Foreign Aid and Fiscal Resources Mobilization in WAEMU Countries: Ambiguous Effects and New Questions

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Abstract
This paper analyzes the effect of different types of foreign aid on tax revenues in West African Economic and Monetary Union (WAEMU) countries. A fixed-effects panel model with instrumental variables was developed over the period spanning from 1985 to 2016. The results indicate that multilateral aid affects positively and significantly tax revenues while bilateral aid does not. Moreover, the analysis of the decomposed effect of aid revealed that concessional aid and technical assistance enhance fiscal resources mobilization. However, grants reduce tax effort. The results also show that when aid is aggregated, its effect on tax revenues is ambiguous. These results justify for many reasons the reorientation of foreign aid towards investment for effective tax systems in WAEMU countries in compliance with Addis Ababa Action Agenda 2015 of the third international conference on Financing for Development. Strengthening multilateral partnership is advocated in accordance with the 17th Sustainable Development Goals. Also, an improvement of institutional quality could make foreign aid more efficient for tax collection in the study areas.

Key words: Foreign aid types; Tax revenues; Panel data analysis; WAEMU.

JEL classification : F35 ; E62 ; C30.

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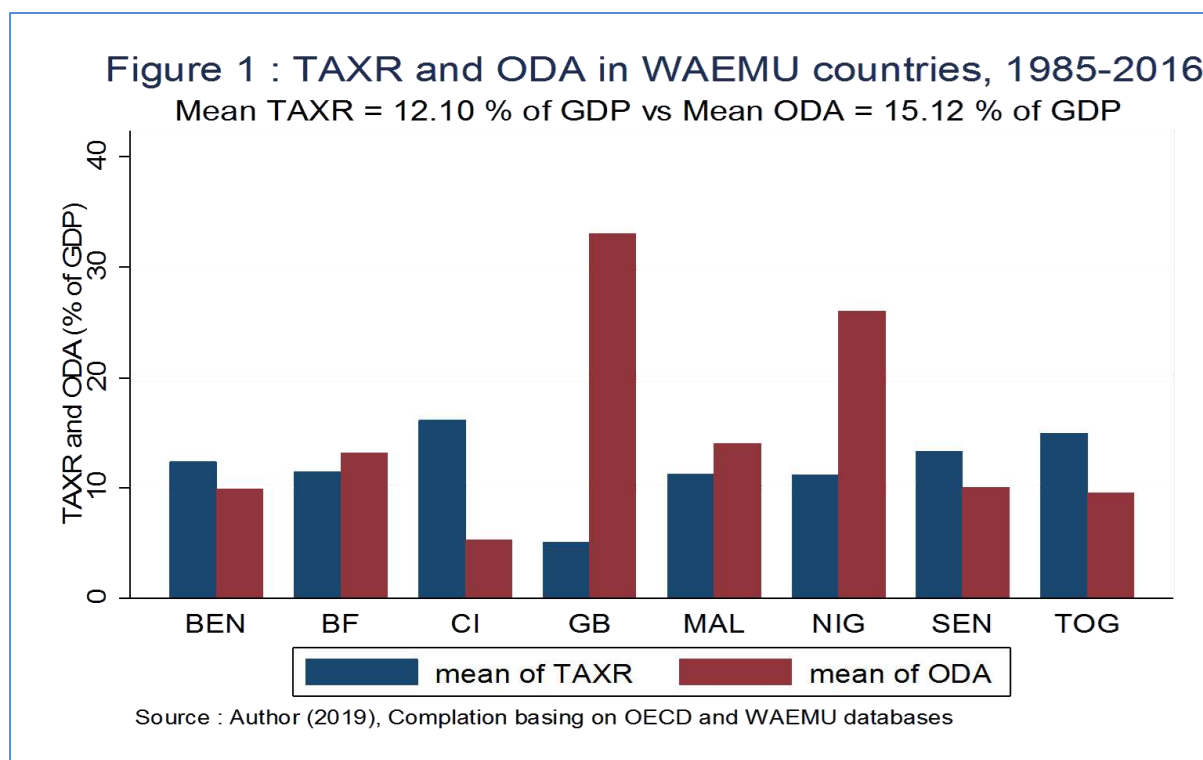
1. Introduction

For several decades, the relations between West African Economic and Monetary Union (WAEMU)[1] countries and the developed countries are dominated by the official development aid (ODA) which represents an important source of financing in these countries (Dreher et al., 2018; Ndikumana and Pickbourn 2017; Bia, 2017). According to the Organization for Economic Cooperation and Development (OECD) statistics, WAEMU countries received on average a net ODA flow of 15.12% of their average GDP over the last three decades (OECD, 2018).

In parallel with aid flows these countries receive from developed countries, intergovernmental organizations and multilateral institutions; the domestic resources mobilization, especially fiscal resources, has become a crucial issue for these countries (Morissey, 2018; Yohou et al., 2016). For this purpose, the heads of State and Government of the Union have taken decisions and directives with a view to create a regional common market which promotes a better allocation of resources to ensure greater equity between consumers within the Union (WAEMU, 2012)[2]. The implicit objective of these directives is to promote a strong mobilization of fiscal resources because the need of public resources is particularly important for the achievement of development goals such as Agenda 2030 for Sustainable Development and the African Union Agenda 2063 targets.

Indeed, it's possible to perform a comparative analysis of the evolution of foreign aid volumes and tax revenues in WAEMU countries from 1985 to 2016 through the figure presented bellow (Figure 1). It indicates that WAEMU countries are highly aid-dependent countries. So, in average, the tax revenue in percentage of GDP (12.1) is less than foreign aid in percentage of GDP (15.12). Digging into details, it is notable that, in some countries of this Union, aid-to-GDP exceeds far their tax revenue-to-GDP. This is the case of Guinea Bissau (5.08 against 33.03), Niger (11.18 against 26.01), Mali (11.23 against 14.02) and Burkina Faso (11.47 against 13.18). In contrary, in the other countries of the Union (Benin, Côte d'Ivoire, Senegal and Togo), even though tax revenues are higher than foreign aid, the latter remains an important source of financing.

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[1] - The West African Economic and Monetary Union (WAEMU) includes the following countries: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo.

[2] - Some decisions taken by the WAEMU Commission: Decision N.01 / 98 / CM / UEMOA of 03 July 1998 adopting the program for the harmonization of internal indirect taxation within WAEMU; Decision N.10 / 2006 / CM / UEMOA of 23 March 2006 adopting the tax transition program within WAEMU; Decision N.16 / 2006 / CM / UEMOA of 16 December 2006 adopting the Program for harmonization of direct taxation within WAEMU.

Figure 1 : TAXR and ODA in WAEMU countries, 1985-2016
Mean TAXR = 12.10 % of GDP vs Mean ODA = 15.12 % of GDP
Source : Author (2019), Complation basing on OECD and WAEMU databases

In view of these stylized facts, foreign aid seems to be a direct and important revenue source for the WAEMU countries. There are legitimate concerns, therefore, as to whether foreign aid is encouraging or disincentives countries to mobilize fiscal resources. In fact, aid is likely to affect the behavior of States by reducing the effort that States provide in terms of resource mobilization (Addison et al., 2017). That is why the purpose of this paper is to analyze the effects of the different types of official development assistance on the tax revenues of the countries of the WAEMU zone.

In this paper, we distinguish bilateral aid from multilateral aid (Appendix: Appendix 1 & 2). We also distinguish concessional loans and technical assistance from grants contained in foreign aid (Appendix 2). In conducting these analyzes which stands out from existing studies, our research will therefore identify policy implications for the type (s) of assistance needed to stimulate tax resource mobilization in WAEMU countries. This work is in line with one of the recommendations of Addis Ababa Action 2015, related to the reorientation of official development assistance towards investment for effective tax systems in Africa (United Nations, 2017). The paper also contributes to the existing empirical literature on the relationship between external aid and tax revenues.

The rest of the paper is structured as follows. The section 2 presents the literature review that addresses the analysis of the relationship between foreign aid and the fiscal resources mobilization. The methodological approach and the discussion of the main results are presented in sections 3 and 4, respectively. The section 5 contains the conclusion and economic policy's implications.

2. Literature review

In the economic literature, analysis of the effect of official development assistance on the fiscal resource's mobilization leads to controversial conclusions. Some studies support the idea that aid through its components (grants, loans and technical assistance) can raise the level of tax revenue mobilization in developing countries (Combes et al., 2016, Dedehouanou and

Dedehouanou (2017). Other studies indicate that an increase in foreign aid can have a crowding-out effect on the effort to mobilize tax revenue in recipient countries (Gupta et al., 2004, Crivelli and Gupta, 2017). In the impossibility of making a complete tour of this literature we are interested in the essential points of the recent studies which dealt with the question.

2.1. Bilateral aid, multilateral aid and fiscal resources mobilization

Regarding the effects of different forms of aid, an economic literature review reveals that very few studies have examined the influence of bilateral and multilateral aid in recipient countries (Radelet, 2006; Dankov et al., 2008; Jeffrey, 2015). It should be noted that these studies have focused on the ability of bilateral and multilateral aid to promote the economic growth of recipient countries rather than the fiscal resources mobilization. To our knowledge, one of the few studies that analyze the effect of bilateral aid on the fiscal resource's mobilization is the paper of Dedehouanou and Dedehouanou (2017). Using an endogenous Hansen threshold model, the authors have shown that the fragmentation of bilateral aid contributes to a reduction in tax revenues in the Union. However, one of the shortcomings of this study is related to the omission of other different types of foreign aid. For instance, technical assistance, concessional loans and grants are not taken into account in their study.

2.2. Technical assistance, concessional loans, grants and fiscal resources mobilization

Regarding the effects of the various components of foreign aid on tax revenues, several previous studies can be mentioned. The seminal paper of Gupta et al. (2004), for example, analyzed the impact of international assistance on tax revenues in 107 countries between 1970 and 2000. The results revealed that, unlike grants, loans have a positive effect on tax revenues. In addition, the study found a negative effect of total development assistance on domestic revenue mobilization. The authors deduce that the negative effect of grants outweighs the positive effect of loans. As a result, the overall effect becomes negative. However, the study concludes that these results are country-specific.

Decades before the work of Gupta et al. (2004), Heller (1975) analyzed the fiscal behavior of recipient countries following an increase in international development aid in developing countries. The results revealed that international aid is reducing the level of tax collection in these countries. This means that the assumption that development aid disincentives to mobilize fiscal resources in recipient countries is maintained.

Concerning contemporary research on the subject, let us note those carried out by Clist and Morrissey (2011). The authors relied on the paper of Gupta et al. (2004) to examine the effect of foreign aid, including loans and grants, on the fiscal effort in 82 developing countries between 1970 and 2005. Although their results showed that, specifically, loans affected positively tax revenues; any increase in overall aid leads to lower tax revenues. In addition, the more these countries receive grants, the more tax revenues are reduced.

Another contemporary study that relied heavily on the analyzes of Gupta et al. (2004) is the work of Benedek et al. (2012). The authors examined the relationship between aid and tax revenues in 118 countries over the period 1980-2009. The results found confirm those of Gupta et al. (2004). Loans positively influence tax revenues, while grants and total aid affect them negatively. In addition, the authors noted that countries that do not have high quality institutions, especially where corruption is pervasive, are more affected by a drastic reduction in the level of tax revenue as a result of increasing in grants.

For Carter (2013), previous research that concluded the negative impact of grants on the mobilization of fiscal resources probably used simple statistical models with strong econometric assumptions. He supports this criticism by showing that the results of this earlier research disappear when more general and robust econometric methods are applied to analyze the same data. According to the author, estimates on panel data will be more robust. It also finds a positive impact of donations on tax revenues, which can be explained in part by developing countries' awareness of the importance of mobilizing domestic revenue.

So far, most of studies evoked have been done on panel data. We will now discuss some country cases. For this purpose, Chaudhry and Munir (2010) analyzed the factors that cause Pakistan's low tax revenues. The results indicated that Foreign aid, considered in their model as an explanatory variable, influenced negatively tax collection in the Pakistani economy. However, this effect was not significant. A similar result has been found in the works of Hisali and Ddumba-Ssentamu (2013). They also found that donations had a negative effect on tax revenues in Uganda. However, this negative effect of grants was offset by the positive impact of loans (Benedek et al., 2012).

In the context of WAEMU countries, the only reference study, to our knowledge, that analyzes the effects of aid on tax revenues is the paper of Yohou et al. (2016). The authors find a positive and significant effect of international aid on tax revenues. However, the study does not take into account Benin and Guinea Bissau. This study differs from the work of Yohou et al. (2016) by taking into account all WAEMU countries. In addition, it captures the effect of different types of foreign aid and highlight the type of support that could enhance the fiscal resources mobilization. Another inadequacy of their paper is related to the foreign aid endogeneity issue, which is not well treated in our opinion. However, the rigorous treatment of the endogeneity of aid is a major issue in studies dealing with aid effectiveness (Brun et al., 2008, Thornton, 2014). Our study also tries to fill this gap.

3. Methodology and data
3.1. Theoretical framework
For the purpose of our analysis, we draw on Heller's (1975) theoretical model, which describes the behavior of a beneficiary country in term of aid flows. It is a utility function that assumes that the recipient country of aid aims to maximize the social welfare of its citizens under its budget constraint. Based on this model, Batten (2010) and Hussen (2014) respectively analyzed the fiscal behavior of the government of Papua New Guinea and Ethiopia facing to foreign aid. This model is applied as part of our analysis because it has a foundation from economic theory (Heller, 1975). Governments in developing countries are supposed to be rational. They try to optimize their spending because their national resources are limited. They therefore face a budget constraint, and thus have to choose between alternative benefits with their limited income.

Thus, assuming that government preferences can be expressed with the Cobb-Douglas utility function, we can write:

$$U(CE_t, RE_t) = CE_t^\alpha RE_t^{\alpha-1} \tag{1}$$

where CE_t and RE_t represent respectively the capital goods (equipment, etc.) and the current goods (other goods) of period t. On the basis of studies of Fagernäs and Schurich (2004) and Ouattara (2006), the basic fiscal identity in conventional public accounting is represented by:

$$E - (T + G) = B + F \tag{2}$$

where (E) is the total expense; (T) is the national income; (G), foreign grants, (B) is national funding and (F) is foreign funding. It is the equality between the government's budget balance and its total funding requirement. The reorganization of this identity gives:

$$E - T = B + A \tag{3}$$

where external aid (A) is the sum of donations (G) and foreign loans (F). $(E - T)$ then becomes the deficit before subsidies (Fagernäs and Schurich, 2004). Based on this formulation, this study also uses the collection of tax resources and official development assistance to determine the fiscal constraint facing by the recipient country. Differences between expenditures and revenues are then captured by changes in the government's level of indebtedness. The budget constraint is therefore written as follows:

$$P_{CE,t}CE_t + P_{RE,t}RE_t - (TXR_t + \beta A_t) = DB_t \tag{4}$$

where, foreign aid A_t is the sum of grants G_t, loans L_t and technical assistance TA_t. Tax revenue TXR_t is the sum of direct taxes DTX_t and indirect ITX_t, DB_t is domestic borrowing and P_t is the price of public goods. The specific amount of aid that the recipient country estimates to be used to reduce taxes / borrowings or to change the composition of capital and operating expenses is represented by β. The problem of maximizing public utility can be written as follows:

$$\begin{cases} MAX: U(CE_t, RE_t) = CE_t^{\alpha}RE_t^{\alpha-1} \\ SC\ P_{CE,t}CE_t + P_{RE,t}RE_t - (TXR_t + \beta A_t) = DB_t \end{cases} \tag{5}$$

The application of the Lagrangian for the resolution of problem translated by the system (5) is written:

$$\mathcal{L} = CE_t^{\alpha}RE_t^{\alpha-1} + \lambda\left(P_{CE,t}CE_t + P_{RE,t}RE_t - DB_t - TXR_t - \beta A_t\right) \tag{6}$$

According to the conditions of first order (FOC), we have the following equations:

$$\frac{\partial \mathcal{L}}{\partial CE} = 0 \implies \alpha CE_t^{\alpha-1}RE_t^{\alpha-1} + \lambda P_{CE,t} = 0 \tag{7}$$

$$\frac{\partial \mathcal{L}}{\partial RE} = 0 \implies (\alpha - 1)CE_t^{\alpha}RE_t^{\alpha-2} + \lambda_{RE,t} = 0 \tag{8}$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = 0 \implies P_{CE,t}CE_t + P_{RE,t}RE_t - DB_t - TXR_t - \beta A_t = 0 \tag{9}$$

When we reorganize these first-order conditions (CPO) from equation (7) to equation (9) and substitute the prices of public goods assumed equal to one (unity), we deduce the following structural equations:

$$CE_t = \frac{\alpha}{2\alpha - 1}(DB_t + TXR_t + \beta A_t) \tag{10}$$

$$RE_t = \frac{\alpha - 1}{2\alpha - 1}(DB_t + TXR_t + \beta A_t) \tag{11}$$

$$TXR_t = CE_t + RE_t - DB_t - \beta A_t \tag{12}$$

$$DB_t = CE_t + RE_t - TXR_t - \beta A_t \tag{13}$$

$$A_t = \frac{1}{\beta}(CE_t + RE_t - DB_t - TXRT_t) \tag{14}$$

According to Batten (2010) and Hussen (2014), we find that, from these equations, the structural relationship translated by equation (12) links tax revenues to foreign aid, expenditure level and domestic borrowing variations. We therefore deduce the following equation:

$$TXT = f(CE, RE, A, DB) \tag{15}$$

From this relation (15), one can specify several others taking into account the interest and the objective of the researcher. The empirical model is thus defined from this equation.

3.2. Empirical setup
Our study analyzes the effect of foreign aid on tax revenues. Indeed, six econometric models are estimated. So, the first model includes aggregated official development assistance and the other control variables. Then two other models take into account bilateral aid and multilateral aid separately. Finally, the last three models disintegrate global foreign aid in loans, technical assistance and grants. Thus, from the theoretical model developed above, we now specify an empirical model on panel data that is presented as follows:

$$TAXR_{it} = \propto + \gamma_1 ODA_{it} + \lambda_j ODA_{F_{it}} + \varphi_k ODA_{C_{it}} + \sum_{j=1}^{k} \varphi_i X_{it} + \varepsilon_{it} \tag{16}$$

with $\varepsilon_{i,t} = v_i + \mu_{it}$ $\qquad\qquad$ (17)

$i = country\ index,\ t = time\ index\ (1985 - 2016),\ j = 1,2\ \ and\ \ k = 1,2\ and\ 3.$
Different types of aid can be written in a matrix form as follows

$$APD_{F_{it}} = \begin{bmatrix} ODA_{BIL_{it}} \\ ODA_{MUL_{it}} \end{bmatrix} \qquad and \qquad APD_{C_{it}} = \begin{bmatrix} ODA_{CL_{it}} \\ ODA_{TA_{it}} \\ ODA_{GR_{it}} \end{bmatrix}$$

In this equation (7), from left to right, are labeled:
- $TAXR_{it}$: tax revenues as a percentage of GDP. It represents the tax rate. This is the explained variable of the model. Data for this variable were extracted from the Multilateral Surveillance Database of the WAEMU Commission.
- ODA_{it} : the official development assistance (overall) received by each country in the study sample. It is related to GDP (% of GDP).
- $ODA_{F_{it}}$: aid forms as a percentage of GDP. It includes bilateral aid ($ODA_{BIL_{it}}$) and multilateral aid ($ODA_{MUL_{it}}$).
- $ODA_{C_{it}}$: other components of foreign aid. This matrix takes into account concessional loans ($ODA_{CL_{it}}$, technical cooperation assistance ($ODA_{TA_{it}}$) and the grant component

($ODA_{GR_{it}}$). All these variables (different types of aid) are valued in percentage of GDP. Data on the different types of aid are found in the OECD Creditor Reporting System (CRS).

Based on the existing literature, we have set expectations on our parameters related to our variables of interest. Indeed, we assume that the coefficients $\gamma_1 \leq 0$, $\lambda_1 \leq 0$, $\lambda_2 \geq 0$ on the one hand, and $\varphi_1 \geq 0$, $\varphi_2 \geq 0$ et $\varphi_3 \leq 0$, on the other hand.

X_{it} is a matrix of control variables that can explain tax revenues. Stotsky and Wolde (1997) have identified more than a dozen variables that may have an effect on tax resources mobilization. However, in this study, we limit their number to better appreciate the influence of our variables of interest[3]. This X_{it} matrix includes: agricultural value added VA_{ag}, industrial value added VA_{in}, trade openness $TOPEN$, GDP per capita ($GDPC$), secondary school enrollment rate (HK). The data for all these variables are taken from the World Development Indicator (WDI). Regarding the institutional quality variables, this study used three indicators of the International Country Risk Guide (ICRG): Corruption Control (COR), Political Stability (PST) and Bureaucratic Quality (BUQ). These variables are important because questions relating to the taxes collection cannot be studied independently of institutional issues, especially corruption, which combines fraud and tax malfeasance. Two other institutional quality variables are added as shown in the data source table (Table 1) for robustness checks.

Table 1: Source of the variables of the model

Name	Description	Source
TAXR	Fiscal / Tax Revenue (% of GDP)	WAEMU Database
ODA	Official Development Assistance (US Dollars)	OECD Database
ODA_BIL	Bilateral Aid	OECD Database
ODA_MUL	Multilateral Aid	OECD Database
ODA_CL	Concessional Loans of Aid	OECD Database
ODA_TA	Technical Assistance Aid	OECD Database
ODA_GR	Grants or Donations	OECD Database
VA_AG	Agricultural Value Added	World Bank Database (WDI)
VA_IN	Industrial Value Added	World Bank Database (WDI)
GDPC	Real Gross Domestic Product per Capita (USD)	World Bank Database (WDI)
TOPEN	Trade openness (%)	Computed using WDI
HK	Secondary School Enrollment Rate	World Bank Database (WDI)
COR	Corruption	ICRG
GST	Government Stability	ICRG
BUQ	Bureaucracy Quality	ICRG
DA	Democratic Accountability	ICRG
LO	Law and Order	ICRG

Source: Author (2019), variables compiled

3.3. Descriptive analysis of variables of the model
The study has covered all eight WAEMU countries based on the agreement establishing the WAEMU in January 10, 1994. So, descriptive statistics of the sample for all variables from 1985 to 2016 are presented in the table below (Table 2). At this step, we focus primarily on the variables of interest. For this purpose, it can be seen that the number of observations for the

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[3] - The choice of these specific variables was made basing on matrix of correlations between the variables of the model. Thus, variables were selected rigorously in order to avoid statistical biases and to reduce the risks of multi-collinearity.
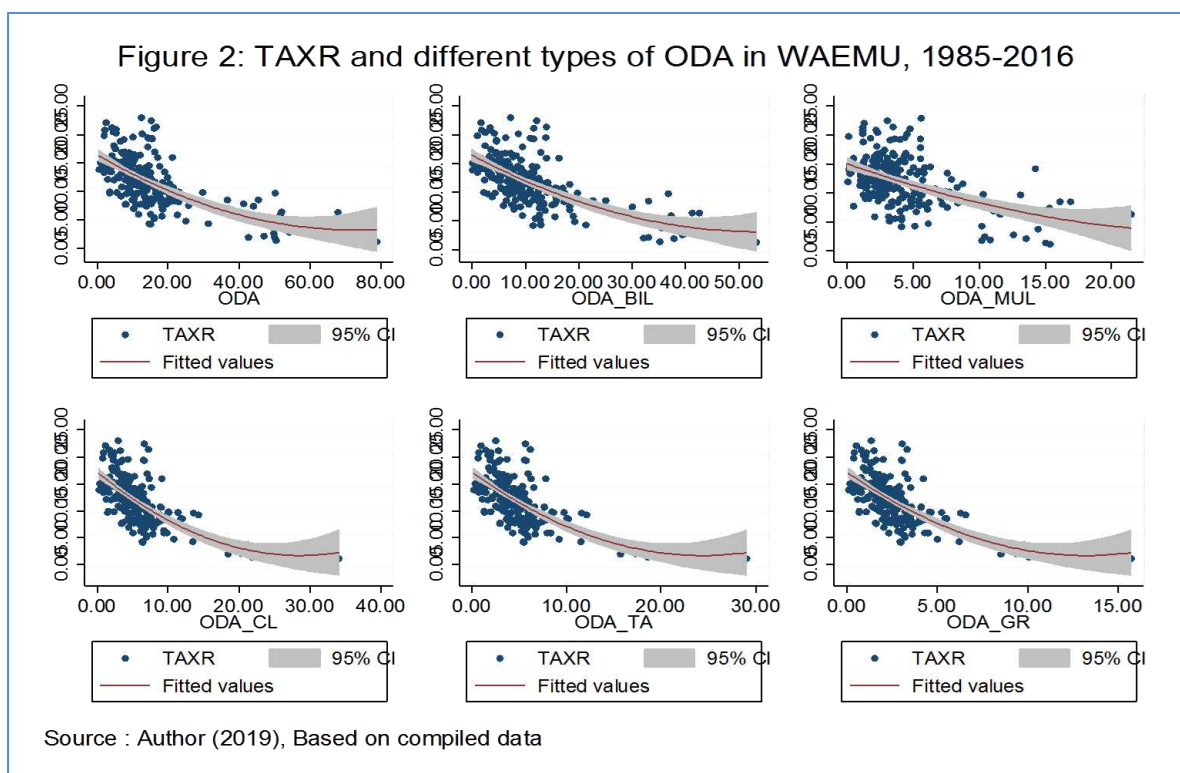
different variables is not identical. This is explained by the number of missing data for selected variables. Consequently, we worked on a unbalanced panel. Specifically, all over the period of the study, the average tax revenue (12.10% of GDP) is very lower than the average of foreign aid (15.12% of GDP). This comparison highlights the aid-dependence of WAEMU countries. Bilateral aid average is 11.04% of GDP compared to 4.40% of GDP for multilateral aid. In addition, it can be noted that, concessional loans are the main component of aid. Its average of 5.95% of GDP is higher than that of technical cooperation (5.10% of GDP), which in turn is much higher than grants (2.76% of GDP).

Table 2: Descriptive statistics of variables of the model, 1985-2016

Variables	Observations	Means	Standard deviation	Minimum	Maximum
TAXR	251	12.10	4.158	1.169	22.98
ODA	256	15.12	13.22	0.555	78.71
ODA_BIL	256	11.04	9.549	0.058	53.08
ODA_MUL	256	4.402	3.875	0.078	21.46
ODA_CL	256	5.954	5.086	0.240	34.04
ODA_TA	256	5.101	4.344	0.204	28.97
ODA_GR	256	2.763	2.353	0.110	15.69
VA_AG	207	34.66	10.04	13.77	62.38
VA_IN	207	20.06	5.024	9.758	32.82
TOPEN	210	38.03	19.28	14.31	118.1
GDPC	256	674.4	320.4	131.6	1639
HK	256	21.64	12.85	3.212	55.91
COR	256	2.223	0.763	0000	4.000
GST	256	7.204	2.093	2.333	11.00
BUQ	256	1.470	0.783	0.070	3.500

Source: Based on data from WDI, OECD and ICRG

Regarding other variables of the model, the agricultural and industrial sectors can be sources of tax revenue mobilization. Descriptive statistics indicate that the average value added of the agricultural sector (34.66% of GDP) is higher than that of industry (19.98% of GDP). This highlights the importance of both sectors in the economies of the Union. Moreover, we characterize graphically the nature of the relationship between aggregate aid, different types of aid and tax revenues. Thus, we have plotted the figure below (Figure 2). It appears that, whatever the type of aid, the relationship between the aid and tax revenues seems to be negative. However, this is a partial conclusion at this stage of the study.

Figure 2: TAXR and different types of ODA in WAEMU, 1985-2016

Source : Author (2019), Based on compiled data

3.4.Econometric procedure
3.4.1. Econometric pre-estimation tests
Among the pre-estimation tests carried out during this study, we can mention the multi-collinearity test, stationarity test and specification test (Hausman [1978] test). The results of the first test (Table 3) revealed the existence of a proven risk of multi-collinearity between the aggregated aid and its different components or types (disaggregated form). Then, we constructed the Variance Inflation Factors (VIF) statistic to test the multi-collinearity. Its value is on average 4.64, substantially equal to 5 (Table 4). Since the VIF statistics associated with some variables, specially, aid variables have exceeded 5 (individual VIFs). These variables cannot be maintained in the same model because the observed problem is likely to bias the results of the estimates. Regarding the unit root test, we applied Fisher's test. The choice of this test is justified by the fact that we are dealing with a unbalanced panel. This test is based on Dickey-Fuller Augmented test. The t-statistics of this test lead to reject the null hypothesis of unit root in the model. These results are robust to the inclusion of deterministic trends or/and constants. This leads us to reject the null hypothesis of non-stationarity of the series. All variables are stationary in level.

3.4.2. Estimation techniques and aid endogeneity issue
Before specifying the appropriate estimation method and the nature of the model, we applied the Hausman test (1978). The results of this test led us to specification a fixed effects model where the specific effect is assumed to be fixed in time. In these conditions, the Least Square Dummy Variables Estimator (LSDV) is proving to be effective. However, the central issue of research work dealing with international aid concerns the consideration of aid endogeneity issue. Indeed, it is clear that foreign aid cannot be considered as exogenous. A seminal paper published by Dudley and Montmarquette (1976) extended by Trumbull and Wall (1994) and later by Bandyopadhyay and Vermann (2013) in relation to foreign aid policies revealed that the motivations for aid flows to countries in development range from selfish interests to generosity. It is therefore necessary to deal with the aid endogeneity issue. To do this, we have

not only taken into account the quality of the institutions of the countries of the Union, but also, we have used the instruments proposed by Tavarez (2003) and revised by Brun et al. (2008), Chauvet et al. (2008), Drabo and Ebeke (2011) and Thornton (2014).

It is aid and global grants weighted by the inverse of the distance between the donor country and the beneficiary country, respectively. In addition to these instruments, we generated an interaction variable between official development assistance and the weight of trade, measured by the ratio of the sum of exports and imports to GDP. The idea underlying all these procedures is that the level of aid received by a given country from one of the major donors is highly dependent on geographical and cultural proximity, political alliances and bilateral trade between the donor country and the recipient country (Drabo and Ebeke 2011, Mallaye and Yogo 2015, Thornton 2014). In order to find an efficient and adapted estimator for our study, we retreated to the econometric literature that developed many efficient estimators using instrumental variable methods and generalized moments (Anderson and Hsiao, 1982, Blundell and Bond, 1998). These estimators have the advantage of offering an efficient estimation of dynamic models in the presence of endogenous variables. However, even if the Monte-Carlo simulations performed by Kiviet (1995) and Bruno (2005) show the superiority of the corrected LSDV estimator compared to the IV and GMM estimators whether in terms of bias or RMSE; all these potential estimators have, a priori, advantages and disadvantages given the size of our panel and the Hausman test results (1978).

Table 3: Correlation matrix

Variables	TAXR	ODA	ODA_BIL	ODA_MUL	ODA_CL	ODA_TA	ODA_GR	VA_AG	VA_IN	TOPEN	GDPC	HK	COR	PST	BUQ
TAXR	1.000														
ODA	0.026	1.000													
ODA_BIL	-0.323	0.932	1.000												
ODA_MUL	0.162	0.641	0.403	1.000											
ODA_CL	0.042	0.897	0.754	0.629	1.000										
ODA_TA	0.174	0.901	0.853	0.594	0.971	1.000									
ODA_GR	-0.442	0.809	0.685	0.752	0.894	0.867	1.000								
VA_AG	-0.223	0.335	0.320	0.162	0.239	0.239	0.239	1.000							
VA_IN	0.318	-0.377	-0.313	-0.259	-0.294	-0.294	-0.293	-0.595	1.000						
TOPEN	0.623	-0.272	-0.283	-0.159	-0.318	-0.313	-0.318	0.054	-0.006	1.000					
GDPC	0.276	-0.504	-0.506	-0.207	-0.408	-0.408	-0.408	-0.711	0.498	-0.026	1.000				
HK	0.410	-0.607	-0.601	-0.381	-0.539	-0.539	-0.539	-0.042	0.121	0.407	0.365	1.000			
COR	-0.215	0.015	0.063	-0.053	0.152	0.152	0.152	-0.426	0.167	-0.189	0.084	-0.362	1.000		
PST	0.235	-0.449	-0.427	-0.281	-0.453	-0.453	-0.453	-0.292	0.320	-0.038	0.331	0.413	-0.201	1.000	
BUQ	0.287	0.149	0.102	0.183	0.173	0.173	0.173	-0.072	0.284	0.285	0.048	0.221	0.203	0.216	1.000

Source: Output from Stata, based on the compiled data

Indeed, for a fixed effects panel like ours, the application of the GMM and LSDVC estimators would produce biased results. This econometric logic therefore leads us to retain the fixed effects estimator with instrumental variables to make our estimates.

Table 4: Multi-collinearity test results

Variables	VIF	1/VIF
ODA	12.16	0.037
ODA_BIL	10.7	0.064
ODA_MUL	8.14	0.456
ODA_CL	5.94	0.168
ODA_TA	5.72	0.255
ODA_GR	4.87	0.366
VA_AG	3.99	0.251
GDPC	3.2	0.312
HK	2.64	0.378
VA_IN	2.02	0.494
COR	1.9	0.526
PST	1.78	0.561
TOPEN	1.63	0.612
BUQ	1.43	0.698
Mean VIF	**4.64**	

Source: Output from Stata, based on the compiled data

4. Results and discussions
4.1. Base model results

The results of the base model estimates are presented in Table 5. They summarize the effect of bilateral and multilateral aid on fiscal resources mobilization. Indeed, it should be noted that the results of the reference regression are provided by the first column [1] of the table (baseline regressions results). They come from the first model that includes only nine control variables. The results show that agriculture has a negative relationship with tax revenues. This result, although surprising, could be explained by the fact that taxation of agricultural activities is difficult (Milovanovic and Smutka, 2019). Most agricultural practices in the WAEMU countries are carried out informally. While agriculture is one of the most important sectors of WAEMU economies, it should be noted that it is generally practiced for subsistence purposes. Thus, this implies a decrease in tax revenue due to the absence of appropriate tax registers, which would logically make collection of the tax extremely difficult.

Concerning the industrial sector, it affects tax revenues positively and significantly, despite the relatively weak industrial fabric of the Union countries. Indeed, the industry sector is one of the sectors of the economy where transactions take place in a relatively more formal environment, with good accounting. As a result, taxation of the industrial sector should be easy since most industrial enterprises operate in a formal setting (Macaluso et al., 2019). This justifies this positive relationship between industry and tax revenues.

Trade openness is measured in this study as the sum of exports and imports of goods and services relative to GDP. Since commercial transactions usually take place in a specific place, one can imagine that it is easier to collect the tax. By inference, it can be argued that countries that are more open to international trade strategically are in a better position to increase tax revenues.

Table 5: Effect of bilateral aid and multilateral aid on tax revenues

Variables	[1]	[2]	[3]
CONS	2.575	1.834	1.902
	(0.595)	(0.731)	(0.258)
ODA	0.011	-	-
	(0.868)	-	-
ODA_BIL	-	-0.371	-
	-	(0.193)	-
ODA_MUL	-	-	0.206**
	-	-	(0.038)
VA_AG	-0.042	-0.297	-0.405
	(0.561)	(0.714)	(0.182)
VA_IN	0.153**	0.316***	0.299***
	(0.043)	(0.001)	(0.002)
TOPEN	0.051***	0.549***	0.423***
	(0.001)	(0.000)	(0.001)
GDPC	0.018	0.027	0.051*
	(0.294)	(0.311)	(0.092)
HK	0.071**	0.184**	0.209**
	(0.041)	(0.028)	(0.031)
COR	-0.418**	-0.553***	-0.628***
	(0.021)	(0.002)	(0.004)
GST	0.854	0.703	0.483
	(0.982)	(0.292)	(0.165)
BUQ	0.099*	0.394	0.267
	(0.078)	(0.527)	(0.293)
Wald test	9.71	11.05	10.62
P_values	(0.000)	(0.000)	(0.000)
Nb of countries	08	08	08

Note: Values in parentheses are p-values; ***, **, * respectively represent significance at 1%, 5%, and 10%.
Source: Output from Stata, based on the compiled data

GDP per capita is used as an indicator of the country's level of development. Human capital, used as an indicator of fiscal responsibility affects positively tax revenues. As for corruption, it negatively influences fiscal resources mobilization. Indeed, the fraudulent practices of certain taxpayers and even agents of the tax administration generates a dispersion of tax revenues. Moreover, in view of the ranks of the countries of the Union in the ranking established by Transparency International for 2018, it is not surprising that the contagion effect that corruption has on fiscal administration (tax collector). Regarding the other institutional variables that are taken into account in our estimates (political stability and bureaucratic quality), they positively affect the mobilization of tax revenues. This means that political stability combined with improved bureaucratic quality improves the tax effort. Overall, most of our control variables are statistically significant.

At this step of the paper, we find that aggregated aid has an ambiguous effect on tax revenues. When one considers the aid in its bilateral and multilateral forms, it emerges a slightly contrasting result a priori. Bilateral aid affects negatively tax revenues, while multilateral aid influences tax revenues positively and significantly (columns [2] and [3]). The explanation for these results could be more on the side of the economic literature, rather than the econometric arsenal used. Some researchers argue that bilateral aid revolves around economic and politico-strategic interests. It is largely aimed at cementing political alliances rather than financing the development or implementation of economic policies, including tax policies (Stiglitz 2002, Stern 2002, Easterly et al. 2006, Bandyopadhyay and Vermann, 2013). In the case of

multilateral aid, it is likely to stimulate the mobilization of fiscal resources through technical assistance (Combes et al., 2016).

4.2.Types of aid and fiscal resources mobilization

As stated in the methodological approach, we have kept our reference equation that integrates aggregated aid. From this equation, we estimate three other equations in which we substitute aggregated aid by one of its three components or types: loans, technical assistance and grants, respectively. These last are this time our variables of interest (Table 6).

Indeed, we can always see that the aid taken in an aggregated form has an ambiguous mixed effect on of fiscal resources mobilization (column [1]). The increase in aggregated aid has been associated with a non-significant increase in tax revenue. Referring to the economic literature, we find that these results corroborate with previous studies one (Gupta et al., 2004; Benedek et al., 2012 and Combes et al., 2016). Among the related studies that found the same result, we can mention the recent studies of Yohou et al., 2016, that analyzed the conditional effect of aid to political stability on tax revenues in WAEMU.

Table 6: Effects of technical assistance, concessional loans and grants on tax revenues

Variables	[1]	[2]	[3]	[4]
CONS	2.575	2.733	2.338	2.017
	(0.595)	(0.559)	(0.415)	(0.623)
ODA	0.011	-	-	-
	(0.868)	-	-	-
ODA_CL	-	0.017**	-	-
	-	(0.039)	-	-
ODA_TA	-	-	0.021	-
	-	-	(0.409)	-
ODA_GR	-	-	-	-0.087
	-	-	-	(0.594)
VA_AG	-0.042	-0.038	-0.053	-0.023
	(0.561)	(0.569)	(0.098)	(0.461)
VA_IN	0.153**	0.159**	0.258***	0.156**
	(0.043)	(0.042)	(0.003)	(0.039)
TOPEN	0.051***	0.115***	0.247***	0.108***
	(0.001)	(0.000)	(0.000)	(0.002)
GDPC	0.018	0.015	0.089	0.024
	(0.294)	(0.299)	(0.311)	(0.261)
HK	0.071**	0.068**	0.097**	0.083**
	(0.041)	(0.039)	(0.028)	(0.035)
COR	-0.418**	-0.421***	-0.504**	-0.435**
	(0.021)	(0.005)	(0.017)	(0.042)
GST	0.854	0.5632	0.3457	0.725
	(0.982)	(0.651)	(0.715)	(0.249)
BUQ	0.099*	0.103	0.218	0.068*
	(0.078)	(0.965)	(0.541)	(0.057)
Wald test	9.71	8.94	9.16	10.49
P_values	(0.000)	(0.000)	(0.000)	(0.000)
Nbr of countries	08	08	08	08

Note: Values in parentheses are p-values; ***, **, * respectively represent significance at 1%, 5%, and 10%.
Source: Output from Stata, based on the compiled data

When foreign aid is broken down into concessional loans, technical assistance and grants, only concessional loans have a positive and significant impact on tax revenues (column [2] and [3]). Regarding grants, they have a negative effect on tax revenues. But their effect is statistically non-significant (column [4]). These results, combined with previous ones, suggest that donors indirectly fund the reduction of tax collection in recipient countries. Technical assistance positively influences tax revenues (Morrissey, 2015). The negative effect of grants can be explained by the argument that grants are collected by the governments of a recipient country as a source of free funding, with no consideration, and therefore no repayment obligation (Benedek et al., 2012; and Morrissey, 2009; Crivelli and Gupta, 2017). In addition, we found from our estimation results that concessional loans influence positively tax revenues in our estimates. Although surprising, this result could be explained by the fact that concessional loans are mandatory repayment. As a result, one can imagine that the concessional loans force the governments of the Union to maintain their tax revenues or, at best, to increase (Gupta et al., 2004).

For the other control variables, there are some changes in the value of the coefficients when moving from one equation to another. By contrast, most variables retained their sign and degree of significance when compared to the results in Table 5 above.

4.3. Robustness Checks

To ensure the robustness of the analysis, the following controls are performed: (1) usage of other institutional quality variables (Democratic Accountability, and Law and Order) of the International Country Risk Guide. These variables are used to construct an institutional quality index (IQI)[4] with variables (Politic Stability, Corruption and Bureaucracy Quality) contained in the basic equation ; (2) the taking into account of interactive variables between different types of aid and the institutional quality index that was build, while looking at the aid endogeneity issue; and (3) the introduction of a dummy variable that captures the effect of the devaluation of the CFA franc. This takes the value "1" from 1994 and "0" otherwise. The results are shown in Table 7 below.

Taking into account new indicators is justified by the fact that international aid and the fiscal resources mobilization cannot be treated differently (Asongou and Nwachukwu, 2016, Okada and Samreth, 2012, Tavares, 2003, Alesina and Weder, 2002). By focusing on our variables of interest, we realize that multilateral aid (column [3]), loans (column [4]) and technical assistance (column [5]) have kept up their positive effect on tax revenues. Grants (column [6]) have also maintained their incentive effects. It is the same for bilateral aid (column [3]). Nevertheless, we noted a slight change in the coefficients of some variables.

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[4] - The institutional quality index (IQI) constructed is the arithmetic mean of the five following variables values: Political Stability, Corruption, Bureaucracy Quality, Democratic Accountability, and Law and Order.

Table 7: Results of robustness checks

Variables	[1]		[2]		[3]		[4]		[5]		[6]	
CONS	2.392	(0.548)	3.108	(0.804)	2.915	(0.901)	2.491	(0.214)	3.051	(0.512)	3.54	(0.458)
ODA	0.105	(0.787)	-	-	-	-	-	-	-	-	-	-
ODA* IQI	0.241	(0.549)	-	-	-	-	-	-	-	-	-	-
ODA_BIL	-	-	-0.293	(0.214)	-	-	-	-	-	-	-	-
ODA_BIL* IQI	-	-	0.125	(0.097)	-	-	-	-	-	-	-	-
ODA_MUL	-	-	-	-	0.303**	(0.029)	-	-	-	-	-	-
ODA_MUL* IQI	-	-	-	-	0.891**	(0.017)	-	-	-	-	-	-
ODA_CL	-	-	-	-	-		0.029**	(0.041)	-	-	-	-
ODA_CL* IQI	-	-	-	-	-	-	0.433**	(0.028)	-	-	-	-
ODA_TA	-	-	-	-	-	-	-	-	0.109	(0.478)	-	-
ODA_TA* IQI	-	-	-	-	-	-	-	-	0.417*	(0.051)	-	-
ODA_GR	-	-	-	-	-	-	-	-	-	-	-0.193	(0.294)
ODA_GR* IQI	-	-	-	-	-	-	-	-	-	-	0.425	(0.841)
VA_AG	-0.223	(0.258)	-0.335	(0.964)	-0.378	(0.845)	-0.162	(0.457)	-0.239	(0.772)	-0.379	(0.604)
VA_IN	0.318**	(0.041)	0.347**	(0.024)	0.113***	(0.000)	0.199**	(0.034)	0.204**	(0.019)	0.339	(0.047)
TOPEN	0.623***	(0000)	0.872**	(0.014)	0.528***	(0.000)	0.259***	(0.000)	0.618**	(0.032)	0.713**	(0.021)
GDPC	0.276	(0.742)	0.191	(0.845)	0.046*	(0.057)	0.207	(0.099)	0.408	(0.521)	0.678	(0.194)
HK	0.411**	(0.024)	0.607**	(0.017)	0.461***	(0.009)	0.381***	(0.007)	0.853**	(0.037)	0.439	(0.042)
DUM	0.954	(0.544)	0.451	(0.632)	0.895	(0.734)	0.632	(0.432)	0.337	(0.904)	0.667	(0.331)
IQI	0.214**	(0.048)	0.157*	(0.086)	0.163**	(0.039)	0.853**	(0.037)	0.152**	(0.041)	0.521*	(0.069)
Wald test	7.854		8.074		9.201		8.941		7.994		9.158	
P_values	(0.000)		(0.001)		(0.000)		(0.003)		(0.001)		(0.000)	

Note: Values in parentheses are p-values; ***, **, * respectively represent significance at 1%, 5%, and 10%.
Source: Output from Stata, based on the compiled data

Regarding the interaction variables that are introduced into the model, we realize that the values and the *significativity* of their coefficients seem to meet our expectations. In particular, the *significativity* of the interaction variables between aggregated aid and the institutional quality index on the one hand, and between donations and this index, on the other hand, increased. However, they still remain no-significant. The general surprise lies in the effect of the interactive variable between bilateral aid and the institutional quality index. Its coefficient is positive but non-significant. These results highlight the ability of WAEMU countries to mobilize fiscal resources in a context of good governance (Asongou and Nwachukwu, 2016, Alesina and Weder, 2002, Acemoglu and Weder, 2002, Burnside and Dollar, 2000). In addition, the devaluation seems to have no significant effect on tax revenues (Collange and Plane, 1994).

5. Conclusion

This paper analyzed the effect of different types of foreign aid on tax revenues in WAEMU countries over the period spanning from 1985-2016. Our results show that multilateral aid influences positively and significantly tax revenues of these countries, whereas bilateral aid is not. They also indicate that concessional loans and technical assistance have a positive effect on tax revenues in these countries while grants disincentives tax collection effort.

From the results of our analysis, it follows that at least three economic policy implications can be formulated:

- The need for WAEMU countries to strengthen the multilateral partnership to improve, through foreign aid, the consolidation of national tax collection capacities according to the 17th Sustainable Development Goal (SDG). Particularly in beneficiary countries, an improvement in the quality of institutions would be necessary.
- There is a need to reorient official development assistance towards investments for efficient tax systems in recipient countries in line with the 2015 Addis Ababa Action Program on Financing for Development. To achieve this, donors, in particular, will be able to condition certain disbursements of aid by the efforts made by the countries of the Union in terms of domestic resources mobilization. On the side of the WAEMU countries, they will have to face the challenge of the taxation of the informal sector which constitutes a bonanza, considering the importance or weight of this sector.
- To remedy the disincentive effect created by grants, we argue that It will be relevant to orientate one part of this component of aid to non-governmental organizations (NGOs) that target social projects or qualitative works, or to support private sector.

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Appendices

Appendix 1 : Bilateral Aid vs Multilateral Aid
in WAEMU countries, 1985-2016 (in % of GDP)

Source : Author (2019), Complation basing on OECD database

Appendix 2 : Loans, Technical Assistance and Grants
In WAEMU countries, 1985-2016 (in % of GDP)

Source : Author (2019), Complation basing on OECD database