RELATIONSHIP BETWEEN EXPORT DIVERSIFICATION AND ECONOMIC GROWTH IN ETHIOPIA

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Abstract

Export diversification on economic growth has been a debatable issue in the empirical literature for a long time. This paper examined the contribution of export diversification on economic growth in Ethiopia using time series data from 1970/71—2013/14 based on purposive samples. National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MOFED), Ministry of Education (MoE) Ethiopia, National Metrology Agency of Ethiopia (NMAE), Central Statistics Authority (CSA) of Ethiopia and United Nations Conference on Trade and Development (UNCTAD) were the data sources. The research used both descriptive and causal type data analyses techniques. In the descriptive parts, the trend analysis of export diversification and real GDP were separately and jointly analyzed. Based on the result from descriptive analysis, the country has recently shown numerical increments. In econometric analysis, however, multiple regression and basic growth model were used. The estimation results obtained from the multiple regression test has revealed that export diversification positively affect Real GDP growth in Ethiopia. The major variables identified in the study were export diversification, rainfall, investment and financial development, trade openness of the country, human capital, and labor force growth. Necessary estimations were done on the effect of each variable on economic growth. The result had indicated that export diversification, rainfall and investment were found to be significant in affecting economic growth. Thus, the effort the country exerts to improve export diversification seems to pay dividends, even though it is still below the mid-level stage of diversification (50%). Likewise, positive link was found to exist between export diversification and economic growth in Ethiopia in which 0.14% effect on the economic growth come from export diversification. The country should look forward to identifying new potential regional and international export markets and to strengthening the existing industries in order to diversify the exportable products, as well as encouraging the establishment of new industries. Furthermore, emphasis should also be given (by the stockholders) to value addition on exportable items.

Keywords: *Export Diversification, Economic Growth, Growth Model, Ethiopia*

[1] This work is an abridged version of his Agricultural Economics Thesis submitted to St. Mary's University in 2015. The study was conducted under the supervision of Dr. Milkessa Wakjira.

Introduction

The issue of accelerated economic growth has been the main agenda in economic policy formulation for most of the Sub-Saharan Africa (SSA) and other developing countries of the world since the early 1970's. The records of the economic performance of most SSA counties exhibit that they had been performing better before their colonial independence than today (Rodney, 1982). Hence, considerable attention has been paid by a number of development economists and government policy makers to review the experiences of these countries in order to promote economic growth and improve their living standards of their people (Chen et al., 2005). One of the areas that have been given much focus in order to promote the economic performance of these countries is external trade (Asiedu, 2002; Damijan, Knell, Majcen, &Rojec, 2003). Following the traditional trade argument, (Riedel, 1984), trade is viewed as an "engine", if not as a "handmaiden", of growth playing a supportive role in the economic growth of the least developed countries (LDCs).

The economic growth of the present day developed nations like the United States, Canada, Australia and New Zealand (referred as regions of recent settlement) that were once developing nations is largely attributed to international trade (Gould, 2013; Scholtz, 2013; Salvatore, 1990). Hence, international trade has been given much importance in the policy formulation of many LDCs, viewing it as a vehicle to transform the economic performance of these countries (McCormick, 1999; Sachs & Warner, 1997).

Maddison (2007) and Mkandawire & Unies (2004) contended that International trade has also played a crucial role in the historical development of the third world countries. In the second half of the 20th century, the tremendous economic performance of the "four tigers"- South Korea, Taiwan, Hong Kong and Singapore has been largely attributed to the performance of the external sector where the export sector was given a greater emphasis (Mengistu, 2014; Debele, 2002). The researcher would also agree that strong political commitment towards export promotion and the application of appropriate policies together with efficient institutional mechanisms helped these countries attain a higher growth rate of exports and hence of the overall economy.

Ethiopia, like many other developing countries has actively pursued the import- substitution industrialization strategy during the Imperial and Derg regime (Alemnesh, 2012). The World Bank (1987) classified Ethiopia as one of the strongly inward oriented countries during the periods of 1963-73 and 1973-85, which coincides with the Imperial and part of the Derge regimes, respectively. However, the import substitution trade strategy hadn't performed well, where the import competing industries remained weak and were at their rudimentary stage despite the tariff and non-tariff protection (Cerny, Menz & Soederberg, 2005; McCarthy, 1994). With the fall of the Dergue regime, however, the current regime initiated trade liberalization in which export diversification is the major component of the program (Debel, 2002). Hence, the researcher contends, a closer look into the policies that were once followed by these governments and an empirical investigation to find out the contribution of exports to economic growth is very essential in order to help the country experience a sustainable economic growth.

Motivated by the desire to spread risks, raising capacity utilization and increasing total export proceeds, export diversification has been the concern of most developing countries including Ethiopia. Despite such a concern, however, Kawai (2002), Gooptu (1993), and Mortimore, & Peres-Núñez, (2001) argue that very few developing countries in East and South East Asia (such as South Korea, Taiwan, Hong Kong, Singapore, Malaysia and Thailand) as well as developing countries in South America (such as Brazil, Argentina and Mexico) have actually managed to achieve a diversified export structure with greater volume of manufactures.

Interestingly assertive, diversification and structural transformation play important roles in influencing the macroeconomic performance of low-income countries (LICs) (Dabla-Norris, *et. al.*, 2010; Hasse, 2006; Bonaglia & Fukasaku, 2003; Armella, 1993). These scholars strongly argued that increases in income per capita at early stages of development are typically accompanied by a transformation in a country's production and export structure. Katila & Ahuja (2002) also agreed that diversification and structural transformation as a mode of playing significant roles in influencing the macroeconomic performance of low-income countries can include diversification into new products and trading partners as well as increased in the quality of existing products. Similarly, the above scholars argue, diversification in exports and in domestic production has been conducive to faster economic growth in LICs. Denizer, Iyigun & Owen (2002), Easterly, Islam & Stiglitz (2001), and Ahmed & Suardi (2009) have taken the idea seriously in that increased diversification is also associated with lower output volatility and greater macroeconomic stability. In these scholars' accreditations, there is both a growth payoff and a stability payoff

to diversification, underscoring the case for paying close attention to policies that facilitate diversification and structural transformation.

The overall performance of Africa in terms of export diversification has been far from satisfactory and most countries continued to be totally dependent on a few traditional exports. As argued by the World Bank (2000), many African countries have lost market share in their traditional exports while at the same time failing to achieve significant export diversification in the past 30 years. Agreeably consistent is by Joshi, *et. al.*, (2004) in that such unsatisfactory performance given the region's huge potential for more diversified production and exports signify the existence of some constraints either on the supply or demand sides or both.

Although exports are important for growth and development for macroeconomic and microeconomic reasons, developing countries have been struggling with the challenge of expanding and diversifying their export baskets for a long time (Assayew, 2013; Salomon, 2010). Salomon argued that when export is concentrated on a few primary commodities, there can be serious economic and political risks, on the contrary; when it is diversified it can expand export and improve backward and forward linkages of domestic inputs and services.

In the case of Ethiopia, export diversification has been in the development plans for more than 40 years while the export structure remained fixed with greater concentration on few traditional exports such as coffee, hides and skins and oilseeds and pulses (Assayew, 2013; Samuel, 2012; Genet, 2008; Debel, 2002).The researcher strongly agrees that they are still dominant in the country's export structure accounting for about a lion’s share of total exports currently. In view of this important role of export diversification, it

is essential to examine the role of export diversification to economic growth of Ethiopia. This paper assesses the relationship between export diversification and economic growth in Ethiopia based on data collected from 1970/71 through 2013/14 in order to clarify the level of diversification of commodities in the export sector of Ethiopia, the role of export diversification on growth of gross domestic product, and to identify the major variables that affect Ethiopia's economic growth.

Research Methodology

The Research Method and Design

The fundamental research design of this study follows clear descriptive and causal methods of investigation under the quantitative approach of huge data stockpile. The descriptive research has been expected to answer questions of what and how much the sub-sector of real GDP attributed to economic development of the country. Again, the trend of export diversification and real GDP separately and jointly discussed in the descriptive method. The study also followed a causal type of research to show the cause-effect relationship between real GDP growth and export diversification in integrative and discrete measures. Optimistic and untailored trend analysis of basic growth model equation is used to identify the major variables that affect economic growth.

This study adopted a dominantly quantitative type design in which the method has been intended to reflect analytic results based on numerical data and its ideological output of the amassed numerical computation. Whereas, numerical data is dominant, the qualitative analysis—textual description, is intended to give a qualitative explanation and description of

the findings from numbers inferred and the intended variables. Historical narration form thick data use in the theoretical argumentation and concept exposition would be the cornerstone of the interwoven qualitative data analysis. Both methods are thought to be supportive and triangulative in each other to bring relevant data into functionality and come up with acceptable findings for the country's development.

Econometric methods, which is based on macroeconomic variables, were also applied to analyze the data in time series; however, in most developing countries, time-series data are non-stationary (Green, 2003; Chauvet, 1998; Stock & Watson, 1988). The authors agreed that estimation within such environment violates most classical econometric assumptions and resulting in a spurious regression. In the first model of the study that relate to export diversification and growth, ordinary least square (OLS) method was used with robustness checks, as data on all variables are expected to be stationary. Multiple regressions using ordinary least square estimation method are also used to assess the relationship among all the study variables.

Model Specification: Growth Model

As discussed in the vast of literatures, export diversification has a non-linear impact on growth (Miller & Pras, 1980; Klinger & Lederman, 2006; Dennis, 2007). Sometimes it is believed to be useful for economic growth; on the contrary, it hampers economic performance. Hence, this issue leads many researchers to investigate the non-linear nexus between export diversification and growth. In order to investigate the same issue in Ethiopia, this study employed the non-linear basic growth model to identify the study variable and multiple regressions to investigate the relation

between export diversification and economic growth, which is used by many empirical researchers. To examine the extent to which economic growth is related to export diversification, one can start from the basic growth model equation (Barro, 1991). The basic growth model can be specified as equation (3.1) below:

$$\Delta \boldsymbol{Y_t} = \boldsymbol{\beta} \Delta \boldsymbol{X_t} + \boldsymbol{\varepsilon_t} \quad \textbf{(3.1)}$$

Where:

$Y_t$is output (GDP)

$X_t$is the vector of explanatory variables

$\varepsilon_t$is error term

Δ is percentage change (growth)

$\beta$is coefficient of explanatory variables

t is time (year).

In order to capture the nexus between growth and export diversification, the basic growth model specified in equation (3.1) can be extended to equation (3.2).

$$\Delta Y_t = \alpha_0 + \alpha_1 ED + \alpha_2 \Delta X_t + \varepsilon_t \quad \textbf{(3.2)}$$

Where:

$Y_t$is output (GDP)

ED is export diversification index

$X_t$is the vector of explanatory variables

$\varepsilon_t$is error term

Δ is percentage change (growth)

$\alpha_0$is intercept

$\alpha_i$is the coefficient of explanatory variables and t is time (year).

A common problem of numerous empirical studies on growth is that they do not produce an exact list of explanatory/control variables in the model. Solow (1956) and Swan (1956) who developed the first neo-classical models of growth, take investment and the rate of growth of population as explanatory variables in their growth model regression equation to show that an increase in investment together with a decrease in population growth promotes economic growth. A Neo-classical growth models consider technology as exogenous factor that determine the growth rate of output in the economy.

New growth theory formally incorporates technology and human capital as determinants of growth. Research and development (R&D) model explains how technology evolves over time, by considering technology as endogenous variable. Human capital models emphasize on the importance of human capital to growth, in addition to physical capital (Romer, 1996). International trade theory proposes to include openness of the economy in the growth regression, which is positively related to growth. Furthermore, nowadays financial development is considered as important for economic growth (Barro, 1991).

Based on the theoretical illustrations in the context of developing countries, the model of this study include the following explanatory/ control variables: investment, population growth as a proxy for labor force growth rate, human capital, openness of the economy and financial development. In addition, since moderate amount of rainfall, which is not too low or too high, results in a good agricultural output harvest, the absolute value of mean deviation of rainfall is included as explanatory variable.

The model specification of this study resembles with the model of Khan and Senhadji (2001), Mubrik (2005), Osama (2004), and many others. Thus, based on the authenticity in empirical literature on growth the equation of the model is given as:

$$\Delta Y_t = \alpha_0 + \alpha_1 ED + \alpha_2 \Delta HC_t + \alpha_3 \Delta FD_t + \alpha_4 R_t + \alpha_5 \Delta I_t + + \alpha_6 \Delta LF_t + \alpha_3 \Delta Ot + \varepsilon_t \ldots . \textbf{(3.3)}$$

Where:

$Y_t$is growth rate of real GDP;

ED is export diversification;

HC_t is growth rate of human capital;

LF_t is labor force growth rate;

$I_t$is growth rate in investment;

Ot is the growth rate of openness of the economy, which can be proxied by the ratio of import and export to GDP (i.e. (Export + Import)/GDP);

FD_t is the growth rate in financial development, which is proxied by growth rate in domestic private credit expansion;

R_t is absolute value of mean deviation of rainfall;

Δ is percentage change (growth),

t is time (year) and $\varepsilon_t$is the error term.

Based on theoretical hypothesis, all variables except export diversification and the absolute value of mean deviation of rainfall are expected to have positive coefficients in the above equation. Due to the unclear conclusion about the relationship between export diversification and output growth in theoretical and empirical literatures, the present study was designed to address the relationship.

Sampling, Data Description and Data Sources

The study used available data executed from selected governmental organizations to investigate the economic contribution of export diversification to the economy in Ethiopia. For the analysis of a data base, the intended scope of the research was set for the period between 1970/71 and 2013/14, because data are accessible in carefully organized form from those institutions under focus. That is, large but secondary data was available in the time period ranging from 1970/71 to 2013/14. The major data sources for the problem under investigation were publications of the National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MOFED), Ministry of Education (MoE), National Metrology Agency of Ethiopia (NMAE) and Central Statistics Authority (CSA) of Ethiopia. Besides, data were extracted from the United Nations Conference

on Trade and Development (UNCTAD) data base. To estimate the models and to make inferences, the required data were collected on necessary macroeconomic variables for Ethiopia running from 1970/71 to 2013/14 on annual frequency according to Gregorian calendar. The full description of the variables and the data source are presented in the following table:

Table 3.1: Sources and Description of the fundamental Variables of the Model

Variable	Definition	Unit	Source
Y	Real Gross domestic product	Million Birr	MoFED /own computation
I	Investment	Million Birr	MoFED
ED	Export diversification	Concentration Ratio	UNCTAD
Lf	Laborforce growth rate	Head count	CSA
HC	Human capital	Head count	MoE
FD	Financial development	Million Birr	NBE
O	Openness of the economy	Million Birr	MoFED
R	Rainfall	Milliliter	CSA/NMA

Results and Discussion

Descriptive Analysis

Export Diversification in Ethiopia

When the value of export diversification states as 1 (100%) diversified, it clearly shows that the county is exporting single product, whereas the value of export diversification formulated for numerical value near to zero, the country is exporting many types of product to the rest of the world. So, the measurement of export diversification ranges from one to zero. More

precisely, the more concentrated the export is the more the square of the shares each exported product approaches one. If there is only one export commodity, for example, the share will be one and the summation of the square of one will be one. On the other hand the less concentrated the market is the smaller the share of the largest firm which will mean that the square will even be smaller as the share is less or equal to one. Therefore, the sum of the square of the shares will be very small and close to zero. This means the market is not concentrated. The numerical value of commodity concentration coefficient from UNCTAD data base had shown an average level of 65.16%, 61.44%, 62.33% and 55% for the last four decades from 1970-2013. This numeric values indicate that export diversification level of the country is low because the value of export diversification stated in figure 4.1 below approach to one by considering the diversification measurement ranging from one to zero as the researcher stated above. Figure 4.1 has shown that the diversification index is approaching to zero in the years from 2001-2013 as compared from the remaining decades that showed the country had taken minimal effort to make its export diversified. But the effort of the country is still below 50% (mid-level diversification index). In the last decade export diversification was showing considerable increment as compared with the last three decades which might come from government sound policy, like availability of more credit facilities for export trade and for establishment of new industry, export promotion and import substitution strategy of the government, foreign direct investment, value-adding effort the exporter and many other policy measures taken by the government to the export trade.

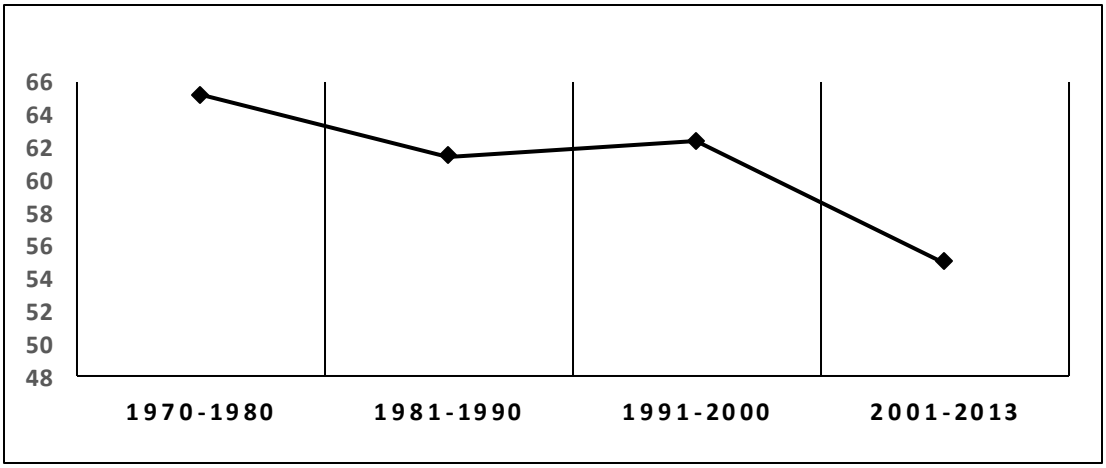


Fig. 4.1 Trend of export diversification for the last four decades.

Source: UNCTAD, 2015

Trends of Real GDP

As an agrarian economy for many years, the Ethiopian economy was dominated by agriculture sector. The agriculture sector was mainly dependent on natural factors and thus performed well in the season in which the climate is favorable. Due to the dominant role of agriculture, the Gross domestic product (GDP) followed the same variation with agricultural output.

In the first decade of the 21st century, the economy performed well relative to the previous consecutive decades. The growth rate of GDP at the constant price with growth rate of sub-sectors from 1999/00 to 2013/14 is presented in figure 4.2. Following the moderate growth rate in first three years of the decade, the growth rate of GDP reached a negative value of 2.2% in 2002/03, which was mainly due to the fall in agricultural output associated with the then drought. In the same time period the growth rate in agricultural output dropped by 10.5%.

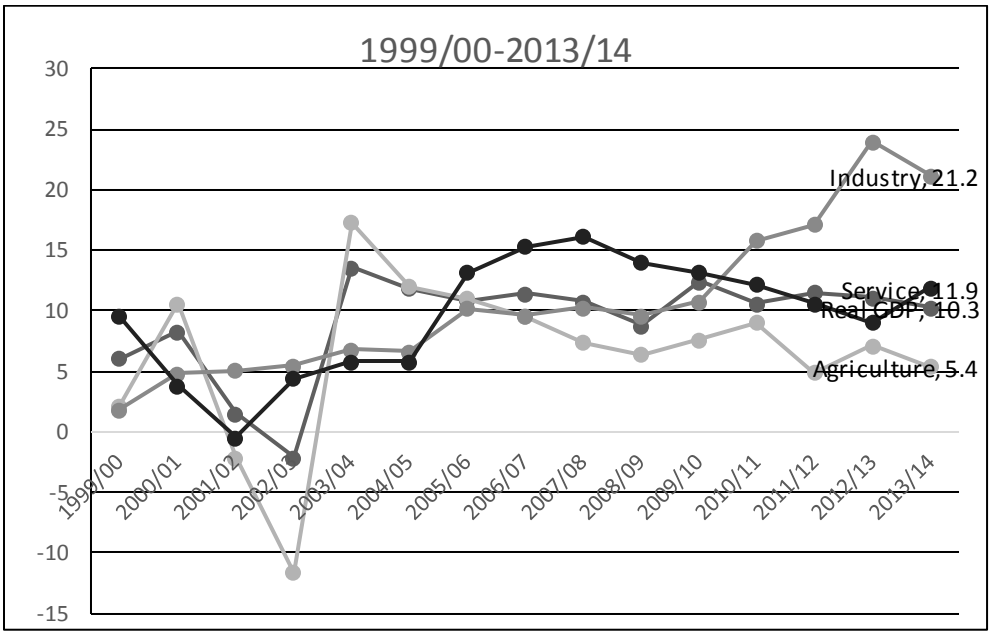


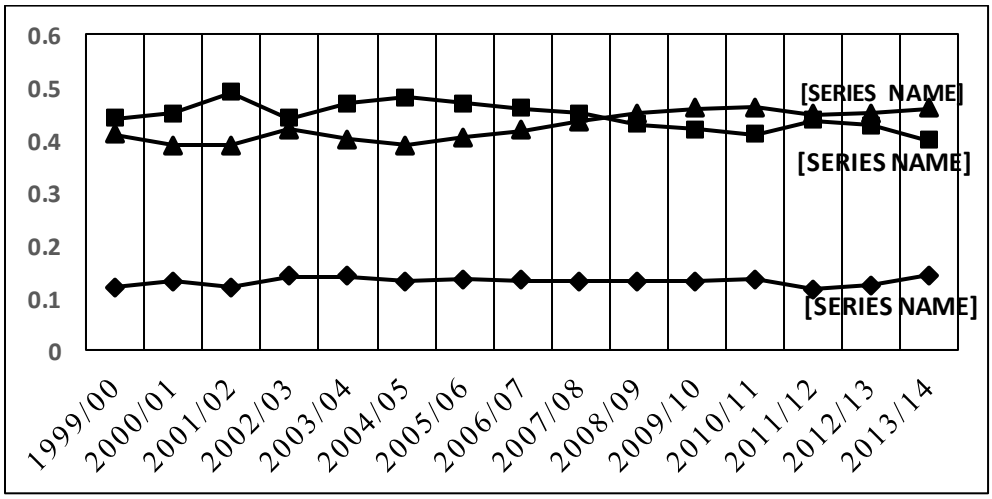
Figure 4.2: Growth Rates of GDP and sub-sectors output at Constant Basic Prices (%)

Source: own sketch from MoFED 1999/00-2013/14.

After 2002/03 fiscal year, GDP increased by double digit except for the year 2008/09. In the considered period, the average growth rate of GDP was 8.5%. The growth rate of agricultural output, industrial output, and service sector was 6.6%, 8.8% and 10.5%, respectively. During this period, the service sector had shown a better performance than other sectors. Recently, the salient feature of the economy has been changed as the agriculture sector ceased to be the largest sector in the economy for the first time in Ethiopia's history. As it is clearly observed from figure 4.2, the growth rate in agricultural output continuously declined after 2003/04 fiscal year. After 2004/05 fiscal year, the growth rate in service sector started to be greater than the growth rate of agricultural output. Furthermore, in 2005/06, the growth rate in industrial output started to be

higher than the growth rate of agricultural output. Consequently, the dominant role of agriculture for the economy declined.

For many years, the agriculture sector had a lion's share of the GDP in the Ethiopian economy, which almost covered 50% of GDP. However, the service sector, which covers real estate, hotels, transportation, communication, banking, health and education, took the highest share form GDP staring from 2007/08 fiscal year. The industry sub-sector remained to cover the lowest share as previous periods. Since 2009/10 real GDP shows double digit growth, the industry sub-sector growing alarmingly with 11%, 16%, 17%, 24% and 21% rate for the last five years and agriculture continuously declining in recent years, as shown in figure 4.3 below.



Legend: 1 = Service 2 = Agriculture 3 = Industry

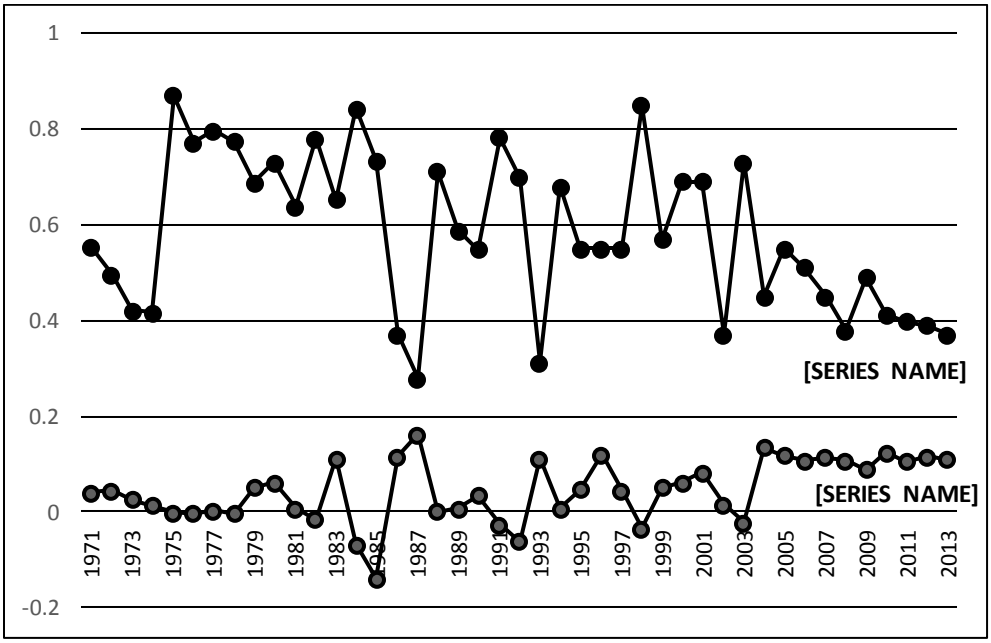
Figure 4.3: Percentage share of sub-sectors from GDP at Constant Basic Prices (%)

Source: own sketch from MoFED 1999/00-2013/14.

Prior to the physical year 2007/08, the agricultural sector took the largest share of the GDP, but starting from year 2008/09 the service sector took the lion's share of GDP. The industry sector is still contributing a small fraction of the GDP. This could be one the reasons for less diversification of the country's export.

Trends of Real GDP and Export Diversification

There was an inverse relationship between export diversification and GDP growth. As the figure below illustrates, growth rates in GDP remained low in 1970s with the average value of 1.9%. During the same period export diversification was 65.16%. In early 1970s export was highly diversified due to the fact that the Derg regime was adopting ten years perspective plan to reducing dependence of the country's export sector on limited export markets, increasing the amount and composition of manufactured exports and increasing the socialization of the export sector (Provisional Military Government of Socialist Ethiopia, 1985). In the 1980s, the average growth rate of GDP was 2.5% and the level of export diversification was 61.44%. In 1985, the level of export diversification was approaching one and the growth of real GDP was negative, which was associated with the then country-wide famine. In 1986 and 1987 the growth of real GDP was satisfactory and export was highly diversified which witnessed a positive relation between economic growth and export diversification (Fig. 4.4).



Legend: 1 = Growth rate Real GDP 2 = Export Diversification

Figure 4.4: Trends of real GDP growth and export diversification, 1971-2013

Source: own sketch from MoFED different physical years report and UNCTAD, 2015.

For the remaining two decades the level of export diversification has shown improvement and the growth of real GDP also has shown incremental over most years. To draw a conclusion on the relationship between export diversification and economic growth in Ethiopia in the last four decades, it is possible to say that when the export is diversified (approaches to zero) the economy has shown improvement.

Econometric Analysis

Unit-Root Tests

In order to avoid the possibility of ending up with spurious or nonsense regression results, it was vital to test the stationary behavior and determining the order of integration of variables in time series analysis. To test the time series for stationarity, the Augmented Dickey-Fuller (ADF) test is conducted. The test has a null hypothesis of the presence of unit root (Non-Stationary) against the alternative hypothesis of the absence of unit root (stationary) in series of data. The ADF test was applied on ADF equation, which only includes drift (constant) term. The appropriate lag length in auto-regressive representation of variables in ADF test is selected based on the result of Akaike information criterion (AIC).The ADF test is conducted on all variables included in the estimation of multiple regression equation. The result rejected the null hypothesis of the presence of the unit root for all variables. Instead, it is worth to notice that all variables except Export diversification and rainfall are the growth rate (Percentage change) of the variables. Therefore, rainfall and export diversification index are integrated order zero (I(0)) while the other variables are integrated order one (I(1)). The test result implies that these variables are suitable for meaningful regression analysis without the panic of getting spurious result.

Multiple Regressions (OLS) Result

In this section, the result of multiple regression analysis is presented and analyzed in order to explore the contribution of export diversification index to real GDP growth in Ethiopia. According to Gujarati (2004), regression analysis deals with the study of the dependency of one variable, the

dependent variable, on one or more variables, the explanatory variables. Although regression analysis reveals the extent of dependent variable on independent variable, it does not necessarily indicate the causation extent or direction. Thus, one needs to depend on theories in order to define the direction of causation between variables.

The multiple regression equation can be specified as;

$$\Delta Y_t = \alpha_0 + \alpha_1 ED + \alpha_2 \Delta HC_t + \alpha_3 \Delta FD_t + \alpha_4 R_t + \alpha_5 \Delta I_t + + \alpha_6 \Delta LF_t + \alpha_3 \Delta O + \varepsilon_t \ldots \textbf{(4.1)}$$

Where:

$Y_t$is output (GDP)

ED is export diversification index

$X_t$is the vector of explanatory variables

$\varepsilon_t$is error term

Δ is percentage change (growth)

t is time (year)

After cleaning the raw data, Ordinary Least Square (OLS) regression, which includes the aforementioned dependent variable and independent variables, were estimated using STATA 12. The regression result is presented in the following table below.

Table 4.1: Regression estimate of the study

variables	Coefficient (-alpha)	SE (Standard error)	P>t P-value
ED	-.0013521	.0005574 -2.43	0.021
R	.0000656	.0000278 2.36	0.024
Δ (pg)	.0063625	.0087979 0.72	0.474
Δ (gpcr)	.04884	.0303601 1.61	0.117
Δ (gi)	.0626311	.0300283 2.09	0.044
Δ (go)	.0019623	.0228354 0.09	0.932
Δ (gh)	.0526051	.0518207 1.02	0.317
Constant	-.0015562	.0629436 -0.02	0.980

F(7,35)= 11.36

R-square=0.6944

Agj R-square=0.6332

Prob>F=0.000

In order to test the significance of independent variables in the model, t statistics with P value was computed which can help to test the null hypothesis that the coefficient of independent variable is zero or insignificant. Among the explanatory variables export diversification index, rainfall and investment were found to be statistically significant at 1% level f significance, as the probability of t statistics implies the rejection of null hypothesis. The parsimonious model that only includes significant explanatory variables can be expressed in equation form as follows;

$$\Delta Y_t = -.0015562 + -.0013521ED + .0000656R_t + .0626311\Delta I_t + \varepsilon_t \quad \text{..... (4.2)}$$

So as to test the overall significance of the model the F test is estimated. The test has a null hypothesis of no difference between the model with only a constant and the model with independent variables. Based on the result reported on the above table, the null hypothesis of the F test is rejected, which implies the overall significance of the model at 1% level of significance.

The above significant variable show there is positive relation with value of real GDP, but it may be questionable since the sign of export diversification is negative. The negative sign shows that diversification of exported product increases when the value of export diversification approaches to zero. R2, which indicates the goodness of fit of the model, is found to be 69.44%. It means that 69.44% variation in real GDP is explained by the explanatory variables. The unexplained variation accounts 30.56% in the model. In our analysis, the percentage absorbed in the error tem is tolerable which may come from the omission variables like consumption level and government expenditure in analysis.

Multicollinearity Test

One of the import assumptions of OLS is the absence of highest level Multicolinearity among the independent variables. In order to check the level of multicollinearity among independent variables, Variance inflation factor (VIF) was computed. As per UCLA (2015), if VIF is greater than 10 and 1/VIF (tolerance) is lesser than 0.1 it indicates the existence of multicollinearity among predictor variables. The estimated Variance inflation factor (VIF) for this study is reported in appendix c of the thesis. The result shows that the Variance inflation factor (VIF) is lesser than 10

and (tolerance) 1/VIF is greater than 0.10 for all independent variables, which confirms the absence of multicollinearity among the independent variables.

Normality of the Residual

One of the assumptions of OLS regressions is the normality of the residual generated from the estimated regression equation. In this study, the residual was predicted from the estimated regression equation, which is presented in the previous sub-section, in order to test the normality of the residual. The normality of the predicted residual was tested for normality using two Caliber tests of normality, which are Kernal Denisty plot (Kdensity plot) and Shapiro Wilk (Swilk) W-test, as recommended by UCLA (2015).

A Kdensity plot shows that the plot of distribution of residual against normal distribution was generated. As Kdensity plot clearly reveals, the distribution of residual doesn't deviate by far from the normal distribution, which may confirms the normal distribution of the residual generated from the estimated regression. In order to confirm the normal distribution of the residual, another, called Swolk test, which has a null hypothesis of normal distribution, was estimated. The estimated Shapiro-Wilk W test for normal data z value is 0.12292. Since the test has a null hypothesis of normal distribution, the above test shows that one cannot reject the residual as it is normally distributed since the p value (0.12) is greater than 5 percent level of significance.

The last assumption of ordinary least squares (OLS) regression is the homogeneity of variance of the residuals. In this study, the fulfillment of this assumption was tested using Breusch-Pagan / Cook Weisberg test for

heteroskedasticity, which has a null hypothesis of constant variance. The estimated Breusch-Pagan / Cook Weisberg test has a value of 0.3742. Since the p value of the test (0.3742) is greater than 5 percent level of significance one cannot reject the null hypothesis, which states constant variance (Homoscedasticity).

Model specification Test

A model can be called wrongly specified if one or more relevant variables are omitted from the model or one or more irrelevant variables are included in the model (UCLA, 2015). Specification error in the model needs to be investigated as it can affect estimates of regression coefficient. In this study, link test is used to check if there is specification error. This test assumes that if one model is correctly specified it is not possible to find any additional independent variables that are significant, except in rare cases. This test generates two additional variables that can be called the variable of prediction (_hat) and the variables of squared prediction (_hatsq). The test runs regression by considering the above two variables as independent variable and if variable of squared prediction is found to be significant one can conclude that there is a specification error, or otherwise. The estimated regression used test specification error through link test is presented as follows;

Table 4.2: Model specification test

ΔY**(grgdp)**	**Coef.**	**Std. Err. R**	**P>t**
_hat	1.050214	.1732955 6.06	0.000
_hatsq	-.6476251	1.780754 -0.36	0.718
_cons	.0009131	.0078068 0.12	0.907

As revealed on the above table, the variables of squared prediction (_hatsq) is found to be insignificant, which indicates the absence of specification error. This result implies that there is no omitted relevant variable or no included irrelevant variable.

Interpretation of the Model

As the estimated regression is proved to be valid through various tests, it indicates the possibility of drawing inference from the result. Export diversification index, rainfall and investment has got significant variables, whereas the regression result also shows that, trade openness, financial development, human capital and labor force as insignificant variables. Thus, variables that are found to be significant in the model in affecting economic growth in Ethiopia are discussed as follows based the multiple regression result found in the above:

$$\Delta Y_t = -.0015562 + -.0013521ED + .0000656R_t + .0626311\Delta I_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots \textbf{(4.3)}$$

I. Export Diversification Index

The results of regression had shown that this variable has a significant differentiating power with respect to real GDP growth rate in the country. It is one of the powerful variables having a positive relationship with the economic growth. The sign of the coefficient for export diversification in the above equation is negative, which showed that the value of export diversification increases when approaching to zero or decreasing. The negative sign does not indicate the relationship between export diversification and real GDP. The regression result about export diversification and economic growth agreed with theories discussed in vast

literatures of similar studies in that export diversification contributes to growth in a country. But, it contradicts with Ricardo's theory of comparative advantage about international trade. Ricardo laid emphasis on the role of specialization in international trade and increases total productivity. According to him, export can promote economic growth by specializing in sectors in which a country has a comparative advantage.

The main advantage of export diversification which has been put forward by economists is that it tends to increase economic growth in the host economy. There are two essential questions that the literature on the relationship between export diversification and economic growth has tried to answer: first, does export diversification affect economic growth? And secondly, can a country boost its economic performance by diversifying its exports? The result shows that export diversification affects economic growth and Ethiopia can boost its economic performance though diversifying its export. The finding empirically compared with different studies in different countries. Gutiérrez de Piñeres and Ferrantino (2000), in their study of Latin American countries, found that there was a positive interplay between export diversification and economic growth. Some examples of countries that experienced considerable diversification of their exports and a fairly strong growth performance were Chile, Colombia, El Salvador, Paraguay, the Pluri-national State of Bolivia and Uruguay. Similar results were also uncovered by Hammouda *et.al.*(2006) with respect to African countries. Levin and Raut (1997) concluded that there may be a positive and considerable impact on economic growth when a country's total exports consist of a higher proportion of manufactured exports. Structural models of economic development suggested that,

countries should diversify from primary exports into manufactured exports in order to achieve sustainable growth (Chenery, 1979; Syrquin, 1989). Again Michaely (1977) founded a positive and significant link between exports diversification and economic growth only among the more developed economies. But this was not the case among least-developed countries. However, in this study, a positive and significant relationship was obtained under Ethiopia's condition (one of the LDCs).

I. Rainfall

As can be seen from the regression result, rainfall has a positive and significant relationship with the real GDP growth, implying that when the annual rainfall is satisfactory for production in the country, the real GDP is expected to increase. The lion's share of real GDP comes from agricultural sector in Ethiopia, which in most part is dependent on rainfall. Similar results were obtained with the study of other researchers. For example, rainfall was a significant variable as Barrio (2008) concluded that rainfall trend affect economic growth in Sub-Saharan countries, but no relationship found for other developing countries. Odusola and Abidoye(2015) had concluded that a percentage change in rainfall lead 6.7 percent change in economic growth. Empirical analysis, using data from Ethiopia, had shown that a deviation from long term mean annual rainfall and erratic distribution of rainfall within a year adversely affect economic growth (Seid, 2012).

II. Investment

There is a general agreement among countries that the process of economic growth and investment is closely interconnected. Both neo-classical and Marxist economists have placed main emphasis on capital accumulation as

the engine of economic growth. The multiple regression result clearly supports the theory indicated above in that investment has a positive and significant relationship with real GDP growth.

Conclusion

This study examined the contribution of export diversification in Ethiopia by investigating a number of practical issues empirically based on historical data that spans from 1970 to 2013. Basic growth model and simple multiple regression analysis were used to assess the extent the major variables contribute to economic growth for the last 43 years in Ethiopia. Descriptive analysis was used to assess export diversification and the trend of real GDP in Ethiopia. The study had revealed that the country had exerted a lot of effort to improve export diversification, but still fall far below the mid-level of diversification (50%) although the real GDP had shown an increasing trend in recent years. According to econometric analysis, export diversification, rainfall and investment were significant in contributing towards economic growth. Nevertheless, the contribution of variables, such as human capital, labor force growth, financial development and trade openness were insignificant. Interestingly, it could be argued that the positive link found between export diversification and economic growth in Ethiopia in the present study is very much the result of sound government policies. The incumbent government has served to create conducive environment for the private sector to operate in and accordingly diversify its export base across various industries.

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