



Munich Personal RePEc Archive

# **The long-run relationship between ODA, growth and governance: An application of FMOLS and DOLS Approaches**

Yahyaoui, Ismahen and Bouchoucha, Najeh

8 September 2019

Online at <https://mpra.ub.uni-muenchen.de/102303/>  
MPRA Paper No. 102303, posted 10 Aug 2020 07:47 UTC

# **The long-run relationship between ODA, growth and governance: An application of FMOLS and DOLS Approaches**

**Ismahene Yahyaoui**<sup>1</sup>  
**University of Sousse**

**Najeh Bouchoucha**<sup>2</sup>  
**University of Sousse**

## **Abstract**

Africa has been received an important amount of foreign aid for several decades; however, it is among the poorest regions in the world. This study examines the relationship between foreign aid, economic growth and governance in the African region for the period of 1996-2014. On fully applying both technique DOLS and FMOLS. In the first stage of this study, we examine the effet of foreign aid on economic growth. In the second stage, we assess the intermediary role of institutions in the relationship between Foreign aid and economic growth in African countries. It was found that Foreign aid has a negative effect on economic growth in African countries in both of FMOLS and DOLS models. However, empirical results indicate that foreign aid improves in terms of economic growth in the presence of good institution quality only in DOLS model.

**Keywords:** foreign aid, effectiveness, governance, economic growth, FMOLS, DOLS

## **1. Introduction**

The effectiveness of official aid is a subject that remains relevant today. Aid effectiveness is closely linked to government effectiveness. However, for development aid to be effective, the government must be effective. In order to be effective, the government must ensure property rights, defend citizens from violence, and also provide the infrastructure (Levi 2006, 5). Also, the government must attain the more support, trust and legitimacy. Without trust and legitimacy, governments have difficulty preserving social order, implementing their policies

---

<sup>1</sup> [asmahen.yahyaoui@gmail.com](mailto:asmahen.yahyaoui@gmail.com)

<sup>2</sup> [najeh.bouchoucha@hotmail.fr](mailto:najeh.bouchoucha@hotmail.fr)

and obtaining external funds, especially official development aid. In other words, only governments able to demonstrate its effectiveness to citizens and obtain their approval in the short term, as well as their confidence and legitimacy in the longer term, will have the necessary influence to guarantee the effectiveness of foreign aid in terms of economic growth. Generally, and particularly in African countries, citizens who consider public officials to be just, honest and competent are considerably more likely to approve of the incumbent government's performance and are more likely to trust the government and trust the government than citizens who consider public officials as discriminatory, corrupt and ineffective.

Improving the integrity and fairness of government and public servants will likely increase the willingness of citizens to pay taxes, which will strengthen the government's ability to provide services and maintain a competent and honest bureaucracy over time.

Foreign aid is seen as an important source of economic growth. Even though many studies have investigated the relationship between ODA (official development aid) and economic growth in developing countries, with most reporting mixed results. In fact, several recent studies, typified by the work of Burnside and Dollar (2000), show that foreign aid is more effective in countries having good institutions, this is the conditionality of effectiveness of foreign aid in terms of economic growth. Others argue that aid is more effective with diminishing returns (Hansen and Trap, 2000; Clemens et al., 2004; Ang, 2010).

This study has gone ahead from the previous studies, by examining the long run relationship among foreign aid, governance and growth in African countries. But, the majority of previous researches have focused on the long run relationship in time series (Bassam (2008); Abd El Hamid Ali (2013)). For this reason, our primary goal is to investigate whether good governance, in African countries, has a long-run impact on improvement of effectiveness of foreign aid on economic growth.

Also, other empirical results (such as those of Dalgaard, Hansen and Tarp (2004), Gomanee, Girma and Morrissey (2005), Bhattarai (2009), Kim (2011), Juselius, Moller and Tarp (2014)) supported the positive impact of foreign aid on economic growth while those of Papanek, (1973), Svensson (1999), Ovaska (2003), Mallik (2008), Alvi, Mukherjee and Shukralla (2008), Herzer and Morrissey (2013) did not corroborate this point of view. As a result, it can be concluded that there is no common empirical evidence that confirms the impact of foreign aid on economic growth.

This study builds on the previous discussion and contributes to the literature in a number of ways, including: (1) to our knowledge, this is the first attempt to have examined the link

between foreign aid, economic growth, and governance on a large sample of 48 countries in the African region. (2) This study not only verifies the effect of foreign aid on economic growth, but also explains whether the effectiveness of development aid in terms of economic growth improves in economies with institutional institutions. (3) There are few empirical studies that studied the effects of governance (as measured by the Kaufmann, Kraay, and Mastruzzi (2010) the six dimensions of governance of the World Bank, such as control of corruption, government effectiveness, political stability, quality of regulation, rule of law and voice and accountability) in improving the effectiveness of foreign aid. In this case, this study uses an iterative approach by calculating a composite index of those six governance's dimensions by the Principal Component Analysis (PCA). Then, we use a disaggregated approach by applying each of the six indicators of good governance. This method is explained by the fact that it exists a correlation between these six indicators.

(4) The majority of previous studies have investigated the long-term direct relationship between foreign aid and economic growth for time series but neglected the role of institutional factors in improving the effectiveness of the long-term aid delivery on a large sample. In this framework, we use two new panel approaches (FMOLS, DOLS) to examine the long-term relationship between foreign aid, economic growth and institutional quality. In fact, the FMOLS estimator takes into account the nuisance parameters and possible autocorrelation and heteroscedasticity phenomena of the residues. It also corrects the endogeneity of the explanatory variables. In addition, to ensure the robust results, we adopt the DOLS approach to eliminate the correlation between regressions and the error term. (5) Previous studies have neglected short-term and long-term causality. For this reason, our work attempts to fill this gap by applying the Granger causality test which is based on the Panel Vector Error Correction Model (VECM).

The rest of the document is organized as follows. Section 2 presents a review of the literature. Then, the paper presents the methodology used and defines the data in section 3. Next, the empirical results and discussions are analyzed in section 4. The last section of the paper provides a conclusion and policy implications.

## **2. Review of the literature**

It is necessary to note that financing the economy includes all the ways in which economic agents obtain the funds they need to carry out their activities. So, it is realized in two different ways: internal and/or external: the Internal financing is carried out by savings (Perkins et al, 2008), but the external one is achieved through the use of the monetary and financial system, indebtedness, etc. Also, financing may be private (FDI, debt, donations...) or public

(development aid...). So, foreign aid represents the important source of financing for many countries, especially the poor ones.

Over the last few decades, the domestic capital needed to ameliorate economic growth in developing countries, especially the African ones, is insufficient. In this case, those countries have received a massive amount of development aid in order to promote economic growth and mitigate poverty (World Bank, 2013). However, those objectives have not been achieved. So, we talk about the ineffectiveness of foreign aid. This ineffectiveness is explained, specially, by the bad management (Boone, 1996) and the bad quality of governance. Boone (1996) affirms that relationship between Foreign Aid and economic development is not significant for two reasons: firstly, capital shortage doesn't cause poverty; secondly, if there is a large flow of aid, it is not optimal for politicians to adjust distortion policies. For relationship between international aid and corruption, some researches investigate that aid increases corruption (Asongu & Jellal (2013); Asongu (2014b)).

Mosley (1980) and Taslim and Weliwita (2000) investigated that foreign aid had a negative effects on domestic savings. Similarly, Snyder (2000), Shields (2007) and Ouattara (2008) confirm the existence for a negative relationship between international aid and saving.

Indeed, Mallik (2008) examined the effectiveness of foreign aid for economic growth in the six poorest and most aid-dependent African countries, such as Central African Republic, Malawi, Mali, Niger, Sierra Leone and Togo. Using the co-integration analysis, Mallik (2008) found that there is a long-term negative relationship between real GDP per capita and aid, as a percentage of GDP, investment, as a percentage of GDP and openness. Using simultaneous equations, Burke and Ahmadi-Esfahani (2006) reversed the thesis of aid effectiveness in terms of economic growth for the case of Thailand, Indonesia and the Philippines, between 1970 and 2000. Moreover, Khan and Ahmed (2007) conducted a study to answer the question of whether foreign aid is a blessing or a curse for Pakistan, using the ARDL approach. They found that foreign aid has a negative effect on economic growth. Other similar empirical studies such as those of Svensson 1999, Ovaska 2003, Mallik 2008 and Ang 2010, have strongly suggested that foreign aid has a negative effect on economic growth .

However, we find studies in favor of the positive effects of aid on growth (Arndt et al., 2010; Juselius et al., 2014). In fact, Addison et al. (2005) showed that foreign Aid has a positive impact on growth and increases pro-poor public expenditure. According to these authors, foreign Aid broadly works largely to eliminate poverty, and, in the absence of aid, poverty would be higher. Also, Arndt, Jones, and Tarp (2014) investigate that aid has promoted growth and decreased poverty and infant mortality.

In addition, others researches focused on the relationship between aid and corruption. In fact, Asongu&Jellal (2013) investigated that international Aid channeled through private investment and tax effort decreases corruption. Similarly, Okada & Samreth (2012) claim that corruption can be reduced by official development aid.

Recently, Abd El Hamid Ali (2013) has studied the effectiveness of international aid for the case of Egypt during the period 1970-2010. More precisely, she has examined the long-term relationship between foreign aid and economic growth using the Johansen Cointegration Test and the Vector Error Correction Model (VECM). She found a negative and significant impact of foreign aid on short- and long-term economic growth. More recently, Arndt et al. (2015) have confirmed a positive impact of foreign aid on economic growth, including its effect on the immediate sources of growth (physical and human capital), on well-being indicators (poverty and child mortality) and measures of economic transformation (the share of agriculture and industry in the value added). Juselius, Moller and Tarp (2014) examined a long-term foreign aid relationship on key macroeconomic variables for a sample of 36 sub-Saharan African countries covering the period 1960-2007 using the VAR model. They confirmed the thesis of the effectiveness of long-term aid on macroeconomic variables. Regarding Arndt et al. (2015), they showed that development aid helps stimulate economic growth, promote structural change, improve social indicators and reduce poverty. In addition, Moolio and Kong (2016) investigated the long-term relationship between foreign aid and economic growth by applying co-integration tests for panel data on a sample of four countries (Cambodia, Laos, Myanmar , Vietnam) of the ASEAN region for the period 1997-2014. As for Moolio and Kong (2016), by applying both the FMOLS and DOLS models, they concluded that in the long term foreign aid has a favorable effect on economic growth. Similarly, Irandoust and Ericsson (2005) showed a positive and significant relationship between foreign aid and economic growth for the African countries. They based their research on a sample of four African countries, those most benefiting from foreign aid in Africa, such as Niger, Nigeria, Rwanda, Senegal, and Togo, during the period between 1965 and 2000.

However, some other studies have supported the idea that the effectiveness of foreign aid in terms of economic growth is conditional. These conditions include sound macroeconomic policies, democracy, institutional quality and governance, financial liberalization, and so on. According to a 1998 World Bank's foreign aid study, this variable has a positive impact on economic growth in recipient countries with sound fiscal, monetary and trade policies. Similarly, some researchers argue that foreign aid can contribute to economic growth, but

only in countries with a good political environment (Burnside and Dollar 2000, Collier and Dollar 2002, Bhattarai 2009). Other researchers found that the foreign aid variable has a positive impact on economic growth, depending on the levels of democracy (Svensson 1999, Islam 2003) and financial liberalization (Ang 2010, Nkusu and Sayek 2004).

In the same context, Ali and Isse (2005) studied the impact of foreign aid on economic growth. They found that foreign aid has a negative impact on economic growth. After studying the interaction between the foreign aid variable and the policy, they found that foreign aid promotes economic growth. Therefore, they suggested that the effectiveness of foreign aid in terms of growth is conditional on the existence of good policies. On the other hand, Rajan and Subramanian (2008) refuted the thesis of the effectiveness of foreign aid in the presence of a good political environment, showing that the effect of foreign aid on economic growth remains negative even by introducing the interaction variable between foreign help and the adopted policies.

Other research studies have tried to examine the direct effect of foreign aid on corporate governance. For example, Bräutigam and Knack (2004) examined the relationship between foreign aid, institutions and corporate governance in 32 countries of sub-Saharan Africa, using the OLS methods and the double OLS. They found that foreign aid has worsened the quality of governance. In addition, they pointed out that large amounts of foreign aid can weaken the institutions and create incentives for aid agencies. This study was also supported by Sarwar, Hassan and Mahmood (2015) who showed that foreign aid is negatively and significantly correlated with corporate governance. In addition, foreign aid is associated with the deterioration of political and economic institutions. Other studies suggested that foreign aid increases the size of governments (Boone 1996, 2000).

### **3. Stylized facts and scatter plots**

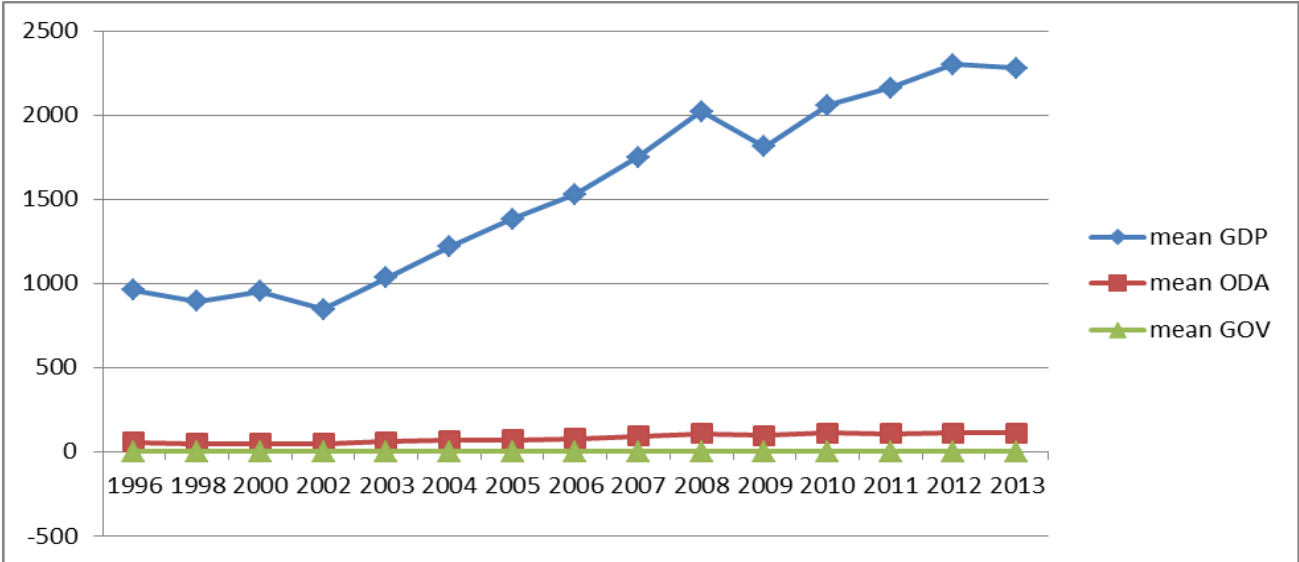
At the economic level, globalization is the main cause of strong inequalities between the North and South. It also strengthens the differences between countries of the South, which explains heterogeneity at the world level: African countries are marginalized while emerging countries experience rapid growth. Thus, official development aid would be seen as an instrument of international cooperation and aims to optimize the minimum welfare level of a marginalized population by financing projects that respect the natural and social environment.

During the 2000s, governments gave major importance to the fight against poverty, aiming to achieve good governance and to protect the environment. With structural adjustment, several

efforts have increased, but the standard of living in some African countries is deteriorating. Similarly, the level of poverty in some countries is increasing. Structural adjustment was called into question because of poor privatization, chronic underinvestment in physical and human capital, and premature trade and financial liberalization. This adjustment gives priority to productive and social concerns, including the provision of basic services (health, education, etc.). This social change in aid is specifically supported by the adoption of the Millennium Development Goals (MDGs), hence a perfect analysis of the institutions and an emphasis on the quality of the legal environment.

In recent years, Africa had achieved a turning point in its development and played a large role in the global economy. Regionally, growth differs from one region to another, reflecting different levels of development and natural endowment, the impact of climatic conditions and, in particular, the degree of political and social stability. Indeed, economic growth in low-income Africa, as shown in Figure 1, has improved in the sense that GDP nearly doubled during the 1996-2013 period from 960,2 to 2278.7 (with a growth rate of 137, 31%).

**Figure 1: Evolution (on average) of foreign aid, governance and economic growth in African countries**



**Source: The author.**

The impressive growth experienced in recent years in Africa is explained by several factors, the most important of which are better macroeconomic management, strong domestic demand and a relatively more stable political climate. Nevertheless, at the external level, this growth is



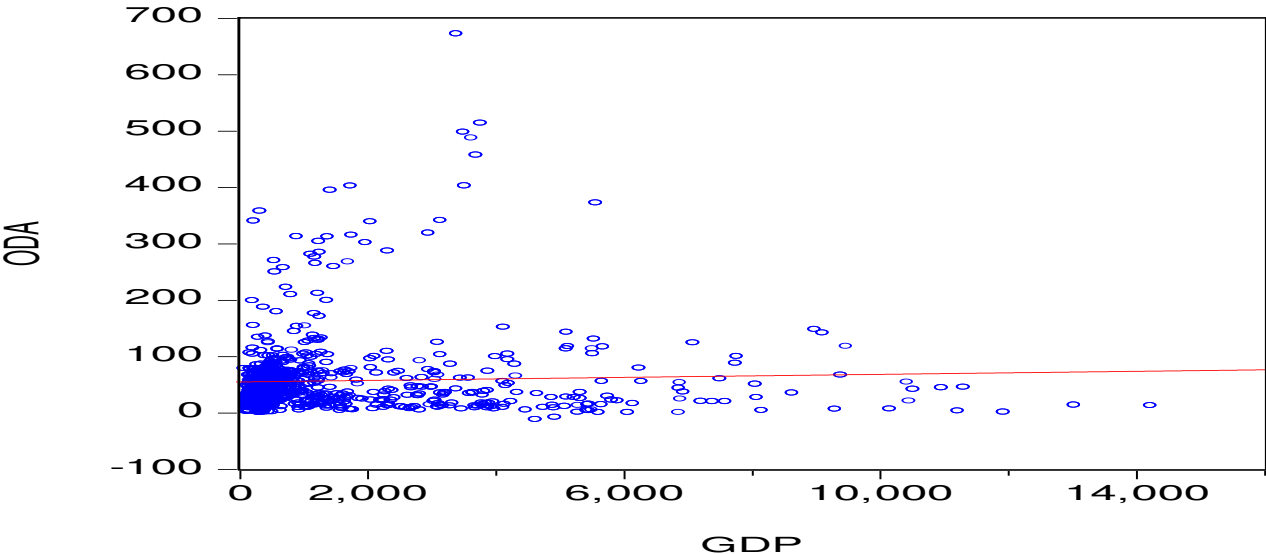
justified, in particular, by very high commodity prices, very strong economic cooperation with emerging countries, increased FDI flows, and a high level of ODA.

As for aid flows received by African countries in recent years, Africa remains a major beneficiary of ODA. Indeed, the continent has recorded a sharp increase in terms of net flows of ODA. In fact, during this same period, Africa's share of net ODA (on average) has risen sharply from 55.425 to 109,24, that is, with a growth rate of 97, 09%. In recent years, the selectivity of ODA is at the heart of the debate and is the subject of much criticism. Indeed, the main idea is to practice an optimal allocation of aid to fight against extreme poverty for example, according to certain criteria such as the level of needs and the degree of performance linked to the quality of governance of country in question. Thus, the quality of governance is a necessary condition for improving the effectiveness of aid in terms of economic growth, for this reason African countries are trying to improve their institutional qualities.

According to the composite index of governance, the quality of governance is of poor quality in African economies. During the period 1996-2013, the values of the variable "governance" is below -0.31 (World Bank, 2013) in all countries regardless of income level, with the exception of certain countries, namely Mauritius. , Botswana, South Africa, Namibia and Cabo Verde, where governance is good (governance values are above 0). The quality of governance is poorer in African countries whose values (on average) vary between -0.63 and -0.565 between 1996 and 2013.

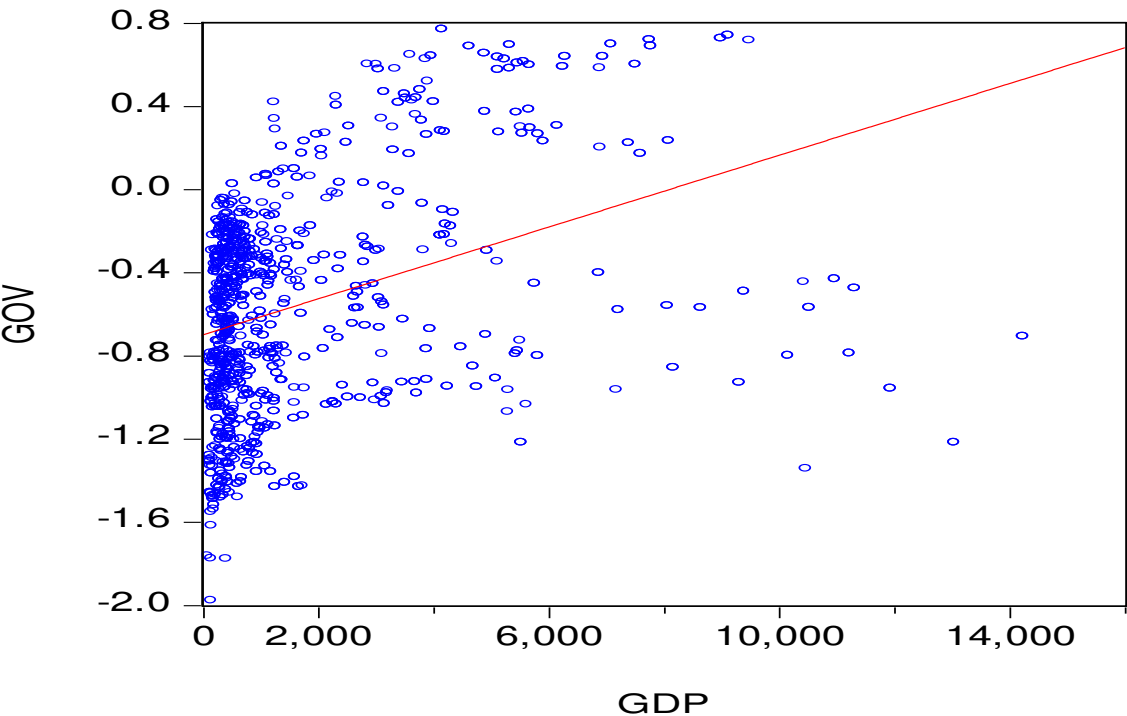
To make the relationship between variables considered in this study, we employed scatter plots with regression line. The regression line of figure 2 illustrates that the relationship between foreign aid and economic growth is stable. Also, the regressions line of figures (from 3 to 9) clearly shows that there is a positive relationship between GDP and all indicators of governance and their component index. That is, an increase in each indicator of good quality of institutions and their component index to increase the GDP per capita.

**Figure 2. Scatter Plot of per Capita GDP and Official development aid**



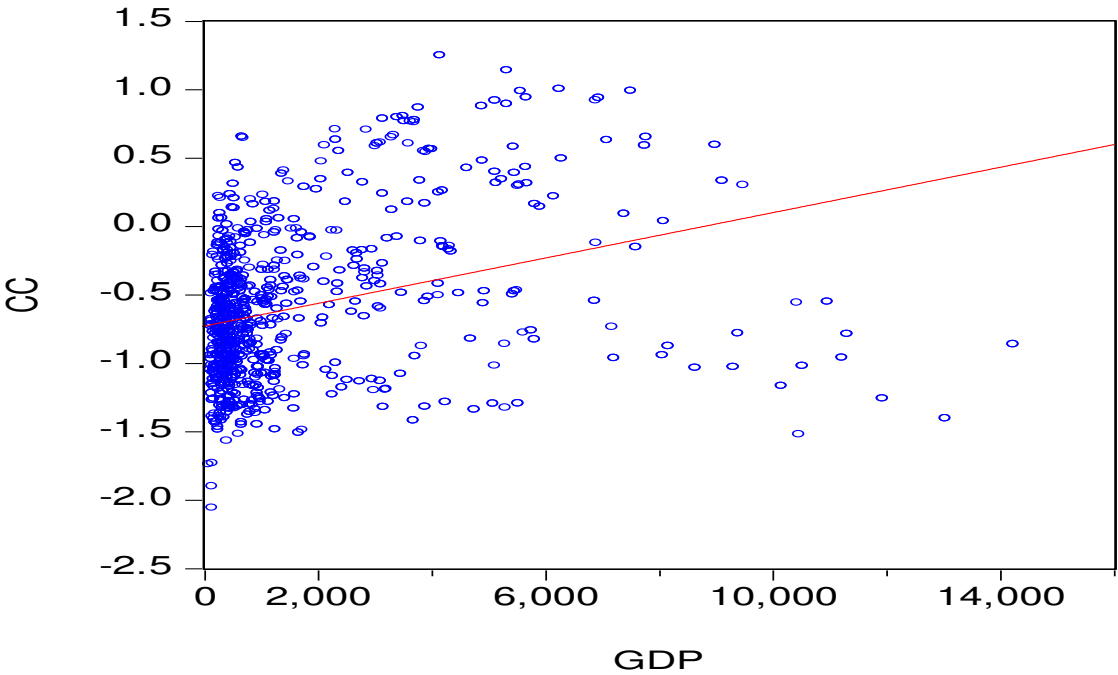
**Source: The author.**

**Figure 3. Scatter Plot of per Capita GDP and Governance**



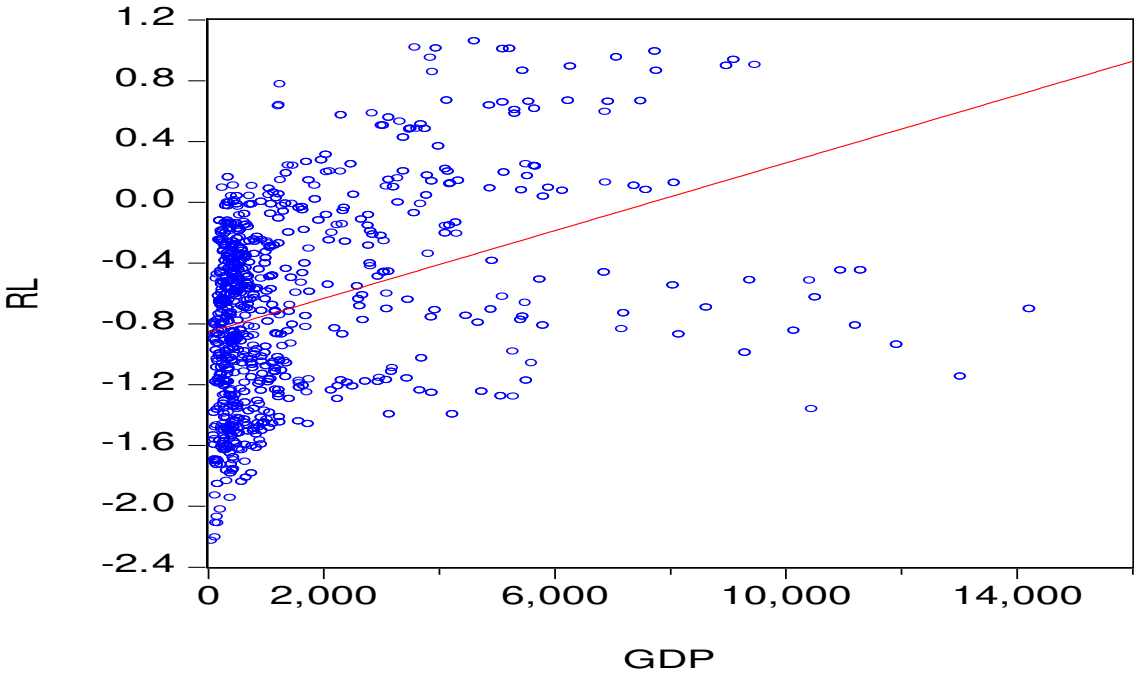
**Source: The author.**

**Figure 4. Scatter Plot of per Capita GDP and Control of Corruption**



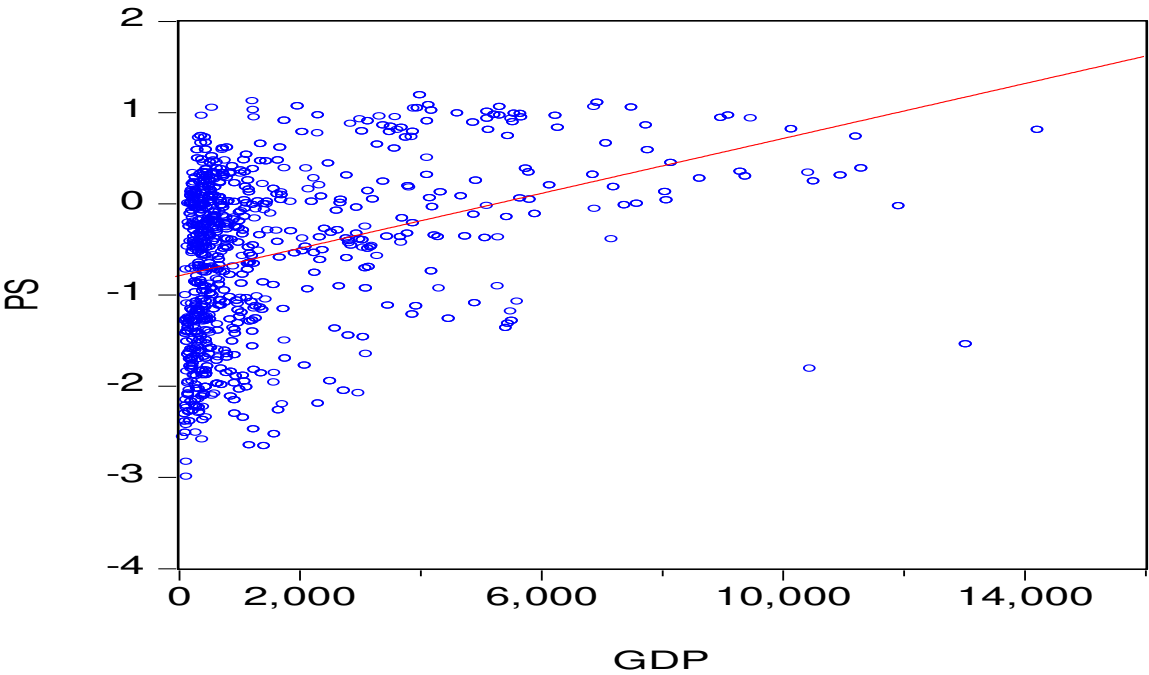
**Source: The author.**

**Figure 5. Scatter Plot of per Capita GDP and Rules and Laws (RL)**



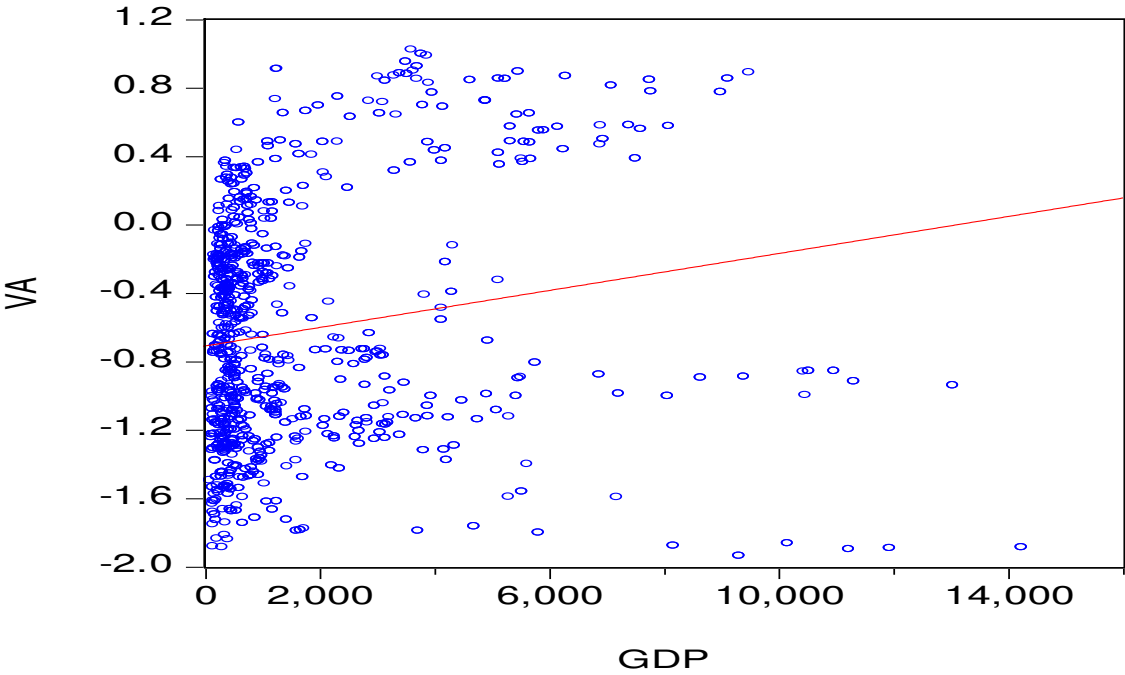
**Source: The author.**

**Figure 6. Scatter Plot of per Capita GDP and Political Stability**



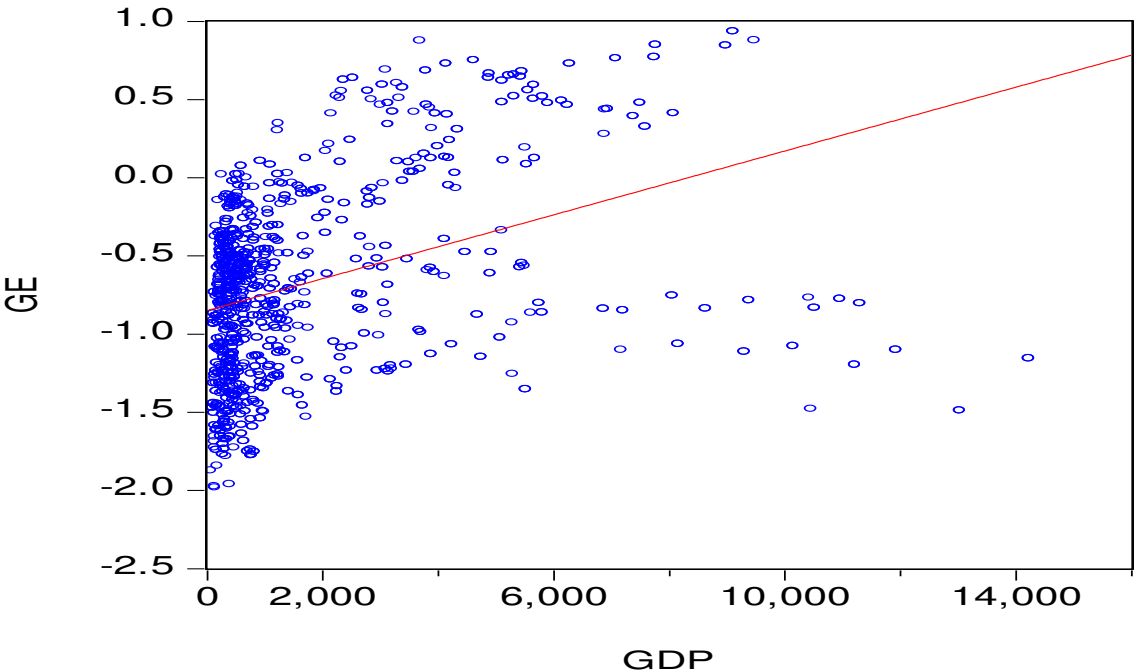
Source: The author.

**Figure 7. Scatter Plot of per Capita GDP and Voice and Accountability (VA)**



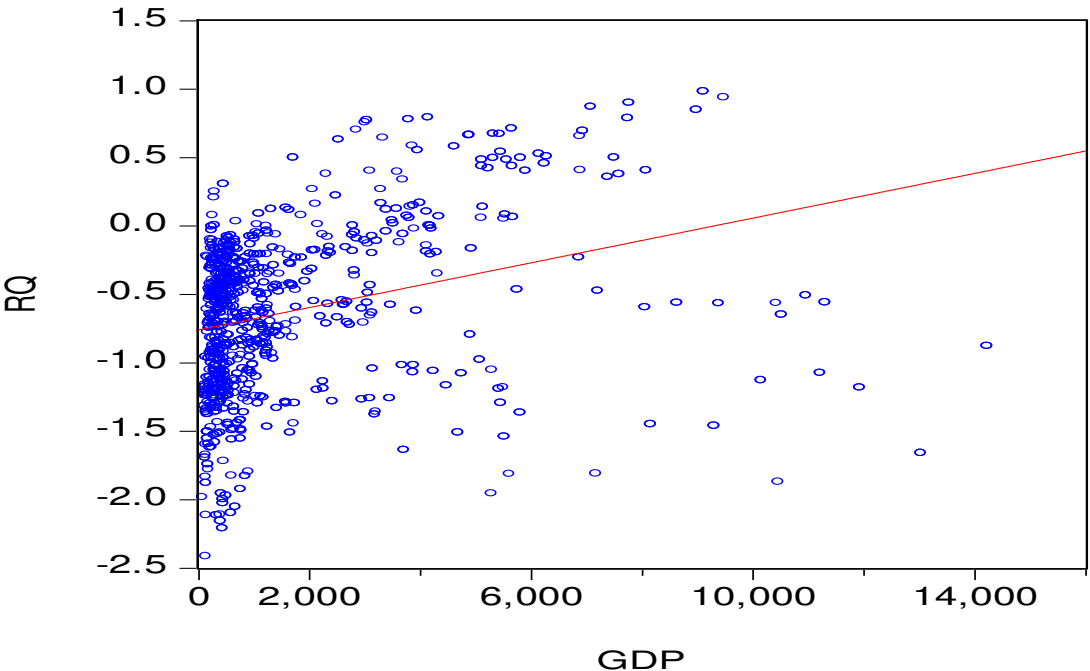
Source: The author

**Figure 8. Scatter Plot of per Capita GDP and Governmental effectiveness**



**Source: The author.**

**Figure 9. Scatter Plot of per Capita GDP and Reglementary Quality**



**Source: The author.**

## 4. Model, Data and methodology

### 4.1. Model and Data

In literature, there are three streams of thought: the first suggests that ODA promotes economic growth in the recipient countries. Nevertheless, the second current suggests that ODA has a negative impact on economic growth in the sense that foreign aid impedes investment and only increases consumer spending. On the other hand, the latest thinking shows that the effectiveness of foreign aid improves only in countries with sound institutional policies.

Our econometric study aims to provide answers to the questions of the relationship between foreign aid and economic growth in forty eight African countries. So, in order to check for the mediation effect of governance institutions (see Baron and Kenny (1986)), we examine in first stage the impact of aid on economic growth. In second stage, we assess the impact of governance on economic growth in African economies. In third stage, we examine the aid effectiveness in presence of good governance.

In this case, we will estimate the first model (equation 1) where economic growth (GDP per capita) is treated as a dependent variable, while development of foreign aid is the main independent variable alongside other variables (inflation, money supply, trade openness, population). Thus, the main question in this work is whether corporate governance has an important role in improving the effectiveness of the development of foreign aid in terms of economic growth. In order to answer this question, equation 2 will be estimated.

Thus, to study the effectiveness of the development of foreign aid in the long term, in terms of economic growth, we consider a sample composed of 48 African countries over the period from 1996 to 2014. In a first place, we will estimate the following model:

$$Y_{it} = \beta_0 + \alpha_1 ODA_{it} + \alpha_2 X_{it} + \varepsilon_{it} \quad (1)$$

Our dependent variable is "Y" that is the log of GDP per capita in current US dollars, while the

explanatory variables are: ODA is the log of the amount of the currently received US net aid per capita (McGillivray et al., 2006), "X" is the set of the explanatory variables, which includes the following variables: M2 is logarithm of monetary mass measured by money and quasi money as % of GDP) (Burnside and Dollar, 1997), Pop refers to population growth (annual%) (Ekanayake and Chatrna, 2010) which is a proxy for the labor force related to GDP (%) (McGillivray et al., 2006, Gries et al., 2009), Inf refers to inflation, which is

approximated by the Consumer Price Index (McGillivray et al., 2006), open is the the trade opening that is measured by the sum of export and import relative to GDP(%) (McGillivray et al., 2006; Gries et al., 2009); oda2 is the square of aid (McGillivray et al., 2006). This variable was introduced to take into account the possibility of non-linearity of the link between aid and economic growth, theoretically based on the law of diminishing productivity of capital (Hansen and Tarp 2000, Clemens et al., 2004).,  $\beta$  is a constant;  $\varepsilon$  designates the model error term;  $\alpha$  represents the parameters to be estimated.

In a second place, we will examine the effect of governance on economic growth. In this framework, we will firstly eliminate the variable “oda” in our model. Then we will introduce into our model the variable "Gov" measured by the component index of governance indicators of Kaufmann, Kraay and Mastruzzi (2010) (Voice and Accountability (VA), Government Effectiveness (GE), Political Stability (PS), Quality of Regulation (QR), Control of Corruption (CC), Rule of Law (RL)), by applying Principal Components Analysis (PCA). After, we will introduce each time one of the six dimensions in order to assess the effect of each indicator of governance on economic growth. The econometric model is specified as follows:

$$Y_{it} = \beta_0 + \alpha_1 GOV_{it} + \alpha_2 X_{it} + \varepsilon_{it} \quad (2)$$

The data on governance indicators are extracted from the World Bank Worldwide Governance Indicators. The WGI constructs aggregate indicators of six dimensions of governance: (1) Voice and accountability, which measure the participation ability of citizens to select their government, as well as freedom of expression, association and a free media; (2) Political stability and absence of violence, which capture the perceptions of the likelihood that the government in power will be destabilized or overthrown by possibly unconstitutional means including politically motivated violence and terrorism; (3) Government effectiveness, which measures the degree of its autonomy from political pressures, the quality of the government to formulate policies and implement them; (4) Regulatory quality (REQ), which captures the perceptions of the government's ability to formulate sound economic policies and regulations for private sector development; (5) Rule of law, which captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence; (6) Control of corruption, which captures perceptions of the extent to which public power is exercised for private gain including all forms of corruption, as well as capture of the state by elites and private interests. All the six indicators are scaled

from 2.5 to -2.5 point, with higher values corresponding to better governance and the lowest value corresponding to poor governance.

In a lastly place, we will examine the effectiveness of the development of aid in the presence of governance. So, we will add in our model the variable "ODA \* Gov" that represents the interaction between foreign aid and governance. The interaction of this variable gives us an idea of how much aid effectiveness in terms of economic growth improves in the presence of good institutional quality. The expected sign of this variable is positive in the sense that the effectiveness of international aid is improving in countries with sound economic policies.

So, we re-estimate our model by applying the variable "gov" and the interaction between governance and aid "ODAGov". The model to estimate at this stage is as follows:

$$Y_{it} = \beta_0 + \alpha_1 ODA_{it} + \alpha_2 X_{it} + \alpha_3 ODA * Gov_{it} + \alpha_4 Gov_{it} + \varepsilon_{it} \quad (3)$$

The dataset is a non-cylindrical panel includes 48 African countries for the period 1996-2014. The selection of countries and the study period were limited by the availability of data. All the variables were taken from the World Bank statistics with the exception of the governance variable, which was derived from World Governance Indicators (WGI) while the inflation variable was obtained from International Financial Statistics (IFS). Table 1 summarizes the sources of our data.

### **Table1. Data and source**

#### **4.2. Methodology**

As the initial attempt in exploring the aid effectiveness in African countries in the long run, the paper examines this relationship using DOLS and FMOLS approaches. Firstly, unit root tests are used in order to identify the presence of long-run characteristics in each variable. Panel unit root tests (first and second generation unit root tests) are conducted to test whether there is a presence of stationarity in the data series of African countries. In the paper, we employ four types of unit root test. For the first generation unit root tests, we use Levin, Lin, and Chu (LLC) test and Im, Peseran and Shin (IPS) test. However for the second generation unit root tests, we use the Bai and Ng (2004) test and Pesaran (2003) test. For each variable, the tests are employed in order to determine the order of integration or the number of differencing operations to render the series stationary.

Secondly, cointegration tests are employed in order to identify the presence of a long-run relationship among the variables with long-run characteristics. The cointegration tests include the Kao test and the Pedroni tests proposed in Kao (1999) and Pedroni (1999, 2004)



respectively. This technique checks whether between all variables, there is a long run relationship.

Lastly, the cointegrating equation estimations include the application of the DOLS and FMOLS approaches proposed in Kao and Chiang (2000) and Phillips and Moon (1999) respectively. These techniques seek to estimate or quantify the long-run relationship among the variables. DOLS technique solves the endogeneity problem and eliminates serial correlation present in standard Ordinary Least Squares (OLS). In fact, OLS estimation is inconsistent in the cointegration panel series data (Dreger and Reimer, 2005). While DOLS and FMOLS solve the problem of endogeneity and eliminate small sample bias, the application of the FMOLS approach essentially requires that all variables must have the same order of integration and that the regressors must not appear as co-integrated. In line with Kao and Chiang (2000), DOLS outperforms FMOLS estimators in terms of mean biases.

## **5. Results and discussion**

Before proceeding to the long-run relationship between aid and growth, examining the unit-root properties of all the series in the study is the first step. The variables in this study should be integrated at the same order, in order to produce the FMOLS and DOLS tests. To study the stationarity properties of the variables, the Levin and al. (2002) and Im and al. (2003) tests are conducted. The study of Levin et al. (2002), Levin-Lin-Chu (LLC)) is structured around the panel Dickey-Fuller augmented panel (ADF) tests, which assume that there is a homogeneity in the dynamics of the autoregressive coefficients with inter-individual independence between the residues. The next step involves testing the presence of a long-term relationship between the series. In this paper the panel cointegration tests (Pedroni's test (2004) and Kao's test employed the residual of Phillips and Perron (1988) and Dickey and Fuller (1979)) are employed.

### **5.1. Aid and Economic growth**

The unit-root properties are investigated by applying the Levin, Lin & Chu t (2002) and Im, Pesaran and Shin W-stat (2003) tests. The finding of unit-root tests are reported in table 2. The empirical evidence supports all the variables to be stationary in first difference. So, we can suggest all the variables to be integrated at order one,  $I(1)$ .

#### **Table 2. Panel unit root tests results**

Due to the same integrating order of all the series, it is appropriate to implement Pedroni's (2004) tests in order to examine the existence of the long-run relationship among the variables. Regarding the analysis of co-integration (table (3)), Pedroni's (2004) tests enabled

us to analyze it in the context of this study. The set of alternative co-integration test hypotheses is accepted. As a result, these tests confirm the rejection of the null hypothesis of no co-integration since the results of these tests confirm the existence of a co-integration relationship between the variables.

### **Table 3. Cointegration tests results**

According to the usual tests of the unit root on the time series, all the series used in our study are integrated of the same order. On the other hand, the co-integration test revealed the existence of a long-term relationship in our model, which enables us to estimate our FMOLS and DOLS models.

### **Table 4. Panel FMOLS and DOLS results**

The results of the estimation of the FMOLS and DOLS models are presented in table 4. Moreover, the coefficients estimated from these two models can be used as long-term elasticities. It is obvious to note that the coefficients estimated from the two models FMOLS and DOLS models are very close and have the same signs. Indeed, from the results presented in table 4, we found that the coefficients obtained from the regression are statistically significant at 1% level of significance except for the case of trade openness and the ODA2.

Regarding development of foreign aid, its coefficient is negative and significant at 10% and 5% level in the FMOLS and DOLS models, respectively. So, we can point out that in the long term, foreign aid has a negative effect on economic growth in the region. In fact, foreign aid decreases the investment of the recipient countries, discourages the financing of several projects in all the fields and increases the consumption expenditures. These results oppose those of Juselius, Moller and Tarp (2014) and Moolio and Kong (2016).

Besides, our empirical research shows that inflation has a positive effect on economic growth. Indeed, the coefficient of inflation shows that an increase of 1% will raise economic growth between 0.468436% and 0.422373% in long run via FMOLS and DOLS respectively. The positive relationship between inflation and economic growth can be explained by the fact that inflation, the locomotive of investment, can lead to output growth and employment. Then economic growth improves.

On the other hand, when the money supply increases by 1%, economic growth increases by 0.304743% and 0.234678%, respectively, for the two models FMOLS and DOLS. Similarly, the labor force measured by the rate of population growth positively affects economic growth. The variable labor force measured by the annual population growth (pop) is significant only in the FMOLS model. For the others explanatory variables “oda2” and “ouv”, they are not significant in the DOLS and FMOLS models. So; we conclude the absence of correlation

between these variable and the economic growth, the results infirm these of Burnside and Dollar (2000).

## 5.2. Governance and economic growth

The empirical analysis starts with analyzing the relationship between governance and economic growth. So, we will estimate equation (2). We adopted an approach based on FMOLS and DOLS models. Our results presented in table 7 show that the overall governance has a positive and significant impact on economic growth. In this case, we estimate 7 regressions in our model. In the first one, the variable “GOV” presents the component index of the six dimensions of governance. Then, we estimate our model (eq (2)) when “GOV” presents each time one of these six dimensions of institutional quality. So, our findings presented in table 7 confirm that the overall governance has a significant positive relationship with economic growth both in FMOLS and DOLS models. However, the disaggregated analysis of governance indicators show mixed results. In fact, the dimensions of governance namely Political Stability, Voice and Accountability, Rule of law, Regulatory Quality and Government effectiveness promote economic growth. The positive impact of governance on economic growth can be explained by the fact that good governance implies political stability, rigid rule of law, et al., which could encourage the “helping hand” of power or inhibit the “grabbing hand” of power, leading to good economic growth performance.

Nevertheless, the coefficient Control of Corruption is negatively correlated with economic growth. This implies that corruption reduces economic growth. The negative relationship between corruption and economic growth can be explained, especially, by the fact that corruption increases the transaction cost and the production cost. Also, the corruption decreases the consumer confidence and investor confidence. So, it degenerates the trust of the society.

### **Table 7. Governance and economic growth: long-run relationship**

## **5.3. Effectiveness of foreign aid in the presence of governance**

To test the existence of a long-term relationship between the development of foreign aid and economic growth in the presence of governance, we will estimate, at this stage, equation 3. Thus, we apply, in the first place, the KAO test to check the existence of a co-integration relationship between the studied variables. The results of this test show that the probability associated with T-statistics (0.0044) is less than 5%, which makes it possible to reject the null hypothesis of no co-integration. This implies the existence of a long-run relationship between foreign aid and economic growth in the presence of governance in the African economies.

As explained previously, the expected sign of “ $\alpha_1$ ” is ambiguous. If “ $\alpha_1$ ” $>0$ , the conventional view that international assistance for development drives growth holds. Alternatively, “ $\alpha_1$ ” $<0$  implies support for unconventional vision, in which case increase in international aid for development is associated, in the long-run, with complacency and indifference behavior leading to a decline in economic growth. The expected sign of “ $\alpha_4$ ”, which represents the direct effect of the governance quality on economic activity, in the long term, is also theoretically ambiguous. The expected sign of the coefficient of the interaction term “ $\alpha_3$ ” is also uncertain for reasons previously discussed, and is ultimately an empirical question. If “ $\alpha_3$ ” has the same sign as “ $\alpha_1$ ”, then the direct effect of aid, in the long term, will be reinforced at higher levels of governance quality. On the other hand, if “ $\alpha_3$ ” and  $\alpha_1$  are of opposite signs, more improvement of governance quality will weaken the direct effect of international aid, in the long-run.

The results of the FMOLS and DOLS regression are presented in table (8) that indicates that equation (3) is tested using the composite index of six governance indicators. Aid is effective in terms of economic growth, in the long-run, in the presence of governance, if and only if the coefficient of the variable of the interaction between aid and governance (that is, the coefficient of the variable (“ODA\*GOV”)) is statistically positive and significant. Indeed, the results of the regressions presented in the tables (8) show that the evidence in favor of aid raising growth, in long term, only in good policy environments remains inconclusive. The results presents in table (8) show that the effectiveness of foreign aid increases, in the long-run, in presence of governance. In fact, the interaction term coefficient is only significant in the DOLS model. Indeed, the coefficient of aid-governance interaction in Model 2 (0.1447 for DOLS) is higher than the coefficient of aid in Model 1 (-0.1988).

For the other explanatory variables: the coefficients of inflation (INF) and money supply (M2) are significantly and positively correlated in the long run to economic growth and they retain the same signs as in Model 1 except for the case of inflation in the FMOLS model, the coefficient is not significant. The coefficient of trade openness is significant only for the DOLS model, but when trade openness increases in the long run by 1%, economic growth increases by 0.633%. This means that an enhancement of liberalization process leads to a positive influence on economic performance. Therefore, liberalization will facilitate the transfer of technologies which improve the productivity; it therefore has a positive impact on economic growth. These findings are in line with those of Tiba et al (2015).

Nevertheless, it is evident that the majority of elasticity of these variables relative to economic growth has decreased compared to those found in Model 1 in both the FMOLS and DOLS models.

**Table 6. KAO test results**

**Table 8. Aid, growth and governance: long-run relationship**

**5.4. Effectiveness of foreign aid in presence of six indicators of governance**

In order to test the conjecture that aid is more effective when specific macroeconomic policies are in place, we use the variable “governance”, measured by the composite component of the six dimensions of governance of World Bank. In this part, we will try to identify what the more pertinent indicator that can ameliorate, in the long term, the effectiveness of foreign aid in terms of economic growth. So, we will estimate the long-term effect of aid on growth in presence of each dimensions of governance. In this case, the variable “gov” in our model (eq 3) denotes each of the six indicators of good governance. So, we have six specifications (M1, M2, M3, M4, M5 and M6) where we include these indicators (political Stability, quality of regulation, Voice and Accountability, Control of Corruption, rule of law, government effectiveness), respectively, in the FMOLS model. We have, also, six specifications (M7, M8, M9, M10, M11 and M12) where we include these same indicators, in the DOLS model.

We note that the 6 variables of interaction between foreign aid and each indicators of governance in the FMOLS model are not significant for the whole panel. At this stage, we can’t conclude that institutions play a significant role in the amelioration of effectiveness of foreign aid, in the long-run of our entire panel. However, all these variables are significant at one percent level, in the DOLS model. So, we can say that the effectiveness of foreign aid in terms of economic growth is ameliorated in the presence of governance, measured by the six dimensions of World Bank Governance. This implies that donors should not only give aid, but increase its allocation to countries where there is improved level of governance. These findings, which are in line with the study of Burnside and Dollar (2000) and Adedokun (2017).

Nevertheless, the results of table (10) show that the most pertinent indicators that ameliorate the aid’s effectiveness are “Control of Corruption”, “Voice and Accountability” and “Quality of Regulation” whose coefficients are 0,620; 0,510 and 0,537, respectively.

**Table 9: FMOLS test results**

**Table 10: DOLS test results**

## **6. Conclusion and political implications**

The work of descriptive and econometric analysis above is a contribution to the debate on effectiveness of foreign aid, in the long-run, in presence of governance in African countries. The results of our studies based on a sample of forty eight African countries, permit us to conclude as Burnside and Dollar (2000) and Abd El Hamid Ali (2013) on high significance in the relationship between "good governance" and effectiveness of international aid in terms of economic growth: We found that, in the DOLS model -as opposed to the FMOLS model-, the conjecture that aid is more effective when specific macroeconomic policies are in place is confirmed.

Despite a substantial aid effectiveness literature, we still know little about the long-run relationship between aid, growth and governance. Our analysis points to the need for further research aimed at identifying the effectiveness of aid in presence of governance over relevant time periods on a panel data

Panel regressions confirm the cross-sectional results: an increase in average foreign aid of 1 percentage point of GDP is associated with average per capita GDP growth 19 years later that is higher by 0.2 percentage points.

In recent decades, economic theory has largely emphasized the effectiveness of foreign aid, with the majority of cases indicating that this effectiveness improves with the presence of a sound institutional framework.

In fact, the major objective of the developing countries, especially the African ones, is to reach the developed countries, improve economic growth and reduce poverty. Thus, our document brings this dilemma to highlight the improvement of the effectiveness of foreign aid development, especially in the long term, in the presence of good governance. In an effort to address this problem, the purpose of this paper is to examine the link between foreign aid and economic growth in the presence of governance on a panel model of 48 African countries from 1996 to 2014 using the FMOLS and DOLS models. The results show that foreign aid development improves economic growth in the presence of long-term institutional quality. On the other hand, we test the causality between the effectiveness of foreign aid development and economic growth. In fact, we found that there is a long causality between the studied phenomena.

Thus, the policy implications of our study suggest that the institutional factor plays a key role over time in helping the African countries to improve the effectiveness of development assistance in terms of economic growth. In other words, long-term development assistance

promotes economic growth, but this efficiency improves with the presence of a healthy institutional environment.

Therefore, given the importance of the quality of governance in improving the effectiveness of the ODA, it is essential to focus on the application of the principles of governance. Indeed, international aid is well used in a country characterized by transparent, accountable and enforced institutions of laws and regulations by ensuring the participation of both the stakeholders and the civil society.

In fact, no one can deny that a good governance in Africa at all levels in the political, social and economic spheres is crucial for the promotion of growth and the development and achievement of the Millennium Development Goals. On the other hand, the contagion of a culture of good governance is crucial for a rational economic management, an effective service delivery and an empowerment of the people.

## **References**

- Abd El Hamid Ali. H (2013), "Foreign Aid and Economic Growth in Egypt: A Cointegration Analysis.", *International Journal of Economics and Financial Issues*, Vol. 3, No. 3, 2013, pp.743-751
- Adedokun, A(2017) , "Foreign Aid, Governance and Economic Growth in Sub-Saharan Africa:Does One Cap Fit All? ", *African Development Review*, Vol. 29, No. 2, 2017, 184–196
- Ali, A. M., and H. S. Isse. (2005). "An Empirical Analysis of the Effect of Aid on Growth." *International Advances in Economic Research*, 11 (1): 1–11.
- Alvi, E., D. Mukherjee, and E. K. Shukralla. (2008). "Aid, Policies, and Growth in Developing Countries: A New Look at the Empirics." *Southern Economic Journal*, 77 (3): 693–706.
- Ang, J. B. (2010). "Does Foreign Aid Promote Growth? Exploring the Role of Financial Liberalization." *Review of Development Economics*, 14 (2): 197–212.
- Ang, J.B. (2010), Does Foreign Aid Promote Growth? Exploring the role of financial liberalization. *Review of Development Economics*, 14(2), 197-212.
- Arndt. C and Jones. S, (2015), "Assessing Foreign Aid's Long-Run Contribution to Growth and Development." *World Development*, Vol. 69, pp. 6–18
- Asongu, S. A., & Jellal, M. (2013). "On the channels of foreign aid to corruption", *Economics Bulletin*, 33(3), pp. 2191-2201.

- Asongu, S. A., (2014b). "On taxation, political accountability and foreign aid: empirics to a celebrated literature", *South African Journal of Economics: Forthcoming*.
- Asteriou, D. (2009). "Foreign Aid and Economic Growth: New Evidence from a Panel Data Approach for Five South Asian Countries." *Journal of Policy Modeling*, 31 (1): 155–161.
- Balde, Y. (2011). "The Impact of Remittances and Foreign Aid on Savings/Investment in Sub-Saharan Africa." *African Development Review*, 23(2), 247-262.
- Baron, R.M. and Kenny, D.A., (1986). "The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations". *Journal of personality and social psychology*, 51(6), p.1173.
- Bassam, A.A. (2008), "Foreign aid and economic growth in Egypt and Jordan: an empirical analysis". Working Paper 418, Economic Research Forum, 1-8
- Bhattarai, B. (2009). "Foreign Aid and Growth in Nepal: An Empirical Analysis." *The Journal of Developing Areas*, 42 (2): 283–302.
- Bhattari. B, and Sharma. K (2013). "Aid, Policy, and Growth: The Case of Nepal?", *Journal of Economic Issues*, 47(4):895-910
- Boone, P. (1996), "Politics and the effectiveness of foreign aid." *European Economic Review*, vol.40, p.289–329.
- Boone, T (2000)"saving, investment and capital flows an empirical study of the Asian economics." Working paper, n°3.
- Bräutigam, D. A., and S. Knack. (2004). "Foreign Aid, Institutions, and Governance in Sub-Saharan Africa." *Economic Development and Cultural Change*, 52 (2): 255–285
- Burke, P. J., & Ahmadi-Esfahani, F. Z. (2006). "Aid and growth: A study of South East Asia." *Journal of Asian Economics*, 17(2), 350-362.
- Burnside, C., & Dollar, D. (2000). "Aid, growth, the incentive regime, and poverty reduction." *The World Bank: Structure and Policies*, 3, 210.
- Burnside, Craig et David Dollar (2000), "Aid, Policies, and Growth." *American Economic Review*, 90:4 (September), pp. 847–68.
- Burnside, Craig et David Dollar (2004), "Aid, Policies, and Growth: Revisiting the Evidence." World Bank mimeo.
- Collier, P., and D. Dollar.(2002). "Aid Allocation and Poverty Reduction." *European Economic Review* 46 (8): 1475–1500
- Dalgaard, C. J., H. Hansen, and F. Tarp. (2004). "On the Empirics of Foreign Aid and Growth." *The Economic Journal*, 114 (496): F191–F216.



- Dickey, D. A., & Fuller, W. A. (1979). "Distribution of the estimators for autoregressive time series with a unit root", *Journal of the American Statistical Association*, 74, 427–431.
- Fayissa, B., and M. I. El-Kaissy. (1999). "Foreign Aid and the Economic Growth of Developing Countries (LDCs): Further Evidence." *Studies in Comparative International Development*, 34 (3): 37–50.
- Feeny, S. (2007). "Impacts of Foreign Aid to Melanesia", *Journal of the Asia Pacific Economy*, 12 (1): 34–60
- Gomanee, K., S. Girma, and O. Morrissey. (2005). "Aid and Growth in Sub-Saharan Africa: Accounting for Transmission Mechanisms.", *Journal of International Development*, 17 (8): 1055–1075
- Gounder, R. (2001). "Aid-Growth Nexus: Empirical Evidence from Fiji." *Applied Economics*, 33 (8): 1009– 1019.
- Herzer, D., and M. Grimm. (2012). "Does Foreign Aid Increase Private Investment? Evidence from Panel Cointegration", *Applied Economics*, 44 (20): 2537–2550.
- Herzer, D., and O. Morrissey. (2013). "Foreign Aid and Domestic Output in the Long Run." *Review of World Economics*, 149 (4): 723–748.
- Im, K.S, Pesaran, M.H., and Shin, Y. (2003). "testing for unit roots in heterogeneous panels", *Journal of Econometrics*, 115, 53-74.
- Irاندoust, M., and J. Ericsson. (2005). "Foreign Aid, Domestic Savings, and Growth in LDCs: An Application of Likelihood-Based Panel Cointegration." *Economic Modelling*, 22 (4): 616–627
- Irاندoust, M., and J. Ericsson. (2005). "Foreign Aid, Domestic Savings, and Growth in LDCs: An Application of Likelihood-Based Panel Cointegration." *Economic Modelling*, 22 (4): 616–627.
- Islam, A. (1992). "Foreign Aid and Economic Growth: An Econometric Study of Bangladesh." *Journal of the History of Economic Thought*, 24 (5): 541–544
- Islam, M. N. (2003). "Political Regimes and the Effects of Foreign Aid on Economic Growth." *The Journal of Developing Areas*, 37 (1): 35–53.
- Juselius, K., N. F. Moller, and F. Tarp. (2014). "The long-Run Impact of Foreign Aid in African countries: Insights from Multivariate Time Series Analysis." *Oxford Bulletin of Economics and Statistics*, 76(2): 153-184.
- Kargbo, P. M., and K. Sen. (2014). "Aid Categories that Foster Pro-poor Growth: The Case of Sierra Leone." *African Development Review*, 26 (2): 416–429.

Karras, G. (2006), « Foreign aid and long-run economic growth: empirical evidence for a panel of developing countries» *Journal of International Development*, vol.18, no.7, p.15–28.

Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). "World governance indicators project." World Bank.

Khan, M. A., and A. Ahmed. (2007). "Foreign Aid – Blessing or Curse: Evidence from Pakistan." *The Pakistan Development Review*, 45 (3): 215–240.

Kim, J. (2011). "Foreign Aid and Economic Development: The Success Story of South Korea." *Pacific Focus*, 26 (2): 260–286.

Levi, M.(2006). "Why We Need a New Theory of Government», *Perspectives on Politics* 4 (1):5-19.

Levin, A., Lin, C. F., & Chu, C. S. (2002). "Unit root tests in panel data: asymptotic and finite sample properties", *Journal of Econometrics*, 108, 1–24.

Lloyd, T., O. Morrissey, and R. Osei.(2001). "Aid, Exports and Growth in Ghana." *CREDIT Research Paper*, No. 01/01. <https://www.econstor.eu/bitstream/10419/81784/1/01-01.pdf>

Loxley, J., and H. A. Sackey. (2008). "Aid Effectiveness in Africa." *African Development Review*, 20 (2): 163–199.

Mallik, G. (2008). "Foreign Aid and Economic Growth: A Cointegration Analysis of the Six Poorest African Countries." *Economic Analysis and Policy*, 38 (2): 251–260.

Mekasha, T. J., and F. Tarp. (2013). "Aid and Growth: What Meta-analysis Reveals." *Journal of Development Studies*, 49 (4): 564–583.

Moller, and F. Tarp. (2014). "The Long-Run Impact of Foreign Aid in 36 African Countries: Insights from Multivariate Time Series Analysis", *Oxford Bulletin of Economics and Statistics*, 76 (2): 153–184.

Moolio. P et Kong. S, (2016). "Foreign Aid and Economic Growth: Panel Cointegration Analysis for Cambodia, Lao PDR, Myanmar, and Vietnam", *Athens Journal of Business and Economics*, Vol. 2, No. 4, pp. 417-128

Moreira, S. B. (2005). "Evaluating the Impact of Foreign Aid on Economic Growth: A Cross Country Study", *Journal of Economic Development*, 30 (2): 25–48.

Nkusu, M. M., and S. Sayek (2004). "Local Financial Development and the Aid-Growth Relationship." *IMF Working Paper*, No. 4-238. <http://www.econstor.eu/bitstream/10419/19849/1/Sayek.pdf>

Ouattara, B. (2008) "A re-examination of the savings displacement hypothesis", *Empirical Economics*, vol. 36, 3, pp.671-683

- Ovaska, T. (2003). "The Failure of Development Aid", *Cato Journal*, 23 (2): 175–188.
- Papanek, G. F. (1973). "Aid, foreign private investment, savings, and growth in less developed countries." *The Journal of Political Economy*, 120-130.
- Pedroni, P. (2004). "Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis", *Econometric Theory*, 20, 597–625.
- Phillips, P. C. B., & Perron, P. (1988). "Testing for a unit root in time series regressions", *Biometrika*, 75, 335–346.
- Rajan, R., & Subramanian, A. (2008). "Aid and growth: What does the cross-country evidence really show?" *The Review of economics and Statistics*, 90(4), 643-665.
- Sarwar, Hassan and T. Mahmood.(2015)."Foreign Aid and Governance in Pakistan." *Pakistan Economic and Social Review*, 53(2):149-173.
- Sharma, K., and B. Bhattarai. (2013). "Aid, Policy, and Growth: The Case of Nepal", *Journal of Economic Issues*, 47 (4): 895–910.
- Shields, M. (2007) "Foreign aid and domestic savings: The crowding out effect", Discussion Paper 35, Monash University.
- Snyder, W.D. (2000) "Foreign aid and domestic Savings: a spurious correlation?", *Economic Development and Cultural Change*, vol.39, 1, pp.175-181
- Solow, R. M., (1956). "A Contribution to the Theory of Economic Growth", *The Quarterly Journal of Economics*, 70 (1): 65–94.
- Svensson, J. (1999). "Aid, Growth and Democracy." *Economics & Politics*, 11 (3): 275–297
- Taslim, M.A and Weliwita, A. (2000). "The Inverse Relation between Saving and Aid: An Alternative Explanation", *Journal of economic development* Volume 25, Number 1, June 2000
- Tiba, S, Omri and Frikha, M.(2015)."The four way linkage between renewable energy environmental quality, trade and economic growth: a comparative analysis between high and middle-income countries", *Energy Systems*, 7, 103-144.

## TABLES

**Table1. Data and source**

<b>Variable</b>	<b>Definition</b>	<b>Source</b>
GDP	The GDP per capita in current US dollars	World bank
ODA	the amount of US current received net aid per capita	World bank
ODA2	the square of aid	World bank
Open	The trade opening that is measured by the sum of export and import relative to GDP(%)	World bank
M2	The monetary mass measured by money and quasi money as % of GDP	World bank
Pop	The population growth (annual %)	World bank
Inf	The rate of inflation calculated on the basis of the consumer price index	International Financial Statistics (IFS)
Gov	It is a synthetic measure of the quality of governance of countries by weighting and aggregation of different scores presented by Kaufman et al. (2010) using Principal Component Analysis. This measure integrates six indicators into a composite index that takes into account: 1) political stability; 2) Voice and accountability; 3) the effectiveness of public authorities; 4) the quality of regulation; 5) the rule of law and 6) the control of corruption.	Author's calculation
PS	political stability	World bank
VA	Voice and accountability	World bank
EG	the effectiveness of public authorities	World bank
QR	the quality of regulation	World bank
RL	the rule of law	World bank
CC	the control of corruption.	World bank

**Table 2. Panel unit root tests results**

	First generation of unit root test			
	Level		first difference	
	Levin, Lin & Chu t	Im, Pesaran and Shin W-stat	Levin, Lin & Chu t	Im, Pesaran and Shin W-stat
<b>GDP</b>	-0.23462	2.21012	-14.3889***	-13.0184***
	(0.4073)	(0.9865)	(0.0000)	(0.0000)
<b>ODA</b>	-4.83987***	-2.08570**	-20.4395***	-17.5427***
	(0.0000)	(0.0185)	(0.0000)	(0.0000)
<b>Open</b>	-2.43345***	-1.05580	-18.8392***	-16.7181***
	(0.0075)	(0.1455)	(0.0000)	(0.0000)
<b>M2</b>	-3.86707***	-0.05203	-16.5003***	-12.5029***
	(0.0001)	(0.4793)	(0.0000)	(0.0000)
<b>Inf</b>	1.07026	-9.03214***	-14.8067***	-15.5248***
	(0.8577)	(0.0000)	(0.0000)	(0.0000)
<b>Pop</b>	-1.87220**	-4.67160***	-11.2724***	-14.3048***
	(0.0306)	(0.0000)	(0.0000)	(0.0000)
<b>Gov</b>	-10.8107***	-1.89320**	-19.8363***	-7.65558***
	(0.0000)	(0.0292)	(0.0000)	(0.0000)

	Second generation of unit root test			
	Level		First difference	
	Bai and Ng	Pesaran	Bai and Ng	Pesaran
<b>GDP</b>	1.78268	-0.13861	-2.59911	-32.3566
	(0.9627)	(0.4449)	(0.0047)***	(0.0000)***
<b>ODA</b>	2.86868	0.96440	-10.7904***	-32.3566***
	(0.9979)	(0.8326)	(0.0000)	(0.0000)
<b>Open</b>	6.08033	1.38295	-16.6724***	-2.82813***
	(1.0000)	(0.9167)	(0.0000)	(0.0023)
<b>M2</b>	1.65936	0.76121	-1.95843**	-1.60862*
	(0.9515)	(0.7767)	(0.0251)	(0.0538)
<b>Inf</b>	-0.29905	-0.92431	-1.95843**	-1.60862*
	(0.3825)	(0.1777)	(0.0251)	(0.0538)
<b>Pop</b>	-0.45968	7.48472	-15.5940***	-16.0640***
	(0.3229)	(1.0000)	(0.0000)	(0.0000)
<b>Gov</b>	9.20374	12.2057	-7.84318***	-8.78719***
	(1.0000)	(1.0000)	(0.0000)	(0.0000)

\*\*\*, \*\*, and \* indicates statistically significant at the 1, 5 and 10 percent levels respectively  
 Values in parentheses are p-values.

**Table 3. Cointegration tests results**

<b>within-dimension</b>				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-0.314305	0.6234	-3.717569	0.9999
Panel rho-Statistic	8.662106	1.0000	8.419623	1.0000
Panel PP-Statistic	-1.658877	0.0486	-6.959101	0.0000
Panel ADF-Statistic	-2.596041	0.0047	-5.333413	0.0000
<b>between-dimension</b>				
	Statistic	Prob.		
Group rho-Statistic	10.45125	1.0000		
Group PP-Statistic	-18.84457	0.0000		
Group ADF-Statistic	-7.528286	0.0000		

\*\*\*, \*\*, and \* indicates statistically significant at the 1, 5 and 10 percent levels respectively

**Table 4 . Panel FMOLS and DOLS results**

	INF	M2	ODA	ODA2	POP	Open
<b>FMOLS</b>	0.468436***	0.304743***	-0.294640***	0.007163	-0.092122*	-0.207713
	(0.0000)	(0.0001)	(0.0023)	(0.6153)	(0.0178)	(0.1021)
<b>DOLS</b>	0.422373***	0.234678***	-0.198847**	0.002064	-0.055004	-0.212850
	(0.0000)	(0.0024)	(0.0403)	(0.8858)	(0.1629)	(0.1030)

\*\*\*, \*\*, and \* indicates statistically significant at the 1, 5 and 10 percent levels respectively.  
Values in parentheses are p-values.

**Tableau 5. KAO test results**

	t-Statistic	Prob.
ADF	-2.617358	0.0044***

\*\*\* indicates statistically significant at the 1 percent level

**Tableau 6. KAO test results (Governance-economic growth)**

	t-Statistic	Prob.
ADF	3.622925	0.0001

\*\*\* indicates statistically significant at the 1 percent level

**Tableau 7. Governance-Economic growth: long-run relationship**

	FMOLS	DOLS	FMOLS	DOLS	FMOLS	DOLS	FMOLS	DOLS	FMOLS	DOLS	FMOLS	DOLS	FMOLS	DOLS	
<b>GOV</b>	0.175373***	0.111902***													
	0.0000	0.0068													
<b>CC</b>			-	-											
			0.429135***	0.369324***											
			0.0067	0.0044											
<b>GE</b>					0.055601*	0.354395***									
					0.0875	0.0016									
<b>PS</b>							0.058424***	0.040528**							
							0.0000	0.0108							
<b>RQ</b>									0.046576*	0.048847*					
									0.0741	0.0608					
<b>RL</b>											0.115401**	0.040479**			
											0.0228	0.0496			
<b>VA</b>													0.062865***	0.068195*	
													0.0035	0.0532	
<b>INF</b>	0.115764***	0.167989***	0.028458***	-0.000107	0.105135***	0.360334***	0.092404***	0.142466***	0.085429	0.151276***	-	0.002534***	0.000109	0.147205***	0.129366***
	0.0001	0.0000	0.0002	0.7420	0.0012	0.0004	0.0002	0.0000	0.1410	0.0000	0.0028	0.1275	0.0003	0.0000	0.0000
<b>M2</b>	0.096828*	0.052115*	1.622621***	1.604785***	0.098717**	0.847765***	0.082100***	0.034137	0.086169***	0.082129***	0.190765***	0.163025***	0.029312	0.045794	
	0.0636	0.0782	0.0000	0.0000	0.0584	0.0000	0.0017	0.2812	0.0012	0.0044	0.0000	0.0000	0.2680	0.1055	
<b>Open</b>	0.083637***	-0.023756	1.203863***	1.262284***	0.085698**	-0.077024	0.111066***	0.022805	0.115413*	0.053257	-	0.170420***	0.028318	0.078002	0.025296
	0.0066	0.5587	0.0000	0.0000	0.0267	0.6987	0.0052	0.5933	0.0818	0.2890	0.0089	0.4223	0.1159	0.5430	
<b>POP</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	0.214335***	-0.026252	0.050805	0.181277***	0.140627***	0.672757***	0.142485***	0.003216	-0.092524	0.036483	0.062826**	0.028407***	0.163976***	0.006707	
	0.0000	0.4194	0.5543	0.0099	0.0046	0.0000	0.0025	0.9269	0.1509	0.2510	0.0270	0.0008	0.0032	0.8379	

\*\*\*, \*\*, and \* indicates statistically significant at the 1, 5 and 10 percent levels respectively; (Values in parentheses are p-values).

**Table 8. Aid, growth and governance: long-run relationship**

	INF	M2	ODA	ODA2	POP	Open	ODAGOV	GOV
FMOLS	0.970542***	0.095311	0.081611	-0.004319	0.015806	-0.375514***	<b>0.006339</b>	0.181623
	(0.0000)	(0.1448)	(0.4750)	(0.7563)	(0.7546)	(0.0004)	(0.8734)	(0.3284)
DOLS	0.444676***	0.235213***	0.375514***	-0.017975	-0.030500	-0.151123	<b>0.144745***</b>	-0.633201***
	(0.0000)	(0.0013)	(0.0030)	(0.2587)	(0.4637)	(0.2364)	(0.0028)	(0.0024)

\*\*\* indicates statistically significant at the 1 percent levels respectively.

Values in parentheses are p-values.

**Table 9: FMOLS test results**

	M1	M2	M3	M4	M5	M6
<b>ODA</b>	0.989451 (0.3944)	0.327035 (0.7856)	1.168997 (0.2996)	0.745941 (0.4775)	0.843735 (0.4415)	0.786036 (0.4633)
<b>ODA2</b>	-0.166245 (0.3020)	0.030102 (0.8849)	-0.147907 (0.3181)	-0.031684 (0.8401)	-0.161237 (0.3796)	-0.131263 (0.4697)
<b>odaPS</b>	<b>0.041213</b> <b>(0.9246)</b>					
<b>PS</b>	0.010691 (0.9950)					
<b>odaQR</b>		<b>0.838567</b> <b>(0.2842)</b>				
<b>QR</b>		-3.138483 (0.3168)				
<b>odaVA</b>			<b>0.423495</b> <b>(0.4370)</b>			
<b>VA</b>			-1.478863 (0.4964)			
<b>odaCC</b>				<b>0.977804</b> <b>(0.1598)</b>		
<b>CC</b>				-3.641420 (0.1777)		
<b>odaRL</b>					<b>-0.112154</b> <b>(0.8712)</b>	
<b>RL</b>					0.604649 (0.8222)	
<b>odaEG</b>						<b>0.003902</b> <b>(0.9947)</b>
<b>EG</b>						0.108311



						(0.9623)
<b>Open</b>	0.162580	0.121884	0.019865	-0.192950	0.125388	0.135682
	(0.7818)	(0.8354)	(0.9751)	(0.7306)	(0.8255)	(0.8197)
<b>POP</b>	-0.222270	-0.225974	-0.229120	-0.227572	-0.242009	-0.216516
	(0.4090)	(0.4182)	(0.3919)	(0.3587)	(0.3721)	(0.4335)
<b>INF</b>	1.118550*	0.951665*	0.859370	0.834741	1.171059**	1.079382*
	(0.0558)	(0.0736)	(0.1550)	(0.1285)	(0.0412)	(0.0597)
<b>M2</b>	0.123898	0.222488	0.205884	0.249622	0.244739	0.260760
	(0.7544)	(0.5033)	(0.5483)	(0.4622)	(0.4913)	(0.4344)

\*\* and \* indicates statistically significant at the 5 and 10 percent levels respectively.  
Values in parentheses are p-values.

**Table 10: DOLS test results**

	<b>M7</b>	<b>M8</b>	<b>M9</b>	<b>M10</b>	<b>M11</b>	<b>M12</b>
<b>ODA</b>	0.411335**	0.490756***	0.485109***	0.515632***	0.470974***	0.459166**
	(0.0339)	(0.0062)	(0.0094)	(0.0040)	(0.0092)	(0.0102)
<b>ODA2</b>	-0.067610**	-0.068084***	-0.064947**	-0.070268***	-0.061861**	-0.063596**
	(0.0146)	(0.0064)	(0.0146)	(0.0055)	(0.0150)	(0.0114)
<b>odaPS</b>	<b>0.251551***</b>					
	<b>(0.0001)</b>					
<b>PS</b>	-0.648572***					
	(0.0009)					
<b>odaQR</b>		<b>0.537408***</b>				
		<b>(0.0000)</b>				
<b>QR</b>		-1.472638***				
		(0.0000)				
<b>odaVA</b>			<b>0.510311***</b>			
			<b>(0.0000)</b>			
<b>VA</b>			-1.455910***			
			(0.0000)			
<b>odaCC</b>				<b>0.620023***</b>		
				<b>(0.0000)</b>		
<b>CC</b>				-1.628338***		
				(0.0000)		
<b>odaRL</b>					<b>0.491870***</b>	
					<b>(0.0000)</b>	
<b>RL</b>					-1.425865***	
					(0.0000)	
<b>odaEG</b>						<b>0.478926***</b>
						<b>(0.0000)</b>

<b>EG</b>						-1.264374***
						(0.0000)
<b>Open</b>	1.014162***	0.823726***	0.781128***	0.764706***	0.782762***	0.813837***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
<b>POP</b>	-0.128996*	-0.120755	-0.146351	-0.110293	-0.156912	-0.103397
	(0.0591)	(0.0650)	(0.0241)	(0.0989)	(0.0186)	(0.1174)
<b>INF</b>	0.709791***	0.703929***	0.675924***	0.735252***	0.693579***	0.724492***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
<b>M2</b>	0.824667***	0.801426***	0.829942***	0.767246***	0.830415***	0.797394***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

\*\*\*, \*\*, and \* indicates statistically significant at the 1, 5 and 10 percent levels respectively.  
 Values in parentheses are p-values.