group\ population\ of\ Ethiopia(15-64)$
- ✓ β_0: $intercept$
- ✓ $\beta_1\ to\ \beta_7$: $are\ short-run\ coefficients$
- ✓ $\gamma_1\ to\ \gamma_7$: $are\ long-run\ coefficients$
- ✓ u_t: $error\ term$

Then, in the first step of the ARDL-bounds testing approach, equation (5) has been estimated using the ARDL model to test for the presence of a long-run relationship between the variables by performing an F-test for the joint significance of the coefficients of the lagged levels of the variables, that is: to detect cointegration by setting a limit of zero on all estimated coefficients for lagged level variables.

H_0(Null Hypothesis): $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = \gamma_7 = 0$

($No\ Long - run\ relationship\ or$ no cointegration)

H_1(Alternative Hypothesis): $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq \gamma_7 \neq 0$

($There\ is\ Long - run\ relationship$)

A cointegration test is provided by two asymptotic critical values bound when the independent variables are I (d) [where 0 d 1]: I (d) [where $0 \leq d \leq 1$]: a lower value assuming the regressors are I (0) and an upper value assuming purely I (1) regressors. Regardless of the orders of integration for the time series, the null hypothesis of no long-run association can be rejected if the F-statistic is above the upper critical value. The null hypothesis cannot be rejected, however, if the test statistic is lower than the lower critical value. Finally, the result is inconclusive if the statistic falls between the lower and upper critical values. Pesaran et al. (2001) provided the approximate critical values for the F-statistic test.

When cointegration has been established, the conditional ARDL long-run model for $LNRGDP_t$ can be estimated as follows:

$$\Delta \mathrm{LNRGDP_t} = \beta_0 + \sum_{i=1}^{n} \gamma_1 \mathrm{LNRGDP_{t-i}} + \sum_{i=0}^{n} \gamma_2 ln\mathrm{K_{t-i}} + \sum_{i=0}^{n} \gamma_3 ln\mathrm{LI_{t-i}} + \sum_{i=0}^{n} \gamma_4 \mathrm{XM_{t-i}} + \sum_{i=0}^{n} \gamma_5 \mathrm{GEI_{t-i}} + \sum_{i=0}^{n} \gamma_6 \mathrm{TEX_{t-i}} + \sum_{i=0}^{n} \gamma_7 \mathrm{LNPOPU_{t-i}} + u_t \quad ---(6)$$

This involves selecting the orders/lags of the ARDL model in the five variables.

The next step is to obtain the short-run dynamic parameters by estimating an ECM associated with the long-run estimates. This is specified as:

$$\Delta \mathrm{LNRGDP_t} = \alpha_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \mathrm{LNRGDP_{t-i}} + \sum_{i=0}^{n} \beta_{2i} \Delta ln \mathrm{K_{t-i}} + \sum_{i=0}^{n} \beta_{3i} \Delta ln \mathrm{LI_{t-i}} + \sum_{i=0}^{n} \beta_{4i} \Delta \mathrm{XM_{t-i}} + \sum_{i=0}^{n} \beta_{5i} \Delta \mathrm{GEI_{t-i}} + \sum_{i=0}^{n} \beta_{6i} \Delta \mathrm{TEX_{t-i}} + \sum_{i=0}^{n} \beta_{7i} \Delta \mathrm{LNPOPU_{t-i}} + \theta \mathrm{ECM_{t-1}} + u_t \quad ----- (7)$$

3.4.Model Stability and Diagnostic Test

3.4.1. Diagnostic Test

OLS parameter estimation requires the standard conditions of normality, homoscedasticity, non-autocorrelation, and non-multicollinearity to be satisfied. To verify the accuracy and soundness of the model, the techniques for testing for classical assumptions were used.

3.4.2. Model Stability Test

The study used the CUSUM and CUSUMSQ tests to verify that long-run relationships between variables exist (Brown et al. 1975). According to past studies (Pesaran & Shin, 1999; Pesaran et al., 2001), these tests seem to appropriately reflect the high level of fitness of the ARDL model. These tests are carried out by plotting the ECM residual.

3.5.Granger Causality Test

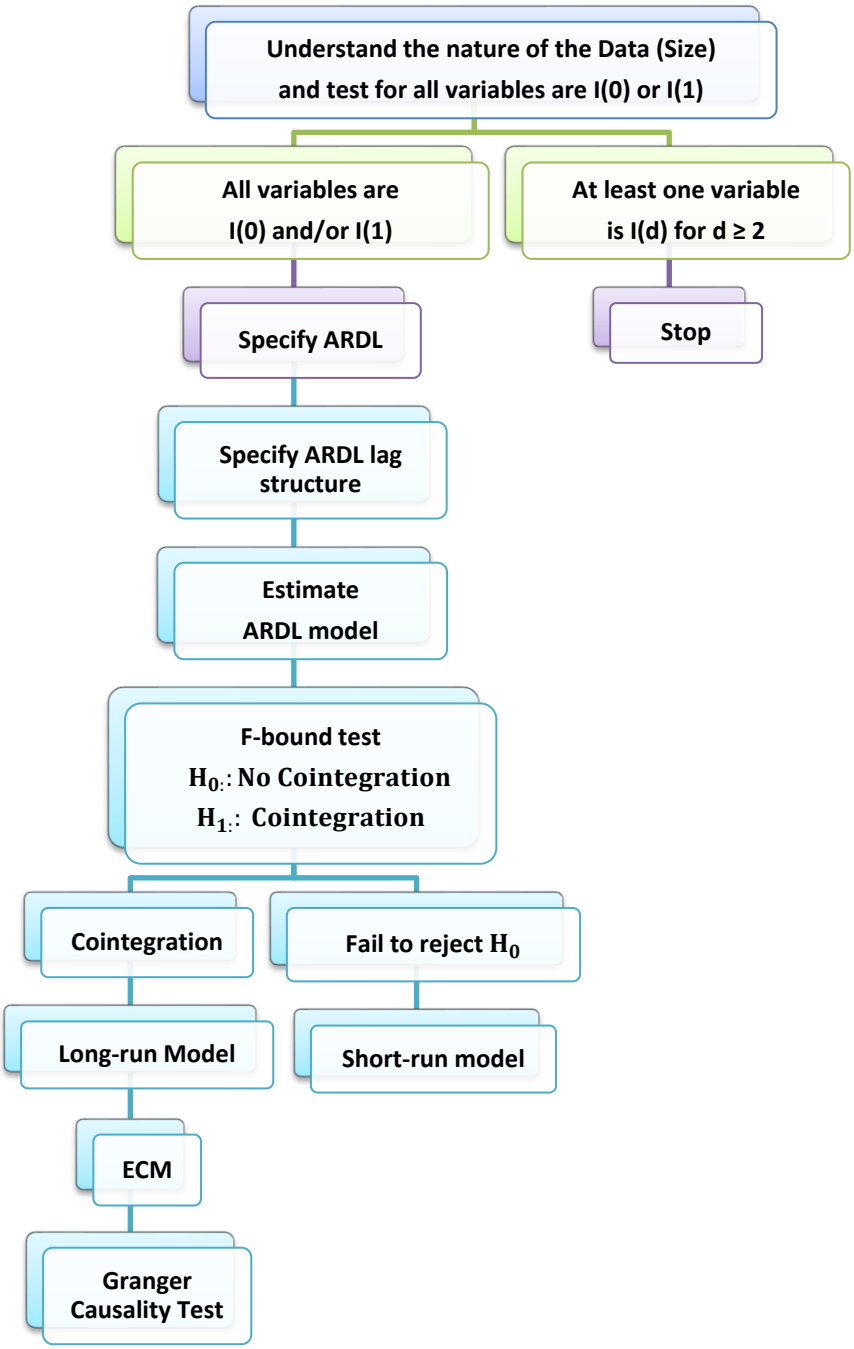
After conducting co-integration and knowing the existence of the long-run relationship, the causal relationships between variables and the direction of causality have been identified using the Granger causality test (1969). As an example, if the variables Y and X are cointegrated, one of the three relationships listed below may be true: either a) X affects Y, b) Y affects X, or c) X and Y affect each other. The first two show a one-way relationship, while the third shows a two-way relationship. Two variables are independent and do not influence one another if they are not cointegrated. In order to identify the pattern of such a relationship, Granger (1969) developed the causality test method.

Granger's (1969) definition of causality states that X causes Y if the history of X can be used to predict Y more accurately than simply using the history of Y alone, and vice versa. Therefore, the Engle and Granger (1987) test procedure is employed to test for the presence of a causal relationship between variables.

3.6.Conclusion

The following Figure 3 below shows what the study's summarized estimating methodology looks like. Model stability and diagnostic tests were then performed after these estimating techniques.

Figure 3: Estimation Procedure/Model Specification



Therefore, for this study, since the variables are integrated of order I (0) and/or I (1), the study followed what is depicted in the left-hand side of the Figure.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1. Introduction

In the preceding chapter, the research methodology used to accomplish the study's goals was covered. The study uses statistical software (EViews-12) to evaluate the data that was gathered, and the results and discussion are presented in this chapter following those findings.

Using annual time series data from 1996 to 2021 with a total of 26 observations, the primary goal of this study is to understand how the TCI industry is influencing Ethiopia's economic growth. The annual data was gathered from the ESS, World Bank Database, IMF, etc.

4.2.Trends of Economic Growth in Ethiopia

Ethiopia is a country in the Horn of Africa, which gives it a strategic advantage for improved economic activity—apart from the fact that it is landlocked. It has shared borders with Somalia to the east, Eritrea to the north, Djibouti to the northeast, Kenya to the south, and Sudan to the west. A total of 1,100,000 square kilometers makes up Ethiopia. With over 120.3 million citizens, it is the most populous country in the world, the second most populous in Africa, and the most populous landlocked nation on earth (WB, 2021).

The most encouraging GDP growth rate was seen in Ethiopia, where the average growth rate from 1996 to 2021 was 7.99% (WB, 2021). The GDP growth rate was below zero in the two study years of 1998 and 2003, with the lowest GDP growth rate occurring in 1998 and the highest being in 2004. As shown in Figure 4 below, GDP growth was consistently positive and generally stable beginning in 2004.

O'Neill (2023) estimates that in 2021, agriculture contributed 37.57% of Ethiopia's GDP, industry made up about 21.85%, and the services sector made up about 36.25%.

Figure 4: Annual Percentage of GDP Growth Rate

(*Source:* WB)

4.3.Reviewing the Ethiopian TCI Sector Performance

4.3.1. Export

A trade surplus, according to the majority of literature, helps a nation's economy expand. This indicates that a country's industries and industrial facilities produce more when there are more exports, which also results in more people being employed. Exports and economic growth are significantly positively correlated, according to a study by Usman et al. (2012). The other study by Hemzawi and Umutoni (2021) found a significant positive significant long-term link between Rwanda's gross domestic product and exports. A study by Mohsen (2015) shows GDP is positively and significantly related to exports.

Ethiopia's TCI sector exports have risen at an average rate of more than 28% during the time period under consideration, according to WB (2021) data as depicted in Figure 5 below. The exports have been increasing. However, when the industries' exports are compared to the textile and clothing imports that the country makes from abroad, the difference is an incredibly large negative number. The net export of TCI products during the study period is entirely negative, per WB (2021) data as shown in Figure 6 below, indicating the necessity for increased efforts to accelerate the sector's growth to enhance exports.

The TCI export share from total exports (exports of goods and services) of the country over the past ten years (2012 - 2021) is also shown in Table 2 below. According to data

from the WB database (2022), the TCI sector's maximum export share was in 2019 (2.4%) and its minimum was in 2018 (0.85%).

Similar to this, when the TCI sector export percentage share of real GDP is determined, the maximum share is obtained in 2019, which is 0.2%, even if it is extremely minor below 1%, as shown in Table 3 below.

Last but not least, according to data from the WB, when the TCI export percentage share of merchandised export is examined, the largest share was noticed in 2019 (6.67%), and the least was noted at the start of the study period in 1996 (0.49%), as portrayed in Table 4 below.

Figure 5: Export of TCI Sector in Ethiopia

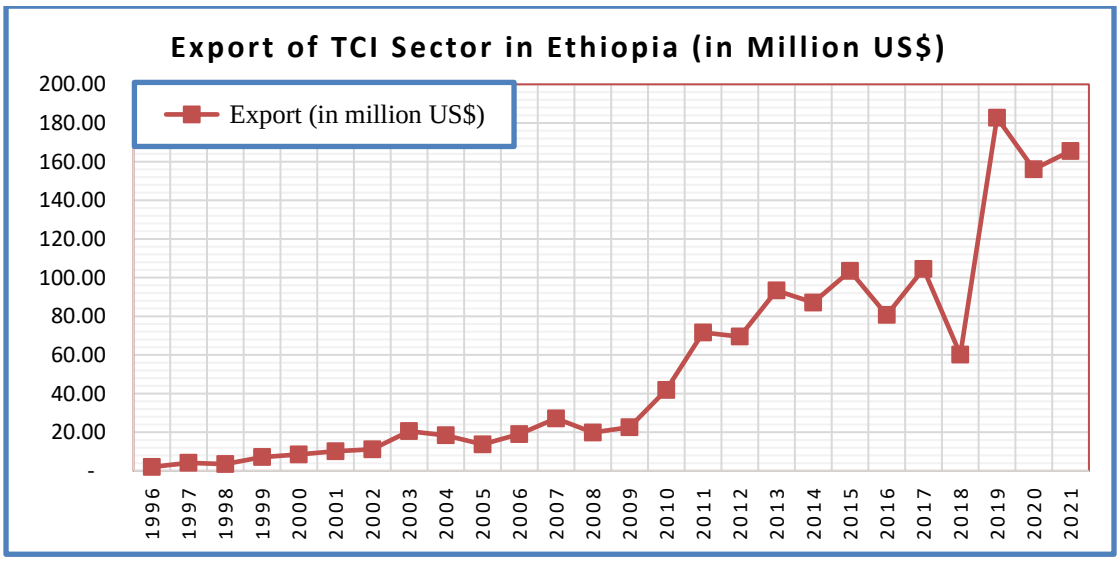


Figure 6: Net Export of TCI Products in Ethiopia

Table 2: TCI Export Share from Total Export of the Country

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Export of TCI (In million US$)	69.46	93.32	87.07	103.41	80.67	104.44	60.17	182.72	156.05	165.51
Total Export of the country (In million US$)	5,962.72	5,948.44	6,474.16	6,047.70	5,804.11	6,238.60	7,055.60	7,615.44	7,672.98	8,448.64
TCI Export Share from Total Export of Ethiopia (%)	1.16	1.57	1.34	1.71	1.39	1.67	0.85	2.40	2.03	1.96

Table 3: TCI Export Share from Real GDP of the Country

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real GDP (In million USD)	47,987.5	53,065.6	58,508.8	64,589.3	70,682.4	77,442.6	82,721.2	89,640.0	95,071.8	100,431.3
Export of TCI (in million USD)	69.5	93.3	87.1	103.4	80.7	104.4	60.2	182.7	156.1	165.5
% Share	0.14	0.18	0.15	0.16	0.11	0.13	0.07	0.20	0.16	0.16

Table 4: TCI Export Share from Merchandise Exports of the Country

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Merchandise exports (In current million US$)	3,370.0	2,973.0	3,275.0	2,914.0	2,789.0	3,022.0	2,704.0	2,741.0	3,258.0	3,949.0
Export of TCI (In current million US$)	69.5	93.3	87.1	103.4	80.7	104.4	60.2	182.7	156.1	165.5
%Share	2.06	3.14	2.66	3.55	2.89	3.46	2.23	6.67	4.79	4.19

4.3.2. Employment

When employment prospects in the TCI sector are taken into account, the sector's overall employment opportunities have increased in Ethiopia. For instance, according to data from ESS, the employment has increased from 33,672 in 1996 to 72,813 in 2016.

The minimum number of jobs in the sector was recorded in 2009 (22,043), and the maximum was recorded in 2016 (72,813), as shown in Figure 7 below.

According to the data from ESS, when job opportunities in the TCI sector are considered in terms of earnings and salaries paid adjusted for the inflation rate, it exhibits an increasing pattern, as shown in Figure 8 below. The minimum employment opportunity in payment adjusted for inflation rate was recorded in 2008, and the maximum was noted in 2016.

As indicated in Table 5 below, the employment proportion of the TCI industry among the entire population of the nation aged 15 to 64 is extremely negligible. The percentage for each of the years under consideration is less than 0.5%.

When employment in terms of payment adjusted for inflation rate is evaluated in relation to real GDP, the share is all below 0.1%, as indicated in Table 6 below.

Figure 7: Employment in TCI Sector in Ethiopia

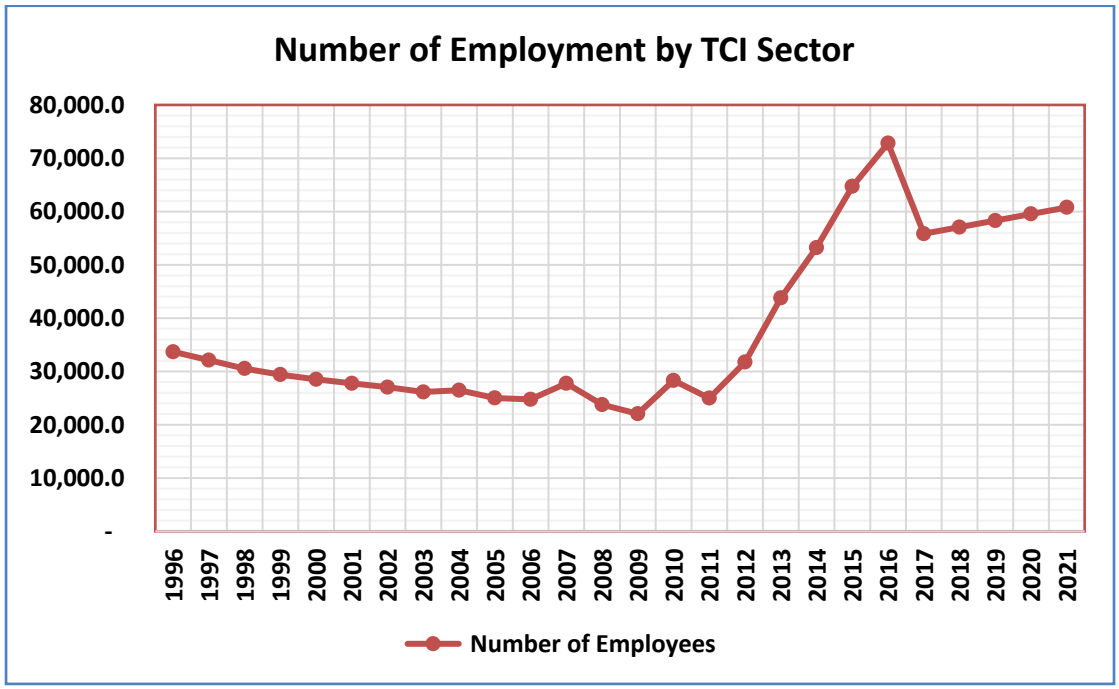


Figure 8: Employment in terms of Wages and Salaries in TCI Sector in Ethiopia Adjusted for Inflation

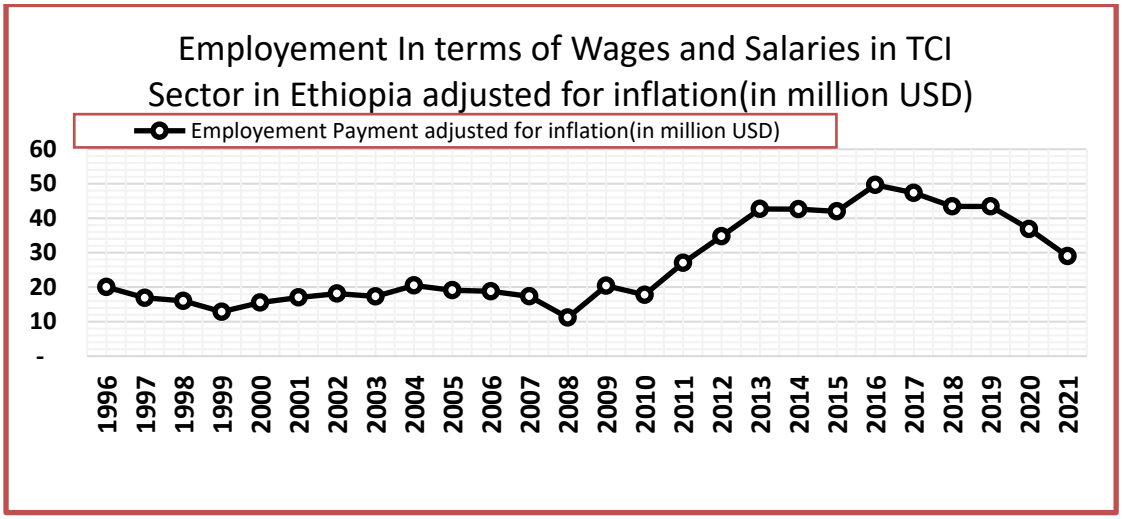


Table 5: TCI Employment Share from total population ages 15-64 of the Country

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TCI Employment (In thousands)	31.749	43.784	53.218	64.712	72.813	55.827	57.065	58.302	59.540	60.778
Population ages 15-64, total (In thousands)	50,111.192	51,981.291	53,901.969	55,867.552	57,895.064	59,985.968	62,067.687	64,147.672	66,279.326	68,441.736
% Share	0.06	0.08	0.10	0.12	0.13	0.09	0.09	0.09	0.09	0.09

Table 6: TCI Employment in terms of payment adjusted for inflation rate share from real GDP

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real GDP (In million USD)	47,987.46	53,065.62	58,508.83	64,589.33	70,682.36	77,442.55	82,721.15	89,640.02	95,071.79	100,431.27
Employment in terms of payment adjusted for inflation rate (in million USD)	34.78	42.68	42.61	42.00	49.65	47.34	43.42	43.42	36.85	28.99
% Share	0.07	0.08	0.07	0.07	0.07	0.06	0.05	0.05	0.04	0.03

4.3.3. Fixed Capital Formation

When real fixed capital formation by TCI sector is taken into account, the capital formation for the sector has been rising, as shown in Figure 9 below. The highest real fixed capital formation by TCI was recorded in 2009 (88.3 million USD), and the minimum was seen in 2002 (6.0 million USD).

The TCI real fixed capital formation share from the gross fixed capital formation of the country data for 10 years (2012 - 2021) collected from ESS and WB depicts that the share of textiles is very small. The largest share was recorded in the beginning (2012), and the smallest was in the end (2021). It has been decreasing, as displayed in Table 7 below.

Similarly, when the fixed capital formation by the TCI Sector in Ethiopia that is adjusted for the 2015 constant price is seen as a percentage share of real GDP, the trend illustrates a continuous decline in the period between 2012 - 2021, with the largest being at the beginning and the smallest being at the end, as portrayed in Table 8 below.

Figure 9: Fixed Capital Formation by TCI Sector in Ethiopia (Adjusted for 2015 Constant Price)

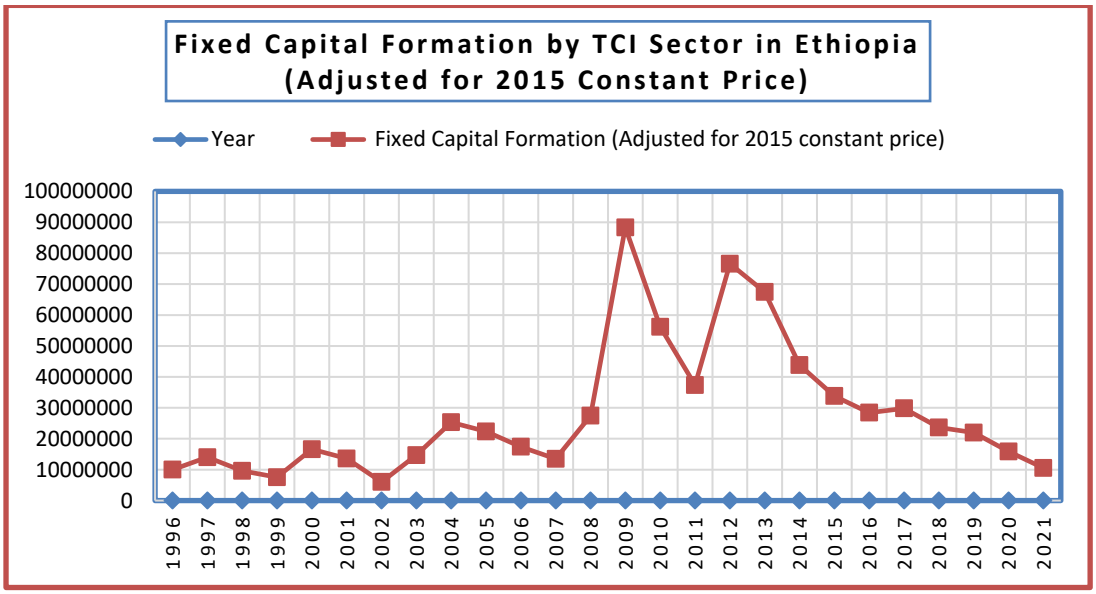


Table 7: TCI Fixed Capital Formation Share from Gross Fixed Capital Formation of the Country

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TCI Fixed Capital Formation (In million US$)	65.89	61.08	41.72	33.80	30.01	31.20	29.99	30.98	28.01	24.15
Gross Fixed Capital Formation (In million US$)	16,067.39	16,239.04	21,129.16	26,269.30	27,748.88	31,435.95	29,265.75	33,822.60	32,920.62	31,181.45
Share of TCI from Total	0.41	0.38	0.20	0.13	0.11	0.10	0.10	0.09	0.09	0.08

Table 8: TCI Fixed Capital Formation Share from Real GDP of the Country

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Real GDP (In million USD)	47,987.46	53,065.62	58,508.83	64,589.33	70,682.36	77,442.55	82,721.15	89,640.02	95,071.79	100,431.27
Fixed Capital Formation adjusted for 2015 constant prices (In million USD)	76.58	67.47	43.83	33.80	28.42	26.90	22.50	21.93	16.50	11.36
% Share	0.16	0.13	0.07	0.05	0.04	0.03	0.03	0.02	0.02	0.01

4.3.4. Value Addition

Finally, Table 9 displays value added share of TCI to the manufacturing sector value added and the share of TCI is all above 7% in the study period of this thesis. The maximum value added from TCI in manufacturing was recorded in 1996 (18.49%), and minimum was recorded in 2008, which was 7.37%.

Table 9: TCI Value Added Share from Manufacturing Value Added

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Manufacturing, value added (in current Million US$)	708.69	902.55	1,111.95	1,258.65	1,189.54	1,176.68	1,481.25	1,764.03	2,219.66	2,844.91
Textiles and clothing, value added in manufacturing (in current Million US$)	62.30	83.28	81.98	101.49	122.38	125.28	125.02	182.98	222.52	285.20
Textiles and clothing (% of value added in manufacturing)	8.79	9.23	7.37	8.06	10.29	10.65	8.44	10.37	10.03	10.03

4.4.Descriptive and Econometric Data Analysis

4.4.1. Descriptive Analysis

Annual time series data are used in the empirical study from 1996 to 2021 to examine how the TCI sector influences Ethiopia's economic growth. The study investigates the relationship between real GDP growth and every significant factor, including job prospects measured in terms of wages and salaries paid adjusted for inflation rate, fixed capital formation of the sector adjusted for 2015 constant prices, net export of the sector, the size of the working-age population (15 to 64), total export of the country (% of GDP), and government effectiveness indicator of the country.

The Jarque-Bera test was found to be non-significant for all of the variables used in the study, indicating that all of the key variables listed in Table 10 below had a normal distribution.

According to the descriptive statistics, the mean real GDP for the period was 43,500 million USD, with the first year's real GDP being the lowest, the last year's real GDP being the greatest, and has been continuously increasing, as depicted in Figure 10. Additionally, the graph demonstrates that the real GDP of the nation varies by 8.4% as the trend shifts by one year.

The fixed capital formation of the sector adjusted for 2015 constant prices in Ethiopia's TCI sector exhibits substantial volatility over the period, with an upward annual movement rate of 4.3%, according to the trend line shown in Figure 11. The sector's

largest capital formation was attained in 2009, while its lowest level was attained in 2002.

According to the pattern in Figure 12, the job opportunities produced by the TCI sector measured in terms of wages and salaries paid adjusted for the inflation rate are increasing with an upward annual movement rate of 4.8%.

The sector's lowest net export, or export minus import, was recorded in 2018, at around -653 million USD, while it peaked in 1996, at about -56.5 million USD, as shown in Figure 13. The net export by the sector is below zero for the whole period under investigation. The net export shifts by 24946726 USD in the opposite direction as the trend shifts by one year.

According to the descriptive statistics, the government effectiveness indicator ranges from a minimum of 1.21 below zero in 1996 to a maximum of 0.4 below zero in 2008. The observed trend line in Figure 14 demonstrates an ongoing increase in the mean government effectiveness indicator at a rate of 0.026 units per year.

According to the trend in Figure 15, the size of the working-age group population (15 to 64) of the country has been increasing without interruption, with the beginning at 29.75 million being the smallest and the last at 68.44 million being the largest in the span of the study period. Additionally, the graph demonstrates that the size of the working-age population (15 to 64) of the nation varies by 3.4% as the trend shifts by one year.

Finally, the total exports of the country (% of GDP), as displayed in Figure 16, show an increment of 0.21 units as the trend shifts by one year.

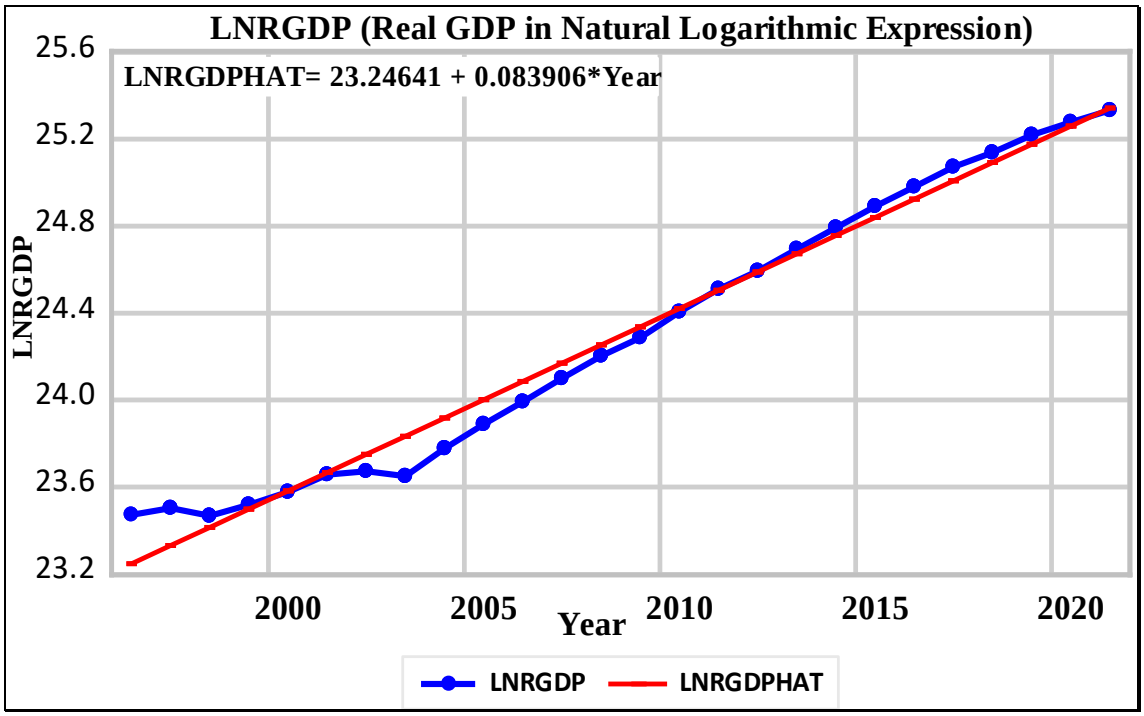
Table 10: Descriptive Analysis

Variables	RGDP	POPU	LI	K	TEX	XM	GEI
Mean	43,500.00	46.06	26.83	28.04	8.74	(305.00)	(0.70)
Median	33,900.00	44.13	20.22	22.13	8.87	(247.00)	(0.64)
Minimum	15,600.00	29.75	11.17	6.01	1.86	(653.00)	(1.21)
Maximum	100,000.00	68.44	49.65	88.34	16.69	(56.50)	(0.40)
Std. Dev.	27,800.00	12.01	12.43	21.77	3.60	207.00	0.22
Skewness	0.72	0.36	0.56	1.46	(0.04)	(0.42)	(0.44)
Kurtosis	2.15	1.88	1.71	4.23	2.79	1.74	2.28
Jarque-Bera	3.01	1.91	3.16	10.91	0.10	2.49	1.40
Probability	0.22	0.38	0.21	0.00	0.97	0.29	0.50
Observations	26.00	26.00	26.00	26.00	26.00	26.00	26.00

Note: The results are taken before using Logarithm. RGDP, POPU, LI, K, TEX, XM, and GEI represent real GDP, the size of the working-age population (15 to 64), job

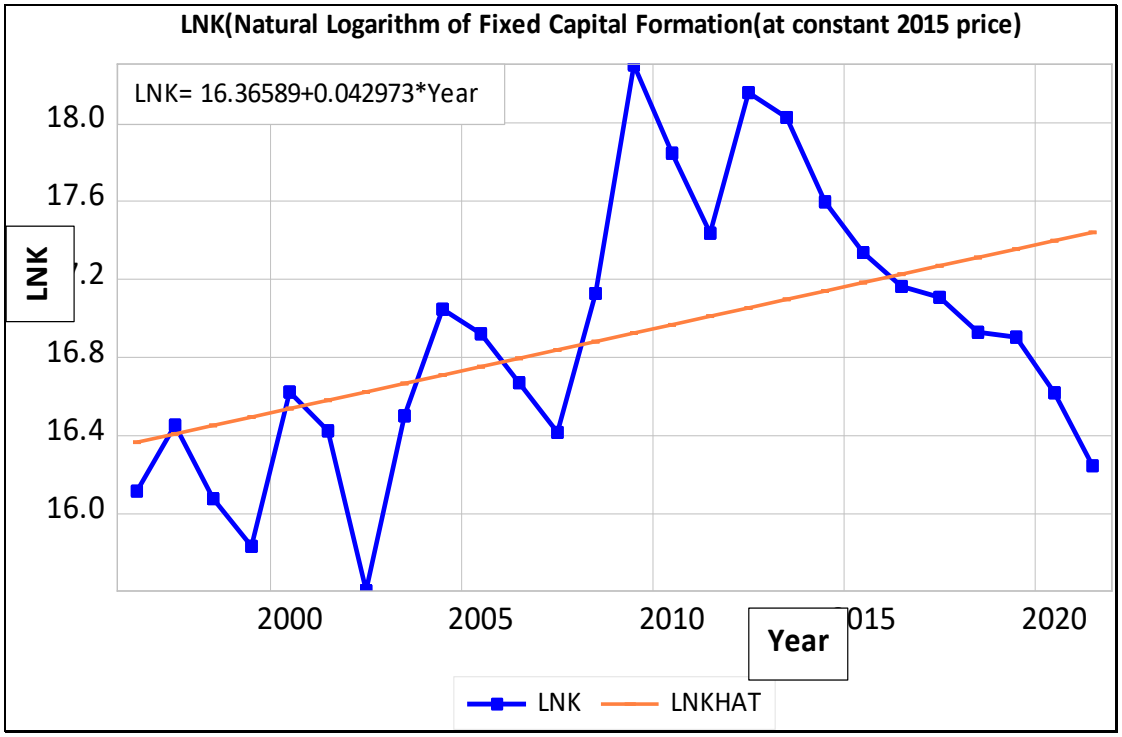
prospects (measured in terms of wages and salaries paid adjusted for inflation rate), fixed capital formation of the sector adjusted for the 2015 constant price, total exports of the country (% of GDP), net exports of the sector, and government effectiveness indicators of the country. The numbers from RGDP to K and XM reflect the millions of variables' mean, median, minimum, maximum, and standard deviation.

Figure 10: The Trend in Real GDP of Ethiopia (1996-2021)



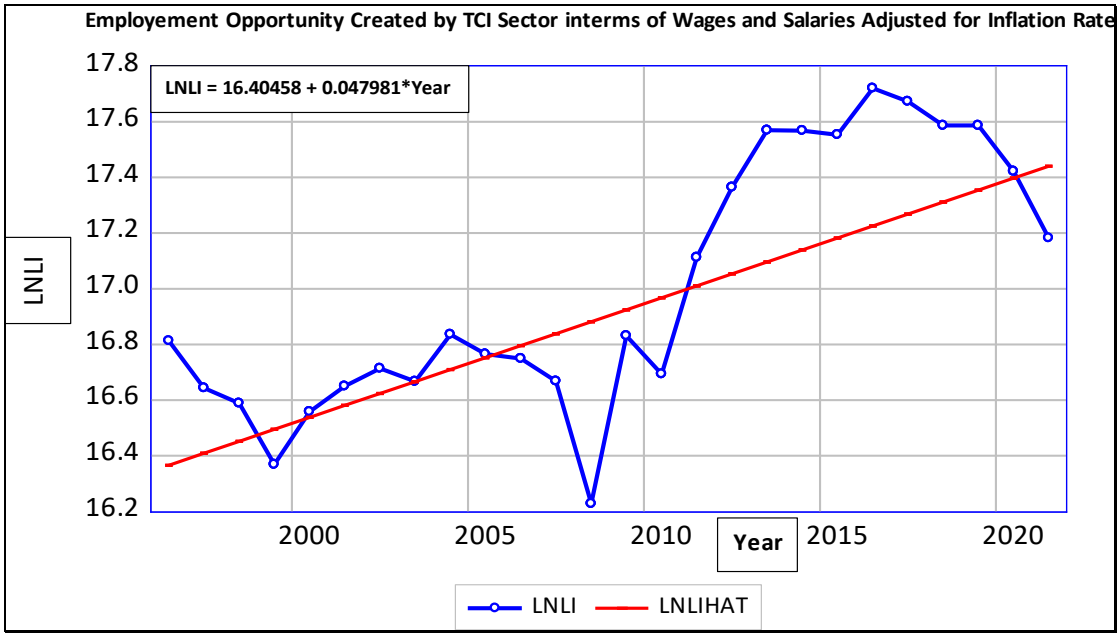
(Source: Estimate by EViews 12*)*

Figure 11: The Trend in Fixed Capital Formation (at constant 2015 price) by TCI Sector in Ethiopia (1996-2021)



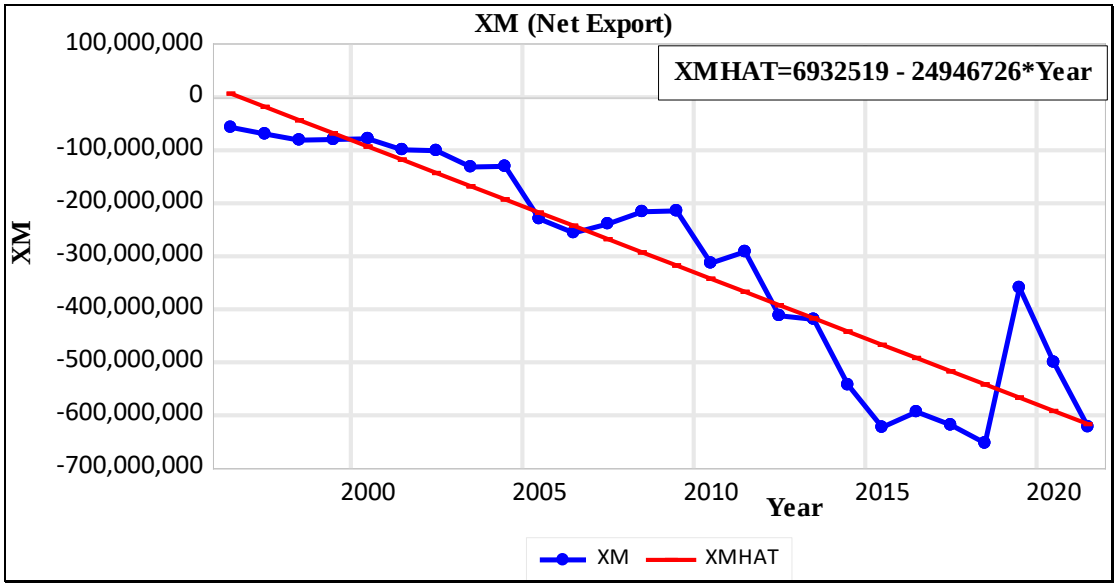
(Source: Estimate by EViews 12*)*

Figure 12: The Trend in Employment Opportunity by TCI Sector in (1996-2021)



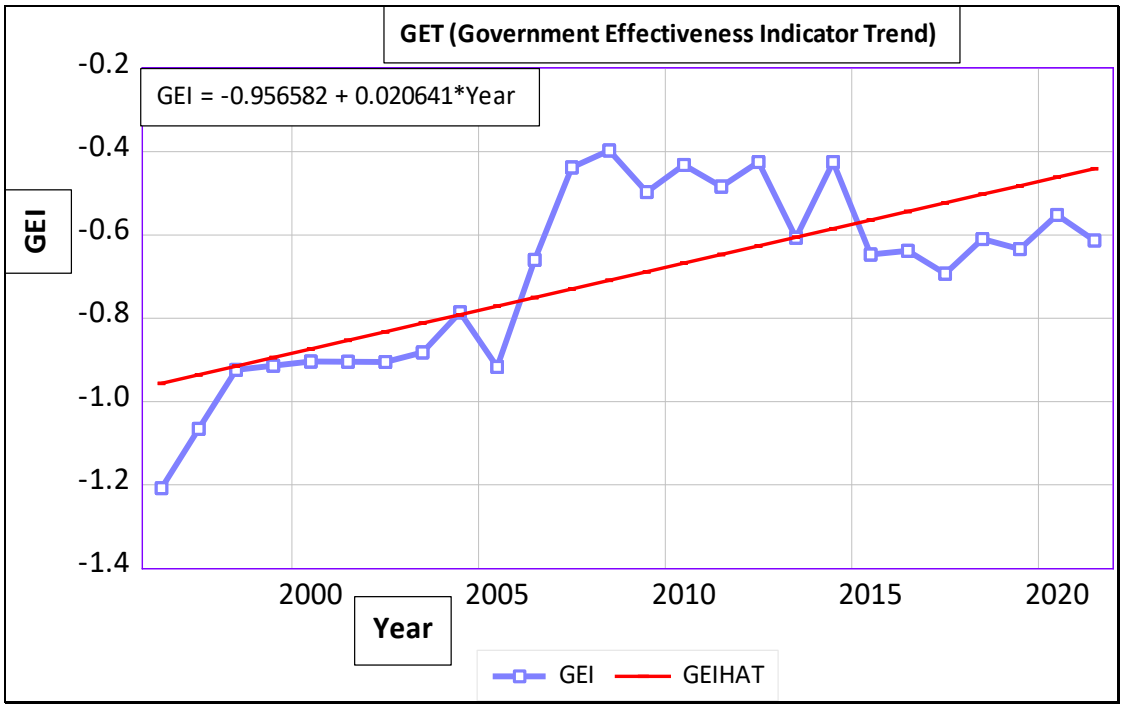
(Source: Estimate by EViews 12*)*

Figure 13: The Trend in Net Export by TCI Sector in Ethiopia (1996-2021)



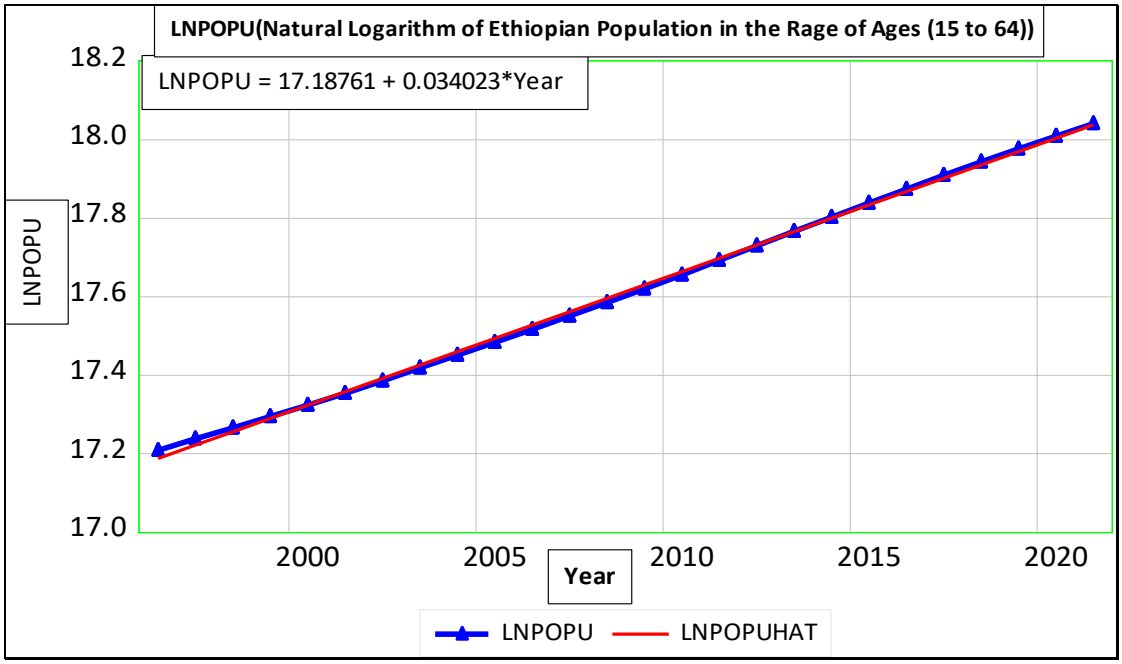
(Source: Estimate by EViews 12*)*

Figure 14: The Trend of Government Effectiveness Indicator in Ethiopia (1996-2021)



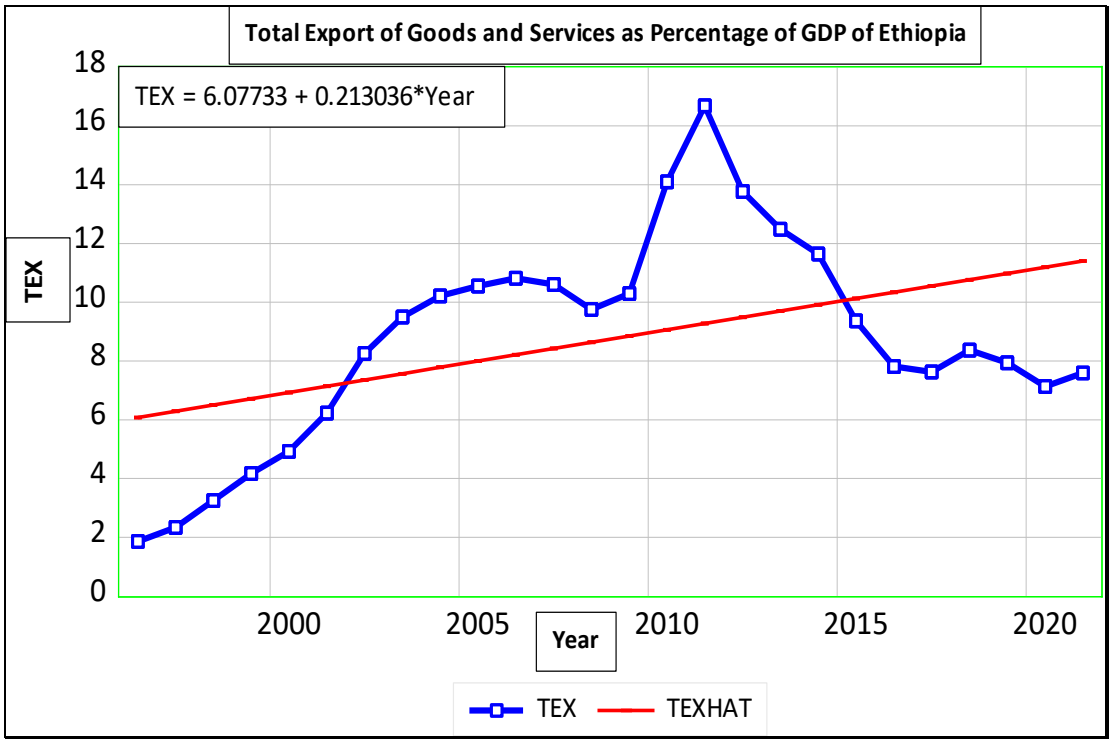
(Source: Estimate by EViews 12*)*

Figure 15: The Trend of Ethiopian Population in the Age Range of 15 to 64(1996-2021)



(*Source*: Estimate by EViews 12)

Figure 16: The Trend of Total Export of Goods and Services (% of GDP) of Ethiopia (1996-2021)



(*Source*: Estimate by EViews 12)

4.4.2. Econometric Data Analysis

4.4.2.1.Unit Root Test

Before using the ARDL bound test, it is critical to verify the unit root of each variable. All variables must be stationary at I (0), I (1), or both to determine the bound F-statistic test. Elliott et al. (1996) assumed to test the order of integration of the variable and used de-trending to boost the ADF test's power. This strategy is thus used in the study to look for unit root tests.

There isn't a unit root in the series that hinders from using the model, according to the results of DFGLS. Table 11 below demonstrates that while real GDP, fixed capital creation, and the size of the working-age population (15 to 64) are stable at order I (0), job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), net exports of the sector, the government effectiveness indicator, and total exports of the country (% of GDP) are stationary at order I (1).

Table 11: Unit Root Tests

Variables	ADF		PP		DFGLS		Order of integration accepted
	Level	1st difference	Level	1st difference	Level	1st difference	
LNRGDP	*0.431997*	*-3.03014*	*1.182326*	*-2.878032*	*-2.114044*	*-2.841474*	*I (0)*
Test critical values at 1% level	*-3.737853*	*-3.737853*	*-3.72407*	*-3.737853*	*-2.685718*	*-2.664853*	
Test critical values at 5% level	*-2.991878*	*-2.991878*	*-2.986225*	*-2.991878*	*-1.959071*	*-1.955681*	
Test critical values at 10% level	*-2.635542*	*-2.635542*	*-2.632604*	*-2.635542*	*-1.607456*	*-1.608793*	
LNK	*-1.292683*	*-6.153585*	*-1.841368*	*-5.615034*	*-1.890319*	*-0.721871*	*I (0)*
Test critical values at 1% level	*-3.752946*	*-3.752946*	*-3.72407*	*-3.737853*	*-2.685718*	*-2.685718*	
Test critical values at 5% level	*-2.998064*	*-2.998064*	*-2.986225*	*-2.991878*	*-1.959071*	*-1.959071*	
Test critical values at 10% level	*-2.638752*	*-2.638752*	*-2.632604*	*-2.635542*	*-1.607456*	*-1.607456*	
LNLI	*-1.168488*	*-5.634913*	*-1.200126*	*-5.590666*	*-1.163578*	*-2.129163*	*I (1)*
Test critical values at 1% level	*-3.72407*	*-3.737853*	*-3.72407*	*-3.737853*	*-2.66072*	*-2.669359*	
Test critical values at 5% level	*-2.986225*	*-2.991878*	*-2.986225*	*-2.991878*	*-1.95502*	*-1.956406*	
Test critical values at 10% level	*-2.632604*	*-2.635542*	*-2.632604*	*-2.635542*	*-1.60907*	*-1.608495*	
XM	*-0.778561*	*-5.765061*	*-0.403749*	*-6.052438*	*-0.558717*	*-5.874122*	*I (1)*
Test critical values at 1% level	*-3.72407*	*-3.737853*	*-3.72407*	*-3.737853*	*-2.66072*	*-2.664853*	
Test critical values at 5% level	*-2.986225*	*-2.991878*	*-2.986225*	*-2.991878*	*-1.95502*	*-1.955681*	
Test critical values at 10% level	*-2.632604*	*-2.635542*	*-2.632604*	*-2.635542*	*-1.60907*	*-1.608793*	
GEI	*-2.139989*	*-6.252869*	*-2.547344*	*-6.267737*	*-1.539022*	*-5.966203*	*I (1)*
Test critical values at 1% level	*-3.737853*	*-3.737853*	*-3.72407*	*-3.737853*	*-2.66072*	*-2.664853*	
Test critical values 5% level	*-2.991878*	*-2.991878*	*-2.986225*	*-2.991878*	*-1.95502*	*-1.955681*	
Test critical values 10% level	*-2.635542*	*-2.635542*	*-2.632604*	*-2.635542*	*-1.60907*	*-1.608793*	
TEX	*-2.030172*	*-1.844722*	*-2.004334*	*-2.756466*	*-1.445056*	*-1.873515*	I (1)
Test critical values at 1% level	*-3.752946*	*-3.769597*	*-3.72407*	*-3.737853*	*-2.67429*	*-2.67429*	
Test critical values at 5% level	*-2.998064*	*-3.004861*	*-2.986225*	*-2.991878*	*-1.957204*	*-1.957204*	
Test critical values at 10% level	*-2.638752*	*-2.642242*	*-2.632604*	*-2.635542*	*-1.608175*	*-1.608175*	
LNPOPU	*-1.627007*	*-3.056583*	*2.292607*	*-1.532592*	*-2.719915*	*-1.751863*	*I (0)*
Test critical values at 1% level	*-3.752946*	*-3.752946*	*-3.72407*	*-3.737853*	*-2.67429*	*-2.679735*	
Test critical values 5% level	*-2.998064*	*-2.998064*	*-2.986225*	*-2.991878*	*-1.957204*	*-1.958088*	
Test critical values 10% level	*-2.638752*	*-2.638752*	*-2.632604*	*-2.635542*	*-1.608175*	*-1.60783*	

(Source: Estimate by EViews 12*)*

4.4.2.2.Structural Break Unit Root Test

Although there were many macroeconomic and policy changes affecting the industrial sector in the nation, the unit root tests did not depict a break in a series, which led to biases in the regression results. Perron (1997) suggests that most macroeconomic variables are trend-stationary with a structural break. According to Perron (1997), they can have a break in the intercept. This is further supported by the findings in Table 12 below, which demonstrate that variables are stationary at the level and have break dates at the same time.

According to EViews, the breakpoint unit root test was conducted to see whether there was a structural break or not. Statistical software EViews 12 has a feature called "breakpoint unit root test" to conduct the test, and the results are shown in Table 12 below.

Table 12: Structural Break Unit Root Test

Break in Intercept				
Variables	**Level (t-statistic)**	**Break Date**	**1st difference (t-statistic)**	**Break Date**
LNRGDP	-2.960068	2003	-6.164019	2003
LNK	-2.241183	1999	-8.103309	2009
LNLI	-4.61596	2008	-6.607895	2008
XM	-2.701008	2011	-8.63123	2019
GEI	-4.639794	2005	-7.169633	2009
LNPOPU	-2.563163	2005	-3.261826	2017
TEX	-2.960761	2013	-5.326848	2011

Note: Critical values for the model are (-4.949133, -4.443649, -4.193627) at 1, 5, and 10%, respectively. (*Source:* Estimate by EViews 12)

There's still a clear structural break in the data for all of these series. Specifically, the structural break that occurred in 2003 was quite acceptable because the time was when the IDS was adopted in Ethiopia, which emphasized export-led industrialization and focused on labor-intensive industries, the development of infrastructure to support rapid economic growth, and the development of small enterprises for massive job creation and poverty reduction (FDRE 2002). The study by Allaro et al. (2011) infers that the endogenously determined structural break time for the macroeconomic variables (export, import, and GDP) of the Ethiopian economy was found to be 2003. Therefore, the investigation, with the help of Giles's (2015) suggestion, constructed a dummy variable, BREAK, that takes the value one for this observation and zero everywhere else. According to Giles (2015), the break doesn't occur at just a single point in time.

Instead, there's a change in the level and trend of the data that evolves over several periods. We call this an "innovational outlier," and in testing the time series for unit roots, Giles (2015) took this into account.

4.4.2.3.Lag Selection Criteria

Table 13: Utilizing VAR (Vector Autoregression) for Lag Order Selection Criteria

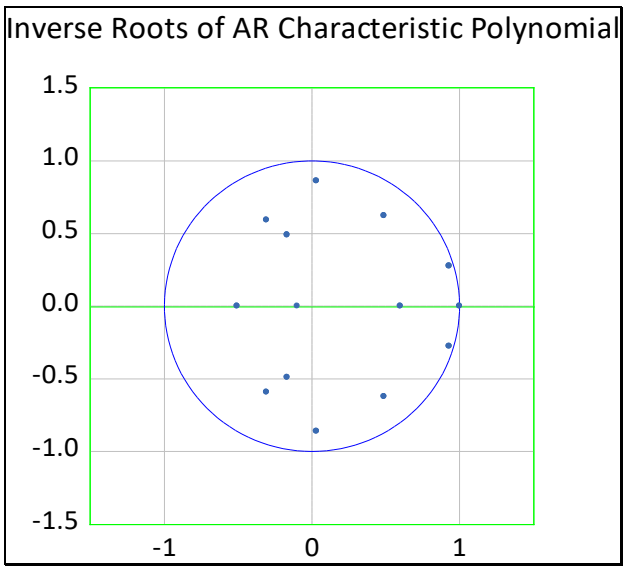
VAR Lag Order Selection Criteria
Endogenous variables: LNRGDP LNPOPU LNLI LNK XM TEX GEI
Exogenous variables: C
Sample: 1996 2021
Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-472.8374	NA	5.48E+08	39.98645	40.33005	40.07761
1	-242.4708	307.1555	179.9699	24.87257	27.62136	25.60182
2	-138.9315	77.65445*	7.219941*	20.32763*	25.48161*	21.69498*

*** Indicates lag order selected by the criterion**
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

(Source: Estimate by EViews 12*)*

Figure 17: Inverse Roots of AR Characteristic Polynomial



(Source: Estimate by EViews 12*)*

It is crucial to choose the correct lag order of the variable before applying the ARDL bound test to determine whether cointegration between real GDP, job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), fixed capital formation of the sector adjusted for 2015 constant price, net export of the sector, government effectiveness indicator of the country, the size of working age population

(15 to 64), and total export of the country (% of GDP) exists or not. In the study, the appropriate lag order was established using the optimal lag order of the VAR model. The observed results in Table 13 above provide the full set of lag selection criteria for utilizing the ARDL bound test, which implies that the model performs better at lag 2 than 1 according to those criteria.

Additionally, the polynomial graph is also used for the confirmation of appropriate lag length under the VAR method, as shown in Figure 17 above. The graph shows that the dots inside the circle confirm the validation of good results at lag 2.

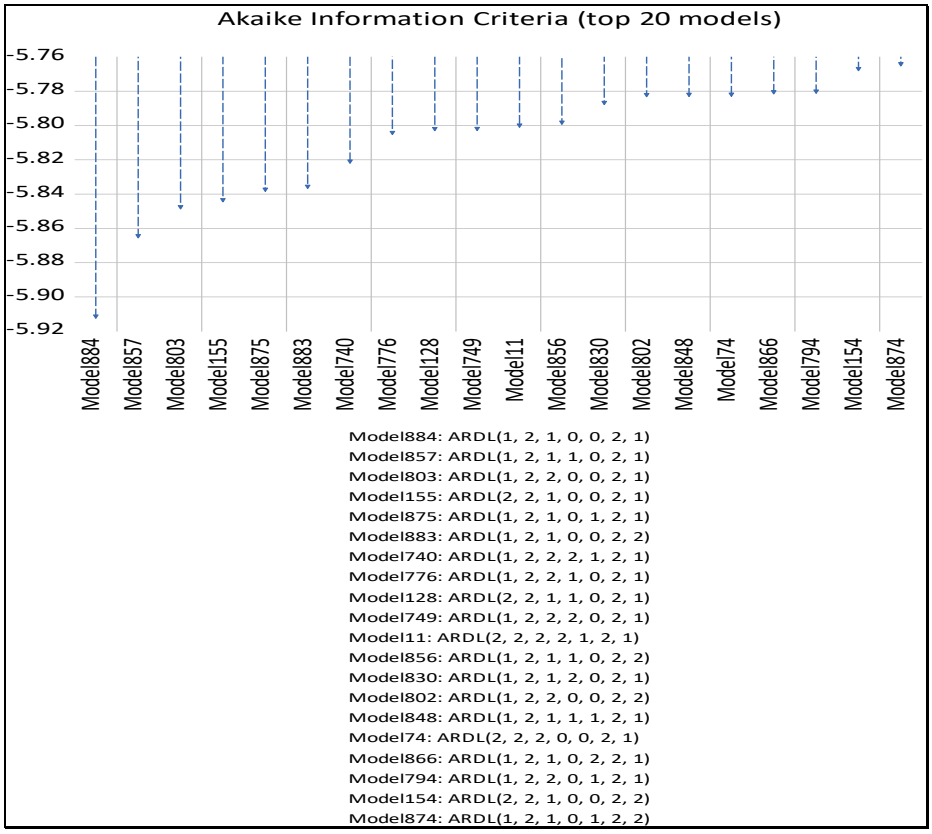
4.4.2.4.The ARDL Model

Table 14: The ARDL Model

Dependent Variable: LNRGDP; Method: ARDL; Sample (adjusted): 1998 - 2021 Included observations: 24 after adjustments; Maximum dependent lags: 2 (Automatic selection); Model selection method: Akaike info criterion (AIC); Dynamic regressors (2 lags, automatic): LNPOPU LNLI LNK TEX XM GEI; Fixed regressors: BREAK C Number of models evaluated: 1458; Selected Model: ARDL (1, 2, 1, 0, 0, 2, 1)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LNRGDP (-1)	0.484154	0.062556	7.73954	0.0000
LNPOPU	0.899363	6.314952	0.142418	0.8899
LNPOPU (-1)	-25.26634	10.50635	-2.404864	0.0396
LNPOPU (-2)	25.35039	6.228115	4.070315	0.0028
LNLI	0.010114	0.022931	0.441044	0.6696
LNLI (-1)	0.061565	0.021518	2.861117	0.0187
LNK	0.033966	0.009354	3.631173	0.0055
TEX	0.008450	0.003095	2.729927	0.0232
XM	-9.45E-11	5.18E-11	-1.825815	0.1012
XM (-1)	-1.84E-10	4.48E-11	-4.100935	0.0027
XM (-2)	-1.03E-10	5.46E-11	-1.886904	0.0918
GEI	5.84E-02	3.66E-02	1.596197	0.1449
GEI (-1)	1.13E-01	4.30E-02	2.637068	0.0270
BREAK	-0.082899	0.014398	-5.75782	0.0003
C	-5.769378	1.357338	-4.250508	0.0021
R-squared	0.999880	**Mean dependent var**		24.36255
Adjusted R-squared	0.999693	**S.D. dependent var**		0.628100
S.E. of regression	0.011007	**Akaike info criterion**		-5.911363
Sum squared resid	0.001090	**Schwarz criterion**		-5.175079
Log likelihood	85.93635	**Hannan-Quinn criter.**		-5.716027
F-statistic	5348.729	**Durbin-Watson stat**		2.862116
Prob(F-statistic)	0.00000			
*Note: p-values and any subsequent tests do not account for model selection.				

(Source: Estimate by EViews 12*)*

Figure 18: Akaike Information Criteria Graph.



(Source: Estimate by EViews 12*)*

Before looking for the ARDL-bound test for cointegration the ARDL model was estimated, and the results are shown in Table 14 above. In addition to this, in Figure 18, we can see that automatic selection (using the AIC) was used with a maximum of 2 lags for both the dependent variable and the regressors. Out of the 1458 models evaluated, the procedure has selected an ARDL (1, 2, 1, 0, 0, 2, 1) model, 1 lag of the dependent variable, NRGDP, and 2 lags of LNPOPU, 1 lag of LNLI, no lag of LNK and TEX, 2 lags of XM, and 1 lag of GEI. EViews also notes that since the selected model has fewer lags than the maximum, the sample used in the final estimation will not match that used during selection. The rest of the output is standard least squares output for the selected model. To view the relative superiority of the selected model against alternatives, we can view the following Figure 18, the Akaike information criteria graph of the AIC of the top twenty models.

4.4.2.5.ARDL Bound Test for Cointegration

Table 15: ARDL Bound Test for Cointegration

F-Bounds Test Null Hypothesis: No levels relationship				
Test Statistic	**Value**	**Signif.**	**I (0)**	**I (1)**
				Asymptotic: n=1000
F-statistic	21.10539	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.50%	2.55	3.61
		1%	2.88	3.99

(Source: Estimate by EViews 12*)*

Table 16: Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized	**Trace**		**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None *	0.968758	270.6301	125.6154	0.0000
At most 1 *	0.963108	187.4463	95.75366	0.0000
At most 2 *	0.89162	108.2519	69.81889	0.0000
At most 3 *	0.716115	54.92108	47.85613	0.0094
At most 4	0.533876	24.70058	29.79707	0.1724
At most 5	0.223617	6.38127	15.49471	0.6505
At most 6	0.012695	0.306638	3.841465	0.5797
Trace test indicates 3 cointegrating eqn(s) at the 0.05 level *** denotes rejection of the hypothesis at the 0.05 level** ****MacKinnon-Haug-Michelis (1999) p-values**				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized	**Max-Eigen 0.05**			
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None *	0.968758	83.18377	46.23142	0.0000
At most 1 *	0.963108	79.19444	40.07757	0.0000
At most 2 *	0.89162	53.33079	33.87687	0.0001
At most 3 *	0.716115	30.2205	27.58434	0.0224
At most 4	0.533876	18.31931	21.13162	0.1184
At most 5	0.223617	6.074632	14.2646	0.6037
At most 6	0.012695	0.306638	3.841465	0.5797
Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level *** denotes rejection of the hypothesis at the 0.05 level** ****MacKinnon-Haug-Michelis (1999) p-values**				

(Source: Estimate by EViews 12*)*

Prior to figuring out the long- and short-run correlations between the variables, it's critical to use the ARDL bound test (Pesaran et al. 2001). The estimated findings are shown in Table 16 above, and the value of the F-statistics (21.10539) is greater than both the lower and upper bounds at the 5% level. Therefore, the alternative hypothesis of cointegration is accepted, and the ARDL bound test verifies the existence of a long-run relationship between real GDP, fixed capital formation by the TCI sector, job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), net

export of the sector, and the control variables: the government effectiveness indicator, the size of the working-age population (15 to 64), and total export of the country (% of GDP).

The study also makes use of the cointegration method developed by Johansen and Juselius in 1990 to examine the robustness of the long-run associations between variables that already exist. The empirical findings of Johansen's cointegration, displayed in Table 16 above, reveal that the variables have a strong and efficient long-run connection. The EViews output releases two statistics: the Trace and the Max-Eigen statistic. We reject the null hypothesis of "no integration" if the Trace or Max-Eigen statistic is higher than the 0.05 critical level. From both the Trace and Max-Eigen statistic we can see that there are three cointegration equations indicating the existence of a long- run relationship between variables at the 5% level of significance. Therefore, we reject the null hypothesis of "no integration" between the variables under consideration.

4.4.2.6.ARDL Long-run and Short-run Estimation of Parameters

4.4.2.6.1. ARDL Long-run Estimation of Parameters

Table 17: ARDL Long-run Estimation of Parameters

Long Run Coefficients				
Dependent variable is LNRGDP				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LNPOPU	1.906412	0.124902	15.26321	0.0000
LNLI	0.138954	0.047174	2.94556	0.0163
LNK	0.065844	0.020879	3.153635	0.0117
TEX	0.01638	0.006198	2.642746	0.0268
XM	-7.39E-10	1.93E-10	-3.82165	0.0041
GEI	0.333048	0.101996	3.265321	0.0098
C	-11.1843	2.357986	-4.74316	0.0011

(Source: Estimate by EViews 12*)*

After validating that there is a long-run and short-run relationship between the variables using the ARDL bound test, the study calculates the variables' short-run and long-run parameters. The coefficients of all the variables show that Ethiopia's economy will be significantly impacted in the long-run regardless of their signs. Thus, studies and analyses of economic growth in terms of factors relating to the TCI sector are extremely solid. Due to this advantage, the study aims to examine the relationship between the country's economic growth and fixed capital formation by the TCI sector, job prospects measured in terms of wages and salaries paid adjusted for the annual inflation rate, net

export of the sector, and the control variables: the government effectiveness indicator, the size of the working-age group population (15 to 64), and total export of the country (% of GDP).

After having the long-run parameter estimation results, the study examines the empirical findings that can be analyzed based on the stated hypothesis as follows:

Hypothesis 1: In terms of fixed capital formation, the TCI significantly contributes to Ethiopia's economic growth.

An increase in the fixed capital formation of the TCI sector in Ethiopia can increase economic growth, according to the empirical results of the association, which are presented in Table 17 above for a long-run association. According to the anticipated results, if all other factors remain the same, an increase of 1% in the fixed capital formation of the TCI sector can enhance economic growth by up to 0.07%. The contribution is very minimal in magnitude, even if it is significant and positive.

A significant number of studies have been put forward to explain the role of fixed capital formation in economic growth.

Desta (2008) contends similarly that there is a long-term, substantial positive association between real GDP and capital accumulation in Ethiopia. This relationship is reflected by a correlation coefficient that, for Romania, Bulgaria, the Czech Republic, and Poland, is very nearly equal to 1. The other study by Gibescu (2010) indicates a clear and significant relationship between economic growth and gross fixed capital creation.

According to Ongo and Andrew (2014), there is a strong correlation between private investment and economic growth. They claim this result is because of the advancement of technology and infrastructure.

In the short-run, gross fixed capital formation had no discernible effect on economic growth, according to Kanu and Ozurumba's (2014) findings. However, in the long-run, the VAR model estimate shows that gross fixed capital formation, total exports, and the lagged values of GDP had positive long-term relationships with economic growth in Nigeria.

In contrast to the studies mentioned above, a study by Onwiodiokit and Otolorin (2021) using annual time series data covering the years 1981 to 2018 and the Dynamic Ordinary Least Square (DOLS) technique argues that gross fixed capital formation had a negative and significant impact on the economic growth of Nigeria.

To summarize, Boskin and Lau (1991) identified the three main drivers of national economic growth as increased capital, labor, and technical progress. Abramovitz (1956), Denison (1962a, b; 1967), Griliches and Jorgenson, Kendrick (1961, 1973), Kuznets (1965, 1966, 1971, 1973), and Solow (1957), to name a few, have all found that the rate of growth of capital (physical and human) and technological advancement account for a sizable portion of economic growth. For instance, Jorgenson, Gollop, and Fraumeni (1987, p. 21) discovered that between 1948 and 1979, capital formation contributed 46% of the economic growth of the United States, labor growth contributed 31%, and technical progress contributed 24% (as cited in Boskin and Lau, 1991).

As a result, the reviews of most other studies and this study have all revealed findings that are in line with the study's hypothesis.

Hypothesis 2: Ethiopia's economic growth is negatively impacted by the sector's net exports.

The sector's net exports, as expected, show a very slight negative and almost nonexistent long-term association with national economic growth at a 5% level of significance. This outcome implies that by holding all other things constant, every unit change in the net export of the TCI sector can decrease the economic growth of the country by 7.39E-8%.

Numerous studies have been presented to explain how net exports affect economic growth. Exports offer chances to start the structural transformation and can enhance economic growth in a variety of ways. Numerous nations have undertaken efforts to diversify their export product bases in awareness of this. Similar to this, in 1998, the Ethiopian government approved an Export Promotion Strategy (EPS), which was eventually expanded into a full-fledged IDS in 2002. The government has worked hard to encourage exports in a few key industries, such as textile, leather, and other agroindustry's, by defining goals and offering a variety of supports to help them achieve these targets (FDRE 2002).

Despite these efforts, Ethiopia's export sector continues to make a relatively minor contribution to the desired structural transformation. According to a study by Gebreeyesus and Kebede (2017), only roughly one-fifth of Ethiopia's import expenditure can be covered by export receipts.

The government of Ethiopia has chosen and given particular attention to the TCI as one of its important strategic sectors, notably since the start of the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) in 2005. This theme was also

stressed in GTP I and GTP II. This is because they are labor- and resource-intensive, closely related to the agriculture sector, and might give the country a comparative advantage and competitive edge in the global market. Despite the potential advantages of the clothing and textile industries, actual results in terms of firm development, job generation, and export revenue have been disappointing. The National Planning Commission (NPC, 2016) found that during the GTPI era (2010-2015) the clothing and textile sectors significantly underperformed in terms of export revenues. At the conclusion of the plan period, export revenues were USD 98.9 million, or around 10% of the USD 1 billion target.

The other study by Akalpler and Shamadeen (2017) showed that there is a long-run co-integration between net exports and economic growth in the USA.

As a result, the majority of investigations, including this one, have shown importance and results that are consistent with the study's hypothesis.

Hypothesis 3: The employment opportunities in the TCI sector in terms of wages and salaries paid adjusted for the yearly inflation rate have no appreciable influence on Ethiopia's economic growth.

The employment opportunity in terms of payment by the sector in Ethiopia that is adjusted for the annual inflation rate has a significant positive long-run association with economic growth. According to the study's findings, by holding all other things constant, economic growth increases by 0.14% for every 1% increase in employment opportunities in the TCI sector over the study period.

According to Sodipe and Ogunrinola (2011), there is a correlation between employment levels and economic growth in Nigeria that is both positive and statistically significant. On the contrary, Ongo and Andrew (2014) claimed that the labor force tends to negatively economic growth in the CEMAC (Economic and Monetary Community of Central Africa) sub-region. This study suggests that countries in the sub-region need to implement realistic employment policies.

An interesting study by Xu and Shang (2015) which is performed based on a multi-agent simulation model of economic growth and in which they designed a wage distribution mechanism to simulate the impact of wage distribution on economic cycles found that there is an inherent relationship between economic growth cycles and the ratio of the minimum wage to average wage through the empirical analysis using data from the US between 1982 and 2013, the existence of this relationship is confirmed and they suggested understanding of such inherent relationship may provide some insights

for government to adjust minimum wage according to the pattern of economic cycles, optimize labor and social security policies, and to promote economic growth.

According to Hjazeen et al. (2021), in their study, they employed the ARDL bootstrap cointegration approach to investigate the correlation and long-run relationship among the variables, and the empirical finding shows a negative linkage between economic growth and unemployment.

In terms of creating jobs during the GTPI period (2010-2015), the clothing and textile sectors in Ethiopia significantly underperformed, according to a report by the National Planning Commission (NPC, 2016). At the conclusion of the plan period, the sector was expected to provide 40,000 citizens with job possibilities, but only half of the target was met.

The findings of the study and most other studies show opposite results to the hypothesis; therefore, the hypothesis is not acceptable.

Finally, the control variables: the government effectiveness indicator serves as the model's additional control variable. The government efficiency indicator created by Kaufmann et al. (2008) at the WB is used in this study. The indicator is a special variable of how effective the government is, and it reflects opinions on the effectiveness of the civil service, the effectiveness of public services, the credibility of the government's commitment to its policies, the quality of policy formulation and implementation, and the degree of political independence of the civil service (Kaufmann et al. 2008). The indicator's range is from -2.5 to +2.5, with -2.5 denoting the least effective level of governance and +2.5 denoting the most effective level.

This study finds a positive correlation or connection between the country's economic growth and the GEI over the period under consideration (1996 - 2021). According to this analysis, it has been getting better between 1996 and 2021. The results showed that for every unit change in the GEI, the economic growth of the nation improved by 33.3%. The results of this variable unequivocally prove the significance of the variable. The outcome is also consistent with a study by Alam et al. (2017), which affirms a notable favorable impact of government effectiveness on economic growth. The results, however, differ from those of Kurtz et al. (2007), who did not discover a significantly favorable relationship between government effectiveness and economic growth. Şaşmaz & Sağdiç (2020) claimed in their investigation that government effectiveness has a positive effect on economic growth.

The other control variable: the size of the working-age population (15 to 64). An increase in the size of the working-age population (15 to 64) in Ethiopia can increase economic growth, according to the empirical results shown for a long-run association. According to the estimated results, if all other factors remain the same, economic growth increases by 1.91% for every 1% increase in the size of the working-age population (15 to 64) in Ethiopia.

The last control variable: the total exports of the country (% of GDP), also a positive relationship with the economic growth of the country. The findings showed that for every unit change in the total export of the country (% of GDP), the economic growth of the nation was improved by 1.64%.

4.4.2.6.2. ARDL Short-run ECM Estimation of Parameters

Table 18: ARDL Short-run Error Correction Model (ECM) Estimation of Parameters

ARDL Error Correction Regression **Dependent Variable: D(LNRGDP)** **Selected Model: ARDL (1, 2, 1, 0, 0, 2, 1)** **Case 2: Restricted Constant and No Trend** **Sample: 1996 2021** **Included observations: 24**				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(LNPOPU)	0.89936	2.372385	0.379095	0.7134
D (LNPOPU (-1))	-25.3504	2.507453	-10.11001	0.0000
D(LNLI)	0.010114	0.008615	1.173937	0.2705
D(XM)	-9.45E-11	2.17E-11	-4.349526	0.0019
D (XM (-1))	1.03E-10	2.36E-11	4.360793	0.0018
D (GEI)	0.058407	0.016477	3.54481	0.0063
BREAK	-0.08290	0.008715	-9.512659	0.0000
ECM (-1) *	-0.51585	0.029774	-17.32529	0.0000
R-squared	0.971817	**Mean dependent var**		0.076243
Adjusted R-squared	0.959487	**S.D. dependent var**		0.041015
S.E. of regression	0.008255	**Akaike info criterion**		-6.494696
Sum squared resid	0.00109	**Schwarz criterion**		-6.102012
Log likelihood	85.93635	**Hannan-Quinn criter.**		-6.390517
Durbin-Watson stat	2.86216			
*** p-value incompatible with t-Bounds distribution.**				

(Source: Estimate by EViews 12*)*

The short-run ECM model is calculated following the acceptance of a long-run relationship between real GDP and the selected key variables of the TCI sector in Ethiopia. The results revealed that from the right-hand side, two variables do not have

a short-run ECM contribution to the economic growth of the country. These variables are fixed capital formation and total exports of the country (% of GDP). So, they do not appear in the short-run ECM model. The coefficients of the remaining variables show that Ethiopia's economy (real GDP) will be significantly as well as insignificantly affected in the short run.

The size of the working-age population (15 to 64) and the job prospects (measured in terms of wages and salaries paid adjusted for inflation rate) have a positive but insignificant effect on the real GDP of the country in the short-run according to the empirical results shown in Table 18 above. But the net export and government effectiveness index have a significant contribution to economic growth.

The results shown in Table 18 above indicated that in the short-run ECM, by holding all other things constant, an increase of 1% in the size of the working-age population (15 to 64) in Ethiopia can increase the economic growth of the country by 0.9%. The result supports what we have seen above in the long-run. The lag, however, indicates a negative and significant impact on the nation's economy.

In the short-run ECM, the study also reveals that there is no significant relationship between employment opportunities offered by the industry in terms of wages and salaries paid, which are adjusted for the inflation rate and economic growth.

In the long-run outcome, the net export of the sector shows a negative and significant association with the economic growth of the country. The sector's net exports exhibit a very small below-zero correlation with national economic growth at a 5% significance level in the short run. This outcome implies that every unit change in the net export of the TCI sector can decline the economic growth of the country by 9.45E-9% by holding all other things constant. In contrast to this, the lag in the net exports demonstrates a significant and minimally positive impact on the national economy. When it comes to the government effectiveness indicator, the results showed that for every unit change in the GEI, the economic growth of the nation increased by 5.8%.

The calculated coefficient of ECM is negative, which strongly suggests that there is cointegration among the variables. The ECM displays the rate of long-run equilibrium adjustment following short-run shocks. The ECM coefficient of economic growth for Ethiopia is -0.52 and significant at the 5% level, as shown in Table 18 above. This statistic shows that any departure from the short-run equilibrium between variables and economic growth may be corrected and regained annually at a rate of 0.52% in the long run.

The structural break remedial variable "BREAK" tells us how much the average real GDP has changed since 2003 because of the adoption of the IDS in Ethiopia, which emphasized export-led industrialization and focused on labor-intensive industries, the development of infrastructure to support rapid economic growth, and the development of small enterprises for massive job creation and poverty reduction (FDRE 2002). The result shows the significance of the strategy but also its negative impact on the growth of real GDP. The result shows that, due to the adoption of this specific strategy, the real GDP decreased by 8.3%.

4.5.Model Diagnostic and Stability Test

4.5.1. Diagnostic Test

4.5.1.1.Serial Correlation (Autocorrelation)

The assumption for this test is that the covariance of the error terms over time is zero ($\boldsymbol{cov(u_i u_j) = 0, for\ every\ i, j}$) in the model. The hypothesis of the serial correlation test was formulated as follows:

H_0: No serial autocorrelation($\boldsymbol{cov(u_i u_j) = 0, for\ every\ i, j}$)

H_1: Autocorrelation ($\boldsymbol{cov(u_i u_j) \neq 0, for\ every\ i, j}$)

Table 19: Test of Autocorrelation Under Breusch-Godfrey Serial Correlation Lagrange Multiplier Test.

Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Test: Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	6.237254	Prob. F (2,7)	0.0278
Obs*R-squared	15.37334	Prob. Chi-Square (2)	0.0005

(Source: Estimate by EViews 12*)*

According to Table 19 above, LM test of autocorrelation showed that, the probability value of F statistics was 0.0.0278, which is less than the level of significance (0.05). It can be concluded that there is autocorrelation problem or that the error terms have correlation with one another because the test resulted in a rejection of the null hypothesis of no serial autocorrelation.

4.5.1.2.Homoscedasticity Test

The researcher uses Brush- Pagan-Godfrey and ARCH tests.

The hypothesis of the study:

H_0: Homoscedasticity which ($\boldsymbol{var(u_t = \sigma^2)}$)

H_1: Heteroscedasticity which ($\boldsymbol{var(u_t \neq \sigma_t^2)}$)

Table 20: Heteroscedasticity Test Based on Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey **Null hypothesis: Homoskedasticity**			
F-statistic	1.649043	Prob. F (14,9)	0.2274
Obs*R-squared	17.26822	Prob. Chi-Square (14)	0.2422
Scaled explained SS	1.972349	Prob. Chi-Square (14)	0.9999

(Source: Estimate by EViews 12*)*

Table 21: Heteroscedasticity Test based on ARCH

Heteroskedasticity Test: ARCH			
F-statistic	1.882627	Prob. F (2,19)	0.1795
Obs*R-squared	3.638684	Prob. Chi-Square (2)	0.1621

(Source: Estimate by EViews 12*)*

There is no support for the presence of the error term variance to be regarded as not constant based on the two tests mentioned above (Breusch-Pagan-Godfrey and ARCH). The p-value of the statistics of the Breusch-Pagan-Godfrey test is 0.2274 and that of the ARCH is 0.1795, which are both above the standard significant value of 0.05; therefore, the null hypothesis of $(\boldsymbol{var(u_t = \sigma^2)})$ failed to be rejected as shown in Tables 20 and 21 above.

4.5.1.3.Normality Test

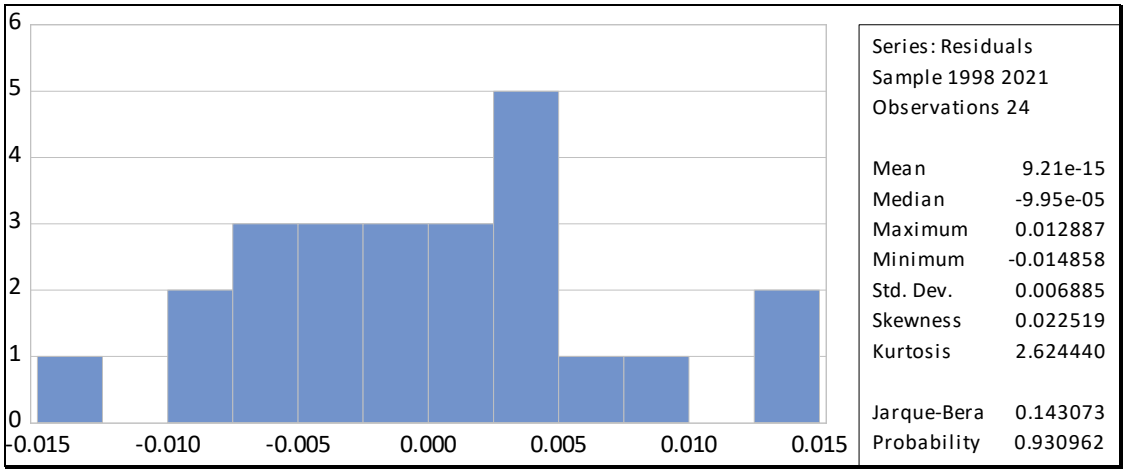
The most popular test for the normality assumption is the Jarque-Bera (1981) test, although there are several options, including the Normal Probability Plot (NPP) and residuals histogram. If the residuals are normally distributed, the histogram should be bell-shaped, and the Jarque-Bera p-value statistics should not be significant.

The following was the formulation of the normality test's hypothesis:

H_0: the data are normally distributed $[\boldsymbol{\varepsilon_t \sim (0, \sigma^2)}]$

H_1: the data are not normally distributed

Figure 19: Normality Test.



(*Source:* Estimate by EViews 12*)*

Jarque-Bera statistics' P-value of 0.930962 implies that it is greater than 0.05, which means there isn't any proof that the data are abnormal. As a result, given that the P-values were above 0.05, the null hypothesis that the data is normally distributed should not be rejected. Therefore, one could conclude that there is no problem with normality.

4.5.1.4.Multicollinearity Test

H_0: No multicollinearity

H_1: Multicollinearity

Table 22: Multicollinearity Test based on Variance Inflation Factor (VIF)

VIF			
Variable	**Coefficient Variance**	**Uncentered VIF**	**Centered VIF**
LNRGDP (-1)	0.003913	457494	282.0283
LNPOPU	39.87862	2.46E+09	449357.7
LNPOPU (-1)	110.3833	6.78E+09	1227780
LNPOPU (-2)	38.78941	2.37E+09	424409.3
LNLI	0.000526	30221.67	21.7052
LNLI (-1)	0.000463	26541.17	19.53805
LNK	8.75E-05	4990.413	8.3022
TEX	9.58E-06	182.0086	18.09214
XM	2.68E-21	76.97308	20.85194
XM (-1)	2.01E-21	51.33643	15.0353
XM (-2)	2.98E-21	70.16441	22.64648
GEI	0.001339	125.1355	8.892401
GEI (-1)	0.001849	184.4142	14.60414
BREAK	0.000207	1.710908	1.63962
C	1.842367	364950.4	NA

(Source: Estimate by EViews 12*)*

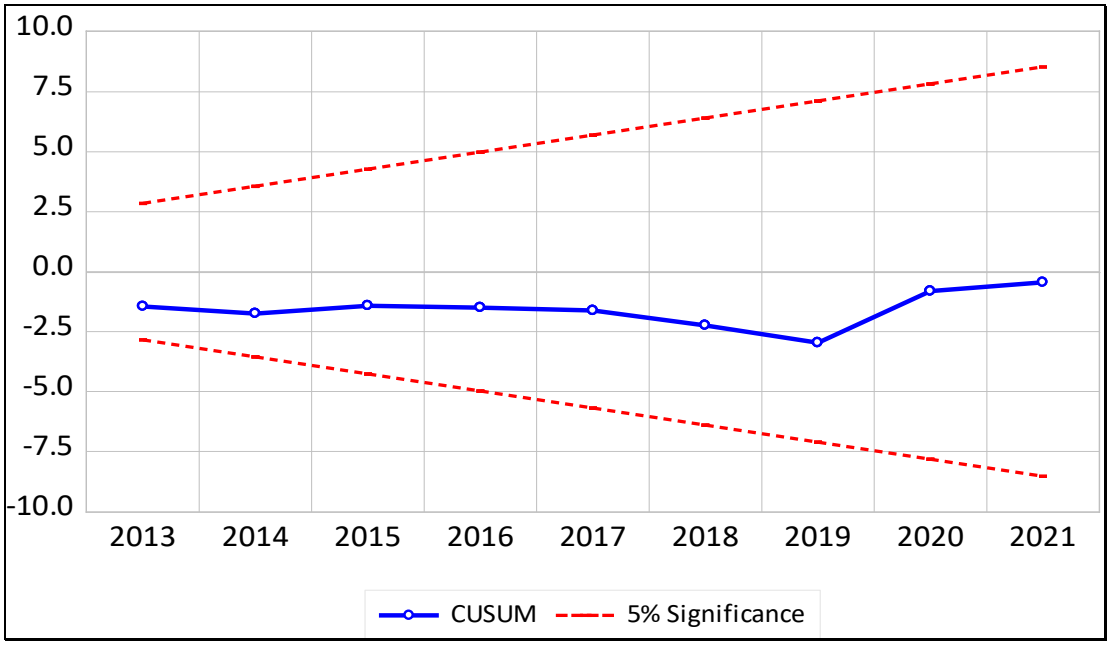
The majority of the independent variables scored above 10, as shown in the Table 22 above, for the centered VIF test. Hence, it was decided to reject the null hypothesis. Therefore, there is multicollinearity among the independent variables because the mean of the centered variance inflation factor for most variables is greater than the general value.

4.5.2. Model Stability Test

H_0: The parameter is not stable

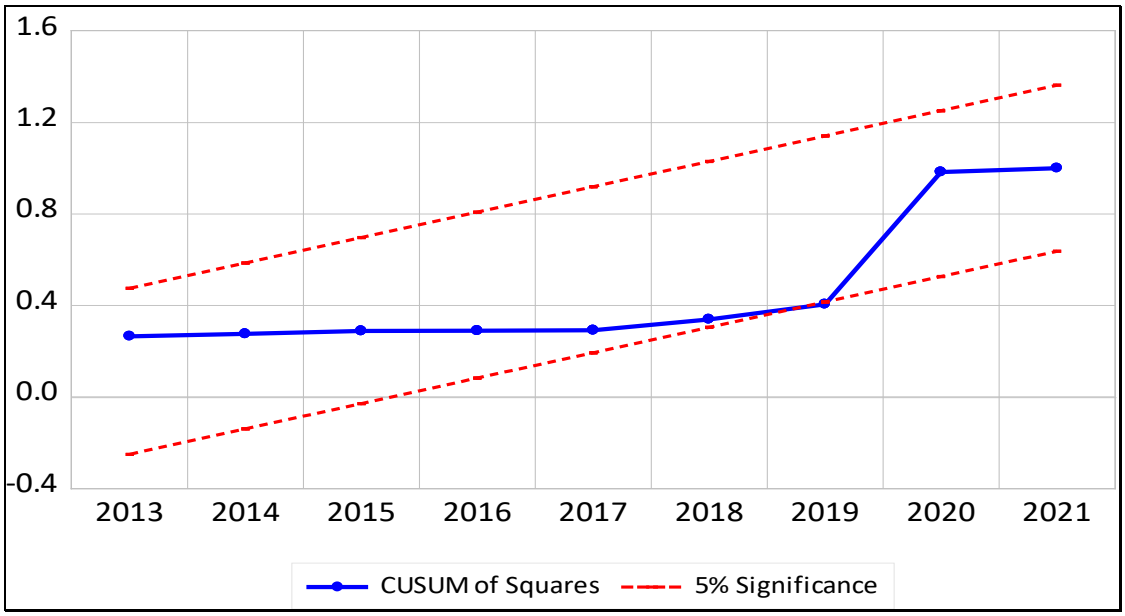
H_1: The parameter is stable

Figure 20: Plot of CUSUM for Coefficients' Stability of the ARDL Model.



(Source: Estimate by EViews 12*)*

Figure 21: Plot of CUSUMSQ for Coefficients' Stability of the ARDL Model



(Source: Estimate by EViews 12*)*

The study used the CUSUM test and CUSUMSQ to verify that long-run relationships between variables exist (Brown et al. 1975). The tests appear to accurately reflect the ARDL model's high level of fitness, according to earlier studies (Pesaran & Shin, 1999; Pesaran et al., 2001). The tests are carried out by plotting the ECM residual. The results imply that the ARDL model's coefficients are stable if the statistical data in the plot falls below crucial constraints at a 5% significant value. The plot of the CUSUM and

CUSUMSQ tests almost does not cross the feasible or critical limitations, as seen in the above Figures 20 and 21. Hence, it may be concluded that long-run estimates are stable and there is no structural break. Thus, the estimated model's outcomes are accurate and effective.

4.6.Granger Causality Test

According to Shrestha & Bhatta (2018), the co-integration relationship identified shows that there are causal relationships between variables, but it does not show which variables are causally related in which direction. For instance, one of the following three relationships could occur if the variables Y and X are cointegrated: A) X influences Y; B) Y influences X; or C) X and Y influence each other. The first two show a one-way relationship, while the third shows a two-way relationship. According to Shrestha & Bhatta (2018), if two variables are not cointegrated, they are independent, and one does not affect the other. To determine the pattern of such a link, Granger (1969) developed the causality test method.

Granger's (1969) definition of causality states that X causes Y if the past history of X can be used to predict Y more accurately than simply using the past history of Y only, and vice versa. Therefore, the Engle and Granger (1987) test procedure is frequently employed to test for the presence of a causal relationship between variables, and this approach was used in the study. The hypothesis would be rejected at that level if the probability value was less than any α level.

This test's primary objective is to look at the relationships between the variables real GDP growth of the country, net exports of the sector, fixed capital formation of the sector, job prospects (as determined by wages and salaries paid), and government effectiveness indicators. The results of the Granger causality test for the study are shown in Table 23, as follows:

Table 23: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LNPOPU does not Granger Cause LNRGDP	24	7.47291	0.0040
LNRGDP does not Granger Cause LNPOPU		1.98845	0.1644
LNLI does not Granger Cause LNRGDP	24	0.71137	0.5036
LNRGDP does not Granger Cause LNLI		1.09396	0.3551
LNK does not Granger Cause LNRGDP	24	3.07371	0.0697
LNRGDP does not Granger Cause LNK		0.14806	0.8634
TEX does not Granger Cause LNRGDP	24	3.58651	0.0477
LNRGDP does not Granger Cause TEX		0.30527	0.7405
XM does not Granger Cause LNRGDP	24	0.32083	0.7294
LNRGDP does not Granger Cause XM		3.95281	0.0367
GEI does not Granger Cause LNRGDP	24	2.38055	0.1195
LNRGDP does not Granger Cause GEI		0.25067	0.7808
LNLI does not Granger Cause LNPOPU	24	6.96871	0.0054
LNPOPU does not Granger Cause LNLI		3.87764	0.0387
LNK does not Granger Cause LNPOPU	24	0.76345	0.4798
LNPOPU does not Granger Cause LNK		10.2304	0.0010
TEX does not Granger Cause LNPOPU	24	2.68743	0.0938
LNPOPU does not Granger Cause TEX		0.62685	0.5450
XM does not Granger Cause LNPOPU	24	1.72523	0.2049
LNPOPU does not Granger Cause XM		3.81619	0.0404
GEI does not Granger Cause LNPOPU	24	4.73994	0.0214
LNPOPU does not Granger Cause GEI		0.21951	0.8049
LNK does not Granger Cause LNLI	24	4.49614	0.0252
LNLI does not Granger Cause LNK		0.69932	0.5093
TEX does not Granger Cause LNLI	24	2.80005	0.0860
LNLI does not Granger Cause TEX		1.64511	0.2193
XM does not Granger Cause LNLI	24	1.71284	0.2071
LNLI does not Granger Cause XM		3.26441	0.0604
GEI does not Granger Cause LNLI	24	5.05171	0.0174
LNLI does not Granger Cause GEI		0.05933	0.9426
TEX does not Granger Cause LNK	24	6.64967	0.0065
LNK does not Granger Cause TEX		5.27353	0.0151
XM does not Granger Cause LNK	24	0.09028	0.9141
LNK does not Granger Cause XM		2.05476	0.1556
GEI does not Granger Cause LNK	24	7.86453	0.0032
LNK does not Granger Cause GEI		0.15669	0.8561
XM does not Granger Cause TEX	24	0.69613	0.5108
TEX does not Granger Cause XM		1.82576	0.1883
GEI does not Granger Cause TEX	24	1.1276	0.3445
TEX does not Granger Cause GEI		0.73739	0.4916
GEI does not Granger Cause XM	24	1.65158	0.2181
XM does not Granger Cause GEI		0.44403	0.6479

(Source: Estimate by EViews 12*)*

The pairwise Granger causality test results in Table 23 when optimal lags are applied imply the unidirectional causality running from LNPOPU to LNRGDP, LNL to LNRGDP, LNK to LNRGDP, TEX to LNRGDP, LNRGDP to XM., LNPOPU to LNK,

TEX to LNPOPU, LNPOPU to XM, GEI to LNPOPU, LNK to LNLI, LNLI to XM, GEI to LNLI and GEI to LNK. Then there is bidirectional causality between LNLI and LNPOPU, TEX and LNK, and no directional causality between LNLI and LNRGDP, GEI and LNRGDP, XM and LNK, XM and TEX, GEI and TEX, and GEI and XM.

To summarize from Table 23, there are the causal links amongst the variables: real GDP growth of the nation, net export of the sector, fixed capital formation of the sector, job prospects (measured in terms of wages and salaries paid adjusted for inflation rate), the size of the working-age population (15 to 64), and total export of the country (% of GDP).

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1.Introduction

The first section of this chapter, which is the conclusion, examines the study's key empirical findings and the implications for policy; the second section addresses recommendations.

5.2.Conclusion

Understanding how the TCI industry contributes to Ethiopia's economic progress is the major goal of this research. The ARDL model was used to ascertain how the long-run and short-run relationships among the variables interacted. DFGLS was employed in the study as the approach to check for unit root testing. The results of DFGLS demonstrate that while real GDP, fixed capital formation, and the size of the working-age population (15 to 64) are stable at order I (0), job prospects measured in terms of wages and salaries paid adjusted for the yearly inflation rate, net export of the sector, government effectiveness indicator, and total export of the country (% of GDP) are stationary at order I (1).

Then the breakpoint unit root test was conducted to see whether there was a structural break or not. Statistical software EViews 12 has a feature called “breakpoint unit root test” to conduct the test, and the results depict a sound structural break in 2003. The dummy variable “BREAK” was created to handle this issue, and the analysis was conducted by incorporating this variable.

After stationarity tests, the optimal lag selection by the VAR model's optimal lag order setting method was used in the study to determine the proper lag order. The results suggest that the model performs better at lag 2, according to the criteria. In order to check that the lag length utilized by the VAR approach is suitable, the polynomial graph is also used. The graph shows that the dots inside the circle confirm the validation of good results at lag 2.

The ARDL bound test for cointegration and the Johansen cointegration tests are then conducted to ascertain the presence of cointegration or long-run relationships between the variables after the ARDL model has been processed through regression. The bound test (F-statistic) value is greater than the upper bound critical value of Narayan (2004) at the standard significant level of 5%, indicating that real GDP and the independent variables have a long-term association.

Following this, ARDL long-run and short-run parameter estimations are carried out, followed by ARDL short-run parameter estimations for the ECM. The main findings are:

Fixed capital formation by the sector that is adjusted for 2015 constant prices has a significant and positive relationship to long-term economic growth. An increase of 1% in the fixed capital formation of the TCI sector can increase economic growth by up to 0.07% while keeping all other factors constant. There is no short-run ECM relationship between economic growth and fixed capital formation in the TCI sector. Furthermore, the Pairwise Granger Causality Test depicts the existence of a single line of causality from LNK to LNRGDP but not vice versa.

The sector's net exports have a significant and negative relationship. By holding all other things constant, the country's economic growth can be reduced by 7.39E-8% for every unit change in net exports from the TCI sector. Similar to the long-term result, the sector's net exports demonstrate a poor correlation with national economic expansion in the short-run ECM. At a 5% significance level, the sector's net exports show a short-term association with national economic growth that is very marginally below zero. According to this result, the country's economic growth can decrease by 9.45E-9% for every unit change in net exports from the TCI sector. This demonstrates that the economy no longer depends on exports from the TCI sector. The net export lag, in contrast, shows a considerable and limited influence on the national economy. The Pairwise Granger Causality Tests show that there is only one line of causality from LNRGDP to XM, but not from XM to LNRGDP.

Employment opportunities in the sector in terms of wages and salaries paid that are adjusted for the annual inflation rate have a significant and positive relationship to long-term economic growth. According to the study's findings, by holding all other things constant, economic growth declines by 0.14% for every 1% increase in employment opportunities in the TCI sector over the study period. In short-run ECM, the study also reveals that there is no significant relation between employment opportunities offered by the industry in terms of wages and salaries paid, which are adjusted for inflation rate and economic growth. Furthermore, there is no causality direction between LNRGDP and LNI, according to Pairwise Granger Causality Tests.

Then, after conducting the main diagnostic tests, such as autocorrelation, heteroscedasticity, normality, and multicollinearity, the results revealed that there was serial correlation problem, no heteroscedasticity issue, the data used were normal, and

there was multicollinearity among the independent variables. In addition, the model stability tests, using the CUSUM and CUSUMSQ tests, were conducted, and it was confirmed that there was no model instability issue. After this, the pairwise Granger causality test was conducted, and the results revealed the causal links amongst the variables under consideration.

Finally, the hypotheses of the investigation are tested based on the estimated long- and short-run parameters and the pairwise Granger causality test. The testing results for the employment opportunity hypothesis are rejected, but those for the fixed capital creation and net export hypotheses are accepted.

5.3.Recommendations

The following policy recommendations are provided based on the study's findings:

- The most crucial task that needs to be accomplished to advance in fixed capital formation is attracting big amount of FDI inflows, besides creating a conducive environment for investment such as research-based revisions and improvements to investment regulations and incentive programs, ensuring political stability and improving the infrastructure such as: increasing the use of clean energy to generate power (hydropower, geothermal, wind, solar), expanding and improving road networks connecting national and regional markets, as well as enhancing telecommunication service, world-class railway construction, look for other ports in addition to port Djibouti, keeping up with and advancing Ethiopian Airlines, and last but not least, enhancing government services (as the results demonstrate the considerable and impressive influence of the government effectiveness indicator on economic growth.)
- The government should implement export-oriented development policies, such as reducing trade barriers and fostering free trade, in order to lift the sector's exports performance and have a trade surplus and positive net export in the textile and clothing industries. It is important to firmly set a beneficial set of policies that can expand regional, continental, and global markets, enforce advantageous trade and exchange rate laws, construct a solid and stable direction that encourages investment and protects property rights, review and sign free-trade agreements, reduce corruption and rent-seeking in the sector, imitate and learn export-enhancing strategies from top-performing nations in the sector, and lastly, support and recognize top-performing companies.

- To enhance employment opportunities, employing realistic employment policies is advisable. The primary goals of all initiatives are to reduce poverty and improve societal well-being. As a result, the development and application of comprehensive national employment policies that are in line with local requirements and conditions can have a significant impact on a nation's economic performance. Labor productivity-enhancing mechanisms should also be employed.

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