# LONG RUN EFFECTS OF FOREIGN DIRECT INVESTMENT ON TAX REVENUE IN DEVELOPING COUNTRIES

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**Abstract**:

FDI inflows could stimulate tax revenue collection through the broadening of the corporate income tax base with the entry of new firms or an increase of new investments from foreign investors. However, the fact that many developing countries often grant too many tax incentives for attracting foreign investors, FDI inflows may not translate into a significant increase into the host country's tax revenue mobilization. – Using the Pooled Mean Group (PMG) estimator, this paper estimates the impact of Foreign Direct Investment (FDI) on tax revenue mobilization for 92 developing countries over the period 1990-2015. The estimation results show that in long term, FDI inflows have a positive impact on tax revenue in developing countries except for resource exporting countries for which we observe that the effect of FDI inflows on tax revenue is negative. However, in the short term, the impact of FDI inflows on tax revenue is positive but not statistically significant at the conventional significance level. These results remain qualitatively unchanged when regressions are carried out on sub-samples of developing countries belonging to the same group depending on their incomes level.

**Keywords:** Foreign direct investment, tax revenue, Pooled Mean Group, resource exporting countries.

JEL Codes: F21 - H20 – E62

## I-Introduction

Developing countries are concerning about enhance domestic tax mobilization to finance sustainable development. Given the low level of savings in many developing countries, all necessary public investment cannot be carried out. And then generates a huge imbalance between savings and investment (Jeza, Hassen, and Ramakrishna 2016). In addition, most developing countries observed severe debt burden which increased during the 80s. This has affected public spending. Therefore, domestic resource revenue mobilization became imperious for developing countries. In this regard, it is of crucial importance for policymakers in developing countries to identify specific opportunities and conditions to stimulate tax revenue collection. FDI net inflows represent a real opportunity for the government to increase its tax revenue collection through taxation of foreign corporate and indirect taxation (Nguyen, Nguyen, and Goenka 2014; Kimm Gnangnon 2017).

FDI, generally considered as having a positive impact on economic growth and income level (Mahmood and Chaudhary 2013), can represent an important financing source for capital investment. In addition, to enhance domestic capital stock, FDI leads to employment opportunity, new technology, efficient management practices. It also reduces the vulnerability of capital flows and increases the development of local firms through backward and forward linkages (De Mello Jr 1997; Lipsey 2004; Alguacil, Cuadros, and Orts 2011). FDI also improves productivity growth (UNCTAD 2005). According to Markusen and Venables (1999), the important complementarities between Foreign industries and local industries may stimulate the development of the host country. In addition, to increase available capital, it serves as a conduit for skills, innovation capabilities and organizational and management practices, and offers facilities access to international marketing networks. In the same line of cost-benefit analysis of FDI, several studies(Bond and Samuelson 1986; Bal and Fazl 2016) concluded that countries that have appropriate policies and high level of human capital, technological and infrastructure development can effectively exploit the opportunities from FDI and avoid the threats, thereby produce a better economic environment. So many developing countries are being tried to attract FDI inflows through fiscal policies to fill the gap between domestic savings and investment to accelerate economic growth. However, the effect of FDI inflows on taxes can be negative in case tax reductions, legal privileges in the transfer of income and fiscal

incentives such as free land allocation and support for the labour costs are provided to attract FDI[1]. In this sense, the net impact of FDI inflows on the total taxes has remained ambiguous.

The paper's contribution is twofold: firstly, it expands the literature on both the effect of FDI inflows and the drivers of tax revenues in developing countries. Some studies (Becker, Fuest, and Riedel 2012; Rochananonda 2006; Bénassy-Quéré, Fontagné, and Lahrèche-Révil 2005) have examined the correlation between tax revenues and FDI, but they have focused only on the impact of tax and fiscal policies on attracting FDI, without exploring the opposite direction. Most studies on the determining factors of tax revenues have not considered the impacts of FDI. Secondly, it contributes to the literature on the topic by estimating the impact of FDI on tax revenue mobilization for developing countries in general, and for resource exporting economies more particularly. To our knowledge, this is the first study that analyses the effect of FDI on tax mobilization for resource exporting economies from developing countries.

The remainder of the paper is structured as follow. Section 2 presents theoretical and empirical literature on the relationship between FDI and tax revenue mobilization. Section 3 describes the data used and provides some stylized facts for this study. Section 4 presents the empirical methodology used to estimate the impact of FDI inflows on tax revenue. Section 5 discusses the empirical results and runs some robustness checks while section 6 concludes the study.

## II-Theoretical and empirical literature on the impact of FDI on tax revenue

In this subsection, we review the theoretical studies on the relationship between FDI inflows and tax revenue collection. the theoretical framework section analyses the transmission mechanisms through which the variations in FDI nets inflows may affect tax revenue. The empirical reviews section reviews the literature on the effect of FDI nets inflows on tax revenue.

### II.1-Theoretical Reviews

The literature on FDI partly indicates that FDI can have a positive impact on tax revenues. However, for other studies, the positive impacts of FDI on tax revenues do not always materialize automatically. FDI can have a negative effect on tax revenues in several ways. The

[1] Two-third of sub-Saharan African countries (SSA) offer currently tax holidays, to attract Foreign Investments, generators of internationally trade tax base. Free business zones have been creating, that in Nigeria since 1991, Gambia and Mauritania in 2002, Ivory Coast in 2004 and Benin in 2005 (Bost,2011)

orientation of FDI effects is partly influenced by the political and economic structure that prevails in the host country.

II.11- Positive effect of FDI on tax revenue

The positive effects of FDI on tax revenues can be manifested in several ways. Bond and Samuelson (1986) calibrates a theoretical model at two periods on the relationship between FDI and Tax revenue. They found that in government tax revenue of host countries could decrease in the short run because of tax holidays, to attract FDI in the early period. However, host countries could improve tax revenue in the long run because the foreign investment would not pull out after the tax holiday period. FDI could also influence tax revenue through the welfare effect.

A theoretical model has been developed by Nguyen and al (2014). This model analyses the impact of FDI on corporate tax rate determination. They revealed that the impact of FDI on tax revenue depends on the competition effect, demand creation effects, technology transfer cost, and the technological spillovers. According to Nguyen and al (2014), the sign of technological spillovers depends on the absorptive capacity of the domestic firm while competition effect decreases the level of the corporate through reducing the production of local firms.

FDI can have a positive effect on tax revenues through some of the channels indicated by UNCTAD (2012). The VAT is more important when foreign direct investment provides financial resources for the establishment of activities in the formal sector and support for the promotion and industrial dynamization, or for higher agricultural productivity. FDI can increase income and labour taxes through job creation. By improving exports and facilitating access to markets or supplies, FDI will increase international tax resources for trade. Knowledge transfer and technology dissemination are ways in which FDI can finance the exploitation of natural resources and thus generate revenue. Capital gains and profits generated by FDI contribute to corporate tax revenues in the said host country.

According to Danielova and Sarkar (2011), the public authorities will have both direct and indirect benefits and costs (employment, indirect taxes, pollution, and technology transfer) from any (foreign) investment project. In this case, the direct net profit to the government represents the value of the corporate tax received on the project, less the subsidies the recipient receives to invest. In addition, the taxable earnings generated by Foreign Capital Companies are an important source of revenue for the host country. Fuest and Riedel (2009) point out that most of the poor population in developing countries are not subject to taxation. Because they are

unemployed and do not receive any taxable income or wages. Therefore, FDI, by supporting investment and employment opportunities, can contribute to revenue mobilization by broadening the taxpayer base and generating more tax revenue on income. FDI flows have reduced the unemployment rate and have significantly contributed to the government's tax revenues in China (Zhang 2001).

Other studies show a positive causal relationship between FDI and international trade (Anwar and Nguyen 2011). It is argued that FDI can increase export capacity and facilitate access to markets or supplies. As a result, FDI will result in higher revenues from the international trade tax. FDI is more frequent in the natural resources sector and is likely to provide more royalties to host countries. For Gajigo et al. (2012) most mines in Africa are owned by foreign multinationals and the main means by which African countries could make mining revenue profitable is through public tax revenues. The royalty is then one of the largest shares of mining tax revenues in African countries.

II.12- Negative effect of FDI on tax revenue

Many studies explain how FDI can shrink the tax base through several mechanisms and factors. Revenue mobilization could be affected by the "negative consequences" of tax incentives, tax evasion and tax fraud and avoidance by multinational companies, overly competitive conditions that can crowd out domestic and local companies, and the pursuit by tax authorities and multinational companies of income from rent-seeking activities.

UNCTAD (2012) shows that foreign direct investment can generate financial resource outflows in the way of repatriation of income or costs. According to Gropp and Kostial (2001), multinational groups have the possibility to transfer taxable income to countries with a less restrictive tax system, through "transfer pricing" and other tax mechanisms such as debt financing. Gropp and Kostial (2001) take the following example: a multinational in a high-tax country that produces a good with the inputs of a branch in a low-tax country. For B2B trade, the multinational has an incentive to overestimate the price of inputs, as this increases profits in the low-tax country and reduces profits in the high-tax country, thereby minimizing global tax obligations. Fuest and Riedel (2009) explain that profit displacement by multinationals acts by distorting trade prices. For these authors, the prices of goods exported to developing countries are distorted upward while the prices of goods imported from developing countries are set at artificially low levels so that the income generated in developing countries is transferred to developed economies.

Zee et al. (2002) point out that the widespread use of tax incentives to attract foreign direct investment has several negative consequences (in terms of lost revenue). For Zee et al (2002) and Fuest and Riedel (2009), FDI can produce tax revenue losses through the existence of tax

incentives such as Free Economic Zones, where goods are generally exempt from duties and taxes, corporate taxes are low or zero. Zee et al. (2002) explain it: First, these incentives reduce the tax base. Second, tax incentives distort the allocation of resources for activities that take advantage of tax benefits are favoured at the expense of others. Finally, tax exemptions create opportunities for corruption and rent-seeking. Therefore, the lack of visibility in the treatment of exemptions may have an impact on revenue. On this line, the International Monetary Fund Staff (2011) shows that the revenue effects of FDI can be significantly reduced when FDI is accompanied by large tax cuts.

For UNCTAD (2012), FDI can, in some situations, crowd out domestic corporations, particularly small and medium-sized enterprises. In the same vein, FDI can reduce the proportion of taxpayers and limit the taxation of these national units.

The orientation of FDI impacts is partly guided by the policy framework as well as the political and economic governance structure in place in the host country (Zee et al., 2002).

Ehrhart (2011) illustrated that in resource-rich countries, democratic institutions are very important because of their higher levels of transparency, which can lead to the positive effects of the initial natural resource rent on domestic tax revenues. Given that most FDI is directed to natural resource exploitation activities in developing countries, it can be inferred that higher levels of transparency can have a positive impact on the income that foreign direct investment can generate. A good institutional environment will not only attract more foreign investors but also ensure their effective participation in tax revenues.

For Zee et al. (2002), the provision of tax incentives to attract FDI creates corruption and business opportunities that generate socially unsuccessful profits and have a large impact on income. The pursuit of rents is likely to be linked to natural resource exploitation activities (Bornhorst et al. (2009). Most foreign companies are involved in this sector, particularly in African countries. Corrupt practices between tax officials and foreign companies in this sector can lead to lower tax revenues. In view of this analysis, it is difficult to determine the net impacts of FDI on tax revenues a priori.

### II.2-Empirical Literature

The economic literature has much focused on the effect of taxation on FDI attraction and revealed that taxations are a crucial determinant of FDI inflows and there was a negative relationship between tax rates and FDI inflows (Devereux and Freeman 1995; Bénassy-Quéré, Fontagné, and Lahrèche-Révil 2005; Loretz 2008; Tabasam 2014). But there are the few studies

which analysed the effect of FDI on tax revenue. And the rare studies on these issues found an ambiguous result (Mahmood and Chaudhary 2013; Gropp and Kostial 2000; Tabasam 2014; Kimm Gnangnon 2017).

The earlier literature typically found a positive relation between FDI and government revenue. Dunning (1993) and Raff and Srinivasan (1998) focus their investigation of FDI effect through the determinants of tax revenues. Dunning (1993) argued that welfare effects of FDI in host county depend on the bargaining power of host country with foreign investors, including either by offering the tax rebates on energy or labour costs to attract foreign investment or by imposing the tax. Whereas Raff and Srinivasan (1998) have claimed that by way of FDI could create employment, local labour's training transferred technology and better management skills, the government should lose some tax revenue to attract foreign investment inflow.
In one of the early empirical studies, Gropp and Kostial (2000) analysed the correlation between FDI, Taxation, and revenues of corporate tax in 19 OECD countries over the period 1987-1997, using panel data analysis and found that FDI inflows affected the corporate tax revenues positively. In addition, Mahmood and Chaudhary (2013) analysed the effect of FDI on the total tax revenue in Pakistan during 1972-2010 and revealed that FDI inflows affected the total tax revenues positively. However, the results may not be generalised to other countries in the MENA's regions.

Okey (2013) also examined the effect of FDI inflows on the tax revenue is 8 West African countries over the period 1989-2009 employing panel regression and found that FDI inflows affected the tax revenues positively. But the findings may not be generalised to other countries of the South Saharan Africa because the investigation is limited to only French-speaking members of ECOWAS (Economic Community West African States) and these countries are political and economic characteristic different with English speaking countries in the West African Region.

In another study, Bunescu and Comaniciu (2014) studied the economic and noneconomic factors which affect tax revenues in 27 EU countries over the period 1995-2011. Using correlation analysis, they revealed that FDI inflows had a weak positive effect on the tax revenues. On the other side, Tabasam (2014) investigated the interaction among tax revenues and the foreign capital inflows (FCI) in Pakistan during 1975-2012. Using time series analysis, he concluded that FDI inflows had a negative impact on tax revenues. In addition, Aslam (2015) examined the long run relationship between FDI inflows and tax revenues in Sri Lanka over the

period 1990-2013 and discovered that FDI inflows significantly positively contributed to the tax revenues.

Bal and Fazl (2016) also investigated the impact of FDI inflows on the tax payments of the firms with different technology levels in Turkey during the 2004-2012 period and found that FDI inflows increased the tax payments by the firms and the effect was found to be highest in the firms with high technology level.

Kimm Gnangnon (2017) analysed the effect of FDI on government revenue. Using panel data over the period 1980-2013, he found that the effect of FDI on government revenue depends on the level on FDI inflows. However, the transformation of FDI in logarithm by Kimm Gnangnon (2017) can suffer from the error of measure, given that FDI contains negative values.

Finally, Bayar and Ozturk (2018) investigated the impact of foreign direct investment inflows on tax revenues in OECD countries with a panel cointegration and causality analysis during the 1995-2014 period and found that there was one-way causality from foreign direct investment inflows to total revenues.

## III-Data and Stylized Facts

In this subsection, we describe data used and provide some stylized facts about tax revenue collection and FDI inflows

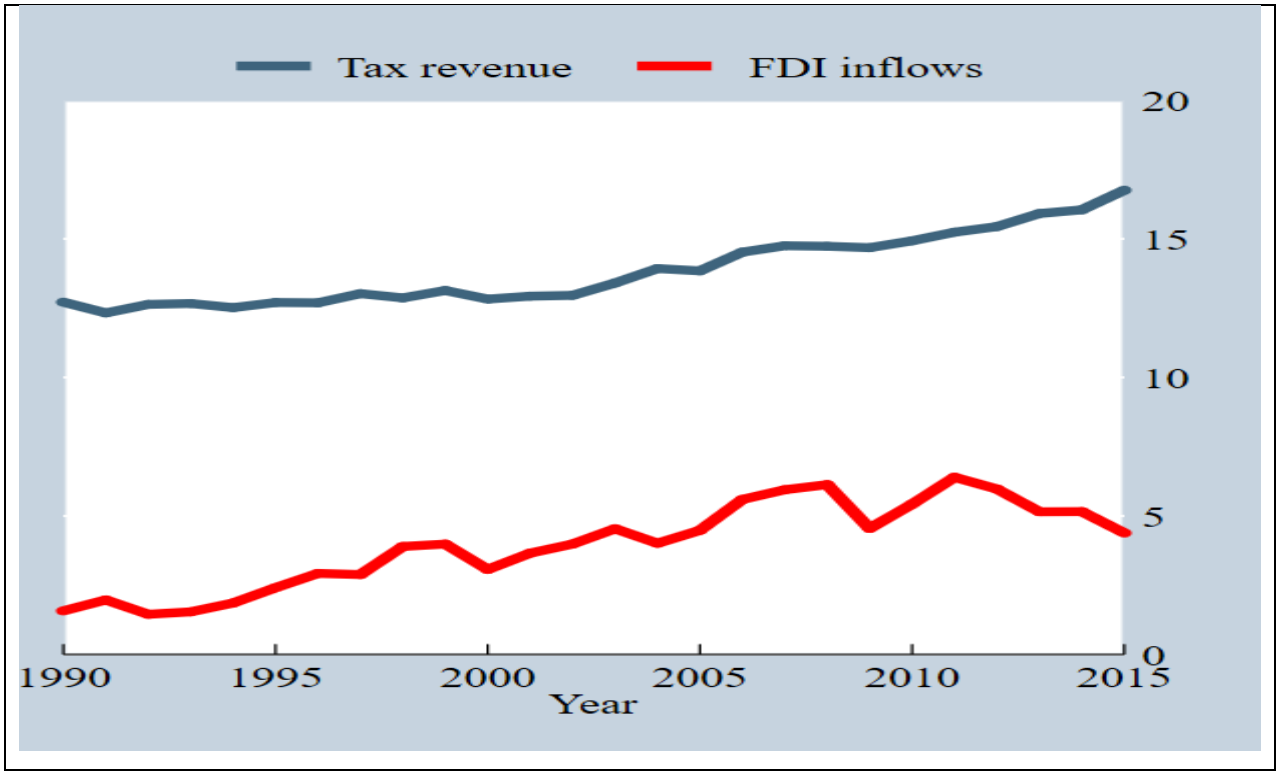
### III.1 Data

The dataset comprises yearly observations of 92 developing countries during the period from 1990 to 2015. For each variable, approximately 2418 observations will be used. Data on FDI net inflows, agriculture added value, and industrial added value as GDP were extracted from the United Nations Conference for Trade and Development (UNCTAD)database. The data on export and imports as GDP and Gross domestic product per capital were obtained from the World Development Indicators database (WDI) of the World Bank. The data on total tax revenue was extracted from United Nations University-WIDER (ICTD/UNU-WIDER GRD,2018).

*The relation between FDI inflows and government Tax revenue*

We obtain a first overview of the relationship between tax revenue and FDI net inflows through graphical analysis. Graph 1 illustrates the relationship between FDI net inflows and tax revenue in a sample of developing countries over the period 1990-2015.

**Graph 1: Relationship between FDI inflows and tax revenue**



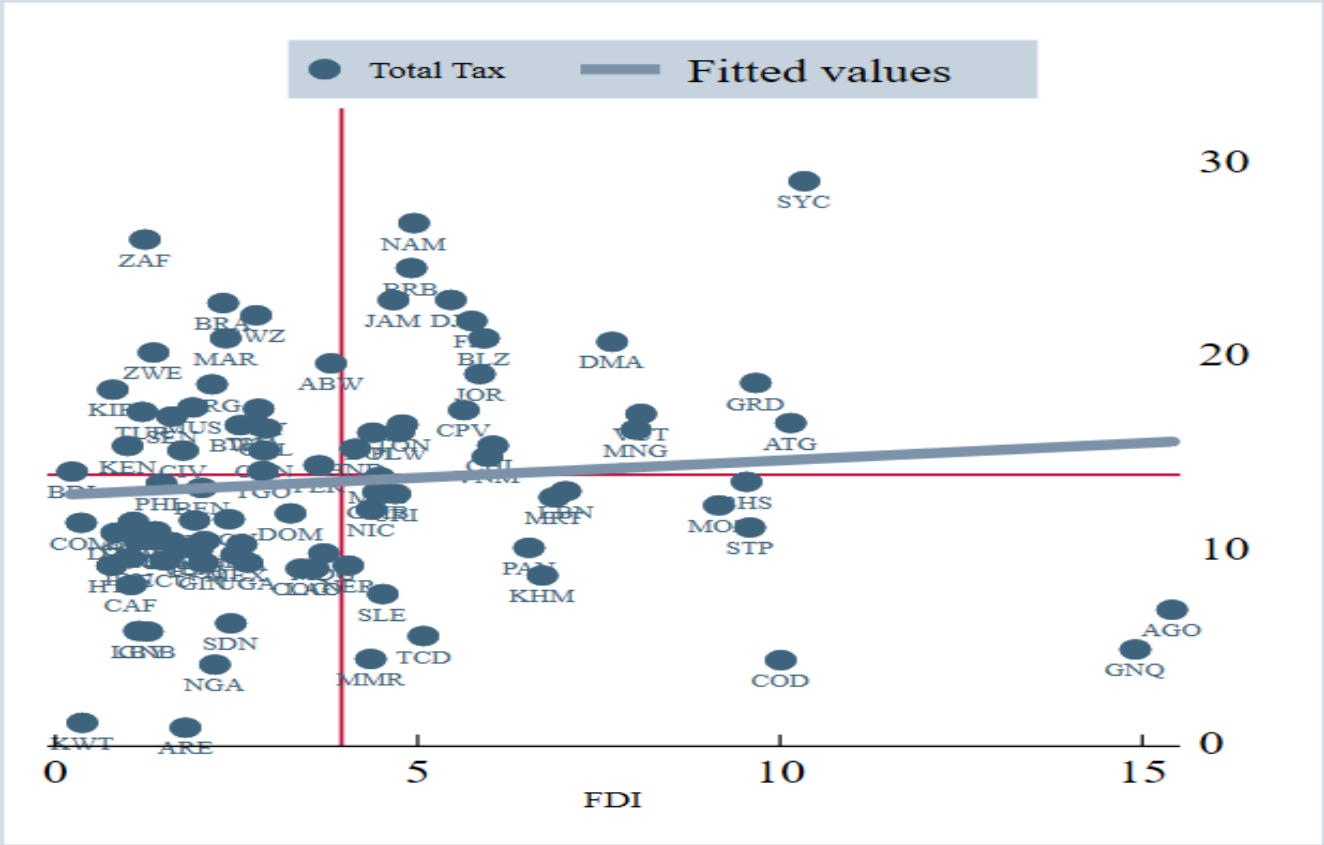

**Source: Author's calculation from UNCTAD database and United Nations University-WIDER (ICTD/UNU-WIDER GRD,2018).**

Graph1 shows that while FDI net inflows and tax revenue followed an upward trend from 1990 to 2011, the FDI net inflows and tax revenue have evolved differently over the period 2011-2015. FDI net inflows increase from 2% GDP to 7% GDP in 2011. Free business zone creation in most of developing countries combined with new countries rich in natural resources over this period could a factor that has contributed to augment the FDI net inflows in these countries. However, from 2011-2015, FDI net inflows decrease while tax revenue has kept growing over the sub-period.

We analyse the correlation between FDI and tax revenue. Graph2 displays the share of FDI as a percentage of GDP relative to the tax revenue during 1980-2015. Abstracting from Equatorial Guinea and Angola, which represent the outliers because of very large FDI as GDP from oil and mining producers. Seychelles have an economy that share of FDI relative to tax revenue is very important. While, at the opposite beginning of the continuum, one can observe several South Saharan African Countries, e.g. Nigeria, Sudan that the part of FDI relative to tax revenue is lowest. One of the reasons could be that countries with a large share of tourism attract more investment through arbitrage between direct and indirect taxes. This cannot be directly

interpreted as a suggestion or a statement of tax competition, but at least points in the direction of countries differences goals to attract FDI in order to finance their development.

**Graph 2: Correlation between FDI and tax revenue**

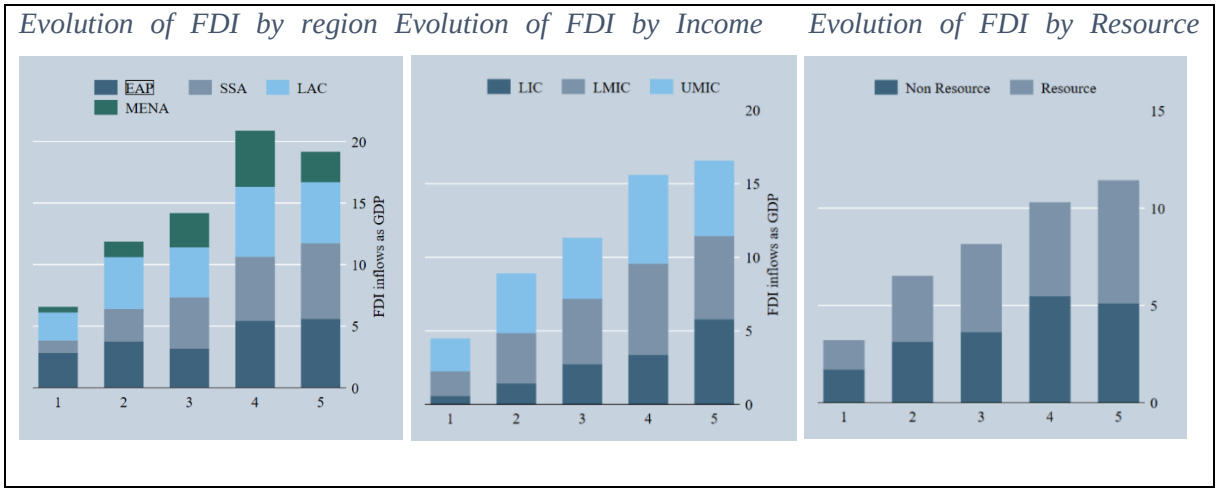



## III.2 Stylised Facts

### *Evolution of FDI inflows*

I observe the evolution of FDI about 93 developing countries observed in the period 1990-2015. The investigation shows the average increase in FDI. This growth in FDI is more important in Sub-Saharan African countries (SSA) than the rest of the region calibrated with the sample. Indeed, the average rate of FDI varied from less than 2% to more than 5% of the average GDP the countries in the sample (graph 3). Regarding the income level, the average rate of low-income countries increased from less than 1% to more than 5% of the average GDP of the sample (graph 3).

**Graph 3: Evolution of FDI inflows**



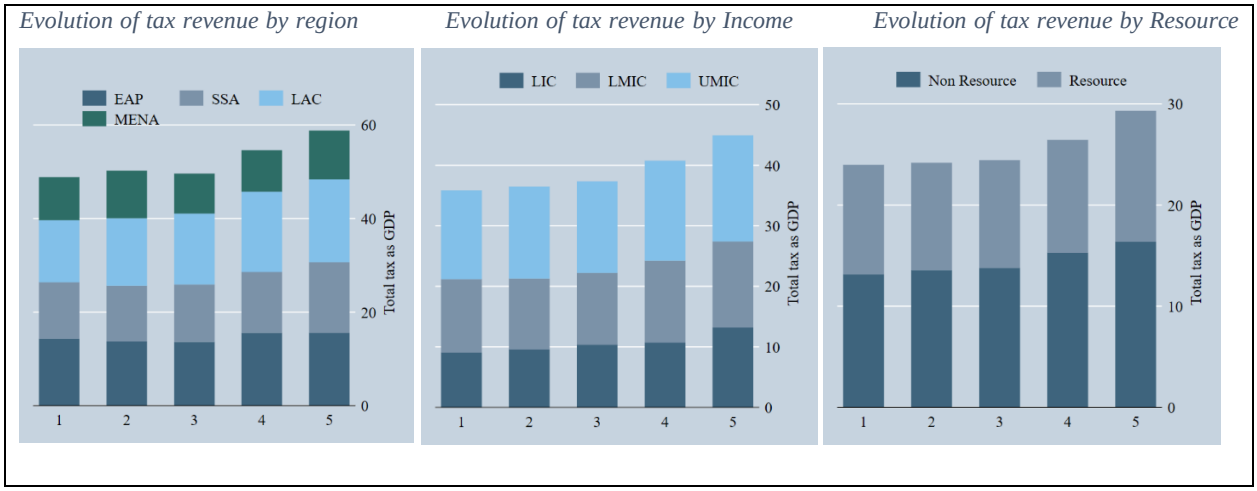

*Note: X-axis represents the average year of 5 years by a bar*

In addition, the average rate of FDI of the Lower Middle-income countries rises from less than 2% to just over 5% average rate of the sample. The evolution of GDP inflows at the level of oil exporting countries is also displayed in graph 2. During the period 1990-2015 of the average rate of FDI in oil exporting countries considerably increase.

**E*volution of government tax revenue***

The graph4 displays the evolution of government tax revenue at the region level. The contrary of GDP inflows, the average level of government tax was weakly growing during the period 1990-2015. On the period 1990-2004, the Total Tax relative to GDP has been relatively stable on average. The same is true for income level, region and exported natural resources. In addition, during the period of the sample, the tax revenues average as GDP in SSA were not driven by the growth of FDI.

**Graph 4: Evolution of government tax revenue**




*Note: X-axis represents the average year of 5 years by a bar*

## IV- Specification of the model and Econometric Methods

This section describes the specification of the empirical model for estimating the impact of FDI on tax revenues and the estimation method used to estimate this empirical model.

### IV.1 Specification of the model

We follow the model specification from the empirical literature on tax revenue mobilization (J.-F. Brun, Chambas, and Guerineau 2011; Pivovarsky et al. 2003; Benedek et al. 2014). More precisely, the empirical model used to estimate the effect of FDI inflows on tax revenue is specified as follows:

$$Tax_{it} = \alpha + \beta FDI_{it} + \lambda X_{it} + temporal\ effects\ (time\ dummies) + \mu_i + \varepsilon_{it} \qquad (1)$$

Where $X_{it}$ represents the controls variables, the share of the added value of agriculture, the share of added value extractive activity, international trade and GDP per capita. $Tax_{it}$ represents total revenue of country i in time t. $FDI_{it}$ represents Foreign Direct Investment net inflows for the host country i at the period t.

Temporal effects (time dummies) are included to control for the common shocks that are affecting developing countries, $\mu_i$ represents country specific effect and $\varepsilon_{it}$ is the error term.

**Dependent variable: Tax revenue (TAX)**

Tax revenue includes national government revenue collected from tax sources aggregated at the central and local level, receipts from taxes and social contributions taxes. It is expressed in percentage of GDP.

**The main explanatory variable: Foreign direct investment net inflows (FDI)**

FDI refers to the net inflows of investment by the acquisition of 10% of the capital of a firm operating in a country other than of the investors. It comprises the sum of equity, reinvested earnings, other long-or short-term capital as they appear in the balance of payments. The expected effect is positive[2].

**Control variables**

The control variables include the share of the added value of agriculture, the share of added value extractive activity, international trade and GDP per capita.

**GDP per capita (GDPC)**

"GDPC" represents the gross domestic product per capita. It is considered as a proxy for the country's overall level of development. It is expected to be positively related to government revenue variables, as it would reflect the fact that the demand for public services would increase with per capita income as well as with stronger economic and institutional environment (Crivelli and Gupta 2014). In this model, GDP per capita is in logarithm

**Trade Openness (OPEN)**

"OPEN" measures the degree of openness to international trade for the country. It represents the sum of exports and imports, divided by the GDP. The impact of trade openness on government revenue be subject to several factors (Stotsky, Ebrill, and Gropp 1999; Agbeyegbe, Stotsky, and WoldeMariam 2006). These factors could take in the degree of replacement of quantitative restrictions with tariffs, in what way tariff reduction affects imports, the price elasticity of demand for imports, the price elasticity of supply of import substitutes and, by what means exports respond to trade liberalization measures. The empirical literature has indeed found a mixed (either positive or negative) effect of trade openness on government revenue. In this study, the expected effect of trade openness on my revenue variables remains a priori unknown.

**Agriculture value added (AGRI)**

"AGRI" is the share of the value added in the agricultural sector to the GDP. Indeed, the literature on the determinants of government revenue has emphasized the rank of the sectoral

[2] UNCTADstat - Documentation, available at https://unctadstat.unctad.org/wds/TableViewer/summary.aspx?ReportId=96740

composition of domestic output for government revenue mobilization. It is certainly likely by considering the difficulties of tax agriculture, an increase of the share of value added in agriculture in the gross domestic product would train a decrease of tax mobilization.

**extractive activity added value (RESOURCE)**

"RESSOURCES" represents the share of the added value of extractive resources in GDP. A huge industrial sector is easier to monitor and tax. Pivovarsky et al. (2003) and Morrissey, Islei, and M'Amanja (2006) have found in their respective studies the coefficient on added value industry is positive and significant. However, given the extent of natural resource and the fiscal incentives of the developing countries, the impact of natural resources on tax revenue could be negative.

## IV.2 Econometric Method

### Pool Mean Group (PMG) estimators

The dynamic panel specification with fixed effects(ardl) takes the form

$$y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta'_{ij} x_{i,t-j} + \mu_i + \tau_t + \varepsilon_{it} \qquad (2)$$

Where $i$ = 1,…, N individuals, $t$ =1,…, T times periods. $x_{it}$ represent $(k \times 1)$ vectors of explanatory variables for individual $i$, $\mu_i$ state-specific effect and $\tau_t$ a time effect. $\delta'_{ij}$ represent $(k \times 1)$ coefficient vectors, $\lambda_{ij}$ scalars and $\varepsilon_{it}$ random effect for the individual $i$ at period $t$.

I derive an error correction model from equation (2): .

$$\Delta y_{it} = \varphi_{it}(y_{it-1} + X_{it-1}\theta) + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta y_{it-j} + \sum_{j=0}^{q-1} \Delta X_{it-j}\, \delta^*_{ij} + \mu_i l + \varepsilon_i \qquad (3)$$

Where $\Delta$ is a difference operator, $\varphi_i = -(1 - \sum_{j=1}^{p} \lambda_{ij})$ is the speed adjustment, $\theta$ is the vector of long-run coefficient, assumed constant across groups, $\lambda^*_{ij} = -\sum_{m=j+1}^{p} \lambda_{im}$ with $j = 1, \dots, p-1$, $\delta^*_{ij} == -\sum_{m=j+1}^{p} \delta_{im}$, $j = 1, \dots, q-1$ ,and $l = (1, \dots, 1)'$ a $(T \times 1$ vectors of ones (Freeman 2000).

The Pool Mean Group (PMG) estimator, suggested by Pesaran, Shin, and Smith (1999), is an intermediate approach between Mean Group (MG) estimator in which the slope of separate

regressions for each unit must be fully heterogeneous and Dynamic fixed effect (DFE) estimator where the slope must be fully homogeneous.

Unit root and cointegration properties of data are the primary conditions for using an error correction model.

**Cross-sectional Dependence Analysis**

For many macroeconomic studies using national or regional data, studies have shown that time series are correlated simultaneously. We, therefore, check the cross-sectional dependencies using the Pesaran (2004) test or the Lagrange multiplier test (LM) developed by Breusch and Pagan (1980). Pesaran's (2004) test, unlike Breusch-Pagan's LM test, is appropriate when the individual dimension is larger than the temporal dimension of the panel, as is the case in our full sample. We will therefore use either the Pesaran test. The test results do not reject the null hypothesis of cross-sectional independence for the entire sample. This situation will be considered in the other analyses below.

**Unit Root Test**

The main assumptions of first-generation panel unit root tests Maddala and Wu (1999), Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin( 2003) suppose interdependence among the individuals in the panel, which is evidently not always the case. These root tests of first generation panel units could therefore lead to false regressions if there are degrees at significant of cross-sectional dependencies in errors (Banerjee et al., 2005). To capture this potential cross-sectional dependence structure, second generation unit root tests were developed and proposed by Bai and Ng (2004), Choi (2002), Moon and Perron (2004), Smith et al (2004) and Pesaran (2004, 2007). These tests differ according to how they eliminate structural dependency factors and how they share.

**Cointegration test**

The cointegration test can be applied to find the long run relationship between variables. It can have the disequilibrium in the short term among variables, but it will move in the long-term balance. That can be indicated by the cointegration test.

For our study, we used three tests which are Pedroni test, Kao test, and Westerlund test.

Pedroni (1995, 1997) proposed several tests to understand the null hypothesis of no cointegration within both homogeneous and heterogeneous panels. The critical value contained

in his results accounted for the case of only one regressor in the cointegration relationship, hence Pedroni (1999; 2004) offer an extension of cases where cointegration relation is compositing of more than two variables. Like unit roots test of Im, Pesaran, and Shin (2003), Pedroni's tests include the heterogeneity via the parameters. This parameter may differ between themselves. And Then under the alternative hypothesis, there is a cointegration relation for each individual and the parameter for this relation is not necessary to be the same for everyone. The implementation of this test first requires estimating the long-run relation:

$$Y_{it} = \alpha_i + \rho_i t + \sum_{m=1}^{M} \beta_{mi} X_{m,it} + \varepsilon_{it} \qquad (7)$$

Where i = 1, …, N designed the individual, t =1, …, T and m =1, …, M.

Pedroni proposals seven tests. Among them, four are related to the dimension within and the next three are related to the dimension between. The null hypothesis of these two categories of tests is the same. This is no cointegration $\mu_i = 1\ \forall i$ $\mu_i$ design the autoregressive term of estimated residuals under alternative hypothesis such as:

$$\hat{\varepsilon}_{it} = \mu_i\, \hat{\varepsilon}_{it-1} + \nu_{it} \qquad (8)$$

However, these two categories of tests are distinguished in the specification of the alternative hypothesis.

- For the tests based on within dimension, the alternative hypothesis is $\mu_i < \mu = 1\ \forall i$
- While the alternative hypothesis for the tests based on between dimension $\mu_i < 1\ \forall i$

The test based on between dimension allows the presence of heterogeneity between individuals under the alternative hypothesis. Therefore, it is more general than the test based on within dimension.

## V. Empirical results

### V.1 Unit Root and Cointegration Tests

The results displayed in a table (1) show that no variable is stationary at level. Table (2) shows that all variables in the first difference are stationary at a 1% level of significance with this test. As the results indicate, all the variables have become stationary at a, 1% level of significance after the first difference with a time trend. We conclude that there could be evidence of first order of integration.

Given that all variables in the model are stationary at first different, the study used Pedroni, Kao and Westherland tests to find the long run relation between variables (Table3). The results of these different tests show that the null hypothesis of no cointegration is rejecting in all tests at the 1% significance level except Westherland Test that at the 10% significance level. We conclude that there is a long run relation between variables.

**Table 1: Unit root test a level**

| Variables | Stats | p_value |
|---|---|---|
| Tax revenue | -0.8772 | 0.8098 |
| Natural Resources | 1.6466 | 0.9999 |
| Gdp per capita | -1.6264 | 0.9481 |
| FDI inflows | -2.6837 | 0.9964 |
| Agricultural added value | 0.0676 | 0.4731 |
| International trade | -2.4956 | 0.9937 |

**Table 2: Unit root test at firs difference**

| Variables | stats | p_value |
|---|---|---|
| D.Tax revenue | 4.8967 | 4.87E-07 |
| D. Natural Resources | 5.7538 | 4.36E-09 |
| D.FDI inflows | 4.5359 | 2.87E-06 |
| D.gdpc | 3.6707 | 0.00012 |
| D.Agricultural Added value | 7.1163 | 5.54E-13 |
| D.open | 2.6441 | 0.0041 |

| Tests | Name_Test | statistic | p_value |
|---|---|---|---|
| KAO | Modified Dickey-Fuller t | -4.441514 | 4.47e-06 |
| KAO | Dickey-Fuller t | -4.956608 | 3.59e-07 |
| KAO | Augmented Dickey-Fuller t | -5.188023 | 1.06e-07 |
| KAO | Unadjusted modified Dickey-Fuller t | -9.037826 | 0 |
| KAO | Unadjusted Dickey-Fuller t | -7.144897 | 4.50e-13 |
| PEDRONI | Modified variance ratio within | -9.110242 | 0 |
| PEDRONI | Modified Phillips-Perron t within | 5.713161 | 5.54e-09 |
| PEDRONI | Phillips-Perron t within | -8.568351 | 0 |
| PEDRONI | Augmented Dickey-Fuller t within | -8.408615 | 0 |
| PEDRONI | Modified Phillips-Perron t between | 9.112984 | 0 |
| PEDRONI | Phillips-Perron t between | -8.726644 | 0 |
| PEDRONI | Augmented Dickey-Fuller t between | -9.302595 | 0 |
| WESTERLUND | Variance ratio | -1.3251 | 0.0926 |

**Table 3: cointegration tests**

## V.2 Results

Before analysing the results, it is necessary to highlight that for the persistence verifying the soundness and efficiency of the PMG model, some essential hypothesis should be satisfied. First, in order to prove the existence of the long run relationship between government tax revenue and the explanatory variables, the error term coefficient must be significant, negative. The estimated average coefficient associated with the error correction term is negative and significant, confirming a long-run equilibrium relationship between government tax revenue and of the group of significant determinants. In addition, the degree of persistence in total tax revenue is large enough to introduce a bias in long-run parameter estimates if ignored.
Another essential hypothesis is the relative size of N and T, which is important to do a dynamic panel technique. The time series in my study is 26 years, which is relatively considerable within macroeconomic data. The lowest value for N is 17, which is used to test the FDI effect on tax mobilization in Asian south and Pacific. Expect this number, the lowest value is 21 countries, which represent the net exporting countries of natural resources. That number is acceptable and can be considered as a reasonable number of countries in macroeconomic variables.

First, we analyse the relationship between tax revenue and our interest variable and others controls variables to provide a general result. The result displayed in table 4, all these variables are statistically correlated to Tax revenue in the long term. Whatever at the regional level, FDI inflows positively affect government tax revenue in the long run. However, in the short term, the effect is negative, but not statistically significant. It appears that 10 points increase in FDI leads to an increase in government total tax revenue in developing countries, East Asia and Pacific, Sub-Saharan Africa and Latin America and the Caribbean by 0.7, 2.2,1.5 and 2.1 points respectively in long term. These results confirm the view of UNCTAD (2012), Mahmood and Chaudhary (2013) and Bal and Fazl (2016). This indicates that FDI contributes to expanding the tax base and tax revenue. Besides, FDI can increase tax mobilization indirectly by providing taxable income by means of employment creation, simplifying access to foreign markets and improving the productivity of local firms UNCTAD (2012). And then by increasing demand and production of goods and services, FDI can improve the added value in each economic sector and generate a more taxable surplus.

Regarding the ordinary factors of tax revenue, used in the paper, our results show that the trade openness (Open) is positively and significantly correlated to tax revenue. Indeed, since import and export transactions are reported on a given location, the collection of trade taxes is easier

and less costly[3].

**Table 4: FDI on Total tax (Pooled Mean Group estimation)**

| | DEVELOPING | SSA | LAC | EAP |
|---|---|---|---|---|
| | | Long Run | | |
| FDI (%GDP) | 0.0735*** | 0.149*** | 0.215*** | 0.219*** |
| | (4.51) | (5.98) | (5.61) | (3.55) |
| Agriculture | -0.141*** | 0.0505 | -0.0762* | -0.216*** |
| | (-7.23) | (1.57) | (-1.78) | (-5.39) |
| Natural Resource | -0.104*** | -0.0886** | 0.228*** | 0.0373 |
| | (-6.70) | (-2.67) | (4.39) | (0.87) |
| Trade openness | 0.0381*** | 0.0925*** | 0.0408*** | -0.0168 |
| | (6.48) | (9.41) | (5.31) | (-1.46) |
| GDP per capita (log) | 2.871*** | 4.543*** | 5.345*** | 0.508 |
| | (8.62) | (7.22) | (5.94) | (0.79) |
| | | Short Run | | |
| Speed Adjustment | -0.271*** | -0.283*** | -0.258*** | -0.294*** |
| | (-11.80) | (-8.51) | (-4.94) | (-4.78) |
| d.FDI (%GDP) | -0.0470 | -0.119 | -0.0103 | -0.0412 |
| | (-1.20) | (-1.36) | (-0.68) | (-0.93) |
| d.Natural Resource | -0.0728** | -0.0697 | -0.0625 | -0.283** |
| | (-2.22) | (-1.42) | (-1.04) | (-3.07) |
| d. Agriculture | 0.176 | 0.0796 | 0.103 | -0.0868* |
| | (1.13) | (0.81) | (0.94) | (-1.75) |
| d.GDP per capita (log) | 6.214*** | 8.798** | 2.033 | 1.399 |
| | (3.51) | (2.57) | (0.89) | (0.59) |
| d.Trade openness | 0.0106** | -0.00653 | 0.0195* | 0.0179** |
| | (2.15) | (-0.79) | (1.94) | (2.57) |
| Constant | -1.749*** | -7.220*** | -9.832*** | 4.533*** |
| | (-7.61) | (-8.14) | (-4.73) | (4.84) |
| Observations | 2150 | 946 | 651 | 375 |

t statistics in parentheses * p < 0.1, ** p < 0.05, *** p < 0.001

Therefore, in accordance with the literature, trade openness generates higher public tax revenues. (Agbeyegbe, Stotsky, and WoldeMariam 2006; Drummond et al. 2012).

The level of development proxied with GDP per capita (gdpc) positively and statistically affects government tax revenue. A 1% increase in gross domestic product per capita leads to an increase in public tax revenue by 0.03 unit in developing countries. In other words, A higher development level promotes mobilization of the total government tax revenue in the developing

[3] However, given the corruption, it is difficult to achieve the tax potential at the level of customs duties.

countries. These results support those of Pivovarsky and al. (2003), Morrissey (2015), J. F. Brun and al (2005) and Chambas (2005).

Regarding the effect of the agricultural sector, the results are in line with the literature. Because of the difficulty to collect tax in the agricultural sector, an increase in agricultural sector share negatively and significantly affect tax mobilization in developing countries.

Our findings also suggest a strong negative and significant relationship between extractive activity share and tax mobilization. Indeed, a one unit increase in the share of the extractive resources sector could reduce tax revenue by as much as 0.104. In addition, an abundant natural resource could reduce the incentive to generate taxation from domestic sources. Besides, host countries government give the tax incentive and tax holidays to some companies which involved in the extractive activity. Consequently, this reduces tax collection from this activity sector.

### V.3 What is the effect of FDI on resource exporting countries?

The phenomenon known as the natural resource curse in the literature could influence the effect of FDI inflows on tax revenues. Therefore, it will be important to analyse the effect of FDI net inflows at the level of countries' net exporters of natural resources by comparing to other countries. Table 5 presents the findings with the countries who are oil exporting countries (column 2) and other countries (column3). Contrary to general results, when countries are resource exporting, FDI inflows negatively and statistically affect government tax revenue. These findings could be explained by the excessive tax incentive and holidays tax accessible to multinational enterprises operating in the national economy.

**Table 5: FDI on Total tax in Natural resource countries (Pooled Mean Group estimation)**

| | NATURAL RESSOURCES NET EXPORTERS | NO NATURAL RESSOURCES NET EXPORTERS |
|---|---|---|
| | Long Run | |
| FDI (%GDP) | -0.0530* | 0.144*** |
| | (-1.86) | (6.80) |
| Agriculture | 0.0497 | -0.00178 |
| | (1.54) | (-0.08) |
| Natural Resource | -0.257*** | -0.00716 |
| | (-7.65) | (-0.37) |
| Trade openness | 0.113*** | 0.00565 |
| | (6.91) | (1.05) |
| GDP per capita (Log) | -2.616*** | 5.553*** |
| | (-3.44) | (13.12) |
| | Short Run | |
| Speed Adjustment | -0.258*** | -0.291*** |
| | (-5.37) | (-10.69) |
| d.FDI (%GDP) | 0.00362 | -0.0585 |
| | (0.41) | (-1.19) |
| d.Natural Resource | -0.0580* | -0.0962** |
| | (-1.93) | (-2.36) |
| d. Agriculture | 0.0419 | 0.0138 |
| | (0.36) | (0.22) |
| d. GDP per capita (Log) | 8.097*** | 5.514** |
| | (3.37) | (2.58) |
| d.Trade openness | 0.0172 | 0.0114** |
| | (1.21) | (2.30) |
| Constant | 8.319*** | -8.348*** |
| | (5.03) | (-10.21) |
| Observations | 489 | 1661 |

t statistics in parentheses * p < 0.1, ** p < 0.05, *** p < 0.001

Besides, the extractive resources sector which needs more capital is dominated by foreign companies. Consequently, excessive tax exemption can significantly diminish the involvement of FDI to tax revenues. Furthermore, the enterprise operating in the extractive resources sector often advance corruption relationship with tax officials to profit substantial tax holidays and royalties and thus reduce their responsibility in host countries. In addition, the firm operating in this sector practice pricing transfer method to avoid corporation taxation, and therefore reduce their corporate tax in host countries. Whereas, when the countries are not oil exporters, the sign of the effect of FDI on tax mobilisation is in line with results of this study and most of the literature on the relationship between FDI and government revenue.

Regarding other variables, the results show that international openness has a positive and significant effect on public tax revenue. while the gross domestic product per capita (gdpc) has a negative and significant effect on government tax revenue for the oil exporting countries. In effect, in cities where extractive activities are carried out, poverty and precarity increase, and other activities in the city are abandoned in favour of exploitation. This leads to a decrease in the purchasing power of the population and therefore a decrease in revenues from direct as well as indirect taxes.

**V.4 robustness checks**

We conduct various robustness analyses to check the resilience of the positive effect of FDI net inflows on tax revenue, as shown in empirical analysis when certain factors are taking account.

**V.41 Classification by income level and tax havens**

In order to explore the sensitivity of these results to supplementary reflections and because of limited data (from 1990 to 2015), we run a succession of robustness checks. I estimated the relationship between total tax resource and the explanatory variables used in regression above at level-income countries. The regressions are based on the same estimator (PMG). Table 6 shows the results based on the income level of countries. Column1, column 2 and column 3 respectively report the results of Upper-Middle-Income Countries (UMIC), Low Middle-Income Countries (LMIC) and Low-Income Countries (LIC). All columns confirm the results that FDI positively and significantly affect government tax revenue. Moreover, the effect of FDI is greater in the LICs (0.271) than in all the countries in the sample (0.0735) and in the UMIC (0.149).

We tried to control by tax havens counties in order to analyse the correlation between tax havens and tax revenue mobilisation. However, since we use PMG as estimators that do not accept the dummy variable. We run our model on the subsample of 14 tax haven countries. This allows us to compare the amplitude of the coefficients with those of the sample. Column 4 of Table 6 shows the results. It shows that tax revenue and FDI net inflows are and significantly correlated. In addition, being a tax haven country increases your ability to mobilize more tax revenue than in the sample. This can be explained by the indirect tax revenue that these countries can collect through tourism and the increasing formal activity.

### V.42 Analysis of the channels through which FDI net inflows are transmitted to tax revenues: Institutions

In section 2, an examination of the mechanisms through which net FDI inflows can influence tax collection highlights that quality of institutions, corruption, bureaucracy quality and government stability with tax obligations are potential channels for transmitting net FDI inflows to tax revenues. Thus, the addition of these variables as controls in the baseline specification can have only a small impact on FDI.

**Quality of institutions**

In the thinking about the way in which FDI net inflows affect the mobilization of tax revenues, we have indicated that FDI net inflows can contribute to the quality of institutions and significantly strengthen tax collection. We must control the effect of institutional quality to properly capture the effect of net FDI inflows on the tax ratio. We use the quality of institution index from the ICRG database with the higher value is more quality of the institution. The regressions results show that the more efficient the institutions are, the more taxes could be collected (column A, Table 7) even if this effect is not statistically significant in our regressions. This finding indicates that the impact of net FDI inflows on tax revenues does not depend on the quality of the institutions for the sample of countries under investigation. This could be explained by the way in which the institutional quality variable is calculated, which is a weighted sum of several institutional variables that have an inverse effect on tax revenue. Nevertheless, again, our main result remains unchanged: net FDI inflows have a positive impact on tax revenues.

**Corruption**

Net FDI inflows can translate into tax collection via corruption. In effect, some taxpayers may reduce their tax base and obligations in complicity with tax administration officials. We control the impact of corruption on tax revenues in the basic specification to verify whether corruption is a channel for transmitting FDI to the tax revenue. To do this, we include the corruption index from the ICRG database with the higher value designate less corruption. We note that tax

**Table 6: Results by Income Level**

| | UMIC | LMIC | LIC | tax havens |
|---|---|---|---|---|
| | | Long Run | | |
| FDI (%GDP) | 0.149*** | 0.0971*** | 0.271*** | 0.135*** |
| | (6.52) | (3.57) | (8.10) | (4.51) |
| Agriculture | -0.179*** | -0.170*** | 0.157*** | 0.154*** |
| | (-4.05) | (-5.01) | (4.67) | (3.66) |
| Natural Resource | -0.264*** | -0.0755** | 0.0880** | 0.280** |
| | (-10.62) | (-2.95) | (2.33) | (3.10) |
| Trade Openness | 0.0800*** | 0.0187* | 0.0600*** | 0.0235** |
| | (10.10) | (1.96) | (4.82) | (2.54) |
| GDP per capita (Log) | -2.529*** | 2.443*** | 3.702*** | 9.715*** |
| | (-3.95) | (4.50) | (5.86) | (6.20) |
| | | Short Run | | |
| Speed Adjustment | -0.272*** | -0.282*** | -0.245*** | -0.360*** |
| | (-6.28) | (-5.54) | (-4.73) | (-4.72) |
| d.FDI (%GDP) | -0.0323* | -0.0234 | -0.187 | -0.0186 |
| | (-1.78) | (-1.07) | (-1.19) | (-1.05) |
| d. Natural Resource | -0.0823 | 0.000621 | -0.120** | -0.215* |
| | (-1.55) | (0.01) | (-2.70) | (-1.88) |
| d. Agriculture | 0.450 | 0.142 | -0.116** | 0.0575 |
| | (1.17) | (1.06) | (-2.43) | (0.32) |
| d. GDP per capita (log) | 4.715** | 6.062** | 6.256** | -3.022 |
| | (2.45) | (2.86) | (2.85) | (-1.02) |
| d. Trade Openness | 0.00343 | 0.0200** | 0.00262 | 0.00551 |
| | (0.42) | (2.64) | (0.24) | (0.44) |
| Constant | 10.57*** | -0.560* | -5.743*** | -27.13*** |
| | (6.46) | (-1.67) | (-4.81) | (-4.78) |
| Observations | 968 | 594 | 554 | 337 |

*t* statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

revenue collection goes hand in hand with the fight against corruption (column B, table 7), and this suggests that sub-Saharan African countries should continue their efforts to reduce corruption and strengthen tax revenue mobilization. As usual, the estimated coefficient for net FDI inflows is positive and statistically different from zero at the 5% threshold.

Our main finding remains robust considering the institutional quality of the country's anti-corruption efforts. The estimated coefficient for net FDI inflows when the variable “corruption control” is included in the basic specification (0.0751) is roughly equal to that obtained by estimating the basic equation (0.0735). This suggests that the fight against corruption is likely to be a channel through which net FDI inflows influence taxes. The corruption pathway for the impact of net FDI inflows on tax revenues is understandable and reasonable. In fact, increasing net FDI inflows could strengthen the fight against corruption in the tax administration and thus

have a positive impact on tax revenues.

**Government stability**

In the discussion on the way net FDI inflows affect tax revenue mobilization, we have suggested that increasing net FDI inflows can favour government stability and significantly promote tax collection. We, therefore, need to control the impact of government stability to effectively capture the effect of net FDI inflows on the tax revenue ratio. We use government stability index from the ICRG database with higher value signifying more stability. The results of the regressions show that the more stable countries could raise more tax revenues (column D, table 7). The result suggests that the impact of FDI net inflows on tax revenue could transit through government stability for the sample of countries under investigation. However, here again, our main finding remains unchanged. FDI net inflows positively affect tax revenue.

**Bureaucracy quality**

In the discussion about how FDI net inflows can affect tax revenue, we suggest that FDI net inflows can improve the institutional strength and quality of bureaucracy and significantly strengthen tax revenue mobilization. We must control the effect of bureaucracy quality to properly capture the effect of net FDI inflows on the tax revenue ratio. To do so, we include bureaucracy quality variables from the ICRG database, that the higher point suggests that a country's bureaucracy has the strength and skill to administer without extreme changes in policy. The results of the regressions show that the more efficient administration of countries could improve tax revenues mobilization (column C, table 7). The result suggests that the bureaucracy quality is a channel by which FDI net inflows can influence tax revenue for the sample of countries under investigation. However, here again, our main finding remains unchanged. FDI net inflows positively affect tax revenue

**Table7: Robustness check**

| | A | B | C | D |
|---|---|---|---|---|
| | Long Run | | | |
| FDI (%GDP) | 0.0656** | 0.0751*** | 0.204*** | 0.191*** |
| | (2.46) | (3.53) | (6.93) | (6.49) |
| Quality of institution | 0.0141 | | | |
| | (0.85) | | | |
| Agriculture | -0.116*** | -0.0910*** | -0.0442** | -0.0549** |
| | (-5.49) | (-3.30) | (-2.19) | (-2.84) |
| Natural Resources | -0.0488** | -0.138*** | -0.107*** | -0.103*** |
| | (-2.20) | (-6.59) | (-5.17) | (-4.78) |
| Trade Openness | 0.0757*** | 0.0611*** | 0.0826*** | 0.0846*** |
| | (11.76) | (8.70) | (11.32) | (12.01) |
| GDP per capita (Log) | 2.526*** | 2.469*** | 1.893*** | 2.318*** |
| | (6.80) | (6.03) | (4.48) | (5.52) |
| Corruption | | -0.401** | | |
| | | (-3.29) | | |
| Bureaucracy Quality | | | 0.849*** | 0.651*** |
| | | | (6.51) | (5.02) |
| Government Stability | | | | 0.103*** |
| | | | | (3.36) |
| | Short Run | | | |
| Speed Adjustment | -0.285*** | -0.291*** | -0.266*** | -0.276*** |
| | (-9.02) | (-9.15) | (-8.75) | (-8.69) |
| d.FDI (%GDP) | -0.0772 | -0.0724 | -0.0831 | -0.0865 |
| | (-1.24) | (-1.15) | (-1.38) | (-1.45) |
| d. Naturel Resources | -0.0879** | -0.0682* | -0.0983** | -0.103** |
| | (-2.44) | (-1.81) | (-2.75) | (-2.78) |
| d. Quality of institution | 0.0180 | | | |
| | (0.81) | | | |
| d. Agriculture | -0.00526 | -0.00256 | -0.0350 | -0.0304 |
| | (-0.10) | (-0.05) | (-0.76) | (-0.69) |
| d. GDP per capita (Log) | 6.375*** | 7.859*** | 7.509*** | 7.018*** |
| | (3.85) | (4.55) | (3.79) | (3.81) |
| d. Trade openness | 0.00999 | 0.0132* | 0.00829 | 0.00838 |
| | (1.30) | (1.74) | (1.10) | (0.98) |
| d. Corruption | | -0.00169 | | |
| | | (-0.01) | | |
| d. Bureaucracy Quality | | | 0.271 | 0.316 |
| | | | (1.25) | (1.45) |
| d. Government Stability | | | | 0.0334 |
| | | | | (1.19) |
| Constant | -2.376*** | -1.144*** | -1.378*** | -2.426*** |
| | (-6.16) | (-4.31) | (-5.21) | (-6.63) |
| Observations | 1333 | 1333 | 1333 | 1333 |

*t* statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

## VI Conclusion

Frequently seen as a significant factor of economic growth in developing countries, FDI inflows are important channels of technology transfer from home countries to host countries. FDI also stimulates local investment, leads to improvements in human capital and improves the quality of institutions of developing countries. Through these channels, FDI could improve tax mobilizations in developing countries. However, on the other hand, tax incentive and tax complexity and natural resources could lead FDI to negatively affect tax mobilisation in developing countries. In addition, a few studies about the relationship between government tax mobilisation and FDI inflows in developing countries are inconclusive.

This paper contributes to empirically investigate in a large sample of developing countries by finding out how FDI affect government tax mobilization. I used the pooled mean group estimators to find the long run relationship. And I find that FDI net inflows affect positively government tax mobilization. Testing the relationship between FDI and tax mobilization at the regional level, the results suggest FDI inflows have a positive impact on government tax revenue. Given the resource curses in developing countries due to tax incentives, we analyse this question for countries that are resource exporters. The results suggest that for resource exporting countries, FDI inflows negatively affect government tax mobilizations.

From these results, we draw the following policy recommendations:

FDI promotion should not be done only with special economic zones with their tax and customs exemptions. Several studies reveal that the developing countries that have adopted special economic zones do not attract more FDI than countries that have not adopted this option. Indeed, it is necessary to substitute or combine these policies with non-tax measures such as subsidies to foreign investors, institutional environment improvement and the infrastructure development, that can attract FDI without much loss in terms of tax revenue.

Countries must also consider the crucial role played by factors such as natural resources, agriculture and trade openness in tax revenue mobilisation.

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**Appendix**

## Appendix 1: table of correlation

| | TAX | FDI | GDP per capita | Agriculture | Trade Openness | Extraxtive Activity |
|---|---|---|---|---|---|---|
| | | | | | | |
| TAX | 1 | | | | | |
| FDI | 0.1150* | 1 | | | | |
| GDP per capita | 0.2574* | 0.1158* | 1 | | | |
| Agriculture | -0.4129* | -0.1704* | -0.6503* | 1 | | |
| Trade Openness | 0.2149* | 0.3553* | 0.2609* | -0.4180* | 1 | |
| Extraxtive Activity | -0.2370* | 0.0248* | 0.1844* | -0.4029* | 0.1751* | 1 |

## *Appendix* 2: Summary statistics

| Variable | | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|---|
| | | | | | | |
| TAX | overall | 13.83142 | 6.336236 | 0.0858074 | 41.35653 | N = 2316 |
| | between | | 5.837362 | 0.9493428 | 32.41307 | n = 92 |
| | within | | 2.539953 | -4.078743 | 27.06113 | T-bar = 25.1739 |
| | | | | | | |
| FDI | overall | 3.970891 | 5.607021 | -17.9626 | 72.79253 | N = 2345 |
| | between | | 3.088546 | 0.2327687 | 15.41011 | n = 91 |
| | within | | 4.692689 | -17.79715 | 61.86034 | T-bar = 25.7692 |
| | | | | | | |
| AGRI | overall | 18.01673 | 13.66464 | 0.152968 | 65.97296 | N = 2392 |
| | between | | 13.10401 | 0.3764963 | 50.795 | n = 92 |
| | within | | 4.099095 | -3.868432 | 42.03957 | T = 26 |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| RESSOU~E | overall | 21.93167 | 12.94123 | 1.623689 | 77.88147 | N = 2392 |
| | between | | 11.99634 | 4.033685 | 58.80687 | n = 92 |
| | within | | 5.006802 | -20.90735 | 48.28794 | T = 26 |
| | | | | | | |
| ouv | overall | 75.60826 | 37.57319 | 3.59069 | 267.3906 | N = 2392 |
| | between | | 33.68941 | 22.42991 | 177.8075 | n = 92 |
| | within | | 16.98926 | -10.90768 | 243.3622 | T = 26 |
| | | | | | | |
| gdpc | overall | 7.761899 | 1.265566 | 4.962982 | 11.04815 | N = 2392 |
| | between | | 1.249406 | 5.377661 | 10.84341 | n = 92 |
| | within | | 0.2386738 | 6.095465 | 8.81708 | T = 26 |

***Appendix 3: List of the sample countries***

| **country** | **FDI as GDP** | **country** | **FDI as GDP** |
|---|---|---|---|
| Aruba | 3.8 | Cambodia | 6.72 |
| Angola* | 15.4 | Kiribati | 0.79 |
| Argentina | 2.1 | Kuwait* | 0.37 |
| Antigua and Barbuda | 10.14 | Lao PDR | 3.56 |
| Burundi | 0.23 | Lebanon | 7.04 |
| Benin | 2.02 | Libya* | 1.15 |
| Burkina Faso* | 1.08 | Morocco | 2.35 |
| Bahamas, The | 9.54 | Madagascar | 3.70 |
| Belize | 5.92 | Mexico | 2.49 |
| Bolivia | 4.38 | Myanmar | 4.35 |
| Brazil | 2.31 | Mongolia* | 8.01 |
| Barbados | 4.91 | Mozambique | 9.15 |
| Botswana* | 2.55 | Mauritania* | 6.88 |
| Central African Republic | 1.04 | Mauritius | 1.90 |
| Chile* | 6.04 | Malawi | 2.05 |
| China | 2.88 | Malaysia | 4.47 |
| Cote d'Ivoire | 1.76 | Namibia* | 4.95 |
| Cameroon | 1.15 | Niger* | 4.04 |
| Congo, Dem. Rep.* | 10.01 | Nigeria* | 2.20 |
| Congo, Rep*. | 3.4 | Nicaragua | 4.36 |

| | | | |
|---|---|---|---|
| Colombia* | 2.91 | Panama | 6.54 |
| Comoros | 0.36 | Peru* | 3.64 |
| Cape Verde | 5.64 | Philippines | 1.46 |
| Costa Rica | 4.69 | Palau | 4.74 |
| Cuba | | Paraguay | 1.42 |
| Djibouti | 5.46 | Rwanda | 1.38 |
| Dominica | 7.68 | Sudan* | 2.42 |
| Dominican Republic | 3.25 | Senegal | 1.61 |
| Algeria* | 0.84 | Sierra Leone* | 4.52 |
| Ecuador | 1.51 | El Salvador | 1.92 |
| Egypt, Arab Rep. | 2.40 | Sao Tome and Principe | 9.58 |
| Ethiopia | 1.96 | Swaziland | 2.77 |
| Fiji | 5.75 | Seychelles | 10.33 |
| Gabon* | 1.04 | Chad* | 5.07 |
| Guinea* | 2.04 | Togo | 2.86 |
| Gambia, The | 4.45 | Thailand | 2.74 |
| Guinea-Bissau | 1.27 | Tonga | 4.79 |
| Equatorial Guinea* | 14.90 | Turkey | 1.20 |
| Grenada | 9.67 | Tanzania | 2.57 |
| Guatemala | 1.60 | Uganda | 2.65 |
| Honduras | 4.14 | Uruguay | 2.81 |
| Haiti | 0.78 | Venezuela, RB* | 1.84 |
| Indonesia | 1.02 | Vietnam | 5.96 |
| Jamaica* | 4.67 | Vanuatu | 8.08 |
| Jordan | 5.86 | South Africa* | 1.24 |
| Kenya | 0.99 | Zimbabwe | 1.36 |

*Petroleum and mining exporting countries