The Impact of Macroeconomic Factors on Manufacturing Sector Value Added in Ethiopia: An Application of Bounds Testing Approach to Cointegration

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A R T I C L E   I N F O

A B S T R A C T

The role of the manufacturing sector for the economic growth and structural change is very low in Ethiopia and performing less compering with that of the other sectors in the economy. So, this research tried to look at how different macroeconomic variables affect the manufacturing sector value added by using annual time series data from 1982 to 2018 estimated by Autoregressive-Distributed Lag (ARDL). The result from the Bound test shows manufacturing sector value added has a long-run relationship with macroeconomic variables in the model. In the long-run, general inflation rate, exchange rate, and trade openness have a significant negative effect on the manufacturing sector value-added. In contrast, general government expenditure has a significant positive effect. Also, the Error Correction model shows an adjustment towards the long-run equilibrium of the manufacturing sector value-added. So, the government has to control the general inflation level, promote demand for domestic manufacturing products and competitiveness of domestic firms, and strengthen the backward link of the sector to decrease its import-input dependency to reduce the effect of exchange rate devaluation. Lastly, effective and efficient government expenditure will have to be used to increase the manufacturing sector value-added.

A B S T R A K

Peran sektor manufaktur untuk pertumbuhan ekonomi dan perubahan struktural di Ethiopia sangat rendah dan kinerjanya kurang sesuai dengan sektor-sektor lain dalam perekonomian. Penelitian ini mencoba untuk melihat bagaimana variabel makroekonomi yang berbeda mempengaruhi nilai tambah sektor manufaktur dengan menggunakan data deret waktu tahunan dari 1982 hingga 2018 yang diperkirakan dengan Autoregressive-Distributed Lag (ARDL). Hasil dari uji Bound menunjukkan nilai tambah sektor manufaktur memiliki hubungan jangka panjang dengan variabel ekonomi makro dalam model. Dalam jangka panjang, tingkat inflasi, nilai tukar, dan keterbukaan perdagangan memiliki efek negatif yang signifikan terhadap nilai tambah sektor manufaktur. Sebaliknya, pengeluaran pemerintah memiliki efek positif yang signifikan. Selain itu, Error Correction model menunjukkan penyesuaian terhadap keseimbangan jangka panjang dari nilai tambah sektor manufaktur. Dengan demikian, pemerintah harus mengendalikan tingkat inflasi secara umum, mendorong permintaan akan produk-produk pabrikan domestik dan daya saing perusahaan-perusahaan domestik, serta memperkuat keterkaitan sektor ini untuk mengurangi ketergantungan input impor untuk mengurangi efek dari depresiasi nilai tukar. Terakhir, pengeluaran pemerintah yang efektif dan efisien harus digunakan untuk meningkatkan nilai tambah sektor manufaktur

1. INTRODUCTION

The Manufacturing sector is an engine for economic growth and structural transformation of the economy (Kaldor, 1967). This is because the manufacturing sector has faster productivity growth than agriculture or services. It also acts as the 'learning center' of the economy in that it plays a leading role in diffusing technological progress

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(ECA, 2016). The growth of the manufacturing sector within the industry is essential to build national technological capacity, industrial capability, technology progress, productivity, and capital accumulation.

For the last ten years, Ethiopia's economy has experienced steady growth averaging 9.9% a year, which is by far higher than a regional average of 5.4% (NBE, 2018). However, the latest economic growth in Ethiopia has not supplemented by substantial progress in manufacturing shares of GDP (Tigabu et al., 2018). Despite the manufacturing sector, the continuously expanding service sector has replaced the decline in the agriculture sector's share on value addition and employment. Mainly, the growth has been driven by public investment and private consumption in the demand side and value-added in agriculture, services, and construction sectors in the supply side (UNDP, 2018).

The role of the manufacturing sector for economic growth and structural change is very low in Ethiopia. Its role in employment generation, exports, and output are very slight. A low level of industrialization characterizes the Ethiopian manufacturing sector in terms of its share in GDP, export earnings, and industrial intensity. It is dominated by small firms and resource-based industries and concentrated around the capital city (Oqubay, 2018). In Ethiopia, the manufacturing sector's contribution to GDP is less compared with the service and agriculture sector as it has observed in the past twenty years. For example, during 1997-2017, its average value added to the GDP was 4.9. This value is by far less compared with 38.89 and 41.86 for service and agriculture sector value-added, respectively.

The structure and performance of the Ethiopian manufacturing sector share the characteristics with many of Sub-Sahara Africa. Nevertheless, it is still performing lower comparing with that of the sub-Sharan Africa average in many dimensions.
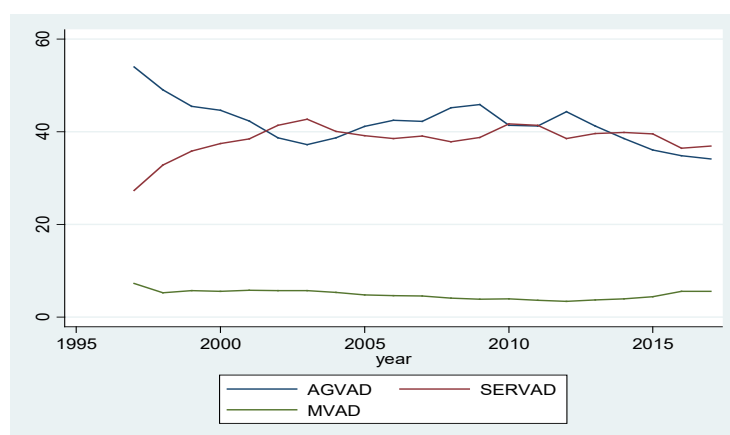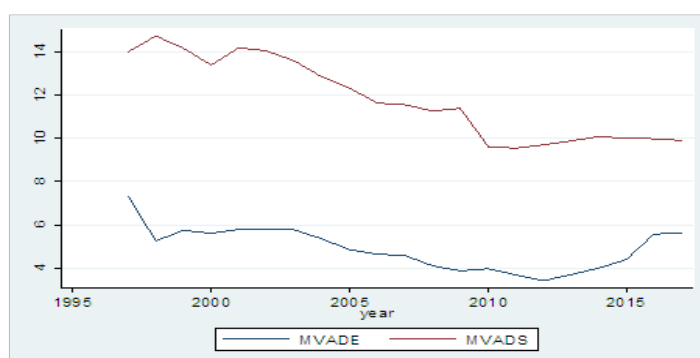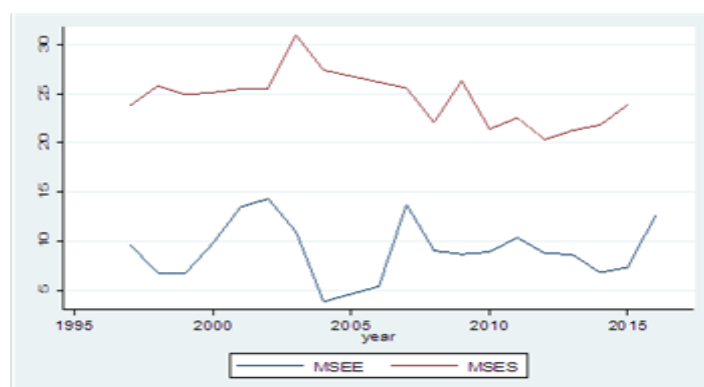

Source: Author Drawing by Using WDI data, 2019

Figure 1. Value-added of different sectors in Ethiopia

For instance, the average manufacturing value added per GDP in Ethiopia from 1997 to 2017 was 4.9 while it was 11.78 for sub-Sharan Africa. In the same period, the manufacturing sector accounts for 8.57 and 19.75 percent of the total export in Ethiopia and sub-Sharan Africa, respectively.

Source: Author Drawing by Using WDI data, 2019

Figure 2: Value-added and Export contribution of manufacturing sector variation
between Ethiopia and Sub-Saharan Africa

Despite being an African country with industrial policy, Ethiopia's manufacturing sector has not improved well. In a broader aspect, the literature on the manufacturing sector's performance tried to look at micro and macroeconomic factors for this sector's poor performance. However, in Ethiopia, many previous attempts to study determinants of manufacturing performance and productivity mainly emphasized the sub-sectoral and micro-economic aspects. For example, the National planning commission (2015) report argued that imported input dependency is the primary factor behind the manufacturing sector's performance. The Study by Rao and & Tesfahunegn (2015) found that human capital, capital intensity, and firm size (economies of scale) are significant determinants of the sector's performance. Also, UNDP (2017) study indicated the human capital and workers experience is the major determinates of manufacturing sector performance. At the sub-sectoral level, Tsegay *et al.* (2018), discussed human capital, agglomeration effects, incentive systems as essential factors behind the productivity of Textile and garment manufacturing industries in Ethiopia. Yayeh (2018) also revealed that manufacturing industries' productivity of firms financed by developmental banks is determined by factors like human capital, the ratio of imported input to the total consumed raw materials, capital intensity, and capital utilization.

Maintaining macroeconomic stability has been recognized as one way of improving manufacturing sector performance in Ethiopia. However, in the empirical world, little has been known about how macroeconomic factors affect manufacturing sector performance. Researches on the issue are scarce and not directly in line with the

theme this research tried to address. For example, Mishra (2018) found FDI net flow and permanent employment as statistically significant in explaining manufacturing sector growth while inflation is insignificant. Abebaw (2019), in his study on the effect of macroeconomic variables on industry sector output, found lending rate and trade balance significantly and negatively affect the industry output while the inflation rate is found to have a positive and significant effect. However, this research cannot generalize the impact of macroeconomic variables on the manufacturing sector because the performance of different sub-sectors under the industry is different. For instance, in various indicators, Construction under the industry sector has been performing well than the manufacturing sector.

In contrast to the above papers, we examine the major macroeconomic drivers of manufacturing sector value added (MVA) in Ethiopia. Therefore, this research provides an excellent insight into how the underlying macroeconomic variables should be affected to promote the sector's performance. Also, it exposed how the highly growing service sector affects the manufacturing sector performance.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The manufacturing sector is one of the important sectors that have prominent roles in country's economic growth and development. So, many pieces of research were conducted to look at how macroeconomic variable determine manufacturing sector growth, output, and value-added in different times and geographical areas. This part reviews some of the recent previous works on the issue

Imran et al. (2013) analyzed the impact of inflation on Pakistan's sectoral growth by employing annual time series data that started from the year 1972 to 2010. They found inflation is harmful to the manufacturing sector growth. Mohammed et al. (2013) paper examined the relationship between changes in the exchange rate and the investment of manufacturing sectors in Iran during1995 to 2009 by using the panel data estimated by Arellano and Bond GMM technique. The finding exposed real exchange rate movement has significant and a negative impact on manufacturing investment.

Chikelu and Okoro (2016) examined the role of capital expenditure on the low manufacturing sector's growth in Nigeria, and causal relationship between capital expenditure and manufacturing sector's growth. Johansen co-integration analysis and error correction mechanism (ECM) were employed. They found that capital expenditure, foreign direct investment, and interest rate are significant and positive determinants of manufacturing output in Nigeria. They also found that capital expenditure granger causes the manufacturing sector's growth in Nigeria. Mawufemor et al. (2016) investigated the effect of inflation on manufacturing sector productivity in Ghana for the period 1968-2013. Johansen test (JT), the vector error correction model (VECM), and the ordinary least squares (OLS) regression are used to look the effect. The result indicated, in short-run, inflation, and manufacturing productivity has no link. However, there is a significant stable long-run relationship between inflation and manufacturing sector productivity. Lastly, the results of the OLS test indicated inflation has a significant negative link with manufacturing sector productivity. Onakoya (2018) studied the impact of the changes in the macroeconomic factors on the output of the manufacturing sector in Nigeria. He deployed Johansen cointegration test and Vector Error Correction Model (VECM) technique to analyze the time series data from the year 1981 to 2015. The finding revealed no short-run association among manufacturing output and GDP, exchange rate, broad money supply, and unemployment rate. The inflation rate and interest rate were statistically insignificant. However, a significant and positive relationship existed between the GDP of the previous year and manufacturing output. Amadi et al. (2018) studied macroeconomic implications of exchange rate fluctuation on manufacturing sector performance in Nigeria between 1981 and 2016. Data were analyzed using the vector autoregression estimation technique. Empirical results confirmed that exchange rate depreciation has a positive impact on manufacturing output and manufacturing value.

Sokunle et al. (2016) tried to look at how manufacturing sector growth relates with variables like FDI, interest rates, inflation, labor costs, and government incentives in 26 sub-Sahara African countries from 2008 – 2010. But the outcome shows all these variables have an insignificant relationship with the manufacturing sector growth in SSA countries. Takam et al. (2017) investigated the effect of trade openness on manufacturing growth in the Economic and Monetary Community of Central Africa (EMCCA) countries. They used uses panel data covering the period from 1984 to 2014 estimated by Dynamic Ordinary Least Square method. They found a positive and significant effect of Foreign Direct Investment and Investment on manufacturing growth. Anyanwu (2017) studied driver of manufacturing value-added in North Africa countries. He used panel data and pooled panel OLS regression and IV-2SLS estimation techniques. He finds the level real GDP per capita has a significant positive relation with MVD while the quadratic and cubic real GDP per capita have a significant negative relationship with MVD. He also finds secondary education, agricultural land, domestic credit to the private sector, trade openness, inward stock of FDI, population size, and ICT infrastructure have significant positive effect on manufacturing sector value-added. On the other hand, Factors like dependence on oil, mineral and natural gas rents, domestic investment rate, political globalization, institutionalized democracy, age dependency ratio, and civil violence have a significant negative effect on Manufacturing value-added in North Africa.

Mishra (2018) examined the determinants of the manufacturing sector growth by using aggregate data compiled by the Central Statistical Agency (CSA) of Ethiopia. He analyzed the data by using descriptive (percentage, mean, standard deviation) statistics. The finding of the study shows manufacturing value-added, manufacturing export per capita, and inflation were not statistically significant in explaining manufacturing sector growth. But, FDI net flow and permanent employment were statistically significant in explaining manufacturing sector growth. Abebaw (2019) studied the effect of macroeconomic variables on industry sector output by using time series data and ARDL. He found lending rate and trade balance have significant and negative effect

on the industry output while the inflation rate is found to have positive and significant effect.

Amiri, *et al.* (2019) studied how natural resource abundance, institutional quality and manufacturing development relates in 28 resource-rich countries. Accordingly, they found that that natural resource rents in countries with good and poor institutional quality lead to a shrinking manufacturing. Although their result revealed, in economies with good institutional framework, institutions exert a positive influence on the manufacturing sector. While institutions, in a poor institutional framework economy, have positive effect on that manufacturing sector which is destructive for production capacity.

3. RESEARCH METHOD
Data
In this research, to look at how macroeconomic factors affect manufacturing sector value added in Ethiopia, time-series data from 1982-2018 was used. Both national and international organization data sets were used to get the required data for variables in the model. Specifically, Data for nominal lending interest rate, credit to the private sector, nominal exchange rate, general government expenditure, and general inflation rate are from Ethiopia's national bank. Data for manufacturing sector value-added, service sector-value added, and trade openness are from World Bank (2019), world development indicator.

Model and Estimation
Determining the stationarity of variables is the first step in time series analysis. It is used to identify the order of integration of each variable in the model, whether the variable I(0), I(1) or more than one. Checking stationarity of variables has two uses: Specifically, avoiding using spurious regression results for analysis purposes and selecting the estimation technique. Accordingly, the stationarity of variables in this research is checked using augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. Therefore, the stationarity of variables in the model is first checked at the level, and then variables which are not stationary at the level are differenced. To explore the empirical relationship between macroeconomic variables and the manufacturing sector value-added an econometric model would be established, and it is written as follows:

$$lnMSV_t = \beta_0 + +\beta_1 inf_t + \beta_2 lnexc_t + \beta_3 int_t +$$
$$\beta_4 lnsvd_t + \beta_5 lngov_t + \beta_6 opn_t +$$
$$\beta_7 lncrd_t + \beta_8 pg_t + U_t \qquad (1)$$

Where $lnMSV_t$: a log of manufacturing sector value-added, inf_t: inflation rate, $lnexc_t$: a log of the nominal exchange rate, int_t: the nominal lending rate, $lnsvd_t$: a log of service sector value-added, $lngov_t$: a log of general government expenditure, opn_t: trade openness, $lncrd_t$ a log of credit extended to the private sector, pg_t population growth rate, and U_t is the disturbance term. $\beta's$ are sample parameters to be estimated. Autoregressive Distributed Lag (ARDL) cointegration test with Error Correction Model (ECM) is used to examine the long-run and the short-run relationship between macroeconomic factors and the manufacturing sector value-added. ARDL is selected because it has some advantages over the other conventional cointegration estimation techniques. It can be applied irrespective of the order of integration of variables in the model; whether the underlying explanatory variables are I(0), I(1), or a combination of both, but none of them must not be an integration of I (2). Thus, it avoids the pre-testing problems associated with standard cointegration tests (Appiah et al., 2019; Pesaran et al., 2001; Zuhroh et al., 2018). In such a situation, applying the ARDL approach to cointegration will give realistic and efficient estimates. It provides unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous (Harris & Sollis, 2003).

Since ARDL is a dynamic single model equation and of the same form with the ECM, re-parameterization is possible. Since ARDL is a dynamic single model equation and of the same form with the ECM, re-parameterization is possible. Therefore, the short-run and long-run relationships can be looked at for variables of a single model (Pesaran & Shin, 1995). ARDL eludes a large number of specifications of the standard cointegration tests. Moreover, in this approach, the optimal lags of different variables can be different. Accordingly, the Autoregressive Distributed Lag (ARDL) version of equation (1) model looks as follows:

$$lnMSV_t = \beta_0 + \sum_{i=0}^{n} \beta_{1i}\Delta lnMSV_{t-1} + \sum_{i=0}^{n} \beta_{2i}\Delta lnf_{t-1} +$$

$$\sum_{i=0}^{n} \beta_{3i}\Delta lnexc_{t-1} + \sum_{i=0}^{n} \beta_{4i}\Delta int_{t-1} +$$

$$\sum_{i=0}^{n} \beta_{5i}\Delta lnsvd_{t-1} + \sum_{i=0}^{n} \beta_{6i}\Delta lngov_{t-1} +$$

$$\sum_{i=0}^{n} \beta_{7i}\Delta opn_{t-1} + \sum_{i=0}^{n} \beta_{8i}\Delta lncrd_{t-1} +$$

$$\sum_{i=0}^{n} \beta_{9i}pg_{t-1} + \beta_{10}lnMSV_{t-1} + \beta_{11}inf_{t-1} +$$

$$\beta_{12}lnexc_{t-1} + \beta_{13}int_{t-1} + \beta_{14}lnsvd_{t-1} +$$

$$\beta_{15}lngov_{t-1} + \beta_{16}opn_{t-1} + \beta_{17}lncrd_{t-1} +$$

$$\beta_{18}pg_{t-1} + U_t \qquad (2)$$

where Δ is the first difference operator, ln is the natural logarithm, β_{1i}, β_{2i}, β_{3i}, β_{4i}, β_{5i}, β_{6i}, β_{7i}, β_{8i}, and β_{9i} indicate the short-run dynamics of the model, β_{10}, β_{11}, β_{12}, β_{13}, β_{14}, β_{15}, β_{16}, β_{17}, and β_{18} represent the long-run association and n is the optimal lag lengths. Cointegration, long-run relationship, of the manufacturing sector value-added with the macroeconomic variables in the model, is checked using Bound Test. Accordingly, we conclude that the existence of a long-run relationship if the estimated Wald or F-statistic is greater than the upper bound, I(1), critical values (Pesaran *et al.*, 2001). However, the null hypothesis of no cointegration is accepted if the estimated Wald or F-statistic falls below the lower bound I(0). However, it is not possible to make a certain conclusion if the estimated Wald or F-statistic is in between the upper and lower bound critical values.

Error Correction Model (ECM) is derived from the ARDL model through a simple linear transformation, which integrates short-run adjustments with long-run equilibrium without losing long-run information once the existence of

cointegration is confirmed. In our case, the ECM general form to be estimated is shown below:

$$\Delta lnMSV_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta lnMSV_{t-1} +$$

$$\sum_{i=0}^{n} \beta_2 \Delta X_{t-1} + + \beta_3 ECM_{t-1} + \mu_{2t} \quad (3)$$

where X is defined previously in equation (1), ECM_{t-1} is the error correction term, and μ_{2t} is the stochastic error term. If the result of the Bound test provides evidence for cointegration, then we should move to the next step to identify the coefficients and the significance level. The AIC model selection criterion and Final prediction Error (FPE) have been used to select the optimal lag order. These should be better choices since we used a small sample year **(**Liew, 2004). The long-run ARDL model and error correction model are estimated after identifying the optimal lags. The validity of the estimated ARDL model is checked by diagnostic tests like the Breusch-Godfrey Serial Correlation LM test and the Breusch-Pagan-Godfrey heteroscedasticity test. Lastly, Cusum and Cusum of squares tests have been used to look at parameter stability.

4. DATA ANALYSIS AND DISCUSSION

Before proceeding with the estimation of the long-run model, the stationarity of variables in the model has been checked using ADF and PP tests. These two tests are used since comparing different results from different test methods is a good way of testing the sensitivity of our conclusion. The results from these two tests show except that of inflation, and all other variables are not stationary at the level, as presented in Table 1. Inflation is stationary at the level in both cases.

Table 1. Unit root test results of ADF

Variable	ADF test at the level I(0)		ADF test at I(1)	
	t-Stat.	P-value	t-Stat.	P-value
Lnmvd	-2.2100	0.2065	-6.2238	0.0000***
Inf	-4.8602	0.0004***	-8.0011	0.0000***
Lnexc	-0.1670	0.9336	-3.4164	0.0173**
Int	-2.0005	0.2853	-6.3364	0.0000***
Lnsvd	-2.1279	0.2355	-5.1655	0.0002***
Lngov	2.0008	0.9998	-5.1466	0.0002***
Ope	-0.5847	0.8615	-7.2208	0.0000***
Lncrd	4.0904	1.0000	-3.0571	0.0396**
pg	-1.3852	0.5738	-5.3172	0.0002***

*,** and *** represents significance level at 10% , 5% and 1% critical values, respectively

The next step is to look at variables stationarity at their first difference. Accordingly, The ADF and PP test results show that all variables became stationary after differencing, as presented in Table 2. Therefore we can conclude that inflation is integrated of order zero I(0). At the same time, the log of manufacturing value-added, inflation, interest rate, the log of the exchange rate, log of manufacturing sector value-added, the log of general government expenditure, the log of credit extended to the private sector, trade openness, and population growth are integrated order one I(1). So, ARDL is more appropriate to estimate the model

efficiently.

The other most important issue in applying ARDL is Lag length specification. Since the lag length of variables in the model, we used has a direct effect on Gaussian error terms that we want to have in our analysis. Among different criteria of lag selection, in this research, Akaike Information Criterion (AIC) and Final prediction Error (FPE) are used to determine the optimal lag length. Accordingly, from the VAR lag order selection test conducted, the apriate lag level selected by these two criteria is two, as can be seen from Table 3.

Table 2. The unit root test result of PP

Variable	PP test at the level I(0)		PP test at I(1)	
	t-Stat.	P-value	t-Stat.	P value
Lnmvd	2.3247	0.1702	6.2211	0.0000***
Inf	-4.8953	0.0003***	-14.492	0.0000***
Lnexc	-0.2956	0.9156	-3.2998	0.0228**
Int	-1.9935	0.2882	-6.3364	0.0000***
Lnsvd	-2.1211	0.2380	-9.5673	0.0000***
Lngov	2.6497	1.0000	-5.1844	0.0002***
Ope	-0.4538	0.8885	-7.1794	0.0000***
Lncrd	3.6526	1.0000	-3.0344	0.0417**
pg	-0.7602	0.8179	-3.8568	0.0058***

*, ** and *** represents significance level at 10% , 5% and 1% critical values, respectively*

Table 3. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-63.87625	NA	5.88e-10	4.2868	4.6909	4.4246
1	252.1567	446.1641	6.84e-16	-9.5386	-5.4983*	-8.1607
2	377.8658	110.9198*	1.54e-16*	-12.1686*	-4.4919	-9.5506*

* indicates lag order selected by the criterion

Next to the previous tests, using the ARDL Bond test for cointegration, whether long-run

relationships among the explanatory variables and the explained variable exists or not was checked.

Table 4: ARDL Bounds Test

Test Stat.	Value	k	Critical Value Bounds		
			Sign.	I0 Bound	I1 Bound
F-stat.	5.3995	8	10%	1.95	3.06
			5%	2.22	3.39
			1%	2.79	4.1

Thus we reject the null hypothesis stating there is no long-run relationship between the manufacturing sector value-added and macroeconomic variables included in the model.

Since the F statistic value of 5.3995 is higher than the upper bound critical values at all levels of significance (Pesaran *et al.*, 2001), as reported in the above table.

Long Run Coefficients

The long-run estimated model result revealed that inflation has a significant negative effect on the manufacturing sector value-added in Ethiopia. Specifically, one percent increases in inflation result in a 0.0109 percent decrease on average in the manufacturing sector value-added, holding the other variables constant. According to Tigabu et al. (2018), macroeconomic stability is one factor determining Ethiopia's manufacturing sector competitiveness. Inflation appeared as a major macroeconomic problem in Ethiopia for a year. The manufacturing sector in Ethiopia is more sensitive to inflation variability. Inflation results increase in the cost of production and a real appreciation of the currency, which in turn reduces the international competitiveness of domestic firms and discourages firms engaging in the manufacturing sector. This finding is in support of the previous empirical work of Chaudhry *et al.* (2013), Judith and Chijindu (2016, Osinowo (2015), Patjoshi (2013), and Siyakiya (2014),

Table 5. Long Run Coefficients

Variable	Coeff.	SE	t-Stat.	Prob.
INF	-0.0109	0.0038	-2.8917	0.0126**
INT	0.0040	0.0277	0.1440	0.8877
LNEXC	-0.2954	0.1391	-2.1229	0.0535*
LNSVD	-0.1808	0.2731	-0.6622	0.5194
LNGOV	0.5628	0.2586	2.1765	0.0439**
OPN	-1.9853	0.4696	-4.2279	0.0010***
LNCRD	0.1225	0.2115	0.5794	0.5723
PG	-0.2727	0.2442	-1.1166	0.2774
C	4.2850	2.1354	2.0067	0.0660*

Notes: *, ** and *** indicates significance at the 10, 5 and 1 percent levels.

The Exchange rate is the other variable that is found to have a significant negative effect on the manufacturing sector value-added. Accordingly, one percent devaluation of domestic currency in terms of American dollar on average results in a 0.295 percent decrease in manufacturing sector value added while the other variables are constant. Mohammed *et al.* (2013) argued the effect of an exchange rate increase on manufacturing sector value depends on whether it is a positive impact on demand of domestic products inputs out weights or the cost of imported capital and other imported goods. Despite continuous devaluation of domestic currency in Ethiopia, the overall global competitiveness of the manufacturing sector is still low (Tigabu *et al.*, 2018) while backward linkages in Ethiopia's manufacturing sector is weak and Imported-input dependency ratio of the sector is high (Legese *et al.*, 2014; Oqubay, 2018). This fact may support the second case where the exchange rate devaluation harms the manufacturing sector value added because the cost is higher than the gain in Ethiopia. Recently, Ethiopia's export-oriented manufacturing industries like leather and leather goods and textiles and apparel have been registering very low manufacturing value-added. The same result is observed by Christopher and Tomilad (2012).

Government expenditure is the only significant variable with a positive sign. A one percent increase in government expenditure result 0.5628 increases in manufacturing value-added on average, keeping the other macroeconomic variables in the model constant. Many scholars and international organizations argue the substantial increase in government expenditure is the reason behind the high economic growth Ethiopia had been registered in recent past years. The government has been engaging in huge investments in infrastructure, which directly affects manufacturing sector performance. Expansion of infrastructure increases the performance of the manufacturing sector by reducing overhead costs resulted because of inefficient utilization of existing resources (Anyanwu, 2002). In this regard, the result is robust. Nwanne (2015), Chikelu et al. (2016) also got the same result.

The coefficient of Trade openness is significant and negative. Specifically, a unit increase in the country's trade openness to the international market will result in 1.9854 decreases in manufacturing value-added in Ethiopia on average. The result supports the infant industry argument explained by the smallness of the manufacturing sector in

developing countries. The Ethiopian manufacturing sector is highly dominated by small firms and resource-based industries (Oqubay, 2018). These firms are not prominently competitive in their ability to compete in the export sector with large firms with higher productivity and economies of scale. Thus, more openness to the international market harms these firms' value-added, and indeed the sector value-added. This result is in line with previous work by Takam et al. (2017).

Furthermore, borrowing interest rate, service sector value-added, credit extended to the private sector, and population growth is found to be insignificant.

Error Correction Model

The ECM is estimated to look dynamic in the manufacturing sector value-added equation in the short-run. The error correction term shows how many percent of short-run shocks adjust towards the long-run equilibrium of the manufacturing sector value-added within a year. In our case, its value is -0.6244 and statistically significant at a 5% level of significance. It indicates approximately 62.4 percent of the long-run disequilibrium from the previous year's shock converges back to the long-run equilibrium in the current year. Also, the error correction value signifies the long-run causality (Granger, 1988).

Table 6. The Error Correction Model

Variable	Coeff.	SE	t-Stat.	Prob.
D(LNMVD(-1))	0.4329	0.141407	3.0613	0.0054***
**D(INF)	-0.0138	0.0020	-7.0281	0.0000***
D(INT)	0.0079	0.0175	0.4533	0.6578
D(INT(-1))	-0.0132	0.0143	-0.9214	0.3736
D(LNEXC)	0.3291	0.1839	1.7894	0.0969*
D(LNSVD)	-0.3313	0.2813	-1.1777	0.2600
D(LNGOV)	0.4253	0.1872	2.271327	0.0408**
D(LNGOV(-1))	-0.1794	0.1594	-1.1257	0.2806
D(OPN)	-0.6908	0.4952	-1.3948	0.1864
D(OPN(-1))	0.8764	0.5964	1.4694	0.1655
D(LNCRD)	0.5628	0.3054	1.8427	0.0883*
D(LNCRD(-1))	1.7505	0.2598	6.7383	0.0000***
D(PG)	0.8599	0.8069	1.0657	0.3059
D(PG(-1))	-0.6353	0.5224	-1.2162	0.2455
ECT(-1)	-0.6244	0.2305	-2.7094	0.0179**

Source: E view 9 results, 2020
Note: The sign*, **, and *** indicate that the variables are significant at the level of 10%, 5%, and 1%, respectively.

The short-run result revealed that previous year manufacturing sector value-added, inflation rate, exchange rate, government expenditure, and financial sector development are variables that affect the manufacturing sector value-added in the short run.

Diagnostic tests

The following table provides different Diagnostics test result values used to check whether the estimated error satisfies the classical linear regression assumptions. The diagnostic test, Breusch-Pagan-Godfrey, revealed heteroscedasticity is not a problem. Since the p-value of the equation (0.4374) is above the critical value (5%).

Table 7: Heteroscedasticity and Serial Correlation tests

Breusch-Pagan-Godfrey Heteroscedasticity test		Breusch-Godfrey Serial Correlation LM Test	
F-statistic	1.103409	F-statistic	0.864432
Prob.F(19,13)	0.4374	Prob. F(2,12)	0.4459

Similarly, the model is not affected by the serial correlation problem. Breusch-Godfrey Serial Correlation LM Test is used to check this, and the P-value result is 0.4459, which is again higher than 5%.

Lastly, our model's stability is checked by using recursive estimate tests, CUSUM, and CUSUM square. Accordingly, the results show that our model is stable; the fitted line is between the 5% percent significance values in both cases.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Different theories support the manufacturing sector's role as an engine for economic growth and structural transformation of the economy. However, the recent economic growth in Ethiopia is not accompanied by a significant improvement in the GDP's manufacturing shares. The role of the manufacturing sector for economic growth and structural change is very low. So this research tried to look at how different macroeconomic variables affect manufacturing sector value added by using time series data spanning from 1982 to 2018. ARDL (Bounds Testing Approach to cointegration) was employed to estimate the econometric model. The result from the Bound test shows manufacturing sector value-added has a long-run relationship with macroeconomic variables in the model. Accordingly, both the long-run and short-run models were estimated. Coefficients of the long-run model show the general inflation rate, exchange rate, and trade openness have a significant negative effect on the manufacturing sector value-added. The only variable that is found to have a significant positive impact on the manufacturing sector value added is general government expenditure. Besides, the Error Correction model shows 62.4% of any previous year's shock adjusts towards the long-run equilibrium of the manufacturing sector value-added. Furthermore, past year manufacturing sector value-added, inflation rate, exchange rate, government expenditure, and financial sector development are variables that affect the manufacturing sector value added in the short-run.

Based on the finding that inflation reduces MVA in Ethiopia, maintaining good macroeconomic performance by controlling the general inflation level must remain an active goal of government policies to promote the manufacturing sector value-added. Since the devaluation of domestic currency reduces manufacturing value-added, the government has to look for a policy alternative that promotes demand for domestic manufacturing products like promoting quality, strengthening the backward link of the sector to decrease its import-input dependency. Another important measure that should be taken by the government is supporting domestic firms through different incentives, like capacity building, tax incentives, and technical supports, to increase their competitiveness both in domestic and international markets. It will help to reduce the negative effect of openness to international trade on the manufacturing sector value-added. Lastly, promoting government expenditure will help to increase the manufacturing sector value-added. It can take place by encouraging government consumption expenditure on domestic manufacturing goods, infrastructure development, and building accountability and responsibility.

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