Effects of Exchange Rate Volatility on Employment in Ethiopia: The Case of Manufacturing Sector.

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Approval

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This is to certify that the thesis prepared by Tolosa Gebisa, titled: **Effects of Exchange Rate Volatility on Employment in Ethiopia: The Case of Manufacturing Sector** and submitted in partial fulfilment of the requirements for the Degree of Master of Science complies with the regulations of the University and meets the accepted standards with respect to quality and originality.

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Abstract

This study examines the effects of exchange rate volatility on manufacturing employment in Ethiopia for the period 1971-2020. Autoregressive Distributed Lag (ARDL) model was applied for analysis. The study revealed that exchange rate volatility has a negative effect on manufacturing employment in Ethiopia. That means the instability of exchange rate against other foreign currency including US dollar significantly decreases the employment in manufacturing sector in Ethiopia. Similarly, lending interest rate has a negative relationship with manufacturing employment. Real gross domestic product, real private sector credit, inflation and export have a positive relationship with manufacturing employment in Ethiopia. The study recommends that concerned body have to be control the volatility of exchange rate by imposing restrictions on buying and/or sale of currencies. Also, creditors or financial sector should offer long term and low interest rate loans. And similarly, government should give incentive for manufacturing sector such as export incentives, supply low interest loans and provide assurance for high risk investments in order to expand their investment, to attract new capital investment and to inspire new job creation. Furthermore, the relationship between exchange rate volatility and employment will require extra study including the other major sectors of economy.

Key Words: - *Exchange Rate Volatility, Autoregressive Distributed Lag Model, Employment, Manufacturing, Bound Test, Ethiopia.*

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Acronym

ADF ----------Augmented Dickey-Fuller

AfCFTA----------African Continental Free Trade Area

ARDL----------Autoregressive distributed lag

CPI----------Consumer price index

CSA----------Central Statistical Agency

D ……...Dummy

ECM ----------Error correction model

HGRA----------Home Grown Reform Agenda

IDSE----------Industry Development Strategy of Ethiopia

ILO----------International Labour Organization

INF----------Inflation

LIR----------lending interest rate

ME----------Manufacturing employment

NBE----------National Bank of Ethiopia

NoF----------Number of firms

OECD----------Organization for Economic Co-operation and Development

PDL----------Planning and Development Commission of Ethiopia

RGDP----------Real growth domestic product

RPSC----------Real Private Sector Credit

UNCTAD----------United Nations Conference on Trade and Development

VOL----------Exchange rate volatility

WDI----------World Development Indicator

X and M----------Export and Import of Goods and Services

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CHAPTER ONE

1. Introduction

1.1 Background of the Study

Employment is one of the factors that influence economic growth of one country. An employee contributes labor and expertise to an endeavour of an employer or of a person conducting a business or undertaking and is usually hired to perform specific duties which are enveloped into a job. In a corporate context, an employee is a person who is hired to provide services to a company on a regular or temporary basis. Employed persons are those who, one, work as paid employees, work in their own business or profession, or labor for fifteen hours or more as unpaid workers in a family-owned business. Two, those who do not work but had jobs or businesses from which they were temporarily absent due to illness, bad Weather, maternity or paternity leave, or personal obligations, whether or not they were paid for the time without work by their employers. A person is considered employed if they have worked at least one week or one day in "gainful" employment (ILO, 2021).

Employment is usually governed by employment laws, regulations or legal contracts. Ethiopia is the second most populous country in Africa after Nigeria and with high rate of population growth. Even if today Ethiopia economy is trying to convert to industry based economy and shows small growth but, still industry has low employment share than other sectors. Manufacturing is that the processing of raw materials or parts into finished goods through the utilization of tools, human labor, machinery, and chemical processing. Manufacturing could be a value-adding process allowing businesses to sell finished products at a better cost over the worth of the raw materials used. The development of industrialization in Ethiopia is largely experienced during the Imperial period, the Derg military system (1975–1991) and after 1991 period. In 1951, the infant manufacturing sector accounted for less than 1% of Ethiopia's GDP (Arkebe, 2018). During the imperial regime the government initiated a ten-year program of industrial development from (1945-55) which was followed by three five-year development plans (1958-1962, 1963-67 and 1969-74) with the strategy of achieving industrial development through import substitution industrialization (Mulu, 2016). Throughout the imperial regime foreign investors more beneficial than local investors but,

after the Investment Declaration of 1963 and 1966, the plan emphasis on the role of local investors and provided a lot of incentives for local investments (Getnet et al., 2006).

After the fall down of the imperial regime, the Derg nationalized most of the medium and large manufacturing enterprises. The state had a monopoly over major economic activities and adopted the key policy objectives of developing the public sector. ‘’Private sector was allowed only to participate in small-scale industries and handicraft activities’’ (Getnet et al., 2006). There were not any economic plans for the first four years (1975-1978), with all sectors of the economy becoming down as the period was characterized by intense political conflict, fierce power struggles within the Derg itself and the Ethio-Somali war. In order to rebuilding the country's war-ravaged economy a ten-year perspective plan including a macroeconomic framework, a Public Investment Programme containing an indicative portfolio of projects and production targets for the period 1984/85–1993/94 was formulated which was modified in 1986 in the Ten-year Development Plan. However, the development campaign was undertaken it is difficult to meet the immediate challenges of food shortages, low capacity utilization in industry. Priorities got to import substitution and labour intensive industries in an attempt to deal with the country’s dependence on imported goods and inputs and to get employment. The development strategy is the same in both imperial and socialist regime, which is import substitution industrialization; the major difference was during the socialist regime, the strategy was state-led.

The government of EPRDF adopted the Agricultural Development-Led Industrialization (ADLI) strategy in 1994 after first came to power in 1991. The Industry Development Strategy of the country has put in place the principles that primarily target is promotion of agricultural-led industrialization, export-led development, and expansion of labour intensive industries (IDSE, 2002). EPRDF government has executed several consecutive development strategies for instance, Sustainable Development and Reduction of Poverty Program (SDPRP) 2002/03-2004/05, the Policy of Action for Sustainable Development and Abolition of Poverty (PASDEP) 2005/06- 2009/10, and the first Growth and Transformation Plan (GTP I) 2010/11-2014/15 and the second Growth and Transformation Plan (GTP II) 2015/16 – 2019/20 (Melkamu, 2019). The first development plan gave great emphasis to small holder agriculture, while in the second and third ones the policy scope was broadened to encompass urban and the industrial sector development. After the reform of 2018, some economic and political reform was undertaken in Ethiopia. After the new administration took over, more

sectors are open to local and foreign investors including giants such as telecom, port administration and transport to encouraging private sectors and to boost economy. For the period from 2000 to 2018, many sectors were restricted to a limited proportion of domestic investment as the government maintained significant presence in the economy through the webs of state-owned enterprises in banking, insurance, telecoms, transport and electricity (Abbi et al., 2020).

One of the economic reforms implemented since 2019 which is '' Home Grown Reform Agenda'' which is focusing on the key sectors where Ethiopia has great potential. One of the sectors is manufacturing sector which remains underdeveloped despite recent efforts to stimulate the sector due to inefficient incentive structure, limited backward and forward linkages, and insufficient incentives for production of import competing activities. In order to expanding manufacturing sector this reform agenda implemented different measurements such as, revisit and overhaul the incentive structure of industrial policy, prioritize the development of manufacturing sectors with strong local content such as agro-processing and leather products, strengthen the backward linkage of emerging manufacturing value chains through encouraging domestic production of primary and intermediate industrial inputs and promote import competing industries, leveraging on large domestic market size (HGRA, 2019).

In Ethiopia manufacturing sector does not contribute to growth as much as expected because the country faced many problems through decades. These are high logistics and transportation cost, low labor productivities, high cost of imported raw materials for the manufacturing, limited compliance to the international requirements and market, lack of infrastructure, weak supply chain integration, low level of technology and weak market institutions and information system (Tekeba, 2018).

This study was tried to see the effects of exchange rate volatility on employment in case of manufacturing sector in Ethiopia. Increasing uncertainty and exchange rate volatility is expected to reduce investment and growth through its effects on macroeconomic uncertainty, profit expectations especially in tradable goods sectors in both developed and developing countries, (Aizenman et al., 1999). Exchange rate movements are expected to have impact on employment and the profitability of export-oriented sectors. Since exchange rate volatility changes the production costs of firms and accordingly, causes uncertainty of future earnings. ''Hiring workings represents and investment within the sense that there are high costs to

reversing this decision'' (Belke et al., 2003). This is the reason why exchange rate volatility is potentially expected to affect employment following the concept of "the option value of waiting", which is linked to interest rate, fixed costs and especially uncertainty governing the growth of income at home and abroad (Michael, 1995).

1.2 Statement of the Problem

This study was attempted to see the effects of exchange rate volatility on employment growth in case of manufacturing sector in Ethiopia. Manufacturing sector is vital to both growth and employment creation in most economies. For instance, the past growth miracles of Japan and the East Asian Tigers (Singapore, Hong Kong, South Korea and Taiwan) was an evidence for how their export-oriented manufacturing sectors were influential in facilitating economic development and growth. In addition, (Tkalec et al., 2009) argue that the significance of the manufacturing sector stems from the fact that it is the carrier of innovation, research and development activities that eventually spill over to other sectors and result in increased economy. Manufacturing is the engine of growth and generate significant job creation directly as well as indirectly in a range of primary and service sector activities.

Overall, in Ethiopia the problem of employment is not only about the quantity but also about quality of the jobs. The job types that have been created lack decent quality. The challenge that the country faced isn't only to maintain, but to translate the rapid economic growth into sustained and inclusive development, based on economic diversification that creates decent jobs and reduction of inequality and poverty rates (Tadele et al., 2015). The shift away from agricultural employment is a basic result of increased productivity in other sectors, especially in manufacturing sector. Hence, the primary focus should be to initiate investment in the manufacturing sector that can generate employment opportunities for the rapidly growing skilled work force in the country.

Manufacturing sectors have got a special attention through the industrial parks development in different parts of the country to create a favourable environment for the private sector. The involvement of potential investors in the manufacturing sector increases from time to time due to the several incentives set by the government. Exceptional, these incentives encourage productivity and competitiveness in the textile industry because of majority of private investors in Ethiopia invests on textile. The incentives and government supports to those private investors who have been investing on the manufacturing sector could also be

considered as another opportunity in improving the sector. The manufacturing sector can boost economic growth and development because of its vast potential for employment. In Ethiopia there are some opportunities for the manufacturing sector. For instant; cheap electricity charge in comparison to other African countries, cheap labor force, access to wide market which include large domestic market, COMESA, AfCFTA and China market, export incentives, Integrated Agro-Industrial Parks which facilitate one stop shopping for all the services (Tekeba, 2018). Regardless of all these aforementioned opportunities, there are also some challenges that hindering productivity of the manufacturing sector in particular and the whole development structures of the country in general. These are government bureaucracy, shortage of foreign currency, lack of access to credit, poor supply of infrastructure, high inflation. Having recognized the benefit of manufacturing to the economy and its contribution to job creation, the government has been exercising maximum efforts to develop it.

This study was being under taken for the reasons that, first, competitive and stable exchange rate is crucial for economic development. Secondly, manufacturing sector would be affected more by exchange rate volatility. Hence, examining the effects of exchange rate volatility on employment is very timely and important. Based on this understanding, even if there were studies in some countries, but in Ethiopia there is no empirical study undertaken that examines the effects of exchange rate volatility on manufacturing employment. Therefore, this study was look at the effects of exchange rate volatility on manufacturing employment by comprehensively including macroeconomic variables.

1.3 Research Questions

1) What factors affects employment in manufacturing sector in Ethiopia?
2) What does the trend of manufacturing employment in Ethiopia looks like?
3) What measurements need to be taken to increase employment in manufacturing sector in Ethiopia?

1.4 Objective of the Study

1.4.1 General Objective

To investigate the effects of exchange rate volatility on employment in manufacturing sector in Ethiopia

1.4.2 Specific Objective

1) To analyze the trend of manufacturing employment in Ethiopia
2) To see the employment shares within the sub-sectors of the manufacturing sector in Ethiopia
3) To examine the determinant of employment in Ethiopia

1.5 Significance of the Study

Manufacturing sector is one of the sub-sectors of industry sector that contribute to the growth of domestic product (GDP). In Ethiopia, now a day manufacturing sectors are more preferable to employing large number of labor force. Therefore identifying the factors that affects the manufacturing employment is essential for sustainable economic growth. One of the major factors that affect manufacturing employment is exchange rate volatility. Due to this, by analysing the effects of exchange rate volatility and other factors on employment in case of manufacturing sectors, the study will contribute to providing an econometric basis, to know how the determinants affect the manufacturing employment. In addition, realistic policy conclusions are taken on the basis of the results of the report, which would be useful for policy makers, planners and researchers.

1.6 Organization of the Paper

This paper was organized as follows. Chapter one includes background of the study, statement of the problem, objective of the study, research questions, hypothesis of the study, significance of the study. Chapter two includes theoretical and empirical literature review, evaluation of the literature. Chapter three covers methodology and data sources of the study, study approach and model specification. Chapter four covers the result and analysis and the last chapter five includes the conclusion and recommendations based on the results.

CHAPTER TWO

2. Literatures Review

2.1 Theoretical Review

The association between exchange rate volatility and employment is stimulated from the concept of uncertainty in exchange rate and investment (Mpofu et al., 2013).When investment is characterized by irreversibility, exchange rate uncertainty has a negative impact on investment. This is because uncertainty increases the value of the option to wait until the next period before investing and affect employment decision. Exchange rate volatility can affect investment and employment decisions of firms through several ways. First, increasing exchange rate volatility can decrease the total supply of credits offered from the bank, (Bernanke et al., 1990) cited in (Demir, 2010). Then when credit supply to the manufacturing sector declines the capacity of production and expansion of the sector also declines. Indirectly, the capacity of manufacturing sector to hire employment deteriorates. In addition, an economic recession has a negative effect on manufacturing growth which raises external finance dependence and financial frictions (Braun et al., 2005). Second, increasing exchange rate volatility causes higher interest rate through increasing risk premium and restrictive monetary policy, both to continue attracting capital inflows and to combat inflation (UNCTAD, 2006). Consequently, increasing interest rate negatively affects employment.

Exchange rate volatility can directly affect firms' employment choices through its effects on sales, profits and investment risk and planning (Aizenman et al., 1999) and (Demir, 2009b, 2009c) cited in (Demir, 2010). It can also: (a) raise inflation uncertainty that is shown to decrease employment and growth (b) encourage short term financial investments at the expense of future fixed investments by real sector firms; (c) damage firms' balance sheets and reduce their net worth (especially when firms suffer from currency and maturity mismatch problems) that limit the quantity of credit they will get, (d) reduce economic growth with negative effects on employment; (e) discourage international trade (assuming risk-averse investors) by raising the risk in global transactions.

The negative effect is expected to be more pronounced when the exports are charged in the importer's currency as is the case for most developing countries, (Qian et al., 1994). Consequently, exchange rate volatility affects both export oriented and imported input dependent firms. In other hands, exchange rate volatility affects employment through higher

wages. Thus, uncertainty in labor demand may cause firms to increase a risk premium to their wage demands and cause higher unemployment.

2.2 Production and Value Addition of the Manufacturing Sector in Ethiopia

Manufacturing sector has a significant role within industrialization process (Manoj, 2018). Manufacturing sector is classified into three based on the number of people employed and use or non-use of power-driven machinery namely, large and medium scale, small-scale and cottage/handcraft manufacturing (CSA). Large and medium-scale industry employ ten persons and above and use power-driven machinery. Small-scale manufacturing are those that use power-driven machinery and employ less than ten peoples. Cottage/handicrafts manufacturing sector requiring small amount of capital, employ below ten individuals and are known for very quality products that are hand-made.

Manufacturing industry development is important to create national technological capacity, industrial capability and make job opportunity and improve income. In addition to this, helps to improve the total factor productivity and competitiveness of the overall economy. Industries which employ a high share of unskilled workers and use domestic inputs and mostly, agricultural products as raw materials can have positive effects on incomes of the local residents (Balcha, 2014) cited in (ECA, 2011). Industrialization has some advantages (1), diversification from the primary sector towards manufacturing to reduce risks and vulnerability to commodity terms of trade and the associated loss in real income. (2), forward and backward linkages with agriculture and mining. (3), contributes significantly to employment creation. (4), technology transfer and creation (Kapunda, 2005).

2.3 Review of Empirical Studies

Most empirical studies emphasis on the effect of macroeconomic volatility on employment in industrialized countries. In OECD and European Union countries employment is significantly associated to exchange rate volatility (Belke et al., 2002). Some of related studies under taken in Ethiopia are, (Manoj, 2018), studies the determinants of manufacturing sector growth in Ethiopia. (Getnet et al., 2006), examine the competitiveness and the way ahead of Ethiopian manufacturing sector. (Arkebe, 2018), reviews late industrialization and industrial policy in Ethiopia. (Mulu, 2016), studies the industrial development and policy in Ethiopia. Therefore, most of the study in Ethiopia was not concentrated on the effects of exchange rate

volatility on employment in case of manufacturing sector. However, some studies are under taken in developed and developing countries around the world. Some of empirical studies under taken in different countries are mentioned below.

(Trust et al., 2013) examines the effect of exchange rate volatility on employment growth in South Africa, employing the Autoregressive Distributed Lag (ARDL) co-integration method over the period 1995Q3 to 2015Q2. They found that real exchange rate volatility has a negative significant effect on manufacturing employment growth. Additionally, results indicate that long-term interest rate, wages and manufacturing exports have a negative effect on manufacturing employment while manufacturing output has a positive impact.

(Galindo et al., 2007) studied industrial employment, dollarization and real exchange rates in Latin America. They used panel dataset on industrial employment and trade for 9 Latin American countries for which liability dollarization data at the industrial level is available. Real exchange rate depreciation has a negative effect on employment growth when industries are in high liability dollarization.

(Hau, 2007) examines the study entitled "the real exchange rate and manufacturing employment in China" by using panel data in 29 counties of China for the time period of 1993 to 2002. He found that real appreciation has strong direct pressure on efficiency improvement in the use of labor. This negative effect of real appreciation on manufacturing employment is reinforced through its positive effect on capital or labor intensity and its negative effect on export volume.

(Salatin et al., 2015) examined the impact of the real effective exchange rate on employment in Iran's economy by employing Ordinary Least Squares (OLS) during (1981-2011). The results indicated that the real effective exchange rate has a negative significant effect on the employment rate while real effective exchange rate fluctuation has positive significant effects on Iran's economy.

(Faria et al., 2005) studies the effect of the real exchange rate on employment performance in an open economy: the case of England and U.S. They derived long run employment as a function of the real wage, real interest rate and real exchange rate from a standard open economy optimizing representative agent model. They found that real exchange rate, real interest rate, and real wage has significant effects only for the US.

(Mensah et al., 2013) employed Ordinary Least Squares (OLS) regression technique to examine the effect of exchange rate volatility on employment growth in Ghana for the time periods of 1990 to 2010. The study revealed that the depreciation of the Ghanaian currency against US Dollar significantly slows the rate of employment at the manufacturing sector. Also, interest rate has a negative relationship with employment growth in manufacturing sector. Gross Domestic Product (GDP) shows a positive relationship with employment growth

(Ay, A., & Ayhan, F. , 2016) analyze the effects of volatility on employment in Turkey covering the period from January 2003 to February 2014 period employing ARDL model. Findings indicate that exchange rate volatility negatively affects the employment however, it is statistically insignificant.

(Dhasmana, 2015) studies the effect of real exchange rate volatility on manufacturing employment in India employing difference-in-difference model. He found that trade exposure as measured by the difference between their export and import shares significantly affect its response to changes in exchange rate volatility. Manufacturing firms with a positive trade exposure are found to experience a more increase or less decrease in employment than similar "non-exposed" firms in reaction to a rise in real exchange rate volatility. The influence of exchange rate volatility on employment is found to be non-linear in trade exposure.

(Yanhui et al., 2006) analyses ''The Effect of Changes in Real Exchange Rates on Employment'': Evidence from Manufacturing Industries in China, using manufacturing data during the 1980–2003 periods. They found that depreciation of real exchange rate encourages employment growth in manufacturing industries, while change in real exchange rate is not a significant factor in promoting wage growth. They also found that an increase in export share offsets partially the effects of real exchange rate on employment and real wages.

(Zmami et al., 2015) estimated exchange rate movements and manufacturing employment of 548 firms operating in Tunisia over the period of 1997–2002 using the system GMM technique. They found that employment positively responds to the depreciation of effective exchange rates and bilateral exchange rates vis-à-vis the Euro and the US dollar. By using different measures of volatility, the result confirms that the exchange rate volatility significantly lowers the employment level in all categories of firms.

(Demir, 2010) studied exchange rate volatility and employment growth in developing countries during the period of 1983 - 2005: Evidence from Turkey. Employing a unique panel of 691 private firms that accounted for 26% of total value-added in manufacturing in Turkey. The result suggests that exchange rate volatility has a statistically significant employment growth reducing effect on manufacturing firms.

2.4 Evaluation of the Literature

This section discusses evaluation of studies conducted on effects of exchange rate volatility on employment of manufacturing sectors. Theoretically, the effects of exchange rate volatility on manufacturing employment are uncertain. First, strong domestic currency (appreciation of birr), makes foreign currencies cheaper, hence lowering the price of import. This encourages imports and discourages exports. This may influence directly the manufacturing firms that export most of their goods and accordingly affect employment (Mensah et al., 2013). On the other hand, weak domestic currency (depreciation of birr) has the opposite effect. Depreciation encourages export and discourages import. This phenomenon has positive effect on employment growth of the manufacturing sector. Due to depreciation most manufacturing sector could increase export commodities and expand their investment which demands high employment.

The theory of Marshall-Lerner Condition named after (Alfred Marshall, 1923) and (Abba P. Lerner, 1944), states that devaluation of a country's currency would positively affect trade balance only if the absolute value sum of the price elasticity of its exports and imports is greater than one. However, devaluing its currency may not always be the best way for a country to improve balance of trade. For example, if total export revenue declines due to inelastic demand for a country's exports and total import expenditure increase due to inelastic demand for its imports, this will lead to an extra worsening of the country's trade deficit. According to this theory devaluation worsens trade balance in Ethiopia since; the total export revenue is less than total import expenses in Ethiopia. The study of (Debela, 2019) also confirms that devaluation worsens the trade balance of Ethiopia even in the long run.

Most studies haven't covered a period long enough to capture the effects of exchange rate volatility. Additionally, such studies apply different methodologies and explanatory variables with different econometric methods thus leading to variations in study findings, conclusions

and policy implications. For instant, (Galindo et al., 2007), apply panel dataset on industrial employment and trade for 9 Latin American countries for which liability dollarization data at the industrial level is available and finding that real exchange rate depreciations can impact employment growth positively. (Mensah et al., 2013) examine the effect of exchange rate volatility on employment growth in Ghana for the time periods of 1990 to 2010. The result shown that depreciation of the Ghanaian currency against US Dollar significantly slows the rate of employment of manufacturing sector. Interest rate and Gross Domestic Product, respectively have negative and positive relationship with employment growth in manufacturing sector. Also, (Demir, 2010) studied exchange rate volatility and employment growth in developing countries during the period of 1983 - 2005: Evidence from Turkey. The result suggests that exchange rate volatility has a statistically significant employment growth reducing effect on manufacturing firms.

In general the effect of exchange rate volatility on employment is different from country to country based on data and methodology they used. Even though many studies have been undertaken in different countries on this issue but in Ethiopia no studies carried out to examine the issue. Hence, this study was tried to address the issues by employing the Autoregressive Distributed Lag (ARDL) model over the period of 1971 to 2020. The variables included in the study are manufacturing employment as dependent variables; exchange rate volatility, inflation, real private sector credit, lending interest rate, real gross domestic product, export of goods and services, import of goods and services, numbers of firms and dummy variable are included as explanatory variables.

CHAPTER THREE

3. Methodology and Data Sources

3.1 Data Source and Variable Definitions

This study was used secondary annual times series data which spans from 1970/71 to 2019/20. The variables used in this study are manufacturing employment as dependent variable and exchange rate volatility, inflation, real private sector credit, lending interest rate, real gross domestic product, total exports, total imports, number of firms and dummy as explanatory variables. Real gross domestic product, real private sector credit, lending interest rate, exchange rate volatility, total exports and total imports was collected from National Bank of Ethiopia (NBE) and manufacturing employment, inflation and number of firms was collected from Central Statistical Agency (CSA).

3.2 Variable Definitions

Employment: Employment is defined as persons of working age who were involved in any activity to produce goods or provide services for wage or profit. According to central statistical agency (CSA) of Ethiopia, employees include all persons on payroll whether seasonal or temporary. For this study total number of employment in manufacturing sector is used as dependent variable.

Volatility: In finance, volatility is the degree of variation of a trading price series over time. Exchange rate volatility is associated with predictable and unpredictable movements in the relative prices in the economy. Volatility can have negative effects on firm growth even when it is predictable, especially given the lack of any self-insurance mechanisms in the financial markets of developing countries. Standard deviation and conditional variance are the two ways of measuring existent of exchange rate volatility. Exchange rate volatility was derived from GARCH (1, 1) model using the returns on the real effective exchange rate after confirming the existence of exchange rate volatility using ARCH and GARCH test. Volatility has ambiguous effects on manufacturing employment.

Inflation Rate: Inflation is defined as a steady and significant increase in the general price of goods and services in economy. There is positive relationship between employment and inflation in terms of real wage. Real wage is the amount of pay a person can expect to receive after nominal wage adjusted for inflation. Inflation causes the reduction of real wage through

two ways. (1), it reduces the capital stock and decreases the productivity of labor. (2), it makes relative prices to shift against the labor-intensive goods (Benedikt, 2004). As real wages decline, firms will hire more employees. Therefore inflation has positive effects on manufacturing employment. General consumer price index was proxy for inflation.

Private Sector Credit: Domestic credit to private sector by banks refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans. Manufacturing sector need more credit to expand their investment and to increase production level. So private sector credit has positive effects on manufacturing employment.

Gross Domestic Product: Gross domestic product is the central measure of national accounts, which summarizes the economic position of a country. GDP and employment has a direct relationship means if gross domestic product of the country increases, it indicates that more investment undertaken in the country so as investment is expanded in the country more employment are hired. Therefore, growth domestic product has a positive effect on manufacturing employment.

Lending Interest Rate: Is the amount charged by creditors for a certain period as a percentage of the total borrowed. Lending interest rate has direct relationship with manufacturing employment in many ways. For example manufacturing sector demand credit in order to expand their investments, however the creditors or financial sector offering loan with interest rate. Due to this if the interest rate is very high manufacturing sectors cannot access the credit and decrease their investment, they also decrease employment. Lending interest rate has a negative effect on manufacturing employment.

Number of Firms: Number of firms means the total number of firms who operate in manufacturing sectors in the country. As the number of manufacturing firms increases in one country the total number of employment in these sectors also increases. Therefore, number of firms has a positive effect on manufacturing employment

Export and Import of Goods and Services: Exports and imports play an important role in determining the overall health of an economy. Exports are the goods and services a country produces domestically and sells to a foreign country. Firms may choose to export their products and services to a foreign country because it allows them to: participate in global trade, access new markets and increase incomes. Export has a positive relationship with

manufacturing sector. Imports are the goods and services purchased from foreign country. Most countries export more goods and services than they import to increase their domestic revenue. Import affects manufacturing sector negatively.

Dummy: Dummy variables included in the model due to the existence of structural break in the exchange rate volatility in 1994 because of devaluation. Structural break might happen due to government policy change. In Ethiopia high percentage reform (devaluation) of exchange rate taken during the regime changes from Derg Regime to EPRDF Regime which was started by devaluing the currency from 2.07ETB/USD to 5ETB/USD in 1992.To capture the effects of these structural break dummy variables included. Therefore, a dummy variable takes value 1 in the year of devaluation and takes value 0 otherwise.

3.3 Study Approach

3.3.1 Descriptive Analysis

Descriptive analysis is the type of analysis of data that describe and summarize data in a useful way. And also it's one of essential steps to conducting statistical data analysis. It helps to know the distribution of our data, detect errors and outliers, enables to identify similarities among variables, thus making us for conducting further statistical analyses. Descriptive analysis divided into four types which are measures of frequency, central tendency, dispersion or variation, and position. Therefore, this study was applying descriptive method of data analysis in addition to econometric model using time series data. Descriptive method is used to see the trend of manufacturing employment and exchange rate volatility

3.3.2 Stationarity Test

Testing the stationarity properties of the variables is important. This is due to the tabulated F-statistics (Pesaran et al., 2001) have lower and upper bound where the lower bound assumes variables are I(0) and the upper bound undertakes variables are I(1) stationary. Hence, identifying whether a variable is stationary at I(0) or I(1) helps to know where the F-values lays within the lower and the upper bound. There are several methods of testing for the presence of unit root. The most common test is: The Dickey-Fuller (DF) test, Phillips Perron (PP) test and Augmented Dickey-Fuller (ADF) unit root test. This study was employing ADF test. The test statistics is given as:

$$\Delta y_t = \alpha + \beta\, t + \gamma y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots EQ1$$

Where, α is a constant, β is the coefficient on a time trend, p is lag order of the autoregressive process, yt is time series variable, Δ is a difference operator, t is time and ε_t is white noise error term. The hypothesis is stated as follows

H_0: If $\gamma=0$, the variable is non–stationary

H_1: If $\gamma<0$, the variable is stationary

When the calculated t-value is less (more negative) than the critical value the null hypothesis of $\gamma=0$ is rejected and there is no unit root in the series.

3.3.3 Lag Length Determination

To select the appropriate lag length of a time series data the most common lag selection criteria are: Sequential modified LR test statistic (LK), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan–Quinan criterion (HQC) was used.

3.3.4 ARDL Bound Test for Co-Integration

Before finding the long- and short-run relations that exist between variables, it is important to use the ARDL bound test (Pesaran et al., 2001) for the confirmation of co-integration. Two sets of critical values for a given significance level can be determined. The first level is calculated on the assumption that all variables included in the model are integrated of I (0) and the second one is calculated on the assumption that the variables are integrated of I (1). These two sets provide critical value bonds for co-integration for both I (1) and I (0) data sets. To apply ARDL model three steps are required:

1). Applying bounds testing procedure for detecting presence of co-integration between variables
2). Estimating long run relationship coefficients with respect to co-integration relations estimated in first step and
3). Estimating short run dynamic coefficients.

Testing the null hypothesis of no co-integration is done through an F-statistics using the critical values calculated by (Pesaran et al., 2001) as follows:

1). If the computed F-statistics is less than lower bound critical values, the null hypothesis of no co-integration cannot be rejected and that there is no long run relationship between variables.

2). If the computed F-statistics is greater than the upper bound value, it could be claimed that variables used in the model are co-integrated.

3). If the computed F-statistic falls between the lower and upper bound values, then the test result is inconclusive.

3.3.5 Model Stability Check and Residual Diagnostic Test

Several diagnostic tests are used to check the standard properties of the model. This study was carrying out model stability condition check and residual diagnostic tests, which includes serial correlation, normality and heteroscedasticity test.

Serial Correlation Test: In time series analysis the selected model should satisfy the assumption of no serial correlation. To test for the existence of serial correlation in the model a Breusch-Godfrey LM test was used. The null hypothesis stated that there is no serial correlation against the alternative hypothesis of there is serial correlation.

Heteroskedasticity Test: Heteroskedasticity occurs when standard errors of variables are not constant. Breusch-Pagan-Godfrey test was applied for this test.

Normality Test: The residuals of the selected model should be normally distributed. To test for normality of the residuals Jarque-bera (J-B) test was used and the null hypothesis state that the residuals are normally distributed against the alternative of not normally distributed.

Model Stability Check: By confirming the long-run relationship exists between variables, the study applied the cumulative sum (CUSUM) and cumulative sum of square (CUSUMSQ) tests to check the stability of model. If the statistics in the plot of residuals fall in critical bounds at a 5% significant value, the results recommend that the coefficients of the model are stable.

3.4 Model Specification

3.4.1 Autoregressive Distributed Lag (ARDL) Model

In regression analysis if model includes both current and lagged values of independent variables it is called distributed lags model and if model also includes lagged values of dependent variables it is called autoregressive distributed lag model (Apriyanto, 2014). Autoregressive distributed lag model allows us to express co-integrated behavior of variables which have different order of integration. ARDL is appropriate for the independent variable in the model which is I (0), I (1) or a mix of I(0) and I(1), but it fails in the presence of I (2) in any variables (Frimpong et al., 2006). ARDL model is the more appropriate method to determine the co-integration relation in small samples (Pesaran et al., 2001)

In ARDL approach it is possible that different variables have different number of optimal lags. The other advantage is both long run and short run parameters are determined simultaneously. This approach involves two stages, at the first stage it examines if there is long run relationship between the variables under investigation. Second stage estimates the long run and short run coefficients. To find the relationship between endogenous and exogenous variables, the following log linear model was stated as follows:

$$LnME_t = \beta_0 + \beta_1\, LnVOL + \beta_2\, LnCPI + \beta_3\, LnRGDP + \beta_4\, LnRPSC + \beta_5\, LnLIR +$$
$$\beta_6\, LnNoF + \beta_7\, LnX + \beta_8\, LnM + \beta_9\, D + \varepsilon_t \ldots\ldots\ldots\ldots EQ2$$

The log linear form of Equation (*EQ2*) can be rewrite in ARDL model form as follows:

$$\Delta \ln ME_t = \beta_0 + \sum_{j=1}^{k} \beta_j{}^{1} \Delta \ln ME_{t-j} + \sum_{j=1}^{m} \beta_j{}^{2} \Delta \ln VOL_{t-j} + \sum_{j=1}^{s} \beta_j{}^{3} \Delta \ln CPI_{t-j} + \sum_{j=1}^{l} \beta_j{}^{4} \Delta \ln RGDP_{t-j}$$
$$+ \sum_{j=1}^{p} \beta_j{}^{5} \Delta \ln RPSC_{t-j} + \sum_{j=1}^{q} \beta_j{}^{6} \Delta \ln LIR_{t-j} + \sum_{j=1}^{z} \beta_j{}^{7} \Delta \ln NoF_{t-j} + \sum_{j=1}^{n} \beta_j{}^{8} \Delta \ln X_{t-j} + \sum_{j=1}^{o} \beta_j{}^{9} \Delta \ln M_{t-j}$$
$$+ \sum_{j=1}^{w} \beta_j{}^{10} \Delta D_{t-j} + \theta_1 \ln ME_{t-1} + \theta_2 \ln VOL_{t-1} + \theta_3 \ln CPI_{t-1} + \theta_4 \ln RGDP_{t-1} + \theta_5 \ln RPSC_{t-1}$$
$$+ \theta_6 \ln LIR_{t-1} + \theta_7 \ln NoF_{t-1} + \theta_8 \ln X_{t-1} + \theta_9 \ln M_{t-1} + \theta_{10} D_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots EQ3$$

After finding the long-run association existing between variables, the study uses the error correction model (ECM) to find the short-run dynamics. ECM shows the speed of adjustment in the long-run equilibrium after a shock in the short run. The ECM general form of Equation (*EQ3*) is specified in Equation (*EQ4*):

$$\Delta \ln ME_t = \beta_0 + \sum_{j=1}^{k} \beta_j{}^{1} \Delta \ln ME_{t-j} + \sum_{j=1}^{m} \beta_j{}^{2} \Delta \ln VOL_{t-j} + \sum_{j=1}^{s} \beta_j{}^{3} \Delta \ln CPI_{t-j} + \sum_{j=1}^{l} \beta_j{}^{4} \Delta \ln RGDP_{t-j}$$

$$+ \sum_{j=1}^{p} \beta_j{}^{5} \Delta \ln RPSC_{t-j} + \sum_{j=1}^{q} \beta_j{}^{6} \Delta \ln LIR_{t-j} + \sum_{j=1}^{z} \beta_j{}^{7} \Delta \ln NoF_{t-j} + \sum_{j=1}^{n} \beta_j{}^{8} \Delta \ln X_{t-j}$$

$$+ \sum_{j=1}^{o} \beta_j{}^{9} \Delta \ln M_{t-j} + \sum_{j=1}^{w} \beta_j{}^{10} \Delta D_{t-j} + \delta ECM_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots EQ4$$

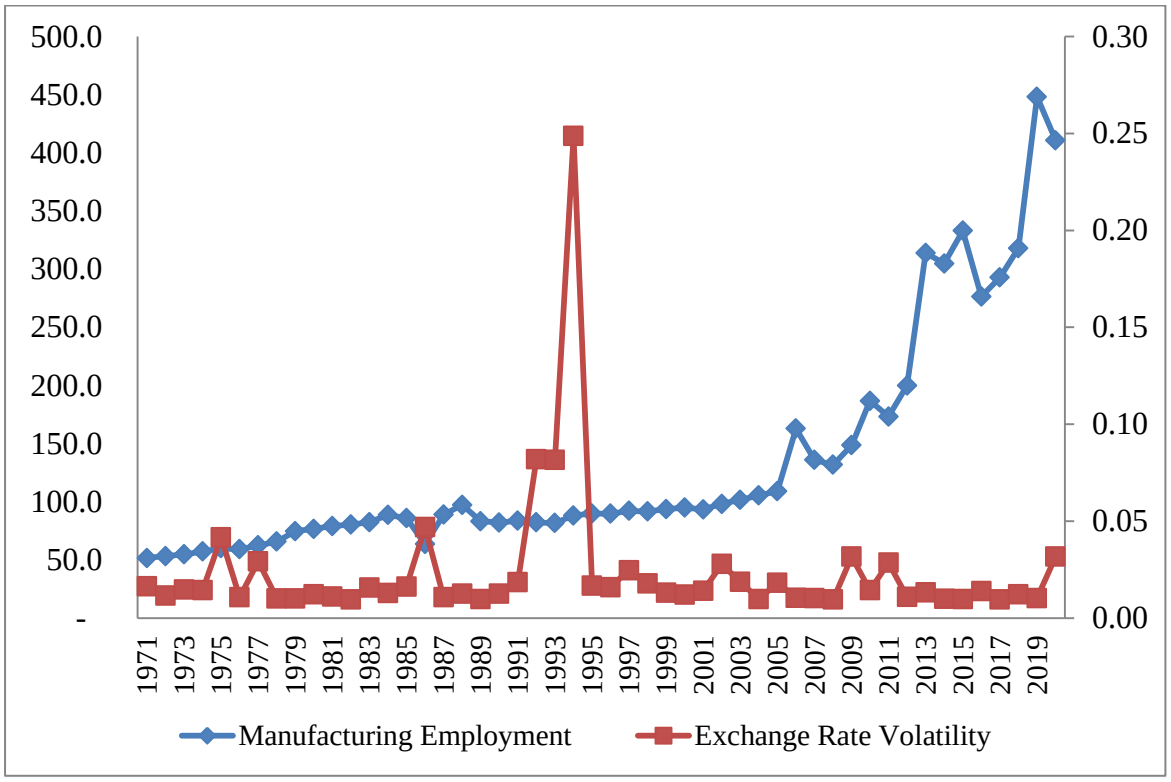
Where; ME manufacturing employment, VOL exchange rate volatility, CPI consumer price index proxy for inflation rate, RGDP real growth domestic product, RPSC real private sector credit, LIR lending interest rate, NoF number of firms, X total exports of goods and services, M total imports of goods and services, D dummy variables used for devaluation policy, Δ is first difference operator, ln stands for natural logarithmic transformation. $\beta_j{}^{i} (i = 1,2,3,\ldots,10)$ are short run coefficients on variable i at lag j, $\theta_i (i = 1,2,3,\ldots,10)$ are long-run coefficients on variable i and k, m, s, l, p, q, z, n, o and w indicate optimum lag length of the variable under study and δ the coefficient of speed of adjustment.

CHAPTER FOUR

4. Empirical Result and Analysis

4.1 Trend Analysis

Trend analysis used to explain the patterns and trends in a data over time. A trend may be a downwards or upwards shifting in a data set over time. One of the advantages of a trend analysis is to predict what might happen to the variables in the future. The Figure 1 below displays that the trend of manufacturing employment (in 1000) on the right hand side of Y-axis and exchange rate volatility on the left hand side of Y-axis from 1971 to 2020 periods.



Source: Own Computation

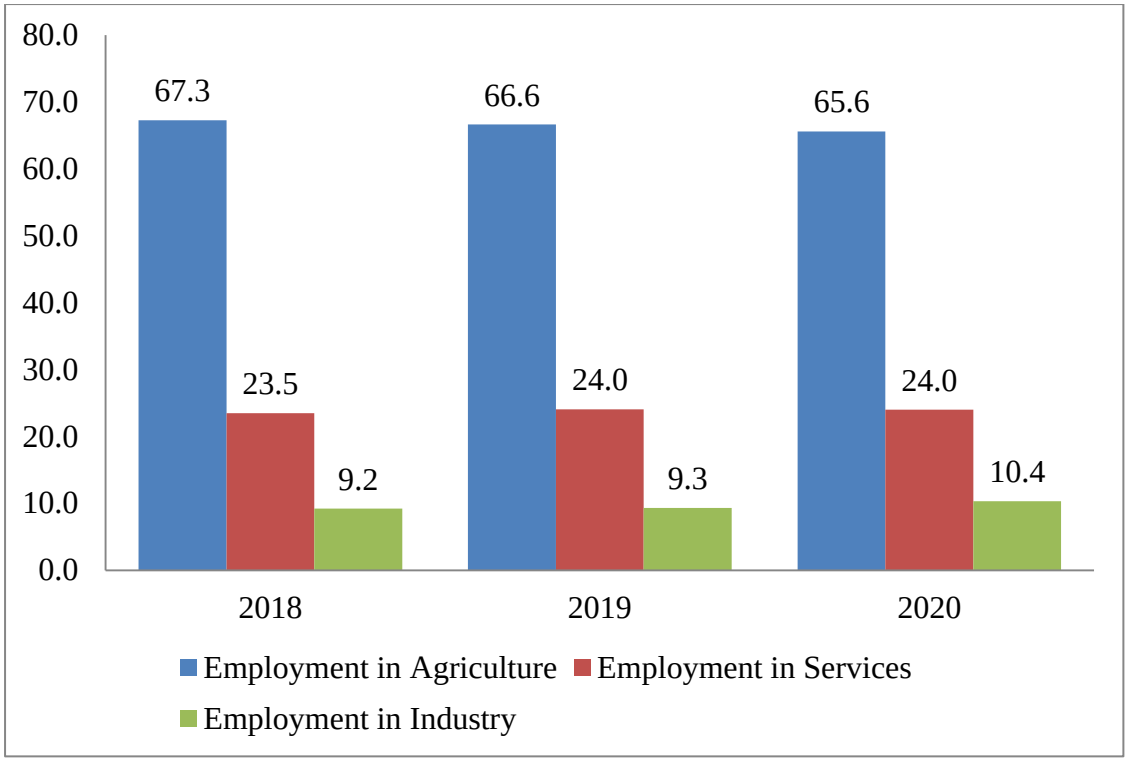
Figure 1: Trend of Manufacturing Employment and Exchange Rate Volatility in Ethiopia

The trend in manufacturing employment shows that the manufacturing employment has strictly increasing trends from 1971 to 2005 but after 2005 it shows up and downtrends until 2020, as shown in Figure 1. In addition, the left-hand side of y-axis graph shows that exchange rate volatility has up and downtrends from 1971 to 1991 and from 1995 to 2020. The trend line in Figure 1 shows that exchange rate volatility was strictly rising from 1992 to 1994 due to exchange rate reform measurement taken during EPRDF Regime which started by devaluing the currency which was fixed for about two decades to 2.07 birr/dollar by 140% to 5birr/dollar in October 1992. Governments sometimes devalue currencies for some

reasons. First devaluation improves current accounts. Second, to fight domestic unemployment. Third, to improve central bank's foreign reserves. Fourth, to stimulate manufacturing sectors and to encourage import substitution (Alemayehu, 2008). Devaluation of a country's currency may effective under the following conditions: (i) if country's export product is elastic demand in other countries. (ii) If elasticity of demand for imports is elastic. (iii) If and only if the Marshall Lerner Condition is fulfilled that means if the sum of the price elasticities of its imports and exports is more than one. When countries devalue their currencies; the local currency price of a product at the export market increases by the full proportion of devaluation, world price remain constant. As we observed from the Figure 1 devaluation causes high exchange rate volatility in Ethiopia during 1994. However, the countries devalue the currency in order to improve trade balance but in Ethiopia context devaluation may not be effective. Because Ethiopian trade balance was initially in deficit and the Marshal-Learner condition is not satisfied. And also, Ethiopia primarily imports factors of productions for production purposes, whenever devaluation implemented in the economy, the cost of imported factors of productions get higher; therefore, in the long run the country's production level will decline. The study of (Ayen, 2014) and (Beakal, 2019) confirmed that the insignificance of devaluation in case of Ethiopia.

4.2 Share of Employment by Major Sectors

The major sectoral contributions to Ethiopia's economy are agricultural sector, services sector and industrial sectors. The Figure 2 below shows that the share of employment by these major sectors. Still in Ethiopia, the agricultural sector has the highest number of employments share than industry and services sectors. However, the share of agricultural employment shows declining trend which implies that the economy is shifting from agricultural based economy to industrial and services based economy. Industrial sector has the smallest share of employment than agricultural and services sectors in Ethiopia. Even if services sector and industrial sectors has the smallest share of employment but, employment in both sectors shows increasing trend.

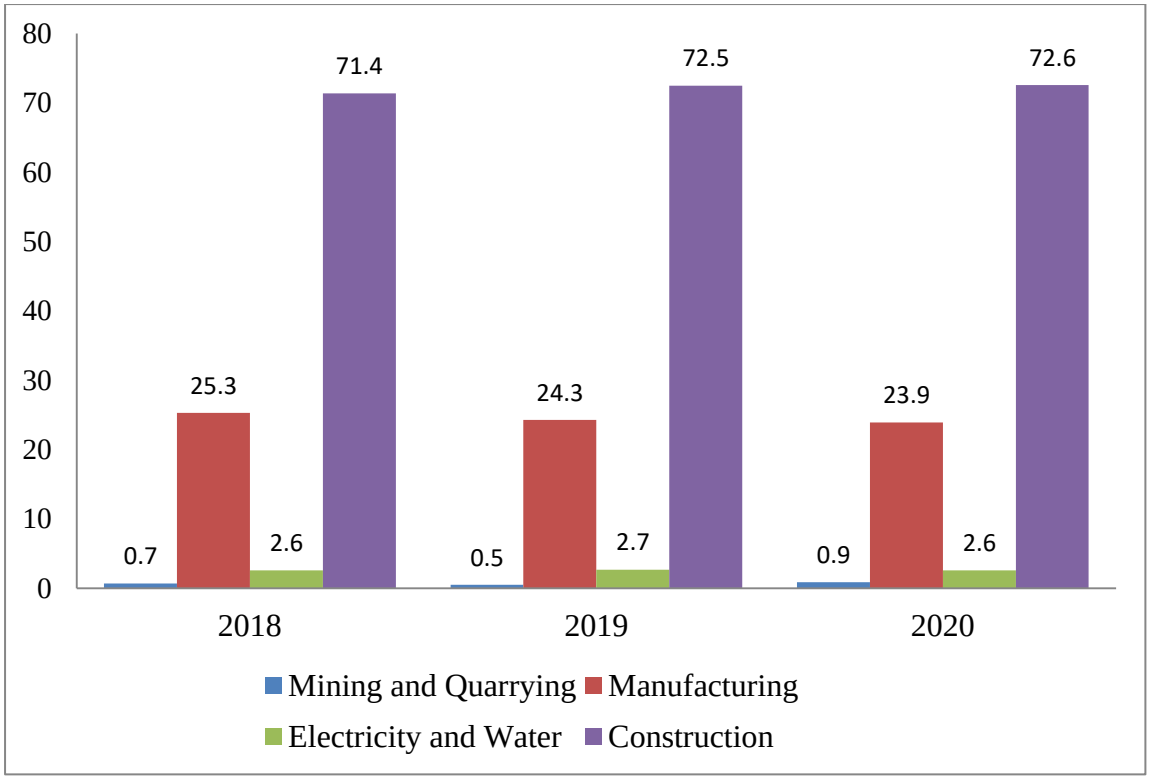


Source: WDI and Own Computation

Figure 2: Employment Share by Major Sector

4.3 Sectoral Contributions to Industry

Industrial sector is one of the sectors that contribute to the economic growth. According to (NBE, 2019/2020) annual reports industrial sector growth about 9.6% and contributed 42.4% to the overall GDP growth, and it constituted a 29.0% share in total GDP in 2020. Figure 3 below displayed that the share of industrial sub-sectors. From the figure 3 below us observed that construction sub-sectors has the highest share of industrial output in all years in Ethiopia. Construction industry accounted about 72.6% share in industrial output in 2020. From year to year the share of construction sub sectors is increasing which plays significant role. The manufacturing sector accounted for 23.9% of the industrial output in 2020. The share of manufacturing sub sectors show decreasing trend from year to year. Electricity & water had a 2.6% share in industrial production in 2020. The share of mining and quarrying sector continued increasing trend in 2020 which is accounts about 0.9% of industrial output. Still, its contribution to industrial output is still insignificant compared to other sub sectors.

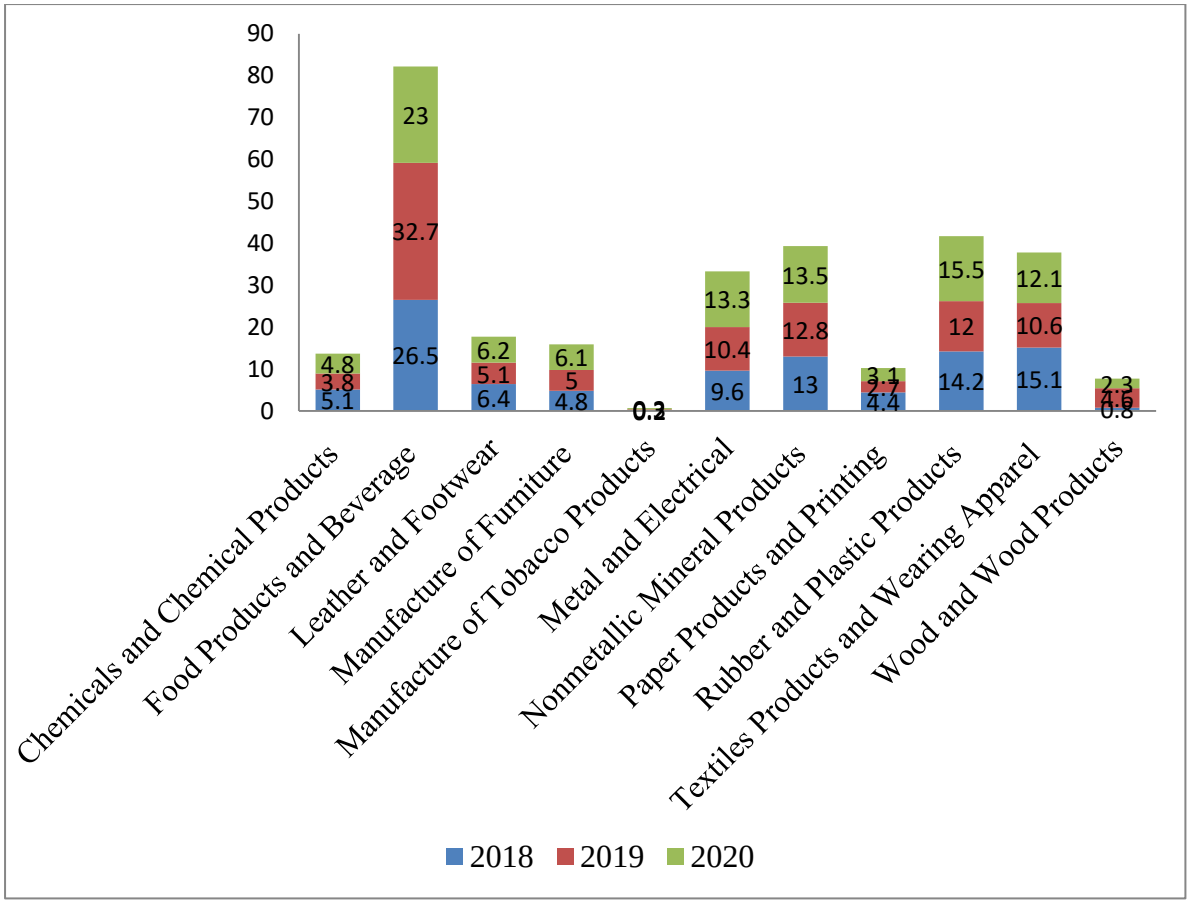


Source: NBE and Own Computation

Figure 3: Percentage Shares of Industrial Sub-Sectors

4.4 Employment in Manufacturing Sub-Sectors

From the Figure 4 we saw that food and beverage has the greater employment share in manufacturing sectors in all years however it declines from 2019 to 2020. The percentage share of food and beverage decreases from 32.7% in 2019 to 23.0% in 2020. The employment share in rubber and plastic products sub sectors increases from 12% in 2019 to 15.5% in 2020. Non-metallic minerals have the third highest share of manufacturing sub sectors in 2020. The percentage share of employment in non-metallic mineral products increases from 12.8% in 2019 to 13.5 in 2020. Manufacture of tobacco products has the smallest employment share in all years comparing with other sector of manufacturing sub-sectors. In general the employment in food and beverage are greater than that of other sub sectors of manufacturing sectors, however, it declined from 2019 to 2020 while the employment share in other sub sector are increasing from 2019 to 2020.



Source: CSA and Own Computation

Figure 4: Percentage Share of Employment in Manufacturing Sub-Sectors

4.5 Testing Existence of Exchange Rate Volatility

The existence of exchange rate volatility was tested using ARCH and GARCH test. Both tests are confirms the existence of exchange rate volatility. Since, the p-value of F-statistic is less than 5% level of significance for heteroskedasticity ARCH test. So, we reject the null hypothesis state that the residual is homoscedasticity. Similarly, for GARCH test the sum of the coefficient of RESID(-1)^2 and GARCH(-1) in variance equation is approach to one. So, this also confirms that the existence of exchange rate volatility. The output is found under appendix.

4.6 Descriptive Statistics

Descriptive analysis is used to quantitatively describes and summarize the basic features of data. The value of Jarque–Bera test for all variables used in the study is greater than 5%, which suggests that all the variables in the study are normally distributed, as shown in Table 1. Manufacturing employment has a mean value of 133.63 and the maximum and minimum value is 448.18 and 51.59 respectively. The reason why the manufacturing employment is

low in 1971 in Ethiopia might have been due to industrialization is largely experienced development after the fall of imperial regime. During the imperial regime foreign investors are more encouraged. Also, in Derg military regime the state had domination over key economic activity and private sector was allowed only to take part in small-scale manufacturing (Getnet et al., 2006). The EPDRF regime has given prioritize to industrialization sector to encourage private sectors and to increase economy growth. Also, after the reform in 2018, the government encouraged the industrial sector. Real growth domestic product has a mean value of 522.29 with a maximum and minimum value of 1,989.52 and 6.91 respectively. Consumer price index, the proxy of inflation, has a mean value of 30.92 and the maximum and minimum value is 175.45 and 2.17 respectively. Lending interest rate has a mean value of 10.59. The maximum and minimum value was 15.50 and 6.80 respectively. Number of firms has a mean value of 1194.40 with maximum and minimum value of 4035.00 and 281.00 respectively. Total import has a mean value of 72.17 with maximum and minimum of 432.19 and 0.41 respectively. Total export has a mean value of 15.68 with maximum and minimum of 94.37 and 0.28 respectively. Real private sector credit has a mean of 10150 and maximum and minimum value is 1039.84 and 0.41 respectively. Exchange rate volatility has a mean value of 0.02 and with the maximum volatility 0.25 happened in 1994 while the minimum volatility is 0.01.

Table 1: Descriptive Statistics of the Variables

	Mean	Median	Max	Min	Std. dev	J-Bera	Obs.
ME	133.63	90.77	448.18	51.59	98.06	32.27	50
RGDP	522.29	295.02	1989.52	6.91	508.85	21.39	50
RPSC	101.50	6.41	1039.84	0.41	228.52	154.77	50
NoF	1194.40	560.00	4035.00	281.00	1143.52	14.34	50
M	72.17	6.98	432.19	0.41	129.14	32.65	50
CPI	30.92	14.77	175.45	2.17	40.69	47.73	50
LIR	10.59	10.63	15.50	6.80	2.44	1.99	50
X	15.68	2.64	94.37	0.28	25.80	23.95	50
VOL	0.02	0.01	0.25	0.01	0.04	2021.84	50

Source: Own Computation by Eviews 10
Note: RGDP, RPSC, M and X are in billion while ME is in thousand.

4.7 Stationarity Test

In order to determine the degree of integration, the test of stationarity of variables is carried out using the standard Augmented Dickey-Fuller (ADF) test statistic.

Table 2: Unit Root Test

Augmented Dickey-Fuller test				
Variables	At level	p-value	At first difference	p-value
LnME	0.767500	0.9925	-6.954789	0.0000*
LnRGDP	-2.694710	0.0822***	-4.063241	0.0026*
LnRPSC	1.714982	0.9995	-4.388921	0.0010*
LnLIR	-1.799035	0.3767	-7.359162	0.0000*
LnVOL	-4.724924	0.0003*		
LnCPI	1.130035	0.9972	-6.344061	0.0000*
LnNoF	1.217952	0.9979	-5.372269	0.0000*
LnX	-0.072017	0.9466	-8.490984	0.0000*
LnM	0.767500	0.9925	-6.954789	0.0000*

Source: Own Computation by Eviews 10
* ** and *** indicates significant at 1%, 5% and 10% level of significance

As the above Table 2 shows us exchange rate volatility is stationary at 1% level of significance at level and also real growth domestic product is weakly stationary at 10% level of significance at level. The other remaining variables manufacturing employment, real private sector credit, lending interest rate, inflation, number of firms, total exports and total imports are stationary at 1% level of significance after first difference. Based on the result of ADF unit root test ARDL model is advisable for this study since the variables are a mixture of I(0) and I(1).

4.8 Lag Selection

By using ARDL automatic lag selection method ARDL (4, 3, 2, 1, 3, 0, 3, 1, 1, 1) an optimal lag length are selected for manufacturing employment, real growth domestic product, real private sector credit, lending interest rate, volatility, number of firms, inflation, total import, total export and dummy variables respectively based on Akaike information criterion (AIC) model selection method.

4.9 ARDL Bound Test for Co-Integration

The study applies the ARDL bound test (Pesaran et al., 2001) to check the existence of long run relationship between variables. The estimated result of bound test for ARDL model in the Table 3 below indicates the value of F-statistics is greater than the critical value of upper bound I[1] at all level of significance. So, we reject the null hypothesis which states no levels relationship exist (no co-integration among variables). Therefore, we can conclude that there is a long run relationship between manufacturing employment, real growth of domestic product, real private sector credit, lending interest rate, volatility, number of firms, inflation, total import, total export and dummy.

Table 3: Bound Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.01*	10%	1.8	2.8
k	9	5%	2.04	2.08
		2.5%	2.24	3.35
		1%	2.5	3.68

Source: Own Computation by Eviews 10
* implies 1% level of significance

4.10 ARDL Long Run Estimate Output

After confirming the existence of long-run relationship among the variables from the ARDL bound test, the study finds the long run coefficients of the variables. The ARDL (4, 3, 2, 1, 3, 0, 3, 1, 1, 1) the maximum lag length are selected for a dependent variable of manufacturing employment and real growth domestic product, real private sector credit, lending interest rate, volatility, number of firms, inflation, total import, total export and dummy respectively.

Table 4: Long-Run Estimation of Parameters

Dependent Variable: Manufacturing Employment(LnME)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LnRGDP	0.993300	0.393853	2.522009	0.0219**
LnRPSC	0.996679	0.305961	3.257531	0.0046*
LnLIR	-0.576426	0.199755	-2.885666	0.0103*
LnVOL	-0.223737	0.101424	-2.205947	0.0414**
LnNoF	0.075436	0.219565	0.343569	0.7354
LnCPI	1.724864	0.415891	4.147398	0.0007*

LnM	-0.072620	0.114710	-0.633073	0.5351
LnX	0.219599	0.110163	1.993410	0.0625***
D	-0.616099	0.218087	-2.825010	0.0117*
C	2.185833	3.569142	0.612425	0.5484

Source: Own Computation by Eviews 10
* **and *** indicates significant at 1%, 5% and 10% level of significance

The above Table 4 had shown the empirical results of the long run relationship between manufacturing employment and explanatory variables. Real growth domestic product has a positive and significant effect on manufacturing employment at 5% level of significance. This implies that an increase in real GDP in Ethiopia can significantly raise manufacturing employment. The estimated results imply that a 1% rise of in real GDP can increase manufacturing employment by 0.993%. (Mensah, 2013) stated that gross domestic product (GDP) shows a positive relationship with employment in Ghana. (Trust et al., 2013) also stated that manufacturing output has a positive impact on manufacturing employment in South Africa. Similarly, real private sector credit has positive effect on manufacturing employment with expected sign and statistically significant at 1% level of significance. The positive effect of private sector credit indicates if credit supply increases the demand of manufacturing sector also increases to expand their investment, so if manufacturing sector is expanded, employment expands as firms will hire in the sectors. The value of real private sector credit implies that a rise of 1% in real private sector credit can increase manufacturing employment by 0.997%.

Lending interest rate has a negative effect on manufacturing employment with expected sign and statistically significant at 1% level of significance. According to Keynes theory, the rate of interest determines the level of employment through its effects on investment in the economy. Lending interest rate has direct relationship with manufacturing employment in many ways. For example manufacturing sector demand credit in order to expand their investments, however the creditors or financial sector offering loan with high interest rate. Due to this if the interest rate is very high manufacturing sectors can't access the credit and as a result their investment will decline, which causes employment to drop. Also, a high rate of interest rate causes the costs of borrowing and production to increase and hence leading to low productivity levels and may be reduced including the employing of new employees. The estimated coefficient on lending interest rate implies that a 1% increase in lending interest

rate decreases manufacturing employment by 0.576%. The result supports the study of (Trust et al., 2018) in South Africa.

Exchange rate volatility has negative effects on manufacturing employment with expected sign and statistically significant at 5% level of significance. Exchange rate volatility is expected to have negative impact on manufacturing employment and the productivity of export-oriented sectors. Since, exchange rate volatility is probably expected to affect employment following the concept of "the option value of waiting", which is related to interest rate, fixed costs, etc. (Michael, 1995). Similarly, Volatility can influence firm's employment decisions through its effects on revenues and investment risk and planning. The negative influence of volatility is more pronounced mostly when exports are charged in the importer's currency. Manufacturing employment decreases by 0.224% with the increase of 1% exchange rate volatility in the long run, this result is similar to the previous study of (Demir, 2010) in Turkey and (Zmami et al., 2015) in Tunisia.

Inflation has positive effects on manufacturing employment and statistically significant at 1% level of significance. Thus, as inflation increases, employment also increases and vice versa. The positive effects imply that as inflation raises the real wage decreases. Real wage is the amount of pay a person can expect to receive after nominal wage adjusted for inflation. The existence of an opposite relationship among real wages and employment indicates that, as real wages drop, more workers can be profitably hired. However, the marginal products of labor decreases as extra workers are employed with a fixed capital stock. Therefore, firms will demand numerous labors only if the real wage declines to compensate for the reduction in the marginal product of the last employee (Robert, 2013). In other ways, the positive sign implies that in Ethiopia there is greater demand for goods and services than supply. This gives the firms a chance to grow the business, employing additional workers and rising volume to match the demand. Similarly, if price of factor of production increase, firms adjust their selling price considering inflation so; companies charge for their products are increasing than the production costs and increase their profit margins. The estimated result implies that for 1% increase in inflation can increase manufacturing employment by 1.723%. The result supports the study of (Salatin et al., 2015) in Iran. However, this positive effect of inflation will be up to some threshold. For instance, in Ethiopia the threshold for inflation is single digit (PDC, 2020).

Export has a positive effects on manufacturing employment and statistically significant at 10% level of significance. Manufacturing sectors may choose to export their products because it allows them to access new markets and increase revenues. Exports are important to economies because they offer firms several additional markets for their goods. Exporting can be profitable for firms, created more jobs and employees earn more. The estimated coefficient on export indicates that a 1% increase in export can increase manufacturing employment by 0.220%.

The dummy variable used for devaluation policy has a negative effects on manufacturing employment and statistically significant at 1% level of significance. Devaluation basically measured by its ability to encourage the development of exports and improvement of current account balance. If imports had been limited before, devaluation may not result in the expected reduction of imports, particularly when import substitution products are insufficient. In Ethiopia still the current account balance is negative due to more import of goods and services and also various domestic export-oriented manufacturing sectors depend on imported raw material as well as capital equipment. Consequently, devaluation causes these raw materials more expensive. Due to, this manufacturing sector will reduce their economic activity, which directly affects employment. The estimated value of devaluation at different years decreases manufacturing employment by 0.616 units. Number of firms has positive effects on manufacturing employment. Accordingly, as number of firm's increases, manufacturing employment also increases even though it is statistically insignificant. Similarly, import is found to be insignificant but negatively affects manufacturing employment.

4.11 ARDL Short Run Estimate Output

After estimating long-run coefficients of the model, then the short-run error correction model (ECM) is estimated. Table 5 below shown that the value of R-squared is 0.865.This suggests that about 86.5% of the short-run total variations in the dependent variables (manufacturing employment) can be explained by explanatory variables. This means that the variables considered in the model explained most of the change in manufacturing employment. The remaining variation in manufacturing employment to be accounted by other factors or captured by error terms. The estimated coefficient of ECM is negative and statistically significant at 1% level of significance confirms the existence of co-integration between variables. ECM shows the speed of adjustment to the long-run equilibrium after short-run

shocks. The ECM coefficient of manufacturing employment is -0.951, which indicates that 95.1% of any disequilibrium of the current year shock adjusted back to the long-run equilibrium in the next year. The result in Table 5 shown that including the lagged value of dependent variable, real growth domestic product, real private sector credit, inflation, total import and volatility significantly influence manufacturing employment in short run in Ethiopia.

Table 5: Short-Run Estimation of Parameters

Dependent Variable: Manufacturing Employment D(LnME)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LnME(-1))	-0.154832	0.087308	-1.773394	0.0941***
D(LnME(-2))	-0.350846	0.089850	-3.904780	0.0011*
D(LnME(-3))	-0.609941	0.101717	-5.996431	0.0000*
D(LnRGDP)	1.062820	0.114840	9.254822	0.0000*
D(LnRGDP(-1))	0.030243	0.025302	1.195282	0.2484
D(LnRGDP(-2))	0.073633	0.024665	2.985366	0.0083*
D(LnRPSC)	0.566964	0.104033	5.449870	0.0000*
D(LnRPSC(-1))	0.595893	0.087756	6.790312	0.0000*
D(LnLIR)	-0.011504	0.113732	-0.101149	0.9206
D(LnVOL)	-0.019838	0.018547	-1.069594	0.2998
D(LnVOL(-1))	0.166701	0.027794	5.997705	0.0000*
D(LnVOL(-2))	0.112329	0.019674	5.709513	0.0000*
D(LnCPI)	0.338508	0.107655	3.144373	0.0059*
D(LnCPI(-1))	-1.250538	0.180767	-6.917976	0.0000*
D(LnCPI(-2))	-0.426807	0.149704	-2.851013	0.0111*
D(LnM)	-0.361748	0.083029	-4.356871	0.0004*
D(LnX)	0.048117	0.030188	1.593898	0.1294
D(D)	-0.281383	0.044251	-6.358831	0.0000*
ECM(-1)	-0.950762	0.101594	-9.358452	0.0000*
R-squared	0.865			
Adjusted R-squared	0.776			
Durbin-Watson stat	2.18			

Source: Own Computation by Eviews 10

* **and *** indicates significant at 1%, 5% and 10% level of significance

The empirical result in Table 5 indicates that in short run manufacturing employment has a negative influence on itself at lagged one, two and three at 10% and 1% level of significance. An increase of 1% manufacturing employment can decrease current manufacturing employment by 0.155%, 0.351% and 0.610% respectively in the Ethiopia. The study also finds that an increase of 1% real growth domestic product and real private sector credit can increase manufacturing employment by 0.074% and 0.596% respectively in Ethiopia. The study also finds that a 0.167% and 0.112% decrease in manufacturing employment happens due to an increase of 1% in volatility in the short run at lagged one and two. The estimated coefficient of inflation at lagged one and two implies that increase of 1% inflation can reduce manufacturing employment by 1.251% and 0.427% respectively. Similarly, the estimated result implies that for 1% increase in total import can decrease manufacturing employment by 0.362%. The dummy variable used for devaluation policy significantly reduces manufacturing employment by 0.281%. The explanatory variable number of firms is not included in the short run output results because of; the maximum lag length selected for number of firms is zero. Once variables are at zero lag, consequently, it is excluded from short-run error correction model (ECM). Accordingly, only that variable at one or more lags included in the short-run ECM.

4.12 Model Stability and Diagnostic Test

Model stability and residual diagnostic test are carried out for this study to check the standard property of the estimated model. The Table 6 below shown that the estimated value of Jaque-Bera test (normality) and Breusch-Godfrey LM test (serial correlation) indicate that the p-value for both test are greater than 5% (0.7203>0.05) and (0.6171>0.05) implies the model is normal and finds no serial correlation problem. The p-value of Breusch-Pagan-Godfrey test (Heteroscedasticity) is larger than 5% that is (0.5654>0.05) shows that the model has constant variance (Homoscedasticit), as shown in Table 6. In the same way, since the p-value of Ramsey RESET is greater than 5% (0.2294>0.05) the estimated result of Ramsey RESET test (functional form) indicates that the functional form of the estimated model is correct or there is no misspecification.

Table 6: Residual Diagnostic Test

Diagnostic Test	Test Methods	F-Statistics	P-Value
Normality	Jaque-Bera test	0.656182	0.7203

Serial Correlation Test	Breusch-Godfrey LM test	0.498620	0.6171
Heteroskedasticity	Breusch-Pagan-Godfrey test	0.944975	0.5654
Functional Form	Ramsey's RESET test	1.626827	0.2294

Source: Own Computation by Eviews 10

4.13 Model Stability

Both CUSUM and CUSUMSQ tests confirming the stability of the ARDL model. Since, plot of recursive residuals fall in critical bounds at a 5% level of significance for both CUSUM and CUSUMSQ hence, the estimates of model's parameters are stable. The results of CUSUM and CUSUMSQ are shown in Figures 5 and 6.

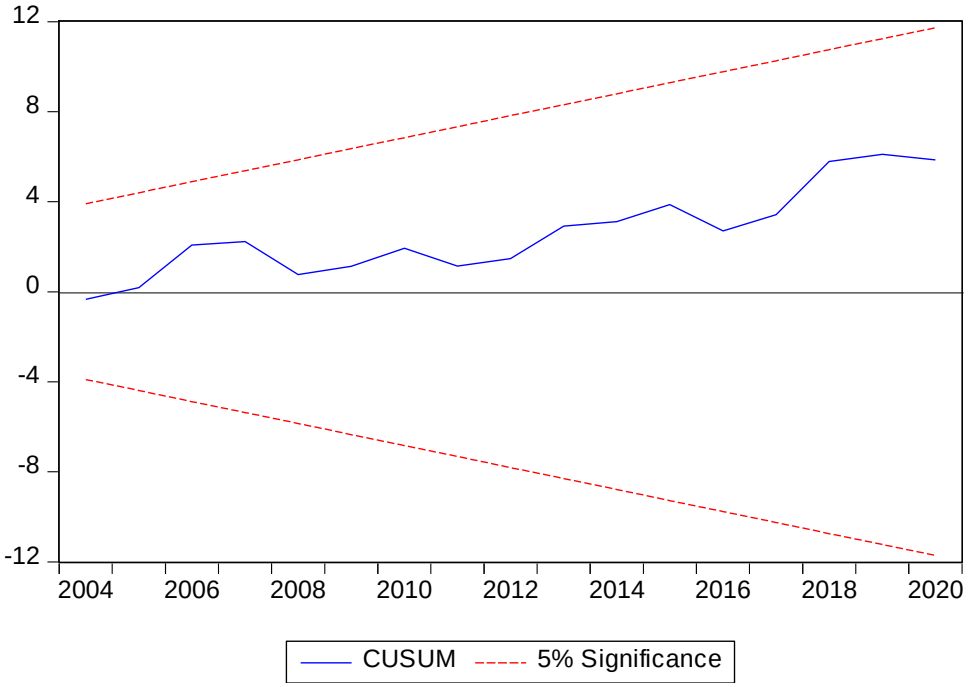


Figure 5: Plot of CUSUM for coefficients' stability of ARDL model.

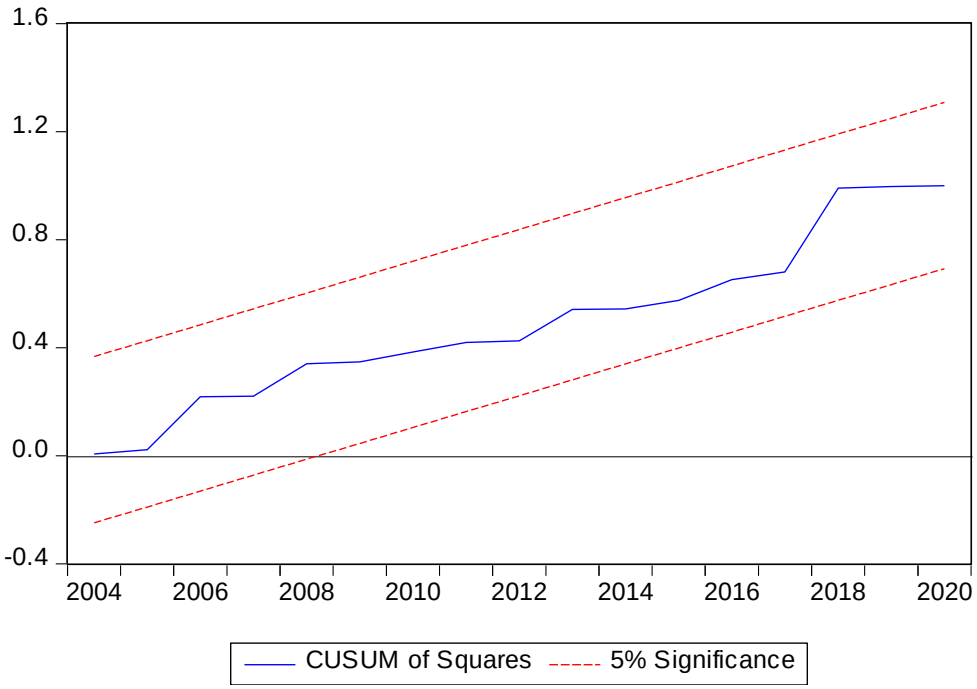


Figure 6: Plot of CUSUMSQ for coefficients' stability of ARDL model.

CHAPTER FIVE

5. Conclusion and Recommendation

5.1 Conclusion

Employment has a contribution to economic growth in different ways: when an individual is hired, they are paid by their firms and which increase individual's income. Theoretically, if income increases consumption also increases which positively related with economic growth. Exchange rate volatility has negative impact on manufacturing employment and the productivity of manufacturing sectors because exchange rate volatility changes the production costs of firms. Therefore, the main objective of this study is to see the effects of exchange rate volatility on employment in case of manufacturing sector in Ethiopia using annual time series data from 1971 to 2020. To determine the long run and short run relationship among the variables, Autoregressive Distributed Lag (ARDL) model was employed. The estimated ADF test results show that, exchange rate volatility and real growth domestic product are stationary at level while manufacturing employment, real private sector credit, lending interest rate, inflation, number of firms, total exports and total imports are stationary after first difference. The estimated ARDL bound test result verified the existence of long and short run relationships between manufacturing employment and explanatory variables. Several residual diagnostic tests verify that the model is a good fit and there are no problems of serial correlation, heteroscedasticity and no-normality in the model. Similarly, both CUSUM and CUSUMSQ tests and Ramsey's RESET test confirming the stability of the ARDL model and no misspecification in the model. The coefficient of error correction term (ECM) is -0.951, which suggests that 95.1% of the disequilibrium of the current year shock corrected back to the long-run equilibrium in the next year. The econometric analysis of ARDL long run model shows that real growth domestic product, real private sector credit, inflation and total export has a positive significant effect on manufacturing employment while exchange rate volatility, lending interest rate and dummy variable for devaluation policy has negative effects on manufacturing employment in Ethiopia. Also, the estimated result of ARDL short run model revealed that including the lagged value of dependent variable, real growth domestic product, real private sector credit, inflation, total import and volatility are significantly influence manufacturing employment in Ethiopia. In general exchange rate volatility has a negative effect on manufacturing employment in Ethiopia.

5.2 Recommendation

- Exchange rate volatility has negative effects on manufacturing employment. Since, exchange rate volatility is expected to have negative impact on manufacturing employment and the productivity of export-oriented sectors. Therefore, government or concerned body has to control the volatility of exchange rate by imposing restrictions on buying and/or sale of currencies.
- Government and other stakeholders should give incentive for manufacturing sector such as export incentives, supply low interest loans and provide assurance for high risk investments in order to expand their investment, to attract new capital investment and to inspire new job creation.
- Dummy variable for devaluation policy has a negative effect on manufacturing employment in Ethiopia. Therefore, before devaluating local currency government should have fulfilling precondition of devaluation like producing more goods and services, expanding export sectors, focused on import substitution.
- Furthermore, the relationship between exchange rate volatility and employment will require extra study including the other major sectors of economy.

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7. Appendix

Testing the Existence of Exchange Rate Volatility using ARCH and GARCH test

ARCH test

Dependent Variable: REER
Method: Least Squares
Sample (adjusted): 1972 2020
Included observations: 49 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	41.65578	16.41349	2.537899	0.0145
REER(-1)	0.739889	0.098253	7.530421	0.0000

R-squared	0.546801	Mean dependent var	159.9255
Adjusted R-squared	0.537159	S.D. dependent var	49.06262
S.E. of regression	33.37850	Akaike info criterion	9.893661
Sum squared resid	52363.84	Schwarz criterion	9.970878
Log likelihood	-240.3947	Hannan-Quinn criter.	9.922957
F-statistic	56.70725	Durbin-Watson stat	1.979598
Prob(F-statistic)	0.000000		

Heteroskedasticity test

Heteroskedasticity Test: ARCH

F-statistic	7.373456	Prob. F(1,46)	0.0093
Obs*R-squared	6.631122	Prob. Chi-Square(1)	0.0100

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Sample (adjusted): 1973 2020
Included observations: 48 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	682.1839	492.8345	1.384205	0.1730
RESID^2(-1)	0.371746	0.136902	2.715411	0.0093

R-squared	0.138148	Mean dependent var	1087.071
Adjusted R-squared	0.119412	S.D. dependent var	3468.080
S.E. of regression	3254.434	Akaike info criterion	19.05420
Sum squared resid	4.87E+08	Schwarz criterion	19.13216
Log likelihood	-455.3007	Hannan-Quinn criter.	19.08366
F-statistic	7.373456	Durbin-Watson stat	2.054026
Prob(F-statistic)	0.009292		

GARCH Test

Dependent Variable: LNREER
Method: ML - ARCH
Sample (adjusted): 1972 2020
Included observations: 49 after adjustments
Convergence achieved after 11 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.810267	0.308406	2.627278	0.0086
LNREER(-1)	0.840029	0.061268	13.71074	0.0000
Variance Equation				
C	0.009007	0.004661	1.932585	0.0533
RESID(-1)^2	0.630053	0.361910	1.740912	0.0817
GARCH(-1)	0.077608	0.225157	0.344683	0.7303

R-squared	0.693576	Mean dependent var	5.033570
Adjusted R-squared	0.687056	S.D. dependent var	0.284807
S.E. of regression	0.159325	Akaike info criterion	-0.966176
Sum squared resid	1.193066	Schwarz criterion	-0.773133
Log likelihood	28.67131	Hannan-Quinn criter.	-0.892936
Durbin-Watson stat	1.983232		

ARDL Long

ARDL Long Run Form and Bounds Test				
Dependent Variable: LNME				
Selected Model: ARDL(4, 3, 2, 1, 3, 0, 3, 1, 1, 1)				
Sample: 1971 2020				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRGDP	0.993300	0.393853	2.522009	0.0219
LNRPSC	0.996679	0.305961	3.257531	0.0046
LNLIR	-0.576426	0.199755	-2.885666	0.0103
LNVOL	-0.223737	0.101424	-2.205947	0.0414
LNNOF	0.075436	0.219565	0.343569	0.7354
LNCPI	1.724864	0.415891	4.147398	0.0007
LNM	-0.072620	0.114710	-0.633073	0.5351
LNX	0.219599	0.110163	1.993410	0.0625
D	-0.616099	0.218087	-2.825010	0.0117
C	2.185833	3.569142	0.612425	0.5484

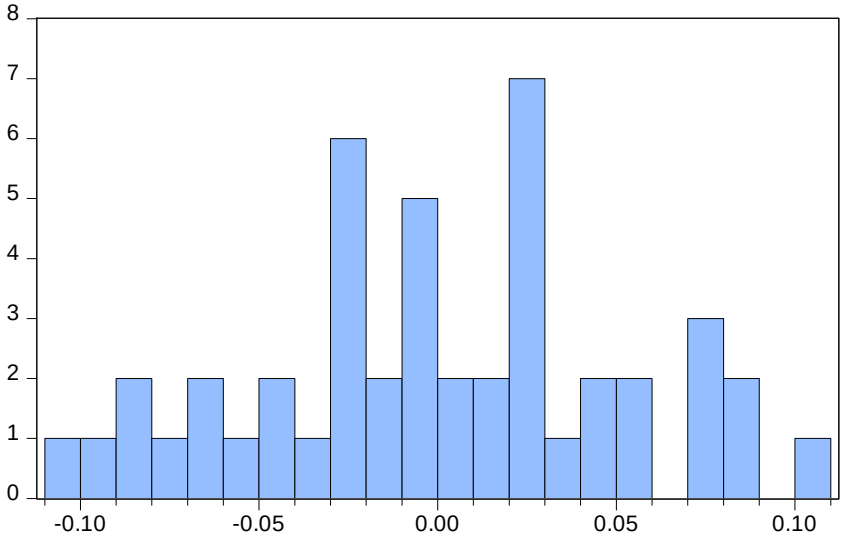
ARDL Error Correction Regression

ARDL Error Correction Regression				
Dependent Variable: D(LNME)				
Selected Model: ARDL(4, 3, 2, 1, 3, 0, 3, 1, 1, 1)				
Sample: 1971 2020				
ECM Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNME(-1))	-0.154832	0.087308	-1.773394	0.0941
D(LNME(-2))	-0.350846	0.089850	-3.904780	0.0011
D(LNME(-3))	-0.609941	0.101717	-5.996431	0.0000
D(LNRGDP)	1.062820	0.114840	9.254822	0.0000
D(LNRGDP(-1))	0.030243	0.025302	1.195282	0.2484
D(LNRGDP(-2))	0.073633	0.024665	2.985366	0.0083
D(LNRPSC)	0.566964	0.104033	5.449870	0.0000
D(LNRPSC(-1))	0.595893	0.087756	6.790312	0.0000
D(LNLIR)	-0.011504	0.113732	-0.101149	0.9206
D(LNVOL)	-0.019838	0.018547	-1.069594	0.2998
D(LNVOL(-1))	0.166701	0.027794	5.997705	0.0000
D(LNVOL(-2))	0.112329	0.019674	5.709513	0.0000
D(LNCPI)	0.338508	0.107655	3.144373	0.0059
D(LNCPI(-1))	-1.250538	0.180767	-6.917976	0.0000
D(LNCPI(-2))	-0.426807	0.149704	-2.851013	0.0111
D(LNM)	-0.361748	0.083029	-4.356871	0.0004
D(LNX)	0.048117	0.030188	1.593898	0.1294
D(D)	-0.281383	0.044251	-6.358831	0.0000
CointEq(-1)*	-0.950762	0.101594	-9.358452	0.0000
R-squared	0.865347	Mean dependent var		0.042813
Adjusted R-squared	0.775578	S.D. dependent var		0.138786
S.E. of regression	0.065747	Akaike info criterion		-2.312718
Sum squared resid	0.116713	Schwarz criterion		-1.557409
Log likelihood	72.19251	Hannan-Quinn criter.		-2.029775
Durbin-Watson stat	2.186667			

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.013032	10%	1.8	2.8
k	9	5%	2.04	2.08
		2.5%	2.24	3.35
		1%	2.5	3.68

Residual Diagnostic Test

1. Normality Test



Series: Residuals	
Sample 1975 2020	
Observations 46	
Mean	-7.02e-16
Median	-0.004171
Maximum	0.105701
Minimum	-0.100733
Std. Dev.	0.050928
Skewness	-0.041103
Kurtosis	2.420692
Jarque-Bera	0.656182
Probability	0.720297

2. Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.498620	Prob. F(2,15)	0.6171
Obs*R-squared	2.867561	Prob. Chi-Square(2)	0.2384

3. Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.944975	Prob. F(28,17)	0.5654
Obs*R-squared	28.00616	Prob. Chi-Square(28)	0.4641
Scaled explained SS	2.717099	Prob. Chi-Square(28)	1.0000

4. Functional Form Test

Ramsey RESET Test			
	Value	df	Probability
F-statistic	1.626827	(2, 15)	0.2294
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	0.020804	2	0.010402
Restricted SSR	0.116713	17	0.006865
Unrestricted SSR	0.095909	15	0.006394

Declaration

I announce that this thesis titled: The **Effects of Exchange Rate Volatility on Employment in Ethiopia: The Case of Manufacturing Sector** is totally my original work and has not been presented for the award of another degree in any other university and that all sources of material used for the thesis have been properly acknowledged.

Declared by:

Name: **Tolosa Gebisa** Signature: _____Date: June, 2022

Confirmed by Advisor:

Name: **Dr. Fantu Guta (PhD)** Signature: _____Date: June, 2022