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Official development aid effectiveness and economic growth in African countries: The role of the governance

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Abstract

This work revolves around support policies of developing countries which, in most cases, need financing and more particularly development aid. In this setting, the aim of this study is to evaluate the effectiveness of development aid for a sample of African countries of which 25 are considered to have intermediate incomes and 23 achieve low incomes. To do this, we relied on a cross-sectional regression over the period 1996-2014. Our results imply that good governance is a deterministic condition of the positive effect of aid on economic growth. Indeed, international aid unaccompanied by good governance practices (control of corruption, political stability, a sound regulatory quality, a rigid state of rights, government effectiveness, voice and accountability) has adverse effects on economic activity and creates more inequalities of opportunity, especially in low-income countries. Thus, we note that the better quality of institutions allow a better allocation of international aid towards productive projects which stimulates economic growth in the two sub regions. So, in order to achieve the desired goals of international aid, countries must first ensure political stability and develop a regulatory and institutional framework to organize economic activities, second need to protect individual properties and resolve disputes between players in different markets.

Key words: Development Assistance Effectiveness; Economic growth; Governance Quality.

Introduction

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The last decades have been marked by great difficulties by African developing or underdeveloped countries in terms of economic growth and political and social stability. They have not even been able to catch up with the emerging countries; contrary to the expectations of convergence theories in that these countries are supposed to know speeds of convergence that are too high because they are far from stationary states. This reality has prompted many academics and international institutions to seek explanations for the non-takeoff of some countries rich in raw materials especially which are characterized by absolute and comparative advantages at regional and international level. Likewise, the main trading partners of these countries have tried to support them in a continuous way directly by financial flows or indirectly by dismantling or reducing customs restrictions. Despite the importance of international aid in terms of frequency and value, most of the countries concerned are still classified as poor or with a low standard of living, which makes the question of the effectiveness of these support policies a topic that is still relevant and of major importance for both economists and politicians.

In this context, the previous literature has never ceased to deal with this subject in order to find answers to the main occupations and questions related to the effectiveness of international aid and the objective of economic development. Although the previous literature is abundant, the results are in most cases unconvincing and depend on the methodology adopted or the sample used. In other words, the conclusions are ambiguous and mixed. Some economists argue for a positive and significant relationship between international aid and economic growth (Stiglitz, 2002). The latter argue that development aid is strongly correlated with economic growth and reduces the poverty of the countries concerned in a remarkable way. They suggest that financial flows in the form of development aid can be seen as substitutes for the lack of national savings that subsequently increase the stock of capital, which encourages investment by reducing rates and costs of loans. Thus, they show that the aid helps improve the living conditions and health of workers in the receiving countries, which is transmitted positively on the productivity and performance of employees in addition to promoting the exchange of knowledge and technology between rich and poor countries.

On the other hand, other studies have focused on a non-coherent effect (Mosley, 1980; Dowling, 1982; Singh 1985) and sometimes negative effect (Bauer, 1984) of international aid on economic growth. In other words, international aid can lead to controversial results by negatively affecting the investment rate and development of

Third World economies'. This recessive effect of aid is explained, in large part, by the lack of responsibilities of public officials seeking their personal interests in an environment of heavy corruption and bureaucracy. Thus, international aid removes the reasons for investment or productivity improvement projects and can also lead to the appreciation of the national currency. The rise in the value of the domestic currency may reduce the profitability of tradable goods that become less competitive in the international market, negatively affecting the prices of agricultural goods that are the main source of revenue for agents in this type of country. Thus, financial flows in the form of development aid do not automatically stimulate economic growth and may even lead to contradictory results. They reduce private savings at the individual level and delay basic reforms at the global level by safeguarding a low level of openness and transparency by policymakers to continue to serve their interests and rents in lobbying systems.

Similarly, another stream of thought has emerged to emphasize a positive and significant effect of development aid on the welfare of poor countries conditioned by the quality of institutions. More specifically, many studies have conditioned the effectiveness of international aid by the presence of civil liberty in the countries of destination (Ishame et al., 1997). In the same line of research Burnside and Dollar (2000, 2004) have shown that the effectiveness of aid depends on the quality of the economic policies implemented by the recipient countries. They support that rampant inflation, unsustainable budget deficit or a situation of trade closure increases the risk of foreign support policies failing and requires internal reform. Other studies have examined the role of the political and social environment in explaining the success of development aid by partners or development agencies in poor countries. They suggest, other than economic strategies, the ability to cope with external shocks, sociopolitical and post-conflict instability situations, volatility and the risk of uncertainty as well as absorptive capacity as deterministic factors of the effectiveness of any development aid policy (Amprou and Chauvet, 2007; Collier and Hoeffler, 2002). In addition, other circumstances may have an impact on the relevance and performance of international aid projects namely shocks affecting export prices (Collier and Dehn, 2001), climate disruptions such as drought and terms of trade (Guillaumont and Chauvet, 2001).

So, as part of this last lineage of idea we seek to support a conditional positive relationship between international aid and economic growth. In particular, we focus on the contribution of

good governance to the effectiveness of development assistance in low- and middle-income African countries⁴.

Our contribution consists firstly in constructing a synthetic index that encompasses the various governance indicators weighted by their contribution to explaining global inertia through a Principal Component Analysis (PCA). Second, our interest is in individualizing the effect of governance, measured based on the indices of World Bank developed by Kaufmann et al. (2010), on economic growth that have not been the subject of previous studies. Indeed, this iterative approach allows us to assess the responsibility or the contribution of each indicator in explaining success or failure of international aid policies and to propose economic implications. In other words, we see that every dimension of governance namely corruption, government effectiveness, political stability, quality of regulation, rule of law and voice and responsibility contribute differently to improving the effectiveness of development assistance. Our study differs from previous work in the sense that we conduct cross-sectional regressions for the cases of countries belonging to the same region, unlike the majority of studies that take the form of time series or panel data, or cross section (different regions). Thus, in order to keep our sample homogeneous as maximum as possible we subdivide it into two parts according to the classification of the world bank of countries by the level of income holding similar characteristics for each group. We conclude that the improvement of governance quality is a necessary condition and not sufficient for the attractiveness and effectiveness of development aid.

The remainder of this manuscript is organized as follows: first we discuss previous economic growth literature highlighting importance of governance quality in improving international assistance of poor countries in section (2). Then, we detail our econometric approach and present main results and interpretations in section (3) and 4, respectively. Finally, we conclude our study with the presentation of key findings and implications in section (5).

⁴ It should be noted that a country is considered to be low-income if the per capita Gross Domestic Product does not exceed 975 \$, while a middle-income country is the one whose individuals have an annual Gross National Income that range between 976 and 11905 US dollars (World Bank, 2013). To be precise note that "middle-income countries" include all lower-middle-income countries with per capita Gross National Product between \$ 976 and \$ 3865 and higher middle-income countries with per capita GNP between \$ 3866 and \$ 11905. High-income countries are countries with income exceeding \$ 11905. In this paper, we are interested only in the first three categories of countries following the availability of data, whereas we rejected those of high income because this category includes only two countries, which number does not guarantee us reliable results since our study is based on panel data.

2. Literature review

The question of the aid development effectiveness is still a subject of political and economic debate, despite its longstanding treatment. It has been a priority in the discussions at most world summits. It is a complex and multidimensional theme as it is of interest to many economic and political stakeholders, as well as forming a tool for geopolitical manipulation within the reach of major global partners. The problem of inefficiency and visibility of significant and clear effects of international aid in most countries of sub-Saharan Africa has led many agents to wonder about the undeclared and not declared objectives of such policies in this region. Thus, researchers must provide answers to the inconsistency between the desired economic and social objectives and the strategies for allocating development aid funds. In particular, they focused on explaining and identifying the determinants of the aid-economic growth relationship instead of poverty reduction. The conclusions are unanimous and mixed.

According to the 2015 Annual Report of the World Bank (Table A.3.2), Sub-Saharan Africa occupies the most important part of the Official Development Assistance (ODA) (15 milliards of dollars), for this reason several empirical studies have examined the effectiveness of aid addressed to this region. However, previous studies have neglected to do a disaggregated study of the various dimensions of governance by breaking down this region according to the income criterion. Thus, to fill this gap, we have decomposed the African region into two sub-regions: low-income and middle-income countries, with the aim of eliminating the effect of heterogeneity that may exist within the sample. Today, African countries are failing to catch up with GDP levels in emerging and developed countries. The various partnerships and agreements, especially with the European Union, as well as international aid are not stopped, with no real impact on development levels.

For this reasons, the relationship between aid and economic growth has been the subject of much scientific researches that can be grouped into three streams. The first line of research emphasizes that the aid-growth relationship is positive in the sense that aid for development improves economic growth (Stiglitz, 2002). According to this trend aid is positively correlated with growth, which can contribute to poverty reduction. Development assistance programs improve economic growth by increasing savings and the stock of capital stimulating investment. In addition, it increases worker productivity and transmits technology and knowledge from rich to poor countries. For example, Sachs (2005a; 2005b) emphasizes the

positive role of international aid in advocating for increased subsidies and loans to poor countries. He shows that many poor countries are trapped in poverty and argues that aid flows from rich countries should increase and that these countries should work closely with aid recipients to achieve the Millennium Development Goals, including the eradication of poverty.

In the second line of works, many economists, such as Easterly (2006), show the negative effect of Aid. Indeed, the latter highlights the negative aspects of development aid by strongly criticizing the aid industry and rejecting the concept of central planning. In the same context, several studies have shown that aid flows could have an adverse effect and hurt the economy, especially in poor countries. Indeed, Friedman (1958) and Bauer (1972) have shown the perverse effects of development aid on economic growth. By focusing on the components of development theory in the 1960s, Griffin and Enos (1970) pointed out that foreign capital inflows could displace domestic savings by showing the existence of three possible ways in which flows could reduce domestic economies. Firstly, public spending or taxation policies could be changed by local governments. Secondly, easy access to credit for entrepreneurs could undermine their savings motive and, finally, consumption could be increased by aid flows. These last two possible causes were also shown by Weisskopf (1972).

Nevertheless, Hansen and Tarp (2000) found that almost two-thirds of those who support the negative effect of savings support suffer from methodological flaws, showing that aid is not tied to growth. However, Papanek (1973) and Mosley (1980) found negative effects of the aid on domestic savings. Boone (1996) focuses on the relationship between policy and aid effectiveness and argues that aid does not contribute to growth. Indeed, aid increases the size of government and consumption, and not the consumption of poor people.

In response to this mixture of results, it is developed a third stream of thought that takes into account the institutional and regulatory framework to explain the effectiveness of international aid. For example, Burnside and Dollar (2000) discuss conditionality of aid effectiveness. They stressed that aid positively affects growth if it is implemented in a good political environment, especially with regard to fiscal, monetary and trade policies; however, even in this case, the aid has diminishing returns. Thus, they conclude that aid is effective when aid flows should be directed to poor countries with good policies.

Similarly, Collier and Dollar (2002) argue that aid is not distributed effectively, assuming that poverty reduction is the ultimate goal and proposes that aid be allocated after taking into account the good policies followed by the poor candidate beneficiary countries.

Despite the importance of having an idea of whether the effectiveness of aid is linked to the political environment, it is essential to study the behavior of governments in aid-receiving countries. In other words, it is important to consider how local governments act after receiving aid (McGillivray, 1994), as this can be decisive as a policy producers in recipient countries may choose to allocate public resources between consumption and investment and to finance such activities, between taxes and loans (Gang and Khan, 1991) significantly affecting the growth process. In general, aid flows increase government spending, which means that subsidy revenues induce public spending, while tax revenues are associated with less public spending (Devarajan and Swaroop, 1998). Remmer (2004) finds that aid increases government spending and reduces tax revenues, unlike the market-oriented plans that many donors are trying to implement for the development of poor countries. The author concluded that aid could lead to corruption, since it weakens incentives for politicians to follow good policies. In the same context, Knack, (2000) emphasized that high levels of aid can reduce institutional quality and administrative capacity and induce rent-seeking behavior in recipient countries. Brautigam and Knack (2004) found that in sub-Saharan African countries, higher levels of aid are correlated with deteriorating levels of governance. In addition, in developing economies, corruption is considered to be the main factor that deteriorates economic development. Thus, issues of politics, good governance and corruption are of major importance for aid effectiveness.

In summary, our objective is to identify a potential link between international development assistance and economic growth conditioned by governance level quality. So, we present firstly a brief review of the literature on the relation between Development Assistance and economic growth. Then, we revise the effect of governance in the level of economic growth. Finally, we highlight the effect of governance in the effectiveness of official development Assistance.

2.1. Aid for developments and economic growth

The relationship between foreign aid and economic growth has attracted much attention in recent decades, but the empirical results are mixed. There is now an abundant literature on the relationship between aid and growth. For example, Griffin (1970), Griffin and Enos (1970) and Weiddkopf (1972) have shown that growth rates are negatively related to the amount of foreign capital inflows in the sense that aid can delay development by decreasing domestic savings.

Also, Boone (1996) showed the existence of a negative correlation between economic growth and ODA. Indeed, he found the absence of a positive correlation between ODA and economic growth, and shows that ODA do not reduce poverty in the sense that it finances only consumption rather than investment. Thus, he considers that public development aid is no more than a means to increase the size of governments.

Similarly, Mallik (2008) based on a sample of six poorest and most aid-dependent African countries (Central African Republic, Malawi, Mali, Niger, Sierra Leone and Togo), showed a long-term negative relationship between real GDP per capita and aid as a percentage of GDP, investment as a percentage of GDP, and trade openness. In the case of Egypt, Abd El Hamid Ali (2013) studied the link between development aid and economic growth during the period 1970-2010, using the Johansen Cointegration test and the Vector Error Correction Model (VECM). He showed a negative and significant impact of foreign aid on economic growth both in the short and long-run.

Young and Sheehan (2014) using a sample of 116 developing countries, between 1970 and 2010, found that aid flows are negatively correlated with the quality of political and economic institutions. These authors also showed that only economic institutions are strongly correlated to growth, and through institutions, aid reduces annual growth (by 2%).

Nevertheless, Papanek (1972) has shown a significant positive correlation between aid and economic growth for a sample of 51 countries over the period 1950-1965, particularly as a result of the disintegration of capital flows into private capital, foreign aid and other inputs. Papanek (1972) criticized revisionist literature by showing the existence of a positive correlation between ODA and growth.

Mitra (2013) used the Johansen Cointegration Test and the Vector Error Correction Model (VECM) to examine the link between development aid and economic growth. He found that

development assistance is significantly and positively correlated in the long-run with economic growth for the Cambodian case during the period 1971-2009.

Similarly, Luqman (2013) found that foreign aid is more effective, in the case of Pakistan, for the period 1972-2011, applying the ARDL model, and therefore improves the growth process in the short and long term only in the presence of development of the local financial sector.

Recently, new methods based on an Autoregressive Vector Model (VAR) have emerged reflecting the new trend of studying the effect of foreign long-term aid on a set of key macroeconomic variables that ultimately lead to economic growth. Indeed, Matthijs et al. (2013) applied the VAR model and showed that foreign aid is positively and significantly correlated in the long-run to income for the 50 developing countries.

In the same context, Arndt et al. (2015) analyzed the aid-economic growth relationship for the case of many developing countries between 1970 and 2000 applying the OLS regressions, limited information maximum likelihood (LIML) and inverse probability weighted least squares (IPWLS) estimator. These authors have shown the existence of a positive impact of foreign aid on economic growth, including the effect of aid on 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 value added). Arndt et al. (2015) showed that development aid helps stimulate economic growth, promote structural change, improve social indicators and reduce poverty. Similarly, Basnet (2015) examined the role of foreign aid on savings and economic growth in South Asian countries; he found that foreign aid positively affects economic growth, while it crowds out domestic savings other than complementing it.

In addition, Moolio and Kong (2016) confirmed the positive relationship between development assistance and economic growth for the following four countries (Cambodia, Laos, Myanmar, Vietnam) during the period 1997-2014. They found that the aid has a favorable effect on economic growth using Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS) models.

More recently, Sothan (2017) studied the relationship between aid and economic growth by applying the ARDL model for the case of Cambodia during the period 1980-2014. He found that international aid positively affects short-term economic growth in this country.

As we have mentioned since the introduction, other work has raised the importance of the governance with regard to the study of this subject. So we try to review the previous literature relating to the direct effect of the quality of the regulatory and legal framework on economic growth.

2.2. Governance and economic growth

The relationship between the quality of institutions and growth is the subject of theoretical and empirical controversy. This literature has been developed in response to the shortcomings associated with classical models to explain the divergence in terms of growth between different nations. At the theoretical level, we can cite Solow's model limitations in the explanation of growth, and those of Lucas (1988), Romer (1986), Mckinnon and Show (1973), Barro (1989), and Roubini and Sala-I-Martin (1995) in the analysis of endogenous growth. These works are mainly focused on finding determinants of growth but fail to explain the difference between nations in terms of capital accumulation and innovation.

Several authors have attributed this gap in terms of growth to institutional quality. Indeed, Barro (1996) gives importance to democracy, Alessina and Perrotti (1994) gives interest to the variable of political instability and Rodrik (1999) affirms that good governance is important in the improvement of economic results.

Also, the new trend of institutional economics considers institutions or governance quality to be one of the most important factors of long-term growth. Institutions with well-protected property rights, an operational judicial system and a low level of corruption are favorable for capital accumulation and growth. However, inefficient institutions favor appearance of a market for unproductive activities and increase transaction costs. Thus, institutions improve economic growth. Indeed, they affect investment because their role is to protect the property rights of investors including foreign direct investment and therefore reduce transaction costs. Similarly, North (1981, 1990) and Rosenberg and Birdzell (1986) focused on the interaction between institutions and growth. This idea was supported by Rodrik (1997, 2003), who explains that growth gaps between Asian countries are due to institutional quality.

The empirical literature places a crucial interest on institutions in promoting economic development. Cross-sectional empirical studies have used per capita GDP as a function of several institutional variables such as civil liberties, rule of law, property rights, political stability and global indicators of governance. For example, Grier and Tullock (1989), Barro (1996), Helliwell (1994) and Isham et al., (1997) show the existence of a positive relationship

between civil liberty and growth. Kaufmann et al. (2004) suggest that good governance is a stimulus for economic growth. Other works have reached the same result as Acemoglu et al. (2004). They have explained the difference in growth between rich and poor countries by the degree of protection of property rights. Jerzmanowski (2006) finds that the economic institution positively affects growth through investor protection. Given the importance of governance to explaining economic growth the following section is devoted to the discussion of the likely effect of international aid on economic growth conditioned by the level of governance.

2.3. Official Development Assistance, governance and Economic growth

In the late 1990s, analyzes became increasingly complicated about the link between foreign aid and economic growth. Indeed, the analysis of Burnside and Dollar (2000) can be considered as the third and last generation of studies of which they have found a significant impact of aid on growth, but this relationship is conditional on the quality of the economic policy. Indeed, in 1997, with the crisis of legitimacy of ODA and the recovery of aid flows, Burnside and Dollar, unlike Boone (1996), brought new conclusions on the effectiveness of aid. Indeed, these two authors have included a term of interaction between foreign aid and economic policies (aid \times economic policy). The purpose of this variable is to differentiate between countries with sound economic policies and those with harmful economic policies.

Burnside and Dollar (2000), from a sample of fifty-six developing countries (East Asia and sub-Saharan Africa), of low or middle income, for six periods of four years between 1970 and 1993, set out place a composite indicator that includes three economic policy variables: inflation, budget surplus, and openness policy. They show that the simple correlation between foreign aid and economic growth is almost zero, especially for countries with sound economic policies. However, the aid has a significant positive effect on economic growth in good policy environments. Contrary to Boone's (1996) finding that there is no opportunity to improve aid effectiveness, Burnside and Dollar (2000) suggest a more positive discourse as aid becomes more effective in terms of economic growth with better selectivity.

Similarly, Alesina and Dollar (2000) examined the aid-policy-change relationship, identifying different scenarios of significant increases and decreases in aid amounts, for a sample of 60 countries. In addition, they analyzed developments before, during and after political and economic openness, measured respectively by the indicators of democratization and trade openness. Alesina and Dollar (2000) pointed out that the largest fluctuations in aid amounts

do not precede economic and political reforms. However, Chauvet and Guillaumont (2004) showed that the recipient country can adopt a better economic policy thanks to ODA.

Moreover, Amprou (2001) showed that aid is strongly correlated with political reforms in the sense that he contribute to promote reforms by making them politically sustainable through neutralization of interest groups with ability of resilience. So, ODA can facilitate the reform process by partially and temporarily compensating for the harm done to these groups. Also, these two authors, out of ten African countries, concluded that aid has played a significant and positive role, notably in Ghana and Uganda. However, Devarajan et al. (2001) argued that large amounts of aid directed to countries with poor economic policies have tended to prolong these bad policies. As a result, the funding allowed the reforms to be postponed.

However, Berg et al. (2001) showed that the aid could sometimes affect the reforms. For example, in Côte d'Ivoire, in 1994, in order to improve competitiveness, various reforms were implemented under pressure from donor countries.

So, the fact that the aid has no effect on economic policy, according to the World Bank, in the Assessing Aid report, justifies recourse to the selectivity of the recipient countries. It is true that there is unanimous agreement on the failure to practice traditional conditionality, but the lack of correlation between aid and the quality of policies is disputed and challenged by certain empirical studies, showing that aid may affect policy directions through another channel than conditionality. In addition, the aid effectiveness debate began to take into account the principle of poverty reduction, especially in the early 1990s.

In addition to the quality of economic policies, there are other factors that are a necessary condition for improving the effectiveness of aid. First, there is vulnerability to external shocks that is intimately linked to climate and natural shocks. For example, the case of the food crisis justifies the adverse effect of climate change especially on the supply of goods, speaking here of an imbalance between supply and demand. These external shocks include climatic factors, mainly floods in Asia and southern Africa, drought in Australia and the Sahel of Africa, hurricanes in Latin America and the Caribbean, and so on.

Thus, according to Amprou and Chauvet (2004), the economic growth of vulnerable countries risks experiencing shocks through their impact on the quality of economic policies. Also, Charnoz and Severino (2005) showed that ODA is more effective in more vulnerable countries in that it helps to protect countries from these external shocks. As a result, the adverse effect of external shocks on economic growth can be offset by ODA. So, ODA is

more effective, especially in countries suffering from external shocks even with poor economic policies.

Secondly, socio-political instability can lead to a deterioration of economic growth, creating an uncertain environment that is not very favorable to investment. Indeed, civil wars have dramatic human and social effects. Similarly, civil wars lead to a deterioration of national production, specifically the destruction of infrastructure and physical capital, as well as the diversion of resources to the non-productive sector of military spending. Likewise, this type of socio-political instability (wars) leads to a loss of household wealth and their assets. According to Hansen and Tarp (2000), the effectiveness of international aid in terms of economic growth is closely linked to the existence of limited absorption capacities of the recipient countries. Absorbency can be measured by decreasing marginal utility of aid. So, as the aid has decreasing marginal returns, then there is a certain threshold beyond which, the productivity of an additional dollar Aid decreases. Also, this absorption capacity varies according to the different factors such as the solidity of the institutions, the management capacity of the administrations, the quality of the public policies, the procedures of the donors, the local competences, etc. Indeed, Charnoz and Severino (2005) spoke of a theoretical saturation point, showing that if beneficiary countries were to benefit as much as possible from aid flows, there would probably be wastage or even misappropriation.

3. Empirical methodology

3.1 Econometric method

In this section we seek to study the relationship between international assistance and economic growth using a sample of 48 developing countries of which 23 are considered low-income and 25 as middle income countries. To do this we are based on the specification of the panel data presented us follow which highlights the link between economic growth and the amount of foreign aid in addition to a number of variables that are unanimous in previous empirical research in the same context:

$$Y_{it} = \alpha_1 + \beta_1 apd_{it} + \beta_2 pop_{it} + \beta_3 m2_{it} + \beta_4 ouv_{it} + \beta_5 inf_{it} + \mu_{it} + \varepsilon_{it} (1)$$

With: Y_{it} is the log of current GDP per capita in current US dollars, apd_{it} is the log of the amount of US current per capita received net aid (McGillivray et al., 2006), $M2$ is logarithm of monetary mass measured by money and quasi money as % of GDP) (Burnside and Dollar, 2000), Pop refers to population growth (annual%) (Ekanayake and Chatrna, 2010) which is

proxying for the labor force, *ouv* refers to the trade opening that is measured by the sum of export and import relative to GDP(%) (McGillivray et al., 2006; Gries et al., 2009), *inf* refers to inflation which is approximated by the GDP deflator (annual %) (McGillivray et al., 2006); α is a constant; ε_{it} designates the model error term; β represents the parameters to be estimated; μ_{it} represents the individual effects ($i = 1, \dots, 48$) and t denotes the time ($t = 1996, \dots, 2014$).

From a methodological point of view, we will try to study the effectiveness of development aid in terms of growth by insisting on the important role of the quality of governance. The estimation of our model begins with a study of the effect of development aid on economic growth using the fixed-effect model (FE) or the random-effects model (RE). The choice between these two models is made using the Hausmann test (1978). Then, we ensure the robustness of our results through the Generalized Least Squares (GLS) method. In this case panel model specification is as follow:

$$Y_{it} = \alpha_1 + \beta_1 apd_{it} + \beta_2 GOV_{it} + \beta_3 pop_{it} + \beta_4 m2_{it} + \beta_5 ouv_{it} + \beta_6 inf_{it} + \mu_{it} + \varepsilon_{it} \quad (2)$$

Where: GOV_{it} takes for each time the value of the composite index calculated by the ACP, then it takes the value of an indicator among the six indicators of the quality of governance of Kaufmann, Kraay, Mastruzzi (2010) of the World Bank;

In the second step, we study the indirect effect of foreign aid on economic growth through the governance variable, which is measured, first, by the composite index of six governance indicators of World Bank elaborated by Kaufmann, Kraay and Mastruzzi (2010). In a second place, this variable corresponds to one sub-indicator of the six dimensions of governance. To do this, we introduce firstly the interaction between the aggregate index of governance and foreign aid. Then, we perform the same analysis by introducing each time an indicator of governance of the World Bank developed by Kaufmann et al. (2010). Thus, our econometric approach is to perform the following tests for all the specifications of our models.

- Fisher's global significance test;
- The Hausman test to select the most appropriate model: fixed or random effects model;
- The Breusch-Pagan test and the Wald test to test the existence of heteroscedasticity;

- The Wooldridge test that allows checking the presence of the autocorrelation of the error terms.

In other words, we will study the role of the governance quality on the effectiveness of ODA by integrating, in a first place, the composite index of six indicators of the governance of the World Bank. This index is calculated based on the Principal Component Analysis method using the SPSS software. In a second place, we integrate separately the indicators of the good governance developed by Kaufman Kraay and Mastruzy (2010) (Voice and Responsibility (VR), Government Effectiveness (GE), Political Stability (PS), Quality of Regulation (QR), Control of Corruption (CC), Rule of Law (RL)). It is quite possible that there are correlation effects between them. The results of the tests based on the correlation matrix (Table A.2.1) indicate obvious correlations between the six indicators. Therefore, estimating the dimensions of governance in our model would have led to erroneous results. Thus, the model is estimated by regressing each time one of the six governance indicators, thus avoiding any correlation effect.

Then, we can formulate the equation to study in the following form:

$$Y_{it} = \alpha_1 + \beta_1 apd_{it} + \beta_2 GOV_{it} + \beta_3 GOV_{it} apd_{it} + \beta_4 pop_{it} + \beta_5 m2_{it} + \beta_6 ouv_{it} + \beta_7 inf_{it} + \mu_{it} + \varepsilon_{it} \quad (3)$$

GOV*apd refers to the interaction term between the quality of governance and aid effectiveness in order to test if the effectiveness of aid is conditioned by the quality of governance.

3.2. Data Sources and stylized facts

This study covers a cross-sectional panel of 48 African countries: 25 middle-income African countries and 23 low-income countries over a period covering 1996-2014. The choice of this period is dictated by the availability of data on indicators of governance starting from 1996. All data are from the statistics of the World Bank. With the exception of governance indicators that are collected from Worldwide Governance Indicators (WGI) and aggregated based on factorial analysis through Principal Component Analysis approach.

3.2.1. Principal component analysis

For the construction of our index of governance, we are based on a statistical method - principal component analysis (PCA) – a technique able to group individual indicators that are collinear to form a composite indicator that captures as much as possible information common to individual indicators. Factor loads are coefficients that relate observed variables to principal components or factors. The square of the factor loads represents the proportion of the total variance of the indicator that is explained by the factor. The series that contributes most to the direction of the common variation in the data takes a higher weight.

The factorial loads on the first main component are chosen as weight. Given the extended nature of the exercise, the first major component can be interpreted as a summary of the latent information on the quality of governance. For example, *t* summarizes the information on political and governance quality and represents more than 81% of the variance of the data in the case of middle income sample (Table A.1.10 in the appendix).

The six sub-indicators of the World Bank's governance (2010) do not have the same weight in the construction of the composite index. We present the contribution of each sub-indicator in the explanation of the total variance of global governance (estimated by the first component) as explained in the previous paragraph and we note that the aggregate index of governance can be written as follows:

$$gov_i = \alpha_1 CC_i + \alpha_2 GE_i + \alpha_3 PS_i + \alpha_4 RQ_i + \alpha_5 RL_i + \alpha_6 VA_i \quad (4)$$

With CC, GE, PS, RQ, RL and VA represent different sub-indices; $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ denote the weighting of each variable (corresponding factorial loads on the first main component) to the construction of the index composite.

Before performing our analysis of the PCA, it is essential to ensure that our data is factorizable⁵. In this context, the Kaiser-Meyer-Olkin (KMO) test, which is a precision index of sampling, is considered excellent (given that the KMO test exceeds 0.8) both in the case of low-income and middle income African countries. Also, the Bartlett test is significant even at the 1% threshold ($p = 0.000 < 0.001$) for the case of the regions studied (see appendixes A.1.6 and A.1.12).

⁵ According to Hair et al. (2010) the KMO index is excellent if its value between 0.8 and higher, KMO good if its value equals 0.7 and above, KMO mediocre when its value between 0.6 and more, KMO miserable when its value between 0.5 and more and KMO unacceptable when its value is less than 0.5.

According to the table of eigenvalues (Tables A.1.4 and A.1.10) the first two factorial axes explain 83.601% and 89.51% of the total information contained in the six initial active variables in the case of the studied regions respectively in low-income and medium-income countries.

It can be seen that the first axis represents 71.91% and 81.88% of the total variance respectively in the low-income and middle-income region of Africa. In other words, the first component makes it possible to synthesize more than half of the total inertia in the totality of the studied sample. So, the six governance indicators can be reduced to just one component to understand governance.

Thus, our composite index is calculated as the linear combination of weighted governance indicators by the share of the variance explained by each variable in the first principal component. According to the results of the PCA, equations (4) and (5) describe the composite indices of the World Bank's governance indicators (2010), respectively, for low-income and for middle income African countries:

$$gov_i = 0,826 CC_i + 0,857 GE_i + 0,810PS_i + 0,881RQ_i + 0,941 RL_i + 0,762VA_i$$

(5)

$$gov_i = 0,941 CC_i + 0,943 GE_i + 0,799PS_i + 0,908RQ_i + 0,961 RL_i + 0,867VA_i$$

(6)

3.2.2. Stylized facts

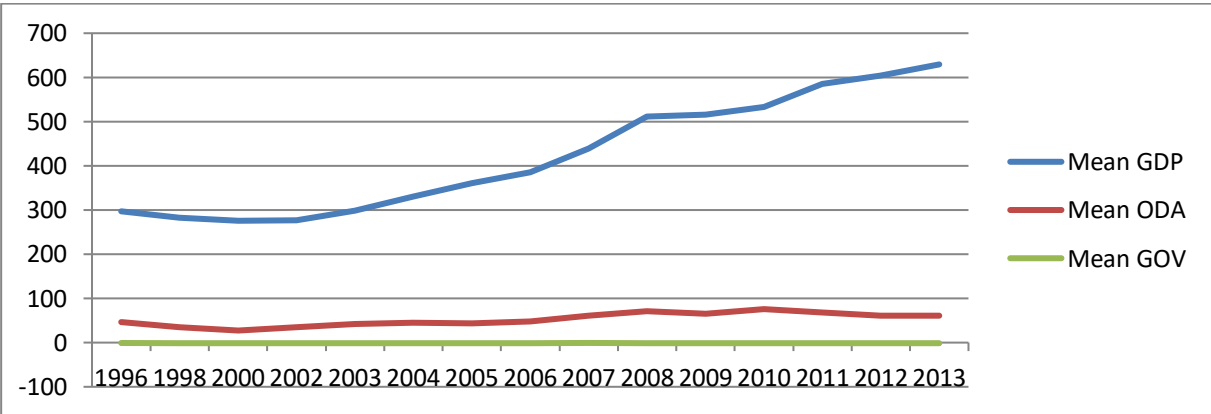
At the economic level, globalization is the main cause of strong inequalities between the North and South. It also strengthens the differences between countries of the South, which explains heterogeneity at the world level: African countries are marginalized while emerging countries experience rapid growth. Thus, aid for development 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.

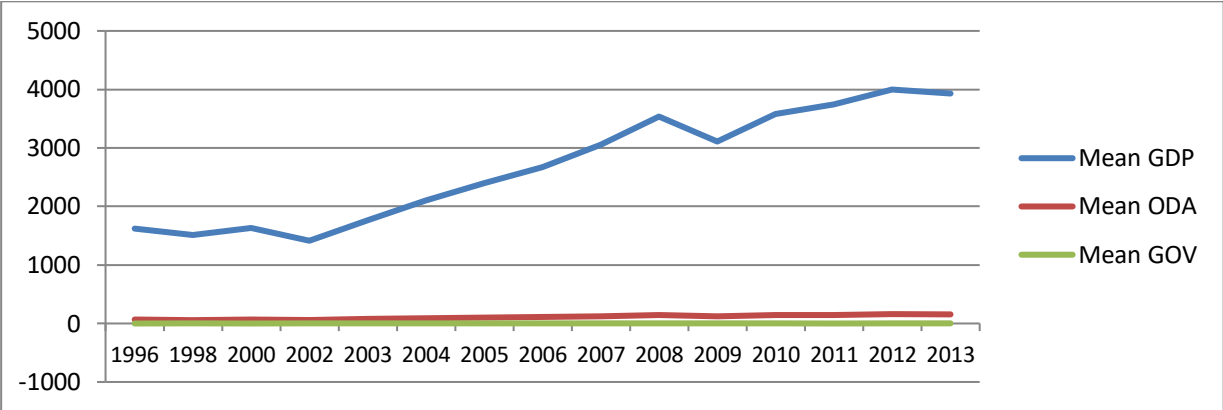
In recent years, Africa had achieved a turning point in its development and played a large role in the global economy. Regionally, growth differs from one region to another, reflecting different levels of development and natural endowment, the impact of climatic conditions and, in particular, the degree 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 297,4 to 629,4 (with a growth rate of 111, 63%).

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



Similarly, economic growth in middle-income African countries (Figure 2) increased by 142.05% over the same period, from 1622.7 in 1996 to 3927.9 in 2013.

Figure 2: Evolution (on average) of foreign aid, governance and economic growth in middle-income African countries



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, low-income African economies grew by 33.61% in net ODA received (on average) between 1996 and 2013, while falling from 61.38 to 45.49. During this same period, Africa's share of net ODA (on average) has risen sharply from 157.12 to 64.91, that is, with a growth rate of 142, 05%.

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).

Figure 3: Evolution (on average) of governance in low and middle income African countries

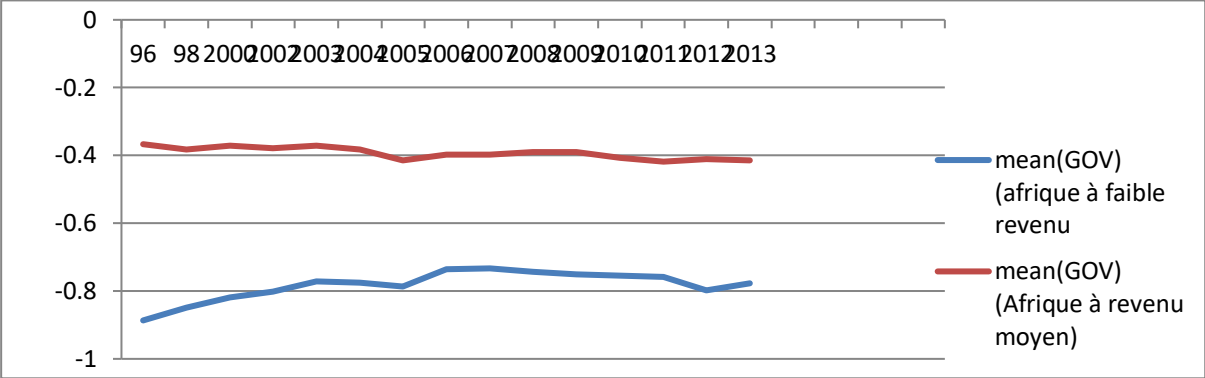


Figure 3 shows that the quality of governance is poorer in low-income countries whose values (on average) vary between -0.88 and -0.77 between 1996 and 2013. However, governance values are in the range [-0.36; -0.41] in middle-income countries.

It is true that the level of governance in middle-income countries is more important, but it decreases between 1996 and 2013, going from -0.36 to -0.41, ie with a rate of Decrease of (12.87%). The sharp decline in the level of governance was recorded during the years 2005, 2011 and 2013 when the average level of governance fell sharply to reach its peak value which is equal to -0.414.

On the other hand, the level of governance in low-income countries increased in the same period from -0.886 to -0.777, that is, with a growth rate of 12.34%. This development is remarkable, especially during the years 2006 and 2007 when the level of governance increases, respectively, to -0.735 to -0.7733.

The declining of governance level in these countries is justified by the fact that the majority of its indicators weakened during this period. Indeed, with the exception of the "Voice and responsibility" indicator, which has been improved in recent years, especially between 2009 and 2013, all other governance indicators have decreased over the period 2002-2013.

Regarding the level of governance in low-income economies, it has seen a remarkable rise in the various governance indicators. Indeed, the level of the fight against corruption has increased on average from -0.805 to -0.835 between the periods 1996 and 2013. As for the

variable efficiency of governance, it has seen a remarkable increase during the same period. It increased on average between the periods 1996 and 2013 from -1,044 to -0,985. Similarly, the increase in governance is due in particular to the increase in the indicator of political stability level. This indicator increases on average from -0.882 to -0.770 during the same period of our study. Also, the regulatory quality indicator has risen dramatically in middle-income economies from -0.927 to -0.770. In addition, the rule of law indicator increased during the same period, it increased from -1.050 to -0.914. Similarly, the variable voice and responsibility increased from -0.477 to -0.391 during the same period.

Figure 4a: Evolution (on average) of aggregate and desegregated governance measures in low-income African countries

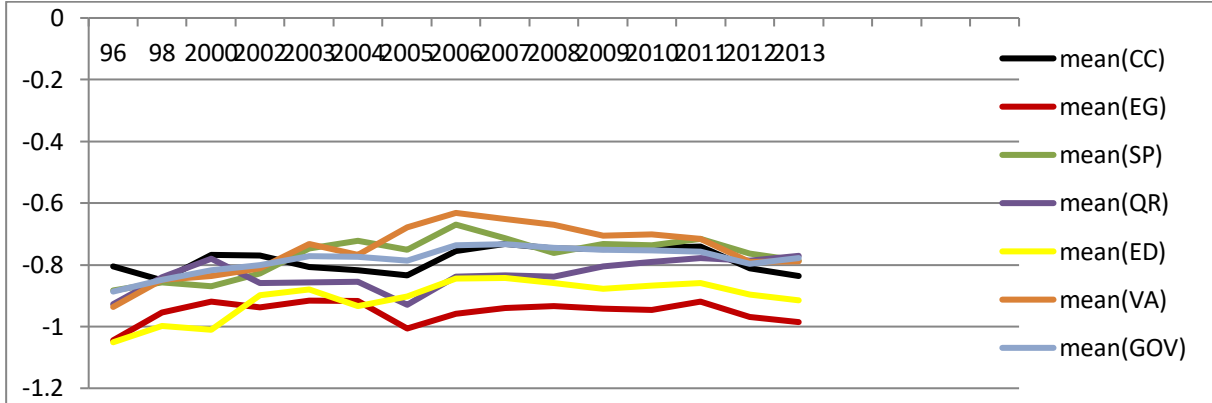
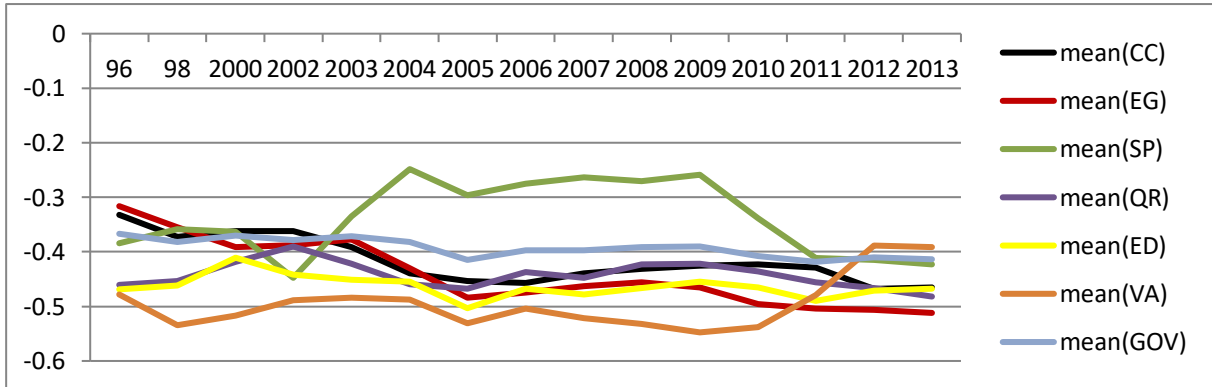


Figure 4 b: Evolution (on average) of aggregate and desegregated governance measures in middle-income African countries



The declining of governance level in African middle-income economies is largely explained by the deterioration of the major sub-indicators. Indeed, the level of the fight against corruption has decreased; it has passed from -0.332 to -0.465 on average between 1996 and 2013. Moreover, the governance effectiveness variable has declined significantly during the same period. It declined on average between 1996 and 2013, from -0.316 to -0.511. Similarly,

this decline is due to the deterioration of the indicator of political stability level. This indicator decreased on average from -0.383 to -0.422 during the same period of our study. Nevertheless, the regulatory quality indicator has risen dramatically in middle-income economies from -0.927 to -0.770. Also, the rule of law indicator increased during the same period, it increased from -0.469 to -0.467. Similarly, the voice and responsibility quality improved from -0.477 to -0.391.

3.2.3. Descriptive statistics

Table 1 contains the descriptive statistics of all the variables of interest used in our study. The main conclusion we can draw from this table is that, on average, global Africa has experienced a growth rate of around 1528.572. While middle-income African countries know a growth rate of 2567.446, low-income economies grew at a rate of 411.2482 on average. The minimum value of growth rates in middle-income economies is recorded in Ghana in 2000. However, this low growth rate in low-income Africa is recorded in Liberia in 1996. On the other hand, the maximum value of Growth in the middle-income economies is in the order of 14396.05 in Libya in 2008 while the maximum value in low-income African economies is 1031.105, specifically in Zimbabwe in 2014.

For the variable aid, Africa received an average of 58.06605 where middle-income and low-income countries received, on average respectively 66.68203 and 48.80491 million dollars. We find that middle-income economies attract an amount of aid more important than low-income economies. Indeed, middle-income countries reaches a maximum value of received aids of 672.4556 million dollars (in Cabo Verde in 2010), while the minimum value of aid received is -11.64525 in Maurice in 2003.

Regarding aid volumes received by low-income African economies, we note that these volumes range from 2.790422 (in the Democratic Republic of Congo in 1998) to 358.0125 (in Liberia in 2010).

Moreover, the level of governance is generally low in African countries, on average the index of governance achieved (-0.543). Indeed, the highest value is recorded in Botswana in 2003 in middle-income economies (0.780), while the highest value of governance in low-income economies was marked in Benin (-0.034) in 1998. On the other hand, the minimum value of the governance index in Middle-income Africa is reached in Angola (-1.49) in 2000. While the lowest value of the index of governance in low-income African countries (-1.88) was marked in Congo Democratic Republic in 1998.

Table 1: Data description

Full sample							
Variable	gdp	Apd	Gov	Inf	m2	pop	Ouv
Obs	907	859	719	902	861	912	897
Mean	1528.5	58.066	-.543	19.63	33.54	2.423	.726
Std. Dev.	2050.6	67.862	.509	185.42	22.385	.909	.334
Min	72.746	-11.645	-1.886	-27.048	1.617	-.277	.178
Max	14396.0	672.45	.780	4800.5	151.548	7.988	2.098
Middle-income African countries							
Obs	470	445	375	465	458	475	465
Mean	2567.4	66.68	-.392	21.83	42.14	2.023	.859
Std. Dev.	2416.2	87.73	.559	224.79	25.57	.752	.361
Min	263.11	-11.64	-1.496	-25.31	8.578	-.277	.178
Max	14396.0	672.45	.780	4800.53	131.71	3.555	2.098
Low-income African countries							
Obs	437	414	344	437	403	437	432
Mean	411.24	48.804	-.707	17.287	23.778	2.858	.584
Std. Dev.	208.09	33.562	.387	131.395	12.1793	.865	.227
Min	72.746	2.790	-1.886	-27.048	1.617	-.123	.209
Max	1031.10	358.01	-.034	2630.123	151.548	7.988	1.791

To gain a general understanding of the data, summary statistics describing the correlation between the different variables is presented in Table (2)⁶. According to this table, all correlation coefficients are weak and do not exceed 0.50. For example, economic growth and development assistance are negatively and weakly correlated for the case of middle-income African countries. However, these two variables are weakly and positively correlated in the case of low-income countries. So, we can accept absence of multicollinearity in our data.

⁶ Note that two techniques are usually used: the realization of a matrix of correlations and the calculation of VIFs ("Variance Inflation Factors"). The correlation matrix allows a two-by-two analysis of the correlations between the explanatory variables. We consider that obtaining correlation coefficients greater than 0.5 is indicative of a problem of multicollinearity. Similarly, a problem of multicollinearity is noted when a VIF has a value greater than or equal to 10 and / or when the average of the VIFs is greater than or equal to 2. If neither of these two values is reached, the impact of multicollinearity is, according to these authors, not worrying and all the explanatory variables can thus be preserved for the analysis, the latter being then not "distorted" by the existing level of multicollinearity.

Table 2 : Correlation matrix

Full sample							
	lngdp	apdlm	Gov	Inf	m2	pop	Ouv
lngdp	1.0000						
apdlm	-0.0239	1.0000					
gov	0.4371	0.3048	1.0000				
inf	-0.0397	-0.0594	-0.1082	1.0000			
m2	0.5492	0.0635	0.5536	-0.1022	1.0000		
pop	-0.5505	0.0732	-0.3428	0.0296	-0.5374	1.0000	
ouv	0.4103	0.1497	0.2111	0.0593	0.2284	-0.3509	1.0000
Middle-income African countries							
lngdp	1.0000						
apdlm	-0.0129	1.0000					
gov	0.3701	0.3644	1.0000				
inf	-0.0990	-0.0089	-0.1063	1.0000			
m2	0.4545	0.0569	0.5509	-0.0434	1.0000		
pop	-0.4486	-0.0189	-0.4691	0.0824	-0.6311	1.0000	
ouv	0.1676	0.1982	0.1414	0.1020	-0.0027	-0.3276	1.0000
Low-income African countries							
lngdp	1.0000						
apdlm	0.2888	1.0000					
gov	0.2555	0.2851	1.0000				
inf	-0.0013	-0.2379	-0.1558	1.0000			
m2	0.2675	0.2361	0.3982	-0.3020	1.0000		
pop	-0.1018	0.1670	0.1308	-0.0240	-0.1504	1.0000	
ouv	0.1817	0.2119	-0.0016	-0.0791	0.2073	0.0486	1.0000

In the next step of the analysis, we conduct a static panel specification where a fixed effect and random effect regression will be estimated. But, we think that before the transition to this regression, a unit root test is necessary in order to have an idea about the stationarity of the variables.

Table 3 presents results of Unit root tests and show that we cannot reject the null hypothesis of unit root (not stationary) for all variables at level. So, we can see that all the variables are not stationary at level but become stationary in first difference for both cases (Africa-low income and Africa-middle income), based on the two tests of Levin, Lin & Chu t^* (2002) and the test of Im, Pesaran and Shin W -stat (2003). In other words, our variables are integrated of same order and can have long-run relationship.

Table 3:Unit root tests

	Low income countries				Intermediate income countries			
	Levin, Lin & Chu t*	Im, Pesaran and Shin W-stat	Constant and trend	W-stat	Levin, Lin & Chu t*	Im, Pesaran and Shin W-stat	Constant and trend	W-stat
	Prob	Prob	Prob	Prob	Prob	Prob	Prob	Prob
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Y	0.3040	0.0000***	0.7852	0.0000***	0.4492	0.0000***	1.0000	0.0000***
apd	0.9025	0.0001***	0.7801	0.0000***	0.2656	0.0000***	0.5223	0.0000***
inf	0.0556	0.0000***	1.0000	0.0000***	0.9192	0.0015***	1.0000	0.0000***
m2	0.6097	0.0000***	0.9696	0.0000***	0.4353	0.0000***	0.8922	0.0000***
ouv	0.3193	0.0000***	0.8741	0.0000***	0.0042	0.0000***	0.1046	0.0000***
pop	1.0000	0.0000***	1.0000	0.0000***	1.0000	0.0000***	1.0000	0.0000***

***indicates statistical significance at 1% threshold level.

4. Results and interpretations

4.1. Impact of foreign aid on economic growth

From the results presented in Table 4, the Fisher test shows an overall significance for all variables in our model, implying that the model is globally significant at 1% threshold (column 2). Thus, the Hausman test⁷ shows that the fixed-effects model is preferable to the random-effects model in the African country as a whole and in the middle-income African countries. On the other hand, the random effect model is more appropriate in low-income African countries. We retain the fixed-effects model for low-income countries because the probability (0.0000) is less than 10%, whereas in the case of middle-income countries, we retain the random effects model since the probability (0.4599) is greater this critical value.

By rejecting the hypothesis of homoscedasticity, the Breush-Pagan test and the Wald test reveal the existence of heteroscedasticity in the model to be estimated. Similarly, the Wooldridge test shows the existence of a problem of autocorrelation of errors. To correct these two types of problems, we will present the results of generalized least squares (GLS) (columns 4, 7 and 10).

Table 4 shows that the foreign aid coefficient is positive and statistically significant at the 1% and 5% level, respectively, in the full sample and Low Income African countries (Columns 4 and 10) and in middle income countries (column 6). Indeed, the aid ratio coefficient is more important in low-income countries than in Africa as a whole and in middle-income countries. We can see that low-income countries are more sensitive to international assistance for

⁷We accept the null hypothesis of fixed effect model if the Haussmann probability is less than critical value threshold and we accept alternative hypothesis of random effect model otherwise.

development and more especially a 1% increase in the amount of development aid leads to an increase of 9.36% in economic growth in this type of countries contrary to a 3.25% in middle-income countries. This finding can be explained by the classical theory of convergence since in the sense that poor countries are more far from their stationary states and are expected to have a higher growth rate than more developed for the same level of inputs. This implies that foreign aid is considered as an engine of economic growth for the development of African economies regardless of income level. These results are similar to those found by Mekasha and Tarp (2013) and Nwaogu and Ryan (2015).

The coefficient associated with the inflation variable is not significant in middle income countries but surprisingly positive and statistically significant at 1% threshold. This result contradicts most of the previous conclusion in this field such as: in the case of high an unstable level of inflation expectations are difficult and lead to misleading results. So, long-run investment decisions slow down and subsequently resulting economic activities decrease. This result can be explained by the fact that in the presence of international aid economic agents are becoming more optimistic. They become more confident and more insured seeing an increase in general price levels as a good sign on the health of the economy such as an increase in consumption encourages investment and as a result stimulates economic growth. Otherwise, foreign aid in poor African countries is seen as a kind of explicit guarantee that encourages the risk-taking behavior of investors affecting positively economic growth independently of crises likelihood.

The coefficient of money supply in M2 sense relative to the GDP is positive and statistically significant at the 1% threshold in the full sample when applying the GLS method. This finding is similar to the results of Burnside and Dollar (2000). This implies that the financial depth according to the level of country's financial development positively affects economic growth.

The population variable has a negative and statistically significant effect at the 1% and 5% level, respectively, in Africa and Middle-income Africa. This result suggests that population growth has contributed in a negative and significant way to the economic growth of these regions.

Surprisingly, the coefficient associated with the variable that measures commercial openness is negative and statistically significant at the 5% threshold for middle income countries. This result can be explained, in large part, by bad quality of governance and by financial markets underdeveloped unable to cope with new demands for services and products increasingly

sophisticated given the entry of new international participants and the presence of multinational firms. In addition, our results show the inability of African markets in their current situations to cope with the competition of international operators who benefit, to a large extent, from efficient subsidies and easy regulations reducing production costs in their country of origin or who benefit from tariff cuts under unbalanced multilateral agreements.

Table 4: Effect of foreign aid on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	FE	GLS	OLS	RE	GLS
oda	-.0401 (.0330)	.2420 (.025)***	.0470 (.0139)***	-.0039 (.036)	.1733 (.031)***	.0325 (.014)**	.2691 (.041)***	.2999 (.039)***	.0936 (.022)***
inf	-.00007 (.001)	-.00011 (.001)	.00008 (.001)*	-.00029 (.001)*	-.00029 (.001)***	-.00001 (.001)	.00044 (.001)**	.00054 (.001)***	.00038 (.001)***
m2	.6537 (.055)***	.5313 (.055)***	.0897 (.035)**	.5336 (.087)***	1.085 (.094)	-.0370 (.067)	.1737 (.049)***	.2012 (.055)***	.0255 (.035)
pop	-.2922 (.038)***	-.0073 (.026)	-.1436 (.030)***	-.2313 (.072)***	-.0107 (.059)***	-.14340 (.056)**	-.0815 (.027)***	-.0015 (.024)	.0098 (.022)
ouv	.8021 (.091)***	-.3407 (.110)***	-.0229 (.064)	.2597 (.118)**	-.7818 (.170)***	-.1941 (.084)**	.3086 (.108)***	.2684 (.127)**	-.0644 (.071)
constant	4.775 (.260)***	4.296 (.1764)***	6.499 (.156)***	5.774 (.461)***	3.647 (.374)***	7.918 (.298)***	4.372 (.203)***	3.961 (.193)***	5.505 (.152)***
Observations	805	805	805	421	421	421	384	384	384
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4420	0.1261		0.2690	0.1376		0.2110	0.1916	
R-squaredwithin		0.2795			0.4107			0.2980	
R-squared between		0.0864			0.0754			0.0883	
Fischer (prob> F)	0.0000	0.0000		0.0000	0.0000		0.0000		
Hausman (p> chi2)	0.0000			0.0000			0.4599		
Breusch pagan (p> chi2)							0.0000		
Wald test	0.000			0.0000					
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

4.2. Impact of governance on economic growth

In a second part of this work, we will study the effect of foreign aid on economic growth by first introducing the governance variable in order to assess its impact on economic growth. Then, we will try to test if the importance (coefficient) of foreign aid improves in the presence of the governance variable. Thus, our model can be extended as presented in equation (2).

Results of the static panel regression adding to first equation governance variable are presented in table 5. The main conclusion we can draw from these results is that good governance can stimulate economic growth too significantly (1% threshold) for all countries types. Our result is similar to the findings of Helliwel (1994) suggesting a strong correlation link between democracy as a proxy for governance quality and economic growth. In other words, he supported that democracy ensures long-run general rules favoring short-run investment decision and so economic growth. Similarly, other works showed that democracy is a primordial condition to guarantee property rights and contracts (Clague et al., 1996). In this sense, democratic countries are more likely to attract foreign direct investment than in the autocratic regimes and economic development. In addition, high institutional quality exerts a larger positive quantitative effect on overall productive factor, especially on human capital accumulation (Rodrik et al., 2001) and encourages the accumulation of factors of production (Eicher et al., 2008). Given these findings previously done and our results, we can conclude that governance may be a major determinant of economic growth and affect the effectiveness of foreign help for development.

In addition, the coefficient associated with the variable aid is positive (0.03) and statistically significant at the 10% threshold (GLS model) for the case of the overall sample. We then observe that this coefficient has decreased in the case of the full sample and become not significant for the middle-income countries with the introduction of the governance variable in the model (2). However, this coefficient is positive and significant at the 1% threshold, using the GLS method, for low-income African countries. So, the inclusion of governance in our model for these less developed countries has improved aid effectiveness in terms of economic growth (while going from 0.09 for the GLS model (equation (1)) to 0.106 for the GLS model (eq (2))). This result implies that a 1% increase of international assistance for development addressed to less developed African countries can lead to an economic growth of more than 10%. On the basis of this conclusion, we will test in the next sub-section whether the relationship between aid and economic growth depends on the level of governance since

the governance variable is positively and significantly associated with the level of economic growth. In other words, our objective will be to study the effectiveness of aid according to the level of governance since the results have changed with the introduction of this variable. In the rest of this section we test the effect of each component of governance in economic growth.

Table 5: Effect of governance on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
Oda	-.1422 (.037)***	.1879 (.028)***	.0314 (.016)*	-.0966 (.042)**	.1329 (.033)***	.0196 (.016)	.2014 (.048)***	.3176 (.048)***	.1061 (.025)***
Gov	.4094 (.077)***	.1813 (.108)*	.4068 (.064)***	.2658 (.097)***	.2729 (.146)*	.2966 (.085)***	.2294 (.077)***	-.1704 (.125)	.2300 (.079)***
Inf	-.0000314 (.001)	-.0001 (.001)*	.0001 (.001)***	-.0002 (.001)	-.0003 (.001)***	.00001 (.001)	.0004 (.001)**	0005 (.001)***	.0004 (.001)***
m2	.4683 (.068)***	.5723 (.061)***	.0865 (.039)**	.4115 (.102)***	.9457 (.097)	.0126 (.070)	.1315 (.060)**	.2687 (.067)***	.0094 (.041)
Pop	-.3043 (.042)***	-.0081 (.030)	-.0925 (.025)***	-.1836 (.077)**	-.0034 (.065)**	-.1441 (.052)***	-.0911 (.033)***	.0002 (.028)	.0060 (.019)
Ouv	.7720 (.099)***	-.3030 (.120)**	-.0330 (.069)	.3068 (.129)**	-.4212 (.176)***	-.1634 (.096)*	.2596 (.115)**	.2508 (.143)*	-.0806 (.076)
Constant	6.09 (.346)***	4.482 (.216)***	6.719 (.174)***	6.586 (.549)***	4.140 (.443)***	7.888 (.317)***	5.001 (.292)***	3.602 (.252)***	5.704 (.185)***
Observations	672	672	672	355	355	355	317	317	317
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4666	0.1793		0.2830	0.1697		0.1855	0.1173	
R-squaredwithin		0.2632			0.3791			0.3064	
R-squared between		0.1516			0.1180			0.0120	
Fischer (prob> F)	0.0000	0.0000		0.0000			0.0000	0.0000	
Hausman (p> chi2)	0.0000			0.1989			0.0000		
Breusch pagan (p> chi2)				0.000					
Wald test	0.000						0.000		
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Tables from 6 to 12 present results of the effect of each indicator of governance on economic growth. For global African countries, improving the effectiveness of foreign aid by increasing governance is justified by the increase in the coefficient of foreign aid when introducing governance sub-indicators into our model. Indeed, this coefficient has increased from 0.03 in equation (1) to (0.043),(0.038),(0.036),(0.046),(0.041) and (0.035) upon introduction of indicators measuring, corruption control, government effectiveness, political stability, quality of regulation, rule of law and voice and accountability, respectively.

Concerning low-income African economies, aid effectiveness has improved as a result of the introduction of the following governance indicators: corruption control, political stability, the rule of law, and voice and accountability. Indeed, the coefficient of development aid has increased from (0.09) to (0.125), (0.108), (0.116) and (0.114) respectively for these four indicators.

Nevertheless, the coefficient of development aid is positive but not significant for the case of medium-income African countries. So, it seems that governance has no role in improving aid effectiveness in terms of economic growth for African middle-income economies. However, with the inclusion of the Regulatory Quality Indicator, international aid remains effective and significant at the 10% level in terms of economic growth, but this efficiency has slightly decreased, the aid coefficient has dropped from 0.032 (Table 4) in the first equation to 0.029 in the second equation (Table 9) .

Table 6. Effect of control of corruption on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	RE	GLS
oda	-.1121 (.037)***	.1971 (.027)***	.0431 (.016)***	-.0764 (.041)*	.1323 (.033)***	.0271 (.017)	.2388 (.047)***	.3192 (.044)***	.1251 (.026)***
cc	.2346 (.071)***	-.0603 (.072)	.1560 (.041)***	.1618 (.085)*	.0834 (.095)	.1096 (.050)**	-.0773 (.079)	-.2600 (.084)***	.0495 (.053)
inf	-.00005 (.001)	-.0001 (.001)*	.0001 (.001)**	-.0002 (.001)*	-.0003 (.001)***	.00002 (.001)	.0004 (.001)**	.0005 (.001)***	.0004 (.001)***
m2	.5450 (.067)***	.5681 (.061)***	.1262 (.041)***	.4633 (.101)***	.9767 (.097)***	.0295 (.071)	.2228 (.059)***	.2689 (.062)***	.0560 (.043)
pop	-.2972 (.044)***	.0008 (.030)	-.1142 (.028)***	-.1784 (.079)**	.0273 (.067)	-.1308 (.053)**	-.0717 (.033)**	-.0134 (.027)	.0037 (.021)
ouv	.7652 (.101)***	-.3092 (.121)**	.0036 (.073)	.3043 (.130)**	-.4478 (.178)**	-.1695 (.096)*	.2001 (.115)*	.2404 (.132)*	-.0344 (.082)
constant	5.636 (.336)***	4.313 (.204)***	6.438 (.177)***	6.285 (.539)***	3.922 (.434)***	7.705 (.317)***	4.340 (.280)***	3.546 (.237)***	5.354 (.183)***
Observations	672	672	672	354	354	354	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4531	0.1198		0.2754	0.1520		0.1699	0.1514	
R-squaredwithin		0.2616			0.3726			0.3261	
R-squared between		0.0891			0.0975			0.0436	
Fischer (prob> F)	0.0000	0.0000		0.0000			10.61		
Hausman (p> chi2)	0.0000			0.9678			0.7421		
Breuschpagan (p> chi2)				0.000			0.000		
Wald test		0.000							
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7: Effect of government effectiveness on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
Oda	-.1038 (.035)***	.2052 (.027)***	.0384 (.016)**	-.0590 (.040)	.1332 (.033)***	.0247 (.017)	.2320 (.047)***	.3419 (.045)***	.1197 (.026)
Eg	.3871 (.065)***	-.2907 (.081)***	.2129 (.045)***	.1013 (.090)	-.1812 (.116)	.1157 (.062)*	.0634 (.064)	-.3696 (.090)***	.0870 (.055)
Inf	-.00008 (.001)	-.0001 (.000)*	.0001 (.000)**	-.0002 (.000)*	-.0002 (.000)***	.00009 (.000)	.0004 (.000)**	.0005 (.000)***	.0004 (.000)
m2	.4340 (.069)***	.5649 (.061)***	.0886 (.040)**	.4734 (.105)***	.9832 (.097)***	.0424 (.072)	.1826 (.060)***	.2652 (.065)***	.0311 (.042)
Pop	-.2874 (.043)***	.0080 (.030)	-.0888 (.026)***	-.1975 (.079)**	.0387 (.067)	-.1401 (.054)**	-.0806 (.033)**	-.0004 (.027)	.0052 (.020)
ouv	.8008 (.099)***	-.3105 (.119)**	-.0287 (.070)	.3288 (.131)**	-.5135 (.177)***	-.1527 (.098)	.2383 (.118)**	.2342 (.138)*	-.0502 (.080)
constant	6.052 (.332)***	4.112 (.209)***	6.593 (.175)***	6.179 (.546)***	3.811 (437)***	7.669 (.324)***	4.614 (.275)***	3.296 (.239)***	5.503 (.186)
Observations	672	672	672	354	354	354	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4721	0.0252		0.2706	0.1116		0.1699	0.0950	
R-squaredwithin		0.2757			0.3759			0.3415	
R-squared between		0.0026			0.0559			0.0045	
Fischer (prob> F)	99.10	54.45		21.45			10.61	20.81	
Hausman (p> chi2)	0.0000				0.9825				
Breuschpagan (p> chi2)	0.000						0.0004		
Wald test				0.000					
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8: Effect of political stability on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
Oda	-.1630 (.037)***	.1928 (.027)	.0360 (.015)**	-.1613 (.0407)***	.1416 (.033)***	.0217 (.016)	.1864 (.0473)***	.2904 (.047)***	.1086 (.025)***
Sp	.2658 (.040)***	.1412 (.037)	.0995 (.023)***	.3429 (.0528)***	.2167 (.054)***	.1448 (.035)***	.1490 (.033)***	.0164 (.043)	.0511 (.025)**
Inf	.00008 (.000)	-.00009 (.000)	.0001 (.000)**	-.0001 (.000)	-.00026 (.000)***	.00001 (.000)	.0004 (.000)**	.0005 (.000)***	.0003 (.000)***
m2	.5028 (.063)***	.5714 (.060)	.0766 (.040)*	.3952 (.092)***	.8930 (.096)***	.0625 (.070)	.1061 (.058)*	.2817 (.067)***	.0016 (.041)
pop	-.3197 (.042)***	-.01751 (.030)	-.0852 (.025)***	-.1809 (.073)**	-.0595 (.066)	-.1625 (.052)***	-.0856 (.032)***	.0017 (.028)	.0096 (.019)
ouv	.6743 (.100)***	-.2889 (.119)	-.0217 (.068)	.1294 (.127)	-.4084 (.170)**	-.1658 (.096)*	.2340 (.112)**	.2275 (.142)	-.0642 (.078)
constant	6.090 (.325)***	4.458 (.201)	6.539 (.167)***	7.049 (.509)***	4.363 (.433)***	7.682 (.312)***	5.088 (.270)***	3.806 (.219)	5.581 (.177)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4781	0.1994		0.346	0.21		0.217	0.161	
R-squaredwithin		0.2773			0.39			0.304	
R-squared between		0.1810			0.16			0.06	
Fischer (prob> F)	0.000	0.000		0.000	0.000		0.000	0.000	
Hausman (p> chi2)	0.0000			0.1940			0.0000		
Breuschpagan (p> chi2)				0.0000					
Wald test	0.000						0.000		
Wooldridge (p>chi2)	0.000			0.0000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9. Effect of regulatory environment quality on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
oda	-.1137 (.035) ***	.1914 (.028) ***	.0460 (.016) ***	-.0723 (.039)*	.1326 (.033)***	.0299 (.017)*	.2197 (.046)***	.3017 .046***	.1196 (.025)***
Qr	.4280 (.061) ***	.0738 (.078)	.0957 (.048) **	.2004 (.085) **	.1345 (.109)	-.0191 (.064)	.2041 (.056) ***	-.0592 (.093)	.0730 (.055)
Inf	-0.00006 (.000)	-.0001 (.000)*	.0001 (.000) **	-.0002 (.000)	-.0003 (.000) ***	.00002 (.000)	.0004 (.000)***	.0005 .000***	.0004 (.000)***
m2	.4597 (.065)***	.5753 (.061) ***	.1349 (.041) ***	.4416 (.100) ***	.9709 (.097) ***	.0486 (.072)	.1586 (.056) ***	.2723 .067***	.0470 (.043)
Pop	-.3054 (.042)***	-.0031 (.030)	-.1072 (.027) ***	-.1925 (.077)**	.0166 (.065)	-.1376 (.054) **	-.1000 (.033)***	.00024 .028	.0048 (.020)
Ouv	.8151 (.098)***	-.3041 (.121) **	-.0072 (.072)	.3480 (.130) ***	-.4337 (.177) **	-.1727 (.096)*	.2861 (.115)**	.2425 .144*	-.0561 (.079)
Constant	6.026 (.318) ***	4.395 (.206)***	6.348 (.178)***	6.353 (.529)	3.972 (.433) ***	7.589 (.322)	4.863 (.258)***	3.728 .231***	5.423 (.179)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.47	0.162			0.154		0.2008	0.1389	
R-squaredwithin		0.261			0.37			0.3047	
R-squared between		0.133			0.099			0.0348	
Fischer (prob> F)	0.000	0.000		0.000	0.000		0.000	0.000	
Hausman (p> chi2)	0.0000			0.191			0.0000		
Breuschpagan (p> chi2)				0.000					
Wald test	0.000						0.0000		
Wooldridge (p>chi2)	0.000			0.000			0.0000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 10. Effect of the rule of law on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
oda	-.1231 (.036) ***	.1888 (.027)	.0419 (.016) **	-.0847 (.041) **	.1349 (.033) ***	.0269 (.017)	.2246 (.047) ***	.2854 (.047) ***	.1169 (.025) ***
Ed	.3182 (.064) ***	.1856 (.080)	.2466 (.047) ***	.1980 (.089) **	.0581 (.121)	.1257 (.066) *	.1311 (.057) **	.0698 (.088)	.1551 (.052) ***
Inf	-.00003 (.000)	-.0001 (.000)	.0001 (.000) ***	-.0002 (.000)	-.0003 (.000)	.00002 (.000)	.0004 (.000) **	.0005 (.000) ***	.0004 (.000) ***
m2	.4600 (.070) ***	.5658 (.061)	.1045 (.040) **	.4095 (.106) ***	.9546 (.101) ***	.0260 (.072)	.1534 (.060) **	.2852 (.067) ***	.0265 (.042)
Pop	-.3028 (.043) ***	-.0026 (.030)	-.0968 (.026) ***	-.1803 (.078) **	.0071 (.066)	-.1359 (.053) **	-.0899 (.033) ***	.0048 (.028)	.0079 (.020)
Ouv	.7629 (.099) ***	-.3283 (.121)	-.0224 (.072)	.3089 (.130) **	-.4513 (.176) **	-.1569 (.097)	.2355 (.115) **	.2010 (.146)	-.0874 (.078)
Constant	6.047 (.347) ***	4.532 (.215)	6.568 (.178) ***	6.529 (.560) ***	4.024 (.459) ***	7.734 (.324) ***	4.816 (.279) ***	3.871 (.238) ***	5.590 (.181) ***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared		0.17		0.2778	0.1498		0.1811	0.1585	
R-squared within		0.266			0.3694			0.3052	
R-squared between		0.15			0.0971			0.0549	
Fischer (prob> F)	0.000	0.000		0.000			0.000	0.000	
Hausman (p> chi2)	0.000			0.9982			0.0410		
Breuschpagan (p> chi2)				0.0000					
Wald test	0.000							0.0000	
Wooldridge (p>chi2)	0.000			0.0000			0.0000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 11. Effect of voice and responsibility on economic growth

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	RE	GLS
oda	-.1161 (.039)***	.1866 (.028)***	.0352 (.016)**	-.0466 (.043)	.1277 (.034)***	.0207 (.017)	1956 (.051***)	.2970 (.046)***	.1141 (.025)***
Vr	.1250 (.055)**	.0879 (.064)	.1500 (.038)***	-.0136 (.066)	.1006 (.094)	.1390 (.052)***	.1076 (.056*)	-.0390 (.066)	.0811 (.039)**
Inf	-.00006 (.000)	-.0001 (.000)*	.00014 (.000)***	-.00029 (.000)*	-.0003 (.000)***	.00003 (.000)	.0004 (.000)**	.0005 (.000)***	.0003 (.000)***
m2	.5737 (.067)***	.5657 (.061)***	.1220 (.041)***	.5229 (.101)***	.9653 (.097)***	.0389 (.071)	.1689 (.058***)	.2765 (.063)***	.0135 (.042)
Pop	-.3280 (.043)***	-.0097 (.030)	-.1206 (.027)***	-.2213 (.077)***	.0120 (.065)	-.1575 (.053)***	-.0854 (.033)**	-.0037 (.028)	.0050 (.020)
Ouv	.8009 (.101)***	-.3106 (.121)**	.0169 (.073)	.3142 (.131)**	-.4618 (.177)***	-.1858 (.097)*	.2364 (.115)**	.2427 (.134)*	-.0596 (.079)
Constant	5.536 (.349)***	4.473 (.220)***	6.481 (.182)***	5.965 (.556)***	4.034 (.442)***	7.778 (.320)***	4.823 (.298***)	3.754 (.261)***	5.564 (.185)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.44	0.148		0.2677	0.1393		0.177	0.1495	
R-squaredwithin		0.262			0.3745			0.3051	
R-squared between		0.117			0.0848			0.0426	
Fischer (prob> F)	0.000	0.000		0.000			0.000		
Hausman (p> chi2)	0.000			0.1445			0.1814		
Breuschpagan (p> chi2)				0.000			0.000		
Wald test	0.000								
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

4.3. Effect of the governance on the relationship between international aid and economic growth

Previous works have focused on the study of the effect of international assistance for development on economic growth but no work has analyzed this effect depending on governance quality. Our contribution is to test the effect of the aggregate and disaggregated governance quality on the relationship between the amount of foreign aid and the level of economic growth. Taking into account our second model (equation2) and in relation with our problematic, we introduced in the third specification (equation3), another exogenous variable namely the interaction term between governance quality and the variable aid for development (Gov*apd). The interaction variable is used as an exogenous variable to assess the significance of governance in reinforcing the effectiveness of international supports for development.

This methodology permits us test the effect of interaction between our variables of interest and to respond to the question of the critical threshold which conditions the significance of the expected effects. From where, we present in the following section the indirect relationship between official development aid and economic growth according to institutional development of African countries. To estimate this model, we will first use the OLS method to check the significance of our explanatory variables but this method remains biased since it does not take into account the problem of autocorrelation and heterocedasticity. For this reason, we opted for the GLS regression.

In table 12, we present the results of the static panel analysis using firstly the OLS method taking into account interaction term. The conditional effect of international aid on economic growth through the governance quality takes the form of the specification presented in equation 3 as follow:

$$Y_{it} = \alpha_1 + \beta_1 apd_{it} + \beta_2 GOV_{it} + \beta_3 GOV_{it} apd_{it} + \beta_4 pop_{it} + \beta_5 m2_{it} + \beta_6 ouv_{it} + \beta_7 inf_{it} + \mu_{it} + \varepsilon_{it}.$$

As explained previously, the expected sign of β_1 is ambiguous. If $\beta_1 > 0$, the conventional view that international assistance for development drives growth holds. Alternatively, $\beta_1 < 0$ implies support for unconventional vision, in which case increase in international aid for development is associated with complacency and indifference behavior leading to a decline in economic growth. The expected sign of β_2 , which represents the direct effect of the

governance quality on economic activity, is also theoretically ambiguous. The expected sign of the coefficient of the interaction term β_3 is also uncertain for reasons previously discussed, and is ultimately an empirical question. If β_3 has the same sign as β_1 , then the direct effect of aid will be reinforced at higher levels of governance quality. On the other hand, if β_3 and β_1 are of opposite signs, more improvement of governance quality will weaken the direct effect of international aid.

The results of the GLS regression are presented in columns (4), (7) and (10) of each of the tables (12), (13), (14), (15), (16), (17) and (18). Table (12) indicates that equation (3) is tested using the composite index of six governance indicators. While Tables (13), (14), (15), (16), (17) and (18) indicate that equation 3 is tested by taking into account each of the six indicators of governance each time. In other words, the "GOV" variable takes the aggregated index and the six governance dimensions each time.

Aid is effective in terms of economic growth, 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 "Aid * GOV") is statistically significant. Indeed, the results of the regressions presented in the tables (12) show that international aid is effective in terms of economic growth only in the case of African economies as a whole as well as low-income African economies. In fact, the coefficients of the interaction between aid and governance (aid * gov) (columns 4 and 10) are positive and significantly correlated with economic growth. However, the magnitude of the interaction coefficients varies according to the sample studied. In fact, the coefficient of the composite index in interaction with foreign aid is positive and statistically significant at the 1% level in global Africa when using GLS model. We notice that the effectiveness of the aid improves in this case; in fact the coefficient of the interaction (0.08) is greater than the two coefficients of the aid in the first equation (0.04) and in the second equation (0.03). This conclusion is consistent with that of an earlier study by Collier and Dollar (2002). These authors have estimated a relationship between aid, politics and growth. They find that aid is subject to diminishing returns, but this absorption capacity depends on the level of policy and institutions as measured by the World Bank's annual rating, the assessment of national policies and institutions (Country Policy and Institutional Assessment, CPIA).

In another work studying aid effectiveness, Burnside and Dollar (2000) used a foreign aid database to examine the relationship between foreign aid, economic policies, and per capita

GDP growth. According to these authors, the policies that have a significant effect on growth are the budget surplus, inflation and trade openness. They showed that aid has a positive impact on growth in developing countries with good fiscal, monetary and trade policies. On the other hand, in the presence of bad policies, aid has no positive effect on growth. However, the coefficient of the composite index with foreign aid is positive but not significant in middle-income Africa.

Table 12 presents the results of the OLS and GLS regressions of equation (3) for all our samples where the economic growth rate is taken as the dependent variable. It can be seen that the direct effect of international aid on economic growth is positive and highly significant (at the 1% threshold for the GLS), both for the full sample and low-income countries. The direct effect of the governance quality is positive and not significant in explaining economic growth. However, the coefficient associated with the interaction term between the level of governance and the amount of aid is positive and significant suggesting that the effect of the latter on economic growth depends on the governance quality.

In order to test whether the effects of international aid, the governance quality and their interactions differ between low and middle income countries, we estimated the model separately for each sub group using firstly composite governance index and ultimately we dissociated the effect of each indicator. In both the OLS and GLS estimates, the applied Fisher test indicates that all models are globally significant. The Hausmann test shows that the fixed-effect model is preferable to the random-effect model for the full sample but random effect is more appropriate for low income countries (Table 12). By rejecting the hypothesis of homoscedasticity, the Breush-Pagan test reveals the existence of heteroscedasticity in the estimated model. Wooldridge's test suggests the acceptance of hypothesis H₀, which proves the presence of an autocorrelation problem at the level of errors⁸.

The coefficient of the aid for development variable is positive and significant, which means that an increase in the amount of international aid stimulate economic growth rate in low-income African countries but this effect is not significant for middle income economies. The coefficient of the interaction variable between aid for development and the composite index of governance is positive and statistically significant. This means that the positive effect of the international program for development assistance in African countries is completed in the presence of a high quality of governance. Conversely, positive effect of high level of foreign

⁸ Note that the same approach is followed for the other tables 13-18.

assistance on economic growth is lowered for countries characterized by bad governance quality.

Indeed, this result emphasizes the negative effect or ineffectiveness of international aid in countries badly ruled. Otherwise, in the case of bad governance quality international resources are not legally and effectively allocated to productive sectors. In this context, poor governance gives agents less opportunities for investment and corruption will be reinforced by legal weaknesses, bureaucratic and political and administrative irresponsibility searching rents regardless of social purposes. This behavior may discourage economic growth since in this environment resources are divided between the different interest groups in proportion to their electoral pressures and do not reach the agents targeted by these aids.

In summary, the results of the positive sign of the coefficient of aid and the positive sign of the interaction term can be interpreted as follows. Taken alone, the positive coefficient of the international help variable indicates that growth increases as countries receive more foreign resources. However, the positive coefficient of the interaction term between governance and the official development aid suggests that the positive effect of this variable depends on the level of countries' institutional quality. More specifically, the expansive effect of received resources will be weakened at lower levels of governance and it may be more beneficial when guaranteeing a minimum degree of development of the regulatory and institutional framework.

The coefficients of aid interactions with the composite index of governance indicators are significantly and positively correlated with economic growth. It is true that the effectiveness of aid in terms of economic growth is improving in the presence of governance in the countries of Africa as a whole and the countries of Africa with low incomes. For the case of African countries, the important role of governance in improving aid effectiveness is justified by the significance of the coefficients of the interactions between aid and the following indicators: the control of corruption (0, 062), government effectiveness (0.052), political stability (0.031), regulatory quality (0.090), rule of law (0.046) and voice and responsibility (0.076). However, this improvement in efficiency is explained, mainly, in low-income African countries, by the integration of aid interaction variables with the following indicators: regulatory quality (0.108); rule of law (0.422) and voice and responsibility (0.076).

Nevertheless, governance plays no role in improving aid effectiveness in Africa's middle-income economies. Indeed, the coefficient of the interaction of the aggregate index of

governance with international aid is positive but not significant. However, some governance indicators can improve the effectiveness of development assistance in this sub-region. In this context, we find that the "regulatory quality" indicator is positively (.048) and significantly correlated with economic growth at the 10% level. So, in this sub-region, only the quality of regulation can improve the effectiveness of development aid.

When we have introduced the interaction variable, the coefficients of the variables of control have the same sign as in the results of the estimation of the direct effect of international aid on economic growth (without interaction variable). Therefore, we can conclude that the governance is an indirect complementary factor in determining the effectiveness of international help to stimulate economic growth.

Table 12: Indirect effect of governance quality on the aid-economic growth link

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	RE	GLS
Oda	-.0995 (.050)**	.3079 (.039)***	.0901 (.026)***	-.1097 .051**	.1908 (.043)***	.0354 (.022)	.4756 (.129)***	.7491 (.106)***	.1919 (.053)***
Gov	.1119 (.243)	-.4436 (.181)**	.1026 (.125)	-.10978 .051	-.0784 (.229)	.1927 (.126)	-1.037 (.560)*	-2.046 (.431)***	-.1669 (.230)
Oda*gov	.0810 (.062)	.1786 (.041)***	.0808 (.029)***	-.0304 .066	.0980 (.048)**	.0266 (.025)	.3407 (.149)**	.5168 (.114)***	.1064 (.058)*
Inf	-.00005 (.000)	-.0001 (.000)**	.00013 (.000)***	-.0002 (.000)	-.0002 (.000)***	.0266 .025	.0001 (.000)	.0001 (.000)	.0003 (.000)***
m2	.4679 (.068)***	.5671 (.060)***	.0867 (.038)**	.4118 .102***	.9524 (.097)***	.0101 (.070)	.1016 (.061)***	.1941 (.067)***	.0029 (.040)
Pop	-.2976 (.043)***	.0009 (.030)	-.0916 (.024)***	-.1861 .077**	.0079 (.065)	-.1475 (.052)***	-.0890 (.033)**	.0073 (.027)	.0085 (.018)
Ouv	.7721 (.099)***	-.2548 (.119)**	-.0364 (.068)	.3047 .130**	-.4185 (.176)**	-.1716 (.096)*	.2580 (.114)**	.3174 (.139)**	-.0712 (.074)
Constant	5.911 (.374)***	3.993 (.242)***	6.480 (.191)***	6.646 .564***	3.860 (.462)***	7.839 (.319)***	4.049 (.507)***	2.169 (.399)***	5.389 (.252)***
Observations	672	672	672	355	355	355	317	317	317
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4680	0.1873		0.283	0.1636		0.199	0.1370	
R-squaredwithin		0.2842			0.3892			0.3528	
R-squared between		0.1591			0.1108			0.0237	
Fischer (prob> F)	0.000	0.000		0.000			0.000		
Hausman (p> chi2)	0.000			0.9850			0.0000		
Breuschpagan (p> chi2)				0.000					
Wald test	0.000						0.0000		
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 13: Effect of control corruption on the aid-economic growth link

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	FE	GLS	OLS	RE	GLS
Oda	-.0747 (.048)	.2958 (.037)***	.0926 (.027)**	-.0775 (.049)	.2016 (.042)***	.0444 (.022)**	.2770 (.134)**	.4288 (.109)***	.1538 (.058)***
Cc	-.0160 (.217)	-.5864 (.151)***	-.0753 (.113)	.1709 (.223)	-.3045 (.189)	.0102 (.098)	-.2498 (.571)	-.7326 (.439)*	-.0759 (.228)
Odacc	.0679 (.055)	.1420 (.036)***	.0621 (.028)**	-.0025 (.057)	.1019 (.040)**	.0268 (.023)	.0468 (.153)	.1282 (.117)	.0342 (.060)
Inf	-.00007 (.000)	-.00014 (.000)**	.0001 (.000)**	-.0002 (.000)*	-.0002 (.000)***	.00002 (.000)	.0004 (.000)*	.0004 (.000)***	.0003 (.000)***
m2	.5446 (.067)***	.5533 (.061)***	.1275 (.041)***	.4634 (.101)***	1.011 (.102)***	.0240 (.072)	.2203 (.060)***	.2567 (.063)***	.0529 (.043)
Pop	-.2922 (.044)***	.0104 (.030)	-.1168 (.027)***	-.1785 (.079)**	.0599 (.069)	-.1359 (.052)**	-.0721 (.033)**	-.0134 (.027)	.0041 (.021)
Ouv	.7567 (.101)***	-.2720 (.120)**	-.0119 (.072)	.3045 (.131)**	-.6228 (.192)**	-.1889 (.095)**	.1938 (.117)	.2358 (.132)	-.0345 (.082)
Constant	5.485 (.357)***	3.928 (.224)***	6.257 (.193)***	6.289 (.549)	3.585 (.422)***	7.676 (.318)***	4.210 (.510)***	3.178 (.410)***	5.257 (.255)***
Observations	672	672	672	354	354	354	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.454	0.123			0.123		0.1702	0.1506	
R-squaredwithin		0.279			0.386			0.3290	
R-squared between		0.093			0.067			0.0441	
Fischer (prob> F)	0.000	0.000		0.000	0.000		0.000		
Hausman (p> chi2)	0.000			0.001			0.8995		
Breusch pagan (p> chi2)							0.0000		
Wald test		0.000		0.000					
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 14. Effect of government effectiveness on foreign aid - economic growth relationship

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
Oda	-.0535 (.053)	.3235 (.040) ***	.0841 (.029) ***	-.0293 (.054)	.2103 (.044) ***	.0529 (.024) **	.5059 (.148) ***	.8815 (.125) ***	.1611 (.069) **
Eg	.1156 (.224)	-.8019 (.151) ***	.0179 (.112)	-.0888 (.252)	-.6328 (.204) ***	-.0389 (.115)	-.8319(.463)*	-1.954 (.356) ***	-.0394 (.207)
Oda*eg	.0737 (.058)	.1480 (.037) ***	.0529 (.027)*	.0544 (.067)	.1211 (.045) ***	.0413 (.025)	.2378 (.121)*	.4439 (.096) ***	.0354 (.054)
Inf	-.00009 (.000)	-.0001 (.000) **	.0001 (.000) **	-.0002 (.000)*	-.0002 (.000) ***	.00001 (.000)	.0002 (.000)	.0002 (.000)*	.0003 (.000) ***
m2	.4397 (.069) ***	.5717 (.060) ***	.0944 (.040) **	.4719 (.105) ***	.9892 (.096) ***	.0506 (.072)	.1719 (.060) ***	.2265 (.063) ***	.0304 (.042)
Pop	-.2818 (.043) ***	.0143 (.029)	-.0924 (.026) ***	-.1931 (.079) **	.0494 (.066)	-.1508 (.053)	-.0868 (.033) **	-.0038 (.026)	.0053 (.020)
Ouv	.7938 (.099) ***	-.2621 (.118) **	-.0291 (.070)	.3231 (.131) **	-.5300 (.176) ***	-.1561 (.097)	.2431 (.118) **	.2375 (.134)*	-.0511 (.080)
Constant	5.835 (.373) ***	3.617 (.241) ***	6.412 (.196) ***	6.069 (.563) ***	3.480 (.451) ***	7.548 (.328)	3.627 (.575) ***	1.466 (.461) ***	5.356 (.291) ***
Observations	672	672	672	354	354	354	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.473	0.045		0.2719	0.1079		0.1800	0.1195	
R-squaredwithin		0.294			0.3904			0.3863	
R-squared between		0.017			0.0528			0.0074	
Fischer (prob> F)	0.000	0.000		0.000			0.000	0.000	
Hausman (p> chi2)	0.012			0.0000			0.0017		
Breuschpagan (p> chi2)				0.000					
Wald test	0.000								
Wooldridge (p>chi2)	0.000			0.0000			0.0000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 15: Effect of political stability on foreign aid - economic growth relationship

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	RE	GLS	OLS	FE	GLS
Oda	-.1588 (.040)***	.2314 (.032)***	.0611 (.020)***	-.1896 (.041)***	.1381 (.037)***	.0238 (.019)	.2840 (.070)***	.4332 (.064)***	.1346 (.031)***
sp	.2314 (.138)*	-.0436 (.092)	-.0126 (.059)	.7016 (.144)***	.2421 (.114)**	.1322 (.065)**	-.2836 (.234)	-.5510 (.182)***	-.0753 (.088)
Oda*sp	.0094 (.036)	.0526 (.024)**	.0311 (.014)**	-.1027 (.038)***	-.0074 (.029)	.0039 (.015)	.1164 (.062)*	.1514 (.047)***	.0344 (.023)
Inf	.00004 (.000)	-.0001 (.000)	.0001 (.000)**	-.0001 (.000)	-.0002 (.000)***	.00001 (.000)	.0002 (.000)	.0003 (.000)**	.0003 (.000)***
m2	.5020 (.063)***	.5632 (.060)***	.0779 (.039)**	.3962 (.091)***	.8971 (.096)***	.0662 (.070)	.0873 (.059)	.2289 (.068)***	-.0015 (.041)
Pop	-.3181 (.042)***	-.0106 (.030)	-.0822 (.025)***	-.1970 (.072)***	-.0609 (.067)	-.1665 (.053)***	-.0793 (.032)**	.0124 (.0283)	.0131 (.019)
Ouv	.6774 (.100)***	-.2551 (.120)**	-.0175 (.068)	.0768 (.127)	-.4196 (.171)**	-.1646 (.096)*	.2537 (.112)**	.3124 (.142)**	-.0541 (.077)
Constant	6.068 (.336)***	4.292 (.214)***	6.421 (.175)***	7.265 (.511)***	4.376 (.442)***	7.668 (.313)	4.738 (.327)***	3.332 (.261)***	5.476 (.190)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	23	23	23	23	23	23
R-squared	0.4782	0.1974		0.3597	0.2148		0.2257	0.165	
R-squaredwithin		0.2828			0.3941			0.3279	
R-squared between		0.1745			0.1694			0.060	
Fischer (prob> F)	0.000	0.000		0.000			0.000	0.000	
Hausman (p> chi2)		0.000			0.7245			0.000	
Breuschpagan (p> chi2)					0.000				
Wald test		0.000						0.000	
Wooldridge (p>chi2)		0.000			0.000			0.000	

Values in parentheses correspond to p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 16: Effect of regulatory quality on foreign aid - economic growth relationship

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	FE	GLS	OLS	FE	GLS
Oda	-.0026 (.053)	.3159 (.038)***	.1134 (.028)***	.0104 (.056)	.2113 (.043)***	.0590 (.025)**	.4954 (.116)***	.6418 (.095)***	.2181 (.052)***
Qr	-.1664 (.226)	-.5115 (.147)***	-.2226 (.117)*	-.2953 (.253)	-.2452 (.196)	-.1890 (.125)	-.8324 (.405)**	-1.313 (.320)***	-.3085 (.190)
Oda*qr	.1652 (.060)***	.1709 (.036)***	.0907 (.029)***	.1432 (.068)**	.1194 (.043)***	.0486 (.028)*	.2798 (.108)**	.3585 (.087)***	.1089 (.050)**
Inf	-.00005 (.000)	-.0001 (.000)**	.0001 (.000)**	-.0002 (.000)	-.0002 (.000)***	.00002 (.000)	.0001 (.000)	.0002 (.000)	.00031 (.000)***
m2	.4615 (.064)***	.5789 (.060)***	.1595 (.041)***	.4373 (.100)***	1.041 (.101)***	.0747 (.072)	.1171 (.058)**	.2187 (.067)***	.0552 (.042)
Pop	-.2920 (.042)***	.0040 (.029)	-.1119 (.027)***	-.1833 (.077)**	.0250 (.066)	-.1616 (.054)***	-.0962 (.033)***	.0069 (.027)	.0053 (.020)
Ouv	.8138 (.097)***	-.2404 (.119)**	.0089 (.071)	.3397 (.130)***	-.6277 (.189)***	-.1686 (.096)*	.3399 (.116)***	.3530 (.143)**	-.0260 (.079)
Constant	5.577 (.356)***	3.874 (.232)***	6.017 (.199)***	6.048 (.546)***	3.572 (.424)***	7.424 (.327)***	3.9172 (.447)***	2.595 (.358)***	5.024 (.244)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4873	0.1933		0.2878	0.1454		0.217	0.1731	
R-squaredwithin		0.2865			0.3895			0.342	
R-squared between		0.1680			0.0925			0.069	
Fischer (prob> F)	0.000	0.000		0.000	0.000		0.000	0.000	
Hausman (p> chi2)	0.000			0.000			0.016		
Breuschpagan (p> chi2)									
Wald test	0.000			0.000			0.000		
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

Table 17: Effect of the rule and law on foreign aid - economic growth relationship

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	FE	GLS	OLS	RE	GLS
Oda	-.0917 (.050)*	.2821 (.039)***	.0861 (.028)***	-.1040 (.051)**	.1732 (.045)***	.0331 (.023)	.6738 (.127)***	.7962 (.105)***	.2307 (.059)***
ed	.1415 (.203)	-.1991 (.142)	.0725 (.102)	.3287 (.220)	-.0501 (.192)	.0899 (.105)	-1.448 (.419)***	-1.669 (.330)***	.2307 (.059)
Oda*ed	.0472 (.051)	.1126 (.034)***	.0466 (.024)*	-.0360 (.055)	.0440 (.040)	.0081 (.021)	.4220 (.111)***	.4682 (.087)***	.1043 (.049)**
Inf	-.00005 (.000)	-.0001 (.000)*	.0001 (.000)***	-.0002 (.000)	-.0002 (.000)***	.00002 (.000)	.00005 (.000)	.0001 (.000)	.0003 (.000)***
m2	.4626 (.070)***	.5581 (.060)***	.1047 (.040)***	.4083 (.106)***	1.005 (.104)***	.0226 (.072)	.1149 (.059)*	.1832 (.062)***	.0230 (.042)
Pop	-.2988 (.043)***	.0040 (.030)	-.0974 (.026)***	-.1828 (.078)**	.0161 (.068)	-.1348 (.053)**	-.0900 (.033)*	-.0031 (.026)	.0070 (.019)
Ouv	.7611 (.099)***	-.2935 (.120)**	-.0248 (.071)	.3076 (.130)**	-.6447 (.191)***	-.1612 (.097)*	.2125 (.112)*	.2615 (.130)**	-.0717 (.077)
Constant	5.907 (.380)***	4.178 (.239)***	6.396 (.197)***	6.618 (.577)***	3.849 (.454)***	7.720 (.328)***	3.248 (.495)***	2.244 (.390)***	5.176 (.257)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4649	0.1869		0.2786	0.1331		0.21	0.196	
R-squaredwithin		0.2792			0.3739			0.366	
R-squared between		0.1585			0.0813			0.094	
Fischer (prob> F)	0.000	0.000		0.000	0.000		0.000		
Hausman (p> chi2)		0.000		0.000			0.312		
Breuschpagan (p> chi2)							0.000		
Wald test		0.000		0.000					
Wooldridge (p>chi2)		0.000		0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

18: Effect of voice and accountability on foreign aid - economic growth relationship

Variables	Full sample			Middle-income African countries			Low-income African countries		
	OLS	FE	GLS	OLS	FE	GLS	OLS	RE	GLS
Oda	-.0917 (.046)**	.3134 (.037)***	.1002 (.025)***	-.0550 (.047)	.2359 (.042)***	.0393 (.023)*	.1686 (.098)*	.5137 (.079)***	.1803 (.044)***
vr	-.0446 (.172)	-.4823 (.126)***	-.1341 (.095)	.0585 (.177)	-.2729 (.150)*	.0463 (.094)	.2302 (.385)	-.9846 (.291)***	-.1943 (.159)
Oda*vr	.0464 (.044)	.1645 (.031)***	.0760 (.022)***	-.0202 (.046)	.1565 (.036)***	.0257 (.021)	-.0324 (.101)	.2542 (.076)***	.0760 (.042)*
Inf	-.00007 (.000)	-.0001 (.000)**	.0001 (.000)***	-.0002 (.000)*	-.0002 (.000)***	.00003 (.000)	.0004 (.000)**	.0003 (.000) **	.0003 (.000)***
m2	.5705 (.067)***	.5777 (.060)***	.1285 (.041)**	.5235 (.101)***	1.074 (.100)***	.0381 (.071)	.1719 (.059)***	.2446 (.062)***	.0173 (.042)
Pop	-.3227 (.043)***	-.0078 (.029)	-.1228 (.027)***	-.2245 (.077)***	.0247 (.065)	-.1631 (.052)***	-.0861 (.033)**	.0015 (.027)	.0045 (.020)
Ouv	.8007 (.101)***	-.2994 (.118)**	.018491 (.072)	.3096 (.131)**	-.5963 (.185)***	-.1893 (.096)*	.2454 (.119)**	.2167 (.132)	-.0487 (.079)
Constant	5.434 (.362)***	3.933 (.239)***	6.189 (.198)***	6.010 (.566)***	3.362 (.435)***	7.709 (.326)***	4.917 (.416)***	3.014 (.340)***	5.295 (.224)***
Observations	673	673	673	355	355	355	318	318	318
Number of groups	48	48	48	25	25	25	23	23	23
R-squared	0.4494	0.1498		0.2681	0.1157		0.17	0.138	
R-squaredwithin		0.2934			0.4111			0.334	
R-squared between		0.1231			0.0669			0.028	
Fischer (prob> F)	0.000	0.000		0.000	0.000		0.000		
Hausman (p> chi2)	0.000			0.0370			0.996		
Breuschpagan (p> chi2)							0.000		
Wald test	0.000			0.000					
Wooldridge (p>chi2)	0.000			0.000			0.000		

Values in parentheses correspond are p-values; ***, **, and * indicates statistical significance at the 1%, 5% and 10% levels, respectively.

5. Conclusion and policy implications

At the end of our current research, it appears that the effectiveness of development aid increases with the presence of the good quality of economic policies, in particular better quality of governance measured by different indicators of the governance extracted from the World Bank (CC, RL, GE, PS, VA and RQ), as well as the weighted composite index. In fact, we first studied the aid-growth relationship for the case of African countries. We subdivided our sample into two sub-regions: low-income countries and middle-income countries. The static⁹ model results show that Development Aid has a positive effect on economic growth in all African countries (low-income and middle-income countries). Nevertheless, this effect is more important in the case of low-income countries. Thus, foreign aid is seen as an engine of economic growth for the development of African economies regardless of income level.

In a second place, we examined the effect of international aid on economic growth, in the presence of governance. In this framework, we have integrated the indicators of good governance developed by Kaufmann Kraay and Mastruzy (2010) (Voice and Accountability(VA), Government Effectiveness (GE), Political Stability (PS), Quality of regulation (RQ), the control of corruption (CC), rule of law (RL) and their composite index in order to avoid any correlation effect that may exist between these indicators. The results show that the effectiveness of the international assistance is improving with the integration of governance only in the case of low-income countries, while the inclusion of this variable in our model, in the case of middle-income African countries, has no effect. Governance has a positive effect on economic growth in African economies (sample global) but it weakens the effectiveness of foreign aid in terms of economic growth in that the aid coefficient has decreased from equation (1) to equation (2).

Lastly, we introduced the interaction between aid and governance (aid*GOV) similarly as done previously in order to study the conditionality of aid effectiveness. Indeed, interactions between the Development Aid variable and the composite indicator of governance is firstly checked. Then, the interactions between each indicator of the governance and the amount of International Aid in relation to economic growth are taken into account. Thus, these coefficients are insignificant in African middle-income economies. So, the assumption that

⁹ We did not pass to the dynamic panel estimation techniques because when conducting an endogeneity test of Wooldridge-Wu we reject the assumption of presence of endogeneity for the dependent variable. This means that our data does not suffer from endogeneity or simultaneity problems and that our results are robust and unbiased.

aid effectiveness is conditioned by the presence of good institutional policies without precision is questioned in these economies. Nevertheless, in this sub-region, only the quality of regulation (RQ) as a desegregated measure of governance quality improves the effectiveness of development assistance. In other words, Middle-income African countries need improving regulatory framework in order to guarantee economic growth when receiving aid from international donors.

However, for the other two subsamples (global and low-income African countries), this assumption is confirmed in the sense that the effectiveness of foreign aid may be significantly improved in countries with good institutional policies. Indeed, the improvement of aid effectiveness in terms of economic growth is explained, mainly, in low-income African countries, by the integration of the following sub-indices: Regulatory quality, the rule of law and voice and responsibility. On the other hand, improving the effectiveness of aid, in the case of Africa as a whole, is justified, in large part, by the control of corruption, the quality of regulation, and the voice and responsibility.

In summary, we think that our work contributes to the previous literature on development aids by permitting an institutional approach that address the link between the amount of aid and the level of growth. This paper has the merit of identifying the most important institutional factor responsible for the absence or lack of a remarkable positive effect of foreign flows in African countries. Our empirical results imply that sound economic policies are primordial for the effectiveness of Development aid in terms of economic growth. So, it is essential for policy makers to take into account the objective of improving the quality of governance and particularly to strengthen the regulatory framework in order to better benefit from foreign development supports by allocating these resources to the most productive projects.

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Appendixes

Appendix 1: Factors analysis's for 48 African countries

African low- income countries

Table A.1.1: Descriptive Statistics

	Mean	StdDeviation	Analysed N
CC	-,7845	,39810	345
GE	-,9526	,45359	345
PS	-,7693	,83621	345
RQ	-,8326	,51031	345
RL	-,9087	,50552	345
VA	-,7511	,54393	345

Table A.1.2: Correlation matrix

	CC	GE	PS	RQ	RL	VA
Correlation	1,000	,712	,572	,673	,737	,496
	,712	1,000	,546	,775	,802	,489
	,572	,546	1,000	,591	,729	,703
	,673	,775	,591	1,000	,831	,579
	,737	,802	,729	,831	1,000	,658
	,496	,489	,703	,579	,658	1,000

Table A.1.3 : Representation qualities(Communalities)

	Initial	Extraction
CC	1,000	,750
GE	1,000	,861
PS	1,000	,832
RQ	1,000	,815
RL	1,000	,889
VA	1,000	,868

Extraction Method: Principal Component Analysis

Table A.1.4 : Total variance explained

Composant	Initial Eigenvalues ¹⁰			Extraction sums of Squared loadings		
	Total	% of variance	Cumulation %	Total	% of variance	Cumulation %
1	4,315	71,918	71,918	4,315	71,918	71,918
2	,701	11,683	83,601	,701	11,683	83,601
3	,356	5,926	89,528			
4	,288	4,801	94,329			
5	,211	3,513	97,842			
6	,129	2,158	100,000			

Table A.1.5 : Component Matrix^a

	Components	
	1	2
CC	,826	-,262
GE	,857	-,356
PS	,810	,420
RQ	,881	-,197
RL	,941	-,057
VA	,762	,536

Extraction Method: component Analysis Method. a. 2 components extracted

Table A.1.6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin measure of sampling adequacy.		,899
Approx Chi-Square		2678,328
Bartlett's test of sphericity	Ddl	15
	Sig	,000

African Middle income countries

Table A.1.7: Descriptive Statistics

	Mean	Std Deviation	Analysed N
CC	-,4179	,63079	374
GE	-,4423	,60076	374
PS	-,3427	,90844	374
RQ	-,4424	,59101	374
RL	-,4668	,65846	374
VA	-,4987	,77933	374

¹⁰The eigenvalue for a given factor measures the variance in all the variables which is accounted for by that factor. The ratio of eigenvalues is the ratio of explanatory importance of the factors with respect to the variables. Eigenvalues measure the amount of variation in the total sample accounted for by each factor.

Table A.1.8: Correlation matrix

	CC	GE	PS	RQ	RL	VA
Correlation	1,000	,890	,716	,809	,901	,771
CC	,890	1,000	,647	,893	,905	,757
GE	,716	,647	1,000	,606	,768	,641
PS	,809	,893	,606	1,000	,842	,756
RQ	,901	,905	,768	,842	1,000	,783
RL	,771	,757	,641	,756	,783	1,000
VA						

Table A.1.9 : Representation qualities(Communalities)

	Initial	Extraction
CC	1,000	,885
GE	1,000	,930
PS	1,000	,982
RQ	1,000	,896
RL	1,000	,924
VA	1,000	,754

Extraction Method: Principal Component Analysis

Table A.1.10 : Total variance explained

Composant	Initial Eigenvalues			Extraction sums of Squared loadings		
	Total	% of variance	Cumulation %	Total	% of variance	Cumulation %
1	4,913	81,882	81,882	4,913	81,882	81,882
2	,458	7,628	89,510	,458	7,628	89,510
3	,295	4,915	94,425			
4	,176	2,930	97,355			
5	,090	1,501	98,856			
6	,069	1,144	100,000			

Table A.1.11 : Component Matrix^a

	Components	
	1	2
RL	,961	,029
GE	,943	-,199
CC	,941	-,023
RQ	,908	-,268
VA	,867	-,050
PS	,799	,585

Extraction Method: component Analysis Method. a. 2 components extracted

Table A.1.12: KMO and Bartlett's Test

Kaiser-Meyer-Olkin measure of sampling adequacy.		,899
	Approx Chi-Square	2678,328
Bartlett's test of sphericity	Ddl	15
	Sig	,000

Appendix 2: Data descriptions**Table A.2.1: Correlation matrix between governance indicators**

		CC	VR	QR	SP	ED	EG
Low-income african countries	CC	1					
	VA	0,4965	1				
	RQ	0,6726	0,5787	1			
	PS	0,5722	0,7032	0,5914	1		
	RL	0,7367	0,6585	0,8315	0,7293	1	
	GE	0,7116	0,4886	0,7747	0,5459	0,8016	1
Middle income african countries	CC	1					
	RL	0,9015	1				
	GE	0,8896	0,9045	1			
	VA	0,7701	0,7815	0,7549	1		
	RQ	0,8087	0,8405	0,8925	0,7544	1	
	PS	0,7146	0,7672	0,6453	0,6395	0,6035	1

Table A.2.2: Variable definition and sources

Variables	Definitions	Sources	
Y	Gross domestic product per capita (current US\$)	World Bank	
Apd	Net ODA received per capita (current US\$)	World Bank	
Inf	Inflation is measured on the basis of the GDP deflator	World Bank	
Pop	It refers to the total population of the country in million	World Bank	
M2	It corresponds to the money supply in terms of m2 relative to GDP and measures the level of internal financial liberalization. It also makes it possible to evaluate the efficiency of financial intermediation.	World Bank	
Ouv	It measures commercial openness and is measured by the sum of import and export to total GDP	World Bank	
Governance composite index (GOV): it corresponds to the weighted average of the six sub-indicators of governance quality where coefficients are indicated in subsection 3.2.1 and varies between -2.5 and 2.5.	CC	Control of corruption : it ranges between -2.5 and 2.5	World Bank
	VA	Voice and accountability: it varies between -2.5 and 2.5	(WGI)
	PS	Political stability : it is between -2.5 and 2.5	
	RL	Rule of Law: it switches between -2.5 and 2.5	
	RQ	Regulatory Quality: it is included in the -2.5 and 2.5 bounds	
	GE	Government effectiveness : it belongs to the interval(-2.5; 2.5)	

Appendix 3: Sample choice and Official Development Aid repartition**Table A.3.1: List of Countries**

Middle income		Low income	
Algeria	Mauritania	Benin	Niger
Angola	Mauritius	Burkina Faso	Rwanda
Botswana	Namibia	Burundi	Sierra Leone
Cameroun	Nigeria	Comoros	Tanzania
Cape Verde	Sao Tome and Principe	Ethiopia	Tchad
Côte d'Ivoire	South Africa	Gambia	Togo
Egypt	Senegal	Guinea	Uganda
Gabon	Swaziland	Guinea-Bissau	Zimbabwe
Ghana	Tunisie Tunisia	Liberia	
Kenya	Zambia	Madagascar	
Lesotho		Malawi	
Libya		Mali	
Morocco		Mozambique	

Table A. 3. 2: Distribution of International Official Development by region

	In billions of dollars
Latin America and the Caribbean	10
Europe and Central Asia	10
East Asia	9
Middle East and North Africa	5
South Asia	11
Sub-Saharan Africa	15

Source: Annual Report of the World Bank (2015)