What is the Economic Impact of Development Aid?

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Abstract – **Foreign aid inflows have grown significantly in the post-war period. Many studies have tried to assess the effectiveness of aid at the micro- and macro-level. While micro evaluations have found that in most cases aid 'works', those at the macro-level are ambiguous. This paper investigates the impact of foreign aid on economic growth in Ethiopia using time series data for the period 1981 to 2015. The main objective is to identify the relationship that aid has with the developmental path of the country and whether one can reasonably link outcomes to aid inputs.**

To this end, the study used the production function initiated by Solow-Swan model and cointegration analysis the study is able to demonstrate the existence of long-run relationship between the official development assistance and economic growth of Ethiopia. The study found that there is negative relationship between ODA and economic growth and tend to be postive in the long run.

Keywords – **Economic Growth, Official Development Assistance, Cointegration Analysis.**

I. INTRODUCTION

Development aid, for this study, is referred to the official Development Aid (ODA[1]) where it is commonly defined according to Organization for Economic Cooperation and Development as "financial flows, technical assistance, and commodities that are designed to promote economic development and welfare as their main objective and are provided as either grants or subsidized loans". The history of development aid goes back to the post-World War II era that aims to improve and bring economic growth to those underdeveloped nations. The Marshall-Plan[2] targeting to reconstruct the war-torn economy of western Europe can be mentioned.

In recent years, aid to developing countries has increased massively and they receive billions of dollars per year in the form of aid from donors. The conclusion on aid effectiveness is doubtful among economists, found to be inconclusive, and has been a controversial subject for years. Various time series and cross-country studies have come up with different results and different policy inferences. While some scholars point out the importance of good governance in order for recipient countries to benefit from aid, others highlight the lack of trust in aid, that is, whether foreign aid has a positive correlation towards recipient country's economic growth. Foreign aid is a subject of an on-going debate that has led to diverse outcomes (Rajan et al, 2005).

A very important question nowadays is that does aid really work? if it does not really work, the justification is that there is no reason to provide aid, it would be withheld and at the extreme aid agencies should be closed down. The argument is also extended how far is official development aid effective and how is possible to see its impact at macro level (Riddell. 2014).

One argument that usually come into the mind of researchers who studied the effectiveness of aid is that there should be a mechanism to look at the after and before or with and without. In other words, the correct economic approach to capture aid-effectiveness is the difference between actual macroeconomic performance observed with aid program and the performance that would have been expected in the absence of such aid. To understand the impact of an action on an event, the basic question that requires being answered is that what would have happened to the event if an action did not take place given that all other circumstances are kept the same (Haque et al, 1998).

There is a very significant increase in the development aids, but the economic growth achieved by many developing countries in general has not been satisfactory. Thus, the actual macro impact of foreign aid on economic growth has been an area of controversy.

Ethiopia has been one of the major recipients of international aid since the imperial regime but there has been less economic growth and poverty remain inherent for many years in spite of the notable donor interventions in the country's economy (Geda et al, 2011).

Generally speaking, poor countries lack the domestic resource to finance investment and capacity to import technology and capital goods, as a result aid is traditionally considered helpful to fill the gap that developing countries usually experience. The case for Ethiopia is not different from those cases. The ability of the country to improve the level of investment and promote economic growth with the domestic capital sources and private capital flows is not sufficient enough (Gomanee et al. 2005).

Most of the research exploring the causality relationship between official development assistance and economic growth are done using cross-sectional method and wider in scope but this paper will attempt to see the impact of ODA on the economic growth of Ethiopia over extended periods of time because, it is believed that each country is unique, the role of aid can be understood best through careful analysis of individual countries. Finally, the study will be extended to include the current dominating debts on the effectiveness of aid mainly the "Big Push" of Jeff Sachs[3] or "Dead Aid" of Dambisa Moyo[4] among others. To be more

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[1] Also can be defined as financial aid provided by governments and other agencies to support the economic, environmental, social and political development of those developing countries.

[2] Officially the European Recovery Program, ERP, American initiative to aid Western Europe rebuilding war-devastated regions, remove trade barriers, modernize industries, make Europe prosperous again and prevent the spread of communism

[3] Jeff Sachs' new book "The End of Poverty" (2005) advocates a big-Push" featuring large increase in aid to finance a package of complementary investments in order to end world poverty.

[4] Zambian born international economist and author where her first book was "Dead Aid: Why Aid Is Not Working and How There Is a Better Way for Africa(2009)"

specific, the study will attempt to assess aid history of Ethiopia and its relationship with economic growth viz-a-viz "dead Aid" of Dambisa Moyo.

II. Literature Review

1.1. *What is Development Aid*

According to the Development Assistance Committee (DAC) of the OECD, official aid or ODA refers to:

"… Grants and loans to developing countries and territories which are: (i) undertaken by the official sector of the donor country; (ii) with the promotion of economic development and welfare in the recipient country as the main objective; and (iii) at concessional financial terms i.e. if a loan has a grant element of at least 25 per cent. This generally accepted definition excludes concessional flows of private voluntary organizations and official flows with little or no concessionality. Grants, soft loans and credits for military purposes are also excluded.........."

The aforementioned definition shows that foreign aid is always a free resources transfer, it rather arrives with both political and economic conditions. In many cases, official donors necessitate that recipient countries to made structural reforms or policies that the donors think those reforms promote economic growth or development. For instance, following the economic and debt crisis of the developing world in the 1970s and 1980s, the major donors, WB and IMF made major change in aid policy to these least developing countries in crisis. They change their main principle towards more conditional assistance and recommend a reform called Structural Adjustment program (SAP). However those conditionality has been the main sources of controversies where some scholars led to argue those conditionality introduced by the institutions have been counterproductive and affected negatively the economic growth and development of the recipient countries.

As The term foreign aid[5] is defined by (M. Kim 2006) "It refers to any money or resources transferred from one country to another without expecting full repayment, and includes all grants and concessional or soft loans made with the intention of fostering economic development. However, it does not include private foreign direct investment, nor preferential tariff reductions to Less Developed Countries (LDCs) enabling them easy access for their exports into the markets of More Developed Countries." Among others the preferential trade arrangements with colonies can be mentioned. Europeans were big colonizers and now a day it involves important trade relation where the main export destination for the colony's traded goods are named as mother country's market. Many scholars and policy makers in the 1960s and 1970s believed that rich countries could help poor countries develop by granting unilateral preferential tariff treatment for poor nation industrial exports. This conception was brought in to the GATT, later

WTO rules as Generalized System of Tariff Preferences, GSP[6]. But all those and other preferential trade arrangements are not considered as development aid or foreign aid.

As for the sources of aid, foreign aid can be public development assistance and private development assistance where public development assistance are official development assistance and private development assistance includes individual government assistances (are sometimes called bilateral aid) and aid by multilateral agencies. Besides, foreign aid can be development aid or emergency assistance. Development aid contains project aid, program aid and technical assistance whereas emergency assistance is intended to provide temporary relief from the effects of natural disaster and other destructive man made events like war rather than stimulating economic growth and development. Therefore, the impact of aid is dealt with degree to which development aid promotes investment in physical and human capital in aid recipient countries.

1.2. *What is the Fact on the Ground*

Nowadays the issue of aid effectiveness which is intended to show whether development aid really works or not receives very huge attention by researchers and divided them in to two main sorts: those who believes aid stimulates economic growth of recipient countries on the one hand and development aids are failing to increase the economic growth of the poor countries on the other side. But generally it seems conclusive in the sense that at the micro-based evaluations, aid works whereas at the macro level many studies yielded ambiguous results, often failing to find significant growth effects. This conflict is what Mosley (1987) refers to as the *'micro-macro paradox'*. The explanations for this continue to be undistinguishable but the econometric aid-growth literature has been criticized on several grounds including sample size and, data quality, econometric technique, specification and other related issues. More explicitly, the inconclusive literature on aid and economic growth was debatable in sense that the result is hampered by the limited availability of data during 1960s, 1970s and 1980s (W. easterly, 2003,).

As it is clearly articulated in the study of 'doubling aid making the big push to work' by UNCTAD "The origins of modern aid can be traced to the colonial period. Precisely, the British Colonial Development Act of 1929 provided for grants and loans to colonial governments to meet their infrastructural needs as well as enabling them to pay for imports. The emphasis only began to change with the shift in international political and financial leadership from the old colonial powers, both at the global and local levels, allowing aid to acquire a more purposeful development rationale. This rationale was initially advanced by the Bretton Woods Conference, which institutionalized the logic of multilateral economic rules and financial support, the success of the Marshall Plan. The objective of both the Marshall Plan and the newly formed World Bank, however,

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[5] Foreign aid to be considered as aid, it need to meet two criteria that is it should be non-commercial from the donors point of view and should be concessional or softer loans so that interests and repayments are less stringent.

[6] The EU was the first to implement a GSP scheme, in 1971 , and it now grants GSP preferences to almost every developing nation in the world. Everything But Arms, EBA was the most common form of GSP where least developed nations are granted zero tariff market access for all their products except arms.

was the reconstruction of war-torn Europe and not the development of the poor, non-industrialized, developing countries……".

The following table clearly summarizes the main ideologies and focuses of the dominant institutions granting aid to those countries who need it and the types of aid granted starting from the early 1940s to the present. As it is discussed in the above paragraph taken from the UNCTAD study, in the beginning of aid history the main focus of the donors was to reconstruct the war torn Europe and later donors diversify their rationale behind helping developing countries with time. For instance; in the 1950s, USA was granting development assistance to countries in order to create alliance against the expansion of communism. The Structural Adjustment Program (SAP) can be also mentioned which was focused to make market based macroeconomic reforms by developing countries. This was considered as a conditionality to get foreign assistance and/or debt forgiveness from the developed world.

[INSERT TABLE 2.1: Schematic overview of main developments in the history of foreign aid]

1.3. *Ethiopia Economic Growth and Aid*

As it is stated by Cherkos M. (2016), the economy of the country is growing with time with the exception of the early 2000s. In the early periods, the economy growth declines and reaches a negative figure in 2003. These decline in the growth are mostly associated with Ethio-Eritrea war which caused a lot of damages in human life as well as in materials. However, the economy started to grow in an increasing rate which is about 11.7% in 2004 and showed a positive growth for the consecutive 10 years ranging from 8.7 % in 2012 and 13.5% in 2011. This consistent and promising growth has enabled the country to maintain an average annual economic growth rate of 11 percent over the last 12 consecutive years between 2003/04 and 2014/15.

However, the high import intensity of the economy, limited capacity to produce capital goods, low levels of domestic savings and limited capacity to generate foreign exchange are considered to be the bottlenecks to the development effort of Ethiopia. All these factors have provided an apparently objective justification for the huge inflow of foreign aid. Consequently, foreign aid has been playing a critical role in the development efforts of Ethiopia since the 1950s. Like the case for all poor countries, development aid has been flowing to Ethiopia since the mid-20th century. Those development aid are considered as the means to finance deficits, filling the trade gap, saving gap by expanding the level of investment of the country.

Aid has played a major role in Ethiopia's development effort since the end of World War II. It has been instrumental in bridging the country's savings- investment and foreign exchange gaps. Its importance as a source of financing for the development of capacity building (human capital, administrative capacity, institutional building, and policy reforms) is also unquestionable. Thus, increasing efforts were made to mobilize foreign aid in the last two regimes. Following the change in political regime in 1991 and the adoption of the structural adjustment program in 1992/93 in particular, the country has enjoyed a significant amount of aid (Alemu 2009).

Nowadays, Ethiopia has been one of the major recipient of international aid. According to the OECD-DAC Statistics, Ethiopia has received a net official development assistance of US $2.03 billion in 2006 making the country the 4th largest recipient from the African countries next to Nigeria, DR Congo and Sudan. In absolute term, ODA to the country has averaged around US$3.3 billion over the last nine years (2006 – 2014). Figure 2.2 shows the trend of development aid to Ethiopia for the recent 35 years. The trend is increasing slowly in the 1980s and early 1990s and started to decline during the period of war with Eritrea. As discussed in the above, the country has enjoyed a very increasing foreign assistance after the adoption of Structural Adjustment Programs of the world dominant financial organizations, IMF and WB.

1.4. *What do Previous Studies Tell us about Aid and Growth?*

In this section a survey of previous studies is made to establish the inconclusive nature of the existing empirical evidences both in a country wise and across group of countries and to justify the need for another empirical study on the same subject area. A lot of empirical works have been made to examine the relationship between development aid and economic growth of recipient country complemented by case study evidence at project levels. But the result of those various studies are found to be mixed where some researchers conclude there exist positive relationship, while others found a negative association and others still concluded neither negative nor positive correlation between the two variables.

The aid-growth literature is subjugated by cross-country studies of growth regression and has also been criticized for methodological problems. Those cross sectional studies on the relationship between aid and growth of the area ends with inconclusive results. That is most of these cross sectional analysis suggest that the growth impacts of foreign assistance vary among countries that pointed out the need for empirical study for individual countries. Therefore, the main idea here is to inspect the possible relationship between development aid and economic growth in time series of country-specific growth regression. Unlike the cross-country growth regressions which puts a number of heterogeneous countries with different economic policy environment, institutional setup, natural resource endowment, and others altogether, this study analyses the impact of foreign aid on economic growth in the context of Ethiopia.

Papanek (1973) had made a cross-country regression analysis for 34 countries where foreign aid, foreign investment, other flows and domestic savings are included in his model as explanatory variables to show the correlation between growth and aid. He found that foreign aid has a strong effect on growth than the other variables which are in the model. The researcher clarified that aid is supposed to be specifically designed to foster growth that is, aid has greater impact on growth through its impact on import financing. He also finds a strong negative correlation between foreign aid and domestic savings.

Gomanee et al (2005) attempted to investigate the impact of aid on economic growth 25 selected sub-Saharan African

countries by using residual regressors approach on the pooled data collected for the period 1970 to 1997. They have identified three mechanisms of transmission where aid can be channeled to economic growth: investment[7], import financing and government spending. The researchers found a significant and positive effect of foreign aid on economic growth. Each one percentage increase in the aid/GNP ratio contributes one quarter of one percentage point to growth rate on average holding other things constant. Finally, they concluded that African poor economic growth performance should not be related to aid ineffectiveness.

Bhattarai (2005) uses time-series data of Nepal for the period 1970-2002, and employs cointegration and the error correction mechanism as the estimation procedure to examine the effectiveness of aid and its link with domestic saving, investment and per capita growth. The results show that aid has a positive and significant relationship between per capita real GDP, savings and investment in the long-run. He also found that aid effectiveness improves economic growth in times of good policy environment, that is, an economy which is characterized by a stable macro-economy, openness to trade and a liberalized financial sector. Moreover, the study also found that bilateral and multilateral aid are equally effective in the long-run. However, grants has a stronger positive association with per capita real GDP in the long-run than loans.

Birara (2011) has examined the impact of foreign aid on economic growth and the transmission mechanisms of Ethiopia using Johansson Maximum Likelihood approach for the period 1970/71 to 2008/09. The co integration test result indicates the existence of long run relationship among the variables[8] entered in his models. In the long run foreign aid has a positive and significant impact on growth through its significant contribution to investment and import. However, the dynamic short run model points out that in order aid to have significant impact on growth it has to be assisted by good monetary, fiscal and trade policy.

Wondwesen (2003) analyzed the impact of foreign aid on growth on annual data covering the period 1962/63 to 2000/01 applying Johansen's maximum likelihood technique found that aid has significant contribution to investment both in the short run and long run. Aid is found to be ineffective in enhancing growth. However, he found that when aid is interacted with policy, the growth impact of aid found to be significant that is, aid is conditional on quality policy environment. His result further implied that attention should be focused on improving the existing macroeconomic policy environment for an inflow of aid to be used effectively.

Tadesse T (2011) has examined the impact of foreign aid on investment and economic growth in Ethiopia over the period 1970 to 2009. The researcher employed multivariate cointegration analysis while conducting his study. Foreign aid is effective in enhancing growth. The empirical result from the investment equation displays that foreign aid has a significant positive impact on investment in the long run. On the other hand, volatility of aid has a negative influence on domestic capital formation activity by creating uncertainty in the flow of aid. On the other hand, the aid-policy interaction term has produced a significant negative effect on growth which means bad policies negatively affects the aid effectiveness. The growth equation also revealed that rainfall variability has a significant negative impact on economic growth.

Rajan (2005) examined the effects of aid on growth using cross-sectional and panel data for selected poorer countries. The data are observed and labeled as follows. Countries are included in the sample for the 1960-00 horizon if there are data for at least 35 years; for the 1970-00 horizon for at least 25 years of data; for the 1980-00 horizon for at least 15 years of data; for the 1990-00 horizon for at least 5 years. The researcher found little robust evidence of a positive (or negative) relationship between aid inflows into a country and its economic growth. He also found no evidence that aid works well in better policy or geographical environments, or that certain forms of aid work better than others. His main findings, which relate to the past, do not imply that aid cannot be beneficial in the future. But he suggested that for aid to be effective in the future, the aid apparatus will have to be rethought.

Liew et al (2012) employed panel data methods, more specifically Pooled OLS, Random Effects, and Fixed Effects (and uses Breusch-Pagan LM test (POLS model vs. RE) and Hausman test (RE vs. FE) to determine which model is best for final estimation of the relationship) to investigate the relationship between foreign aid and economic growth of East African countries over the period of 1985 to 2010. The results of the regression suggested that foreign aid has significant negative influence on economic growth for these countries. This calls for further studies to investigate the possible channels through which foreign aid can have positive influence on growth.

Burnside et al (1997) used a new database on foreign aid to examined the relationships among foreign aid, economic policies, and growth of per capita GDP. In panel growth regressions for 56 developing countries and six four-year periods (1970-93) the policies that have a large effect on growth are fiscal surplus, inflation, and trade openness. They constructed an index of these three policies, interact it with foreign aid, and instrument for both aid and aid interacted with policies. They found that aid has a positive impact on growth in developing countries with good fiscal, monetary, and trade policies. In the presence of poor policies, on the other hand, aid has no positive effect on growth. This result is robust in a variety of specifications that include or exclude middle-income countries, include or exclude outliers, and treat policies as exogenous or endogenous. They examined the determinants of policy and find no evidence that aid has systematically affected policies - either for good or for ill. They also estimated an aid allocation equation and show that any tendency for aid to reward good policies has been overwhelmed by donors' pursuit of their own strategic interests. In a counterfactual they reallocated aid, reducing the role of donor interests and

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[7] Gomanee et al (2005) identify investment as the most significant transmission mechanism among others.

[8] The explanatory variables includes Level of investment that is not financed by aid, foreign aid, policy index times aid, human capital peroxided by education expenditure and labor

increasing the importance of policy: such a reallocation would have a large, positive effect on developing countries' growth rates.

III. METHODOLOGICAL FRAMEWORK AND DATA SOURCES

3.1. *Model Specification*

To investigate the impact of development assistance on economic growth of Ethiopia, this study applies a time series approach for the period 1991 to 2014 and the Swan Solow model has been employed to estimate the growth effect of foreign aid. The neo classical Solow model articulated economic growth is resulted from the combination of capital and labor. The total factor productivity which is referred to as Solow residual also encompasses all other factors that accounts output growth. Thus, the general equilibrium model for this study can be presented in the Cobb-Douglas production form with constant return to scale with respect to capital and labor as follows.

$$Y_t = F(A_t, L_t, K_t) \ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3.1)$$

Where: Y_t, K_t, L_t and A_t represents total output, physical capital, labor force and technological progress or total factor productivity[9] (TFP) at time t respectively. A production function which follows the specification in (3.1) can be decomposed to determine the contribution of each variable to economic growth. Suppose an economy can be described by a Hicks neutral Cobb-Douglas production function of the form,

$$Y_t = A_t L_t^{\beta 1} K_t^{\beta 2} \ldots\ldots\ldots\ldots\ldots\ldots..(3.2)$$

Where: $0 < \beta_1 < 1$ and $0 < \beta_2 < 1$[10]

The study extends the Cobb-Douglas production function[11] in to a detailed version by assuming that Total factor Productivity is determined by level of development assistances, international trade and skilled human power. I assume that the increase of development assistance inflows increase the total factor productivity which in turn raises the rate of overall economic growth of Ethiopia. Morrisey (2001) has pointed that foreign aid can contribute to economic growth through increase in physical and human capital investment, increases the capacity to import capital goods or technology and is associated with technology transfer. International trade is believed to contribute positive impact on economic growth by efficient allocation of internal and external resources, shift of technological advancements from developed countries to developing economies and less developed countries practice the innovations by developed countries i.e. ***learning by doing***

effects[12]. Similarly, the presence of skilled human power in a country means there will be higher potential to originate and innovate new goods and services which can stimulate the economy. Expressing the technological progress as a function of trade openness, development aid, skilled human power and other external factors given as;

$$A_t = F(ODA_t, TO_t, H_t) \ldots\ldots\ldots\ldots..(3.3)$$

Where: ODA_t, TO_t and H_t are official development aid, trade openness measured as the ratio of trade (import and export) to GDP and skilled human power at time t respectively.

The above expression can be arranged as follows'

$$A_t = \beta_0 ODA_t^{\beta 3} TO_t^{\beta 4} H_t^{\beta 5} \ldots\ldots\ldots..(3.4)$$

Where: β_0 is time invariant constant

$$0 < \beta 3 < 1, 0 < \beta 4 < 1 \text{ and } 0 < \beta 5 < 1$$

Upon substitution of the expression 3.4 for TFP in to the Solow growth model of 3.2, we will have the following general appearance.

$$Y_t = \beta_0 L_t^{\beta 1} K_t^{\beta 2} ODA_t^{\beta 3} TO_t^{\beta 4} H_t^{\beta 5} \ldots..(3.5)$$

The study specifies the model to be estimated by transforming in to natural logarithmic form, therefore the above equation can be explained as;

$$lnGDP_t = \beta_0 + \beta_1 lnL_t + \beta_2 lnK_t + \beta_3 lnODA_t + \beta_4 lnTO_t + \beta_5 lnH_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots(3.6)$$

There are five deterministic sources of economic growth in equation (3.6) : labor, physical capital, official development aid, trade openness and human. Of interest in this paper is the sign of the parameter β_3 which is the marginal effect of ODA to economic growth. Since all variables are expressed in terms of natural logarithms then the coefficients can be interpreted as elasticities and the variables are expressed in growth terms.

If the six variables including the proxy for economic growth in equation (3.6) are cointegrated then one can find an expression that defines the long run relationship between natural logarithm of GDP and the other five variables, although this has to be tested formally. Thus, the model can be generally expressed in terms of a long-
run or cointegrating relationship given by:

$$F(Y_t, K_t, H_t, ODA_t, L_t, TO_t) = 0 \ldots\ldots\ldots(3.7)$$

Where Y_t is the natural logarithm of GDP or growth rate of GDP, K_t and H_t are the natural logarithm of physical and human capital respectively, $ODAt$ is the natural logarithm of official development assistance, L_t is the natural

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[9] The Total Factor Productivity variable consists of all other variables other than those included in the model and affects the growth of output.
[10] Note that the coefficients β_1 and β_2 represents the marginal effects labor and capital on output respectively.
[11] The standard growth model can be also rewritten as follows after logarithmic transformation

$\ln Y_t = \beta_1 \ln Lt + \beta_2 \ln Kt + \ln At$
[12] Learning by doing implies that greater investments in certain sectors increases the experience of firms, workers, managers in the production process, making the production process itself more productive.

logarithm of labor force and TO_t is the natural logarithm of trade openness.

To find out the long and short run dynamics between trade liberalization and economic growth, this study employs time series econometrics: error correction model and co-integration regression. The following table briefly presents the expected sign as well as the description of the variables mentioned in the above specification and their most widely used proxies applied to measure in a very workable way.

3.2. Spurious[13] Regressions

The assumption that the Y_t and X_t variables are stationary is crucial for the properties of standard estimation and testing procedures. To show consistency of the OLS estimator, for example, I use the result that when the sample size increases, sample variances and co-variances converge to population (co) variances. Unfortunately, when the series are nonstationary the latter (co) variances are ill-defined because the series are not fluctuating around a constant mean.

Consider two variables, Y_t and X_t, generated by two independent random walks,

$$Y_t = Y_{t-1} + \varepsilon_{1t}, \ \varepsilon_{1t} \sim IID(0, \sigma^2_1) \ \ldots\ldots\ldots\ldots\ldots\ldots(3.7)$$
$$X_t = X_{t-1} + \varepsilon_{2t}, \ \varepsilon_{2t} \sim IID(0, \sigma^2_2) \ \ldots\ldots\ldots\ldots.......(3.8)$$

where ε_{1t} and ε_{2t} are mutually independent. There is nothing in this data generating mechanism that leads to a relationship between Y_t and X_t. A researcher, unfamiliar with these processes, may want to estimate a regression model explaining Y_t from X_t and a constant,

$$Y_t = \alpha + \beta X_t + \varepsilon_t \ldots\ldots\ldots(3.9)$$

The results from this regression are likely to be characterized by a fairly high R^2 statistic, highly autocorrelated residuals and a significant value for β. This phenomenon is the well-known problem of nonsense or spurious regressions. In this case, two independent nonstationary series are spuriously related due to the fact that they are both trended. In these situations, the regression is characterized by a high R^2 and a low Durbin–Watson (dw) statistic, the usual t- and F-tests on the regression parameters may be very misleading. The reason for this is that the distributions of the conventional test statistics are very different from those derived under the assumption of stationarity. In particular, as shown by Phillips (1986), the OLS estimator does not converge in probability as the sample size increases, the t- and F-test statistics do not have well-defined asymptotic distributions, and the dw statistic converges to zero. The reason is that with Y_t and X_t being I (1) variables, the error term ε_t will also be a nonstationary I (1) variable. Thus as of Hamilton (1994) including lagged values in the regression is sufficient to solve many of the problems associated with spurious regression.

The standard classical methods of estimation which are used in the applied econometric work are based on a set of assumption one of these is that all variables are stationary. However, It has been commonly concluded that most economic variables are not stationary (Gujarati, 1995). A data series is said to be stationary if its error term has zero mean, constant variance and the covariance between any two – time periods depends only on the distance or lag between the two periods and not on the actual time which it is computed (Harris, 1995). On the other hand a time series is stationary if its mean, variance and auto covariance (at various lags) remain the same on matter at what point we measure them, i.e they are time invariant (Gujarati, 2004). The stationary of the variables can be determined by performing the Augmented Dickey-Fuller (ADF) test. The significant part of the test is that testing for non-stationarity is equivalent to testing for the of a unit root. As the error term is unlikely to be white noise, Dickey and Fuller extended their test procedure suggesting an augmented version of the test which includes extra lagged terms of the dependent variable in order to eliminate autocorrelation. The ADF test can be performed with intercept, trend and intercept, and none of them.

3.3. Co-Integration

An essential exception arises when the two nonstationary series have the same stochastic trend in common. Consider two series, integrated of order one, Y_t and X_t , and suppose that a linear relationship exists between them. This is reflected in the proposition that there exists some value β such that $Y_t - \beta X_t$ is I (0), although Yt and Xt are both I (1). In such a case it is said that Yt and Xt are cointegrated, and that they share a common trend. Although the relevant asymptotic theory is nonstandard, it can be shown that one can consistently estimate β from an OLS regression of Y_t on X_t.

An important issue in econometrics is the need to integrate short run dynamics with long run equilibrium. The desire to evaluate models which combine both short-run and long-run properties and which at the same time maintain stationarity (i.e., which are non-trended), has prompted a reconsideration of the problem of regression using variables measured in their levels. This 'reconsideration' the product of breakthroughs in econometric theory in the past 15-20 years or so has given rise to cointegration methods and error correction models.

If the economic series have become non-stationary at level and have the same integration order then co-integration becomes an overriding requirement for any economic model. Mostly, a null hypothesis of there is no cointegration or long run relationship between variables in the model against the alternative hypothesis of the null hypothesis is not true will be tested using the Johansen cointegration test. Besides, Engle Granger test is strong in the case of bivariate analysis. It is then possible to test for cointegration among the variables using the ADF unit root test on the residuals(ε_t) estimated from the cointegrating regression between Yt and Xt (equation 3.10). Let us consider that we have the following equation.

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[13] The existence of high correlation between two variables does not automatically imply the existence of a causal relationship between the variables concerned. The possibility of correlation representing a purely mathematical rather than a causal relationship is termed spurious correlation.

$$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \quad ....(3.10)$$

To examine whether ε_t is I(0) or I(1), we should obtain the values of the error term from the OLS estimates of equation (3.10) and perform unit root tests using the ADF. According to the Engle and Granger approach, if the error term is a stationary process or I(0), then cointegration exists. In other words, although individually two variables are nonstationary, if residuals are found to be stationary the regression is a cointegration regression.

When the variables or series are having cointegrated relationships then the linear combination of these series would be stationary and gives long relationship between the variables. The ECM is a convenient model measuring the correction from disequilibrium of the previous period which has very good economic implications.

The Granger representation theorem (Granger, 1983; Engle and Granger, 1987) states that if a set of variables are cointegrated, then there exists a valid **error-correction representation** of the data. Thus, if Yt and Xt are both I (1) and have a cointegrating vector $(1,-\beta)$', there exists an error-correction representation, with $\varepsilon_t = Y_t - \beta X_t$, of the form:

$$\Delta Yt = \delta + \varphi_1 \Delta X_{t-1} - \gamma (Y_{t-1} - \beta X_{t-1}) + \varepsilon t \quad ....(3.11)$$

where the error term has no moving average part and the systematic dynamics are kept as simple as possible. Intuitively, it is clear why the Granger representation theorem should hold. If Y_t and X_t are both I (1) but have a long-run relationship, there must be some force which pulls the equilibrium error back towards zero. The error-correction model does exactly this: it describes how Yt and Xt behave in the short-run consistent with a long-run cointegrating relationship. If the cointegrating parameter β is known, all terms in the above expression are I (0) and no inferential problems arise.

Generally speaking, in the cointegrating regression, the residuals are constrained by the cointegrating relationship; hence, they are never far from the regression line. In a spurious regression, the residuals would most likely be often far away and increasingly far with time from the regression line. Because the two cointegrated variables are trended, each additional observation spreads out the range of the sample and so enables more precise estimation than would be the case of stationary variables necessarily constrained to a narrower range of variation.

There can be a strong statistical relationship between two or more variables that is caused by a statistical fluke or by the nature of the specification of the variables, not by a real underlying causal relationship. e.g., cumulative rainfall and the price level.

IV. RESULT AND DISCUSSION

4.1. *Stationarity Test Analysis*

Prior to testing for cointegration and estimating the long run equation explaining growth and ODA in Ethiopia, it is necessary to examine whether the data series is stationary in level, or stationary in differences using ADF test in order

to apply the correct methodology. Testing for stationarity also helps to avoid any spurious inferences.

Unit root tests for each variable in the model, is performed on both levels and first differences. The ADF test for the stationarity shows that all the variables are non-stationary at their level and we cannot reject the null hypothesis of unit root. Thus having this non stationarity case, a regression analysis using ordinary least squares (OLS) may give us spurious results. However, all of the series are stationary after first differencing with the exception of the variable labor which is stationary after differencing twice. That is , it is found to be integrated of order 2, and cannot be used in regression analysis. Therefore, the disadvantage of this differencing variables to have stationary one is the possibility of losing information.

In case of testing variables in their level, the ADF test is performed with constant as well as with constant and trend whereas the ADF test of unit root is done without constant and with constant for the differenced variables. The detail of the test is summarized in the table below.
[Insert Table- 4.1: ADF Test of variables for unit root]

4.2. *Johansen's Cointegration Test Result*

From the stationarity test discussed in the previous section, it is found that all variables except labor variable are stationary at their first differed and are the same order, I (1). Besides, we have found that there is an evidence showing the long run association between the variables according to the Engle-Granger test of cointegration. But this type of test is mostly criticized in case there are more than two variables, that is the problem of uniqueness. Thus, to avoid this problem a Johansen test is required to determine how many cointegrating vectors there are for a set of variables.

The cointegration test proposed by Johansen (1988) and Johansen and Juselius (1990) requires that the optimal lag length must be determined before testing. The optimal lag length is determined from the unrestricted vector auto-regression equation that minimizes the Akaike Information Criterion (AIC) or Schwarz Information Criterion (SIC) or Hannan-Quinn Criterion (HQC). In doing so, the maximum lag order is set to be 4 recommended by the software and later decided to be 1, the lag which is minimum. The asterisks below indicate the best (that is, minimized) values of the respective information criteria, AIC, and HQC.

[Insert Table 4.2: Lag length Selection criteria using AIC, SIC and HQC]

So far the study has been testing for the stationarity of the variables included in the model and the maximum lag order is also determined using the vector auto-regressive equation with the help of AIC, SIC or HQC. Since the number of variables are more than two, it is better to use the Johansen test for cointegration to see whether there is long run relation or not. The following table summarizes this test. The trace and Lmax test statistics results show that there is a significant long-run relationship between aid and economic growth. That is, rank equals to zero implies that the null hypothesis of no cointegration relation exist is tested against the alternative hypothesis of there is one cointegrating relationship and the test statistics suggest that there are one cointegrating relations (at 5% level of signifi-

-cance).

[Insert Table 4.3: Johansen test for cointegration]

4.3. *Long-Run Estimates*

Since the variables are cointegrated then one can determine the long run estimates for the relationship between official development assistance and economic growth. Table 4.6 presents the normalized cointegrating coefficients guided by the results of the cointegration tests.

Table 4.3: long run normalized (β) Coefficients

Var	$logGDP_t$	$logCAP_t$	$logHC_t$	$logODA_t$	$logTO_t$
β	1.00	-0.50	0.75	0.35	-0.24
SE	0.00	(0.27)	(0.33)	(0.16)	(0.18)

Source: own calculation using GRETL software package

The long run equation from the regression output presented in the above table shows that the sign of the explanatory variable is as expected and specified in the previous chapter. Human capital is found to be the main prominent variable affecting economic growth more than others according to this model. This strong positive individual effect of human capital on economic growth can be explained by the fact that human capital help the economy through the knowledge and skills of people. The government of Ethiopia has been investing on people's education and this inturn initiates the economic growth to grow forward and positively.

This study found that trade openness, a proxy for the degree of trade liberalization comes to affect the economic growth negatively. This is probably due to the infant industry argument where government is uspposed to protect from external competition. Most of manufacturing industries are small and medium enterprises that their financial and production capacity is limited. Therefore, in times of liberalization those enterprises will face strong competition from external companies, they will immediately liquidate or demolished. Another reason may be the existence of bureaucratic, rent seeking behavior and corrupted individuals, public and private institutions wich they fail to facilitate every processes for the benefits of the country.

Official development assistance is affecting RGDP positively as of the study by Bhattarai (2005) who studied the relationship of those two variables for Nepal case and Birara (2011) a study for the case of Ethiopia. This paper basically shows how much aid is effective in terms of bringing postive economic growth in Ethiopia. Helping others who are in a need of it means putting ***"plaster in a wound"*** which atleast can minimize the pain. Similarly foreign aid may not a sustainable solution but still it is contributing a lot in the developing countries by saving millions of life, as of the case for Ethiopia, it is also making the economy to step forward. It is very common to observe that many individuals travel for longer hour on foot, horse or other traditional transportation system to get social services including education and hospitals due to shortage of those infrastructures in nearest possible area.

4.4. *Error Correction Model and Short Run Elasticities*

Since the explanatory variables are found to be cointegrated, one can proceed to find the Error Correction

Model (ECM) which also represents the short run relationship among the variables under study. Table 4.7 summarizes the error correction model as well as the short run elasticities of the variables, that is the short run effects of the explanatory variables on the economic growth of the country. The ECM is economically and statistically meaningful in the sense that it is negative and less than one. Therefore, according to the regression, the error correction term −0.269958 shows that the economic growth measured by the real GDP adjusts to its long run equilibrium with a speed of about 27 percent annually.

Table 4.4. Error Correction Model and Short Run Elasticities

	coefficient	std. error	t-ratio	p-value
Intercept	−0.195217	0.0643068	−3.036	0.0054 ***
$d\_l\_GDP_{t-1}$	0.53535	0.238833	2.242	0.0337 **
$d\_l\_CAP_{t-1}$	−0.2185	0.136951	−1.596	0.1227
$d\_l\_HC_{t-1}$	0.147587	0.171814	0.8590	0.0982 *
$d\_l\_ODA_{t-1}$	−0.0033	0.0782985	−0.04305	0.0460 **
$d\_l\_TO_{t-1}$	0.191342	0.140450	1.362	0.0087 **
EC_{t-1}	−0.269958	0.106651	−2.531	0.0178 **
Mean dep var	−0.013623	S.D. dep var		0.122043
Sum squ resid	0.214492	S.E. of regression		0.090828
R-squared	0.549976	Adjusted R-squared		0.446124
rho	0.013313	Durbin-Watson		1.841384

Regarding the diagnosis, the study comes with different procedural tests performed to come up with this final stage, therefore it is evidenced that the model specification followed in the study do not exhibit any statistically problem and as a result this can be taken as a good representation of the variables.

The goodness of the fit (R-squared and Adjusted R^2) of the model are elaborating a considerable relationship of the variables. About 55 percent (using R-squared) and 45 percent (using Adjusted R^2) of variations in the dependent variable is explained by the variations in the explanatory variables included in the model. The Durbin-Watson statistic is also showing that we fail to reject the null hypothesis of error terms are not serially correlated.

In addition to the adjustment speed, this short dynamics shows the individual effects of the explanatory variables. For instance; last year's RGDP is showing positive and significant impact on current year RGDP that is, for every one percent change in the last year's RGDP, the current RGDP changes in about 0.54 percent on average, Ceteris Paribus. In contrast, last year ODA comes to affect the current year RGDP inversely and it is also statistically significant. This can be due to the fact that the effect of aid comes to be effective with longer time span. It is in fact arguable issue but putting a plaster on a wound will not exacerbate the wound provided that the plaster is safe. Therefore, given that the development aid coming from the external partners have not any other implicit objective and the government of receipts use the aid on the right place, for those areas/people who are really in need of that aid, the outcome of such effects at the end of the day will positive. The personal view of the researcher here is against the argument of so called Dambisa Moyo "Dead Aid".

Similarly, the effect of trade liberalization proxied by trade openness is positive and this effect is statistically

significant. This can be justified by the fact that by integrating the economy of the country, Ethiopia can benefit from the market access created for the products being produced domestically. Furthermore, countries may benefit from the introduction of new technologies, knowledge that can finally produce new products at a very minimum cost. Domestic customers can further be beneficial to get quality products at reasonable price created due to the higher degree of competition. There might be business entities which can liquidate or merge with other domestic firms in order to resist the degree of competition coming from the external world but the net effect on the economy of the country will be positive. This finding is consistent in line with Okonkwo eta'al (2015), Felix and eta'al (2013), Cherkos (2016) and others who concluded there is positive relationship between trade liberalization and economic growth.

Finally, human capital exists to affect economic growth positively and significantly. The presence of skilled human power in a country means there will be higher potential to originate and innovate new goods and services which can stimulate the economy.

V. CONCLUSION AND RECOMMENDATION

5.1. *Conclusion*

Developing countries have a deficiency of domestic resource to finance investment and capacity to import technology and capital goods that is why it is mostly common to see those countries recieving billions of dollar in the form of grants and loans from the developed world. The case for Ethiopia is not different from those circumstances as the flow of ODA coming to country dramatically increased for the last two decades. Eventhough there has been a bulky of literature on the subject with different methodologies, the area remains to be debatable among the researchers.

The study has examined the economic analysis of the impact of development aid in Ethiopia. More specifically, the study has attempted to investigate whether there is long run relationship between official development aid and economic growth of Ethiopia for the time period extended from 1981 to 2015. To do so, multivariate cointegration technique is employed for the analysis of the long run relation where VECM analysis is used to assess the short run relationships and its linkage with the long run equilibrium path.

As it has been discussed many times so far, the prerequisite for cointegration analysis is that the variables need be stationary and integrated of the same order, the series is tested for unit root and the result found indicated that all the variables in the specified model except the explanatory variable labor are stationary after first difference i.e. I(1). Eventually, cointegration test using Engle-Granger two step estimation for bivariate case and Johansen cointegration test has performed and the result satisfied the presence of long run relationship among the variables in the model.

The study confirmed that ODA and economic growth of Ethiopia are negatively related in the short run but in the long run, official development assistance has positive and significant effect on the economic growth of the country. Besides, the paper showed that the variables physical capital and trade openness exist to affect economic growth negatively.

Generally, since we are living in the world where assisting others who are in a need of the help is a culture. This study is also in favor of foreign aid. ***Who knows best about a patient: the doctor or the patient?*** Therefore, whatever the degree of aid effectiveness is, it is found that aid is helping developing countries in general and Ethiopia in specific by saving lives of millions of people, bringing positive economic growth and other related contributions.

5.2. *Recommendations*

Based on the empirical conclusions, the study is able to forward the following reasonable recommendations to be taken by the government of Ethiopia.

Including Ethiopia, the economy of developing countries is basically characterized by low level of saving, very huge trade and budget deficits. For this reason, the government need to use development aid as a main mechanism to finance those gaps that their country is experiencing persistently and eventually bring positive economic growth. But the development aid is required to be invested in the most productive sectors (investment areas) including agriculture, infrastructural developments and other areas which inturn stimulates the economy as a whole. In addition to this, the government need to minimize the bureaucratic nature and rent seeking behavior of individuals and institutions which limits the effectiveness of aid.

Where as the donors should also have a clear cut follow up commitment that tracks the progress of every dollar granted to the developing countries in general. Otherwise all those billions of dollars coming from the developed world may attract extra interest from the governing body to be corrupted. It should not be granted in a reciprocity principle where donors give aid to countries in an exchange or expectation of something to get back from them. The conditionality for granting aid is sometimes challenging to met and as a result those should be minimized as far as possible.

The study also found that human capital as the main driving variable in the growth equation. Therefore, policy makers need to put their attention in the development of skilled human power through long and short term training schemes.

Finally, further investigations on the effectiveness of ODA at sector specific, in regional level, inclusion of new variables in to the model, the use of non-linear model specification and methodology is highly recommended. Besides, the inconsistencies of data reported by national institutions (including NBE and MoFED) as well as figures reported by WB, IMF, OECD and others needs to be harmonized as much as possible.

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AUTHOR'S PROFILE

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Mr. Cherkos was born in Workamba, Tigray region in Ethiopia since 13 February 1988.Mr. Cherkos has graduated his BA degree in Economics from University of Gondar in July 2009. He has graduated Master Degree in Applied Economic Modelling and Forecasting with special concentration in Financial Policy Analysis from Addis Ababa University since July 2014. Finally, he has also graduated Advanced Erasmus Master in Economics of Globalization and European Integration from Staffordshire University (UK), Universidad de Cantabria (Spain) and Universidad de Brasilia (Brazil).
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Appendices

Table 2.1. Schematic overview of main developments in the history of foreign aid

Year	Dominant or rising institutions	Donor ideology	Donor focus	Types of aid
1940s	Marshall Plan and UN system (including World Bank.	Planning.	Reconstruction.	Marshall Plan was largely programme aid.
1950s	United States, with Soviet Union gaining importance from 1956.	Anti-communist but with role for the state.	Community Development Movement.	Food aid and projects.
1960s	Establishment of bilateral programmes.	As for the 1950s, with support for state in productive sectors.	Productive sectors (e.g. support to the green revolution) and infrastructure	Bilateral gave technical assistance (TA) and budget support; multilaterals supported projects.
1970s	Expansion of multilaterals especially World Bank, IMF and Arab-funded agencies.	Continued support for state activities in productive activities and meeting basic needs.	Poverty, taken as agriculture and basic needs (social sectors).	Fall in food aid and start of import support.

Year	Dominant or rising institutions	Donor ideology	Donor focus	Types of aid
1980s	Rise of NGOs from mid-1980s.	Market-based adjustment (rolling back the state).	Macroeconomic reform.	Financial programme aid and debt relief.
1990s	Eastern Europe and former Soviet Union Become recipients rather than donors; emergence of corresponding institutions.	Move back to the state towards end of the decade.	Poverty and then governance(environment and gender second order focus).	Move toward sectoral support at the end of the decade.
2000s	OECD, Commission for Africa, EU, proposed IFF. IMF/World Bank.	Enhanced effectiveness through donor coordination and policy harmonization, PRSPs.	MDGs/poverty reduction (emphasis on health, education and water), local ownership.	Increased technical cooperation and social sector support; move towards SWAPs and budget support.

Source: Hjertholm and White (2000: 81, table 3.1) and UNCTAD's addition

Table 4.2. Augmented Dickey Fuller Test of variables for unit root

Variable		ADF Test of Unit Root		
		P-Value (With constant)	P-Value (With-out constant)	P-Value (With constant and trend)
$logGDP_t$	level	0.3697	-	0.6191
	First difference	0.004572***	0.0002529***	-
$logHC_t$	level	0.9993	-	0.9892
	First difference	0.003017***	0.05909*	-
$logODA_t$	level	0.6287	-	0.3557
	First difference	0.0326**	0.006741***	-
$logTO_t$	level	0.9899	-	0.2033
	First difference	0.02592**	0.05143*	-
$logCAP_t$	level	0.4876	-	0.8485
	First difference	0.00000126***	0.000000001199***	-
$logLAB_t$	level	0.8213	-	0.1934
	First difference	0.2363	0.4592	-
	Second difference	0.08253*	0.02098**	

Sources: own computation using GRETL software
Note: H_0: Unit root, H_1; No unit root, alpha level (α=0.05)
***, ** and * indicates the rejection of the null hypothesis of unit root at 1%, 5% and 10% respectively.

Table 4.2. Lag length Selection criteria using AIC, SIC and HQC

| lags	AIC	SIC	HQC	loglik	P(LR)
1	-6.464472	**-5.076742***	-6.012107	130.19931	
2	-6.041162	-3.496991	-5.211826	148.63801	0.05930
3	-7.051268	-3.350656	-5.844961	189.29466	0.00000
4	**-9.724749***	-4.867695	**-8.141470***	255.73360	0.00000

Source: own calculation using GRETL software

Table 4.3. Johansen test for cointegration

Rank	Hypothesis		Eigen value	Trace test	P-value	Lmax test	P-value
	Null	Alternative					
0	$H_0 = 0$	$H_1 = 1$	0.65932	69.939	[0.0470]**	36.611	[0.0192]**
1	$H_0 <= 1$	$H_1 = 2$	0.33550	33.327	[0.5432]	13.897	[0.8243]
2	$H_0 <= 2$	$H_1 = 3$	0.30837	19.431	[0.4732]	12.536	[0.5095]
3	$H_0 <= 3$	$H_1 = 4$	0.18342	6.8951	[0.5958]	6.8894	[0.5107]
4	$H_0 <= 4$	$H_1 = 5$	0.00016685	0.0056734	[0.9400]	0.0056734	[0.9400]

Source: own computation using GRETL software

Time series Plot of Stationarity test at level
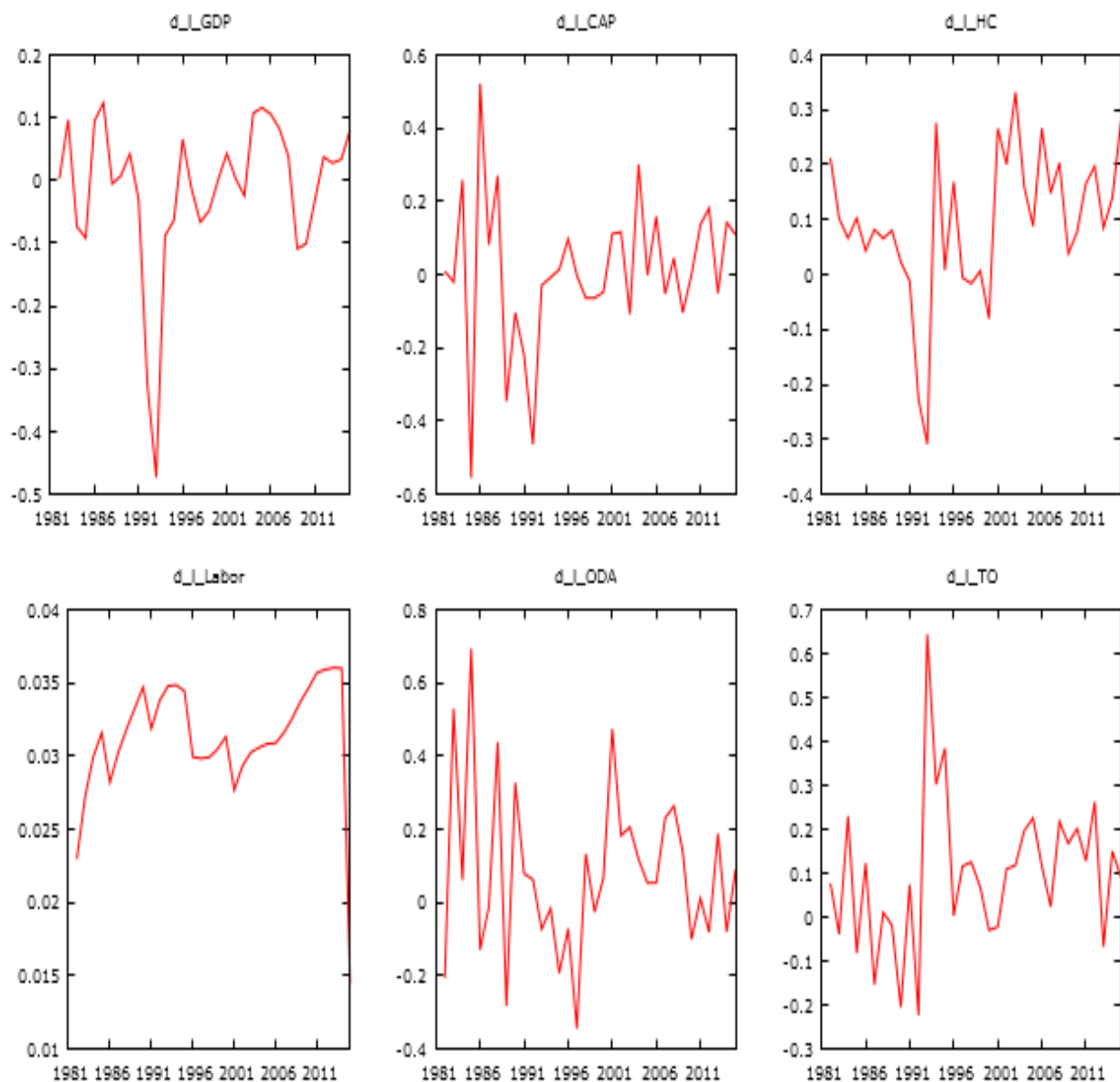
Regressions and Tests
Ordinary Least Square
using observations 1981-2015 (T = 35)

Dependent variable: l_GDP
HAC standard errors, bandwidth 2 (Bartlett kernel)

	Coefficient	Std. Error	t-ratio	p-value	
const	3.28142	0.43654	7.5169	<0.0001	***
l_CAP	0.383274	0.0662892	5.7818	<0.0001	***
l_HC	0.568218	0.0667153	8.5171	<0.0001	***
l_ODA	0.148648	0.0418715	3.5501	0.0013	***
l_TO	−0.541355	0.0301956	−17.9283	<0.0001	***

Mean dependent var	10.46247	S.D. dependent var	0.368620
Sum squared resid	0.204169	S.E. of regression	0.082496
R-squared	0.955807	Adjusted R-squared	0.949914
F(4, 30)	405.3410	P-value(F)	1.22e-25
Log-likelihood	40.35983	Akaike criterion	−70.71966
Schwarz criterion	−62.94292	Hannan-Quinn	−68.03513
rho	0.473206	Durbin-Watson	1.018988