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Tax Policy, Foreign Direct Investment and Spillover Effects

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Abstract

Foreign direct investment (FDI) inflows are crucial for economic development. To attract them, countries have typically used tax incentives, specifically reductions in corporate income tax (CIT) rates. This paper empirically assesses the impact of such CIT rate changes on FDI net inflows in Africa. Using a dynamic spatial Durbin model with fixed effects, our results show that cuts in CIT rates increase FDI net inflows in the host country and in the neighboring countries in the short and long run. These results are robust to the use of alternative spatial weighting matrices as well as the inclusion of additional controls in the baseline specification. Furthermore, we find a strategic complementarity in FDI inflows between the countries in our sample, suggesting that an increase in FDI inflows in a host country is likely to stimulate FDI inflows of its neighbors.

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Tax Policy, Foreign Direct Investment and Spillover Effects

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1. Introduction

Due to multiple expected development benefits, attracting foreign direct investment (FDI) has been a key policy objective in many (developing) countries.1 Therefore, in order to attract FDI, governments have offered various incentives, including fiscal incentives (such as reduced corporate tax rates), financial incentives (such as grants and preferential loans), and monopoly rights; with the possibility of neighboring countries engaging in harmful competition - the so-called "race to the bottom". The focus of this paper is to empirically explore the effect of tax incentives, specifically changes in corporate income tax (CIT) rates, on attracting FDI to African countries. In doing so, we analyze spillover effects, whereby changes in CIT rates in one country can have positive or negative effects on the level of FDI in neighboring countries.

The debate around the effects of tax incentives on FDI is a relatively old one, but nevertheless unsettled. Opponents argue that tax incentives negatively affect economic growth and development by depriving developing countries from tax resources that are much needed to finance investments in infrastructure, education or health, in addition to the fact such incentives are not effective in attracting FDI (e.g., Oates, 1972; IMF, 2014; World Bank, 2005). In contrast, proponents of tax incentives suggest that tax incentives lead to a more effective use of public resources and limits rent-seeking activities (e.g., Tiebout, 1956). These incentives to investors are also needed given the poor investment climate in developing countries (e.g., political instability, inadequate public infrastructure, or corruption). Moreover, revenue losses from tax incentives may be justified by the positive effects of FDI on economic growth, which will ultimately increase the income tax base (OECD, 2008).

Using panel data from 19 African countries[2] over the period 1990-2012, we find that the levels of FDI between neighbouring countries are strategic complements, suggesting that an increase of FDI net inflows in a given country increases FDI levels in countries that are neighbors, both geographically and economically. We also find that lowering of CIT rate increases FDI net inflows not only for the country that is carrying out the reform but also for its neighboring countries, suggesting that a "tax competition" through lowering of CIT rate

[1] FDI is typically defined as investments realized in a country other than that of the investor and in which the foreign investor owns at least 10% of the capital that is invested. Expected benefits from FDI include increased capital inflows; spillover or demonstration-imitation effects related to technology or production/marketing/management methods; enhanced human capital through training and labor mobility; improved business environment due to increased competition; forward and backward linkages with domestic firms; and better international trade integration through enhanced export capabilities. For details see e.g. Borensztein et al. (1998); Van Parys and James (2010); Guy-Diby and Renard (2015), Newman et al. (2015).

[2] The list of the countries is given in the Appendix.

between by neighborhood countries can be beneficial to all of them in the both short and long term.

We contribute to the literature on the impact of tax incentives on FDI in two ways. First, we focus on African countries for increase policy relevance, as FDI and their related attraction instruments can have differential effects in different regions (Kumar and Pradhan, 2002; Klemm and Van Parys, 2012). Previous studies have concentrated on either developed countries or developing countries. In the latter case, only three studies have examined the link between taxation and FDI in developing countries using samples that included African countries (Abbas and Klemm, 2013; Cleeve, 2008; Klemm and Van Parys, 2012). Second, previous studies have typically used gravity models that assume bilateral exchanges of FDI between countries (see Bénassy-Quéré et al., 2005). However, for most African countries, FDI flows are predominantly one-way: from developed and transition countries to Africa.[3] Moreover, as pointed out by Blonigen et al. (2007), these previous studies have ignored spillover effects between countries, whereby an increase in FDI in one country can have positive or negative spillover effects on the level of FDI in neighboring countries. As emphasized by Lesage and Pace (2009), ignoring the spatial interactions in regression models (OLS, panel data, etc.) can not only bias the standard deviations but can also have an impact on the value of the estimates. This paper takes spillover effects into account by using a spatial econometrics approach.

The remainder of the paper is organized as follows. In section 2, we briefly discuss previous the literature on the linkages between taxes and FDI. Sections 3, 4 and 5 discuss the empirical approach, data and results, respectively. We conclude in section 6.

2. Related Literature

Recent empirical studies on tax incentives, mainly based on developed countries, suggest that competition to attract FDI is likely to lead to a "race to a bottom" among countries (see, e.g., Devereux et al., 2002; Klemm and Van Parys, 2012). These studies typically focus on the effects of tax incentives on government revenues or on public expenditures. To the best of our knowledge, only three studies (Abbas and Klemm, 2013; Cleeve, 2008; Klemm and Van Parys, 2012) have estimated the empirical effects of tax incentives on FDI with samples of developing countries that included African countries. Klemm and Van Parys (2012), using a sample of 40 Latin America, Caribbean and African countries over the period 1985-2004, show that lowering

[3] South Africa, which is the only African country to be among the top 10 investors in Africa, accounts for only 8% of the total stock of FDI on the continent (UNCTAD, 2016).

of CIT rate has a significant positive impact on FDI in Latin and Central America but not in Africa.

However, this study does not take into account spatial interaction in FDI inflows between countries. Focusing on 16 sub-Saharan African countries, Cleeve (2008) estimates the impact of fiscal incentives in attracting FDI over the period 1990-2000. He proxied fiscal incentives by a tax holidays variable equal to 0 if no tax holiday is offered in the host country, 1 if the tax holiday is less than five years, and 2 if the tax holiday is greater than five years. Cleeve (2008) shows that tax holidays positively and significantly affect FDI inflows to sub-Saharan Africa, only when country fixed-effects are not controlled for. Moreover, none of the previous studies discusses the effect of a change in the CIT rate of a host country on FDI inflows in neighbouring countries geographically or economically. Abbas and Klemm (2013) find that the Effective Marginal Tax Rate (EMTR) does not significantly affect FDI while only reductions in Effective Average Tax Rate (EATR) applicable to special tax regimes positively affect inward FDI for 50 emerging and developing countries including 13 African countries over the period 1996-2007.[4] Notably, these previous studies ignored spillover effects between countries, whereby an increase in FDI in one country can have positive or negative spillover effects on the level of FDI in neighboring countries.

Beside tax incentives, several determinants of FDI inflows can be found in the literature. These determinants can be classified into two main categories: demand and supply factors on the one hand, and institutional and macroeconomic factors on the other hand. Demand-supply side determinants with positive impact on FDI inflows include domestic market size, typically proxied by population size (Diaw and Guidime, 2013), government spending relative to investments or consumption (Greene and Villanueva, 1991; Serven and Solimano, 1992; Mlambo and Elhiraika, 1997), openness to trade (Asiedu, 2002), and natural resources endowment, particularly in African countries (Asiedu, 2002; Basu and Srinivasan, 2002). FDI determinants in the institutional and macroeconomic category with a negative effect on FDI inflows comprise macroeconomic instability (proxy by inflation rate in the literature) and political risk (Busse and Hefeker, 2007). In contrast, the availability of skilled labor (Noorbakhsh and Paloni, 2001), financial development (Dutta and Roy, 2011; Desbordes and Wei, 2017), and high-quality infrastructure (Asiedu, 2002; Dupasquier and Osakwe, 2006; Diaw and Guidime, 2013) all stimulates FDI inflows through their positive impact on the productivity of investments. Likewise, exchange rate can increase FDI since depreciation

[4] Botswana, Egypt, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda, and Zambia.

makes local assets cheaper to buy while stimulating exports competitiveness (Froot and Stein, 1991).

3. Empirical Approach

The spatial interaction between countries' FDI flows and the cross-border effects generated by tax policy could potentially be captured using a Spatial Durbin Model (SDM). The SDM allows identification of both the endogenous effects (spatially lagged endogenous variable) and the contextual effects (spatially lagged explanatory variables). It produces unbiased estimates even if the underlying data generator process is a Spatial Autoregressive Model (SAR) or a Spatial Error Model (SEM) (Elhorst 2010b). Moreover, we take advantage of the panel data structure for the 1995 to 2012 period and therefore estimate a Dynamic Spatial Durbin Model (DSDM). The model is written as follows:

$$FDI_{it} = \delta FDI_{i,t-1} + \rho WFDI_{jt} + \beta_1 \tau_{it} + \beta_2 W\tau_{jt} + \theta_1 X_{it} + \theta_2 WX_{it} + \vartheta_i + \mu_t + \varepsilon_{it} \qquad (1)$$

where $FDI_{i,t}$ represents the amount of FDI in country i at time t; $FDI_{i,t}-1$ the amount at time t-1 ;[5] W a spatial weight matrix ; $W\,FDI_{j,t,}$ the amount of FDI in neighboring countries ; $\tau_{it,}$ the statutory CIT rate in country i in year t ; $W\,\tau_{jt,}$ the CIT rate in neighbors countries multiplied by the weights matrix W ; $X_{it,}$ a vector of FDI determinants in country i in year t ; $WFDI_{jt}$, the weighted average values of FDI determinants in other countries except i ; ϑ_i, country fixed effects to control for time-invariant unobserved country heterogeneity ; μ_t, time dummies controlling for common shocks affecting African countries each year; ε_{it}, an independent and identically distributed error term; and ρ a spatial autocorrelation coefficient.

This DSDM model includes spatially lagged explanatory variables (WX), spatially lagged variables of the dependent variable (WY). Spatial autocorrelation relates to the first law of geography: "[E]verything is related to everything else, but near things are more related than distant things" (Tobler, 1970: 236). Spatial autocorrelation is likely to exist in our study given that FDI decisions can be affected not only by domestic CIT rate but also by CIT rates in neighboring countries. First, there can be substitution between FDI in the preferred country and FDI in other destination markets. For example, a multinational firm can invest in an African country and use it as a platform to export to neighboring countries (Blonigen et al., 2007).

[5] Technically, as pointed by Singh and Jun (1995), the inclusion of the lagged dependent variable among the explanatory variables allows taking into account of autocorrelations of errors and indirect capturing of the impact of factors omitted from the model, but which may have affected FDI in the past.

Second, FDI in a host country could be a factor of attractiveness for a neighboring country. For example, if a lead multinational enterprise in a sector decides to invest in an African country, other firms operating in the same sector may follow this first mover in its new location or in a neighboring country in order to preserve their market shares in this country or region (Knickerbocker, 1973). Third, a multinational firm operating in country A may react to FDI in country A from another multinational located in neighboring country B by also investing in country B, following the so-called "aggressor attacked" strategy (Mucchielli, 1985). Fourth, the degradation of the macroeconomic and institutional environment in neighboring countries could lead FDI to move from these countries to a given host country, suggesting that FDI traditional determinants in neighbors' countries may affect FDI inflows in a host country.

Our model also includes a one-period lagged value of the dependent variable (Y_{t-1}). This is motivated by the fact that foreign investors may decide to invest because their previous investments have produced satisfactory results (Batana, 2011), suggesting that the current level of FDI depends on previous investments decisions (Singh and Jun, 1995; Diaw and Guidime, 2013; Batana, 2011).

To estimate spatial autocorrelation, we need to define how countries are connected to each other. Following standard practice in spatial econometrics, we use geographical distance to measure closeness using a spatial weights matrix *W*, which has to be symmetric.[6] Algebraically, an element w_{ij} of the geographic distance weighting matrix takes the following form:

$$w_{ij} = \begin{cases} \dfrac{1/d_{ij}}{\sum_j 1/d_{ij}}, & for\ i \neq j \\ 0, & for\ i = j \end{cases}$$

with d_{ij} being the Euclidean distance between the capitals of countries i and j. Economic neighborhood (GDP per capita distance) is also considered as a relevant measure for building the weights matrix in tax competition studies (Devereux et al., 2008; Cassette and Paty, 2008), assuming that countries with similar income levels are more likely to compete against each another in attracting FDI. With an economic neighborhood matrix, each country is linked to all others countries, but the intensity of connectivity is stronger between countries with similar levels of development. For example, the more developed countries of sub-Saharan Africa (Kenya, Côte d'Ivoire, Ghana, South Africa, and Nigeria) are more likely to be in competition

[6] This symmetric matrix defines for each observation (row) those locations that belongs to its neighborhood set as non-zero elements.

between each other to attract FDI than with lower-income countries such as Niger, Burundi, or Burkina Faso.

The elements of this weighting matrix are based on the absolute difference in GDP per capita (GDPpc) between countries i and j. We take the inverse of the absolute difference so that the weighting matrix attributes a higher weight to countries that have a smaller absolute difference in GDP per capita. Algebraically, an element w_{ij} of the economic distance weighting matrix takes the following form:

$$w_{ij} = \begin{cases} \frac{(|GDPpc_i - GDPpc_j|)^{-1}}{\sum_j (|GDPpc_i - GDPpc_j|)^{-1}}, & for\ i \neq j \\ 0, & for\ i = j \end{cases}$$

In contrast to most previous studies, our paper also considers a spatial weight matrix combining both geographic and economic distance. The underlining idea is the fact that tax competition can take place between both geographically and economically close countries (Martinez-Vasquez and Liu, 2014). Following Martinez-Vasquez and Liu (2014), the elements w_{ij} of this mixed weight matrix are computed as follows:

$$w_{ij} = \begin{cases} \frac{e_{ij} d_{ij}}{\sum_{j=1}^{N} e_{ij}\, d_{ij}}, & for\ i \neq j \\ 0, & for\ i = j \end{cases}$$

where e_{ij} is the inverse of the absolute value of the difference in GDP per capita between countries i and j; and d_{ij} is the inverse of Euclidian distance between the capital cities of countries i and j.

To the best of our knowledge, this is the first paper that models explicitly and estimates the spatial spillover effects using geographic or/and economic neighborhood matrices and a Dynamic Spatial Durbin Model to characterize the nature of spillovers effects (complementarity or substitution) of FDI inflows to African countries. In order to obtain consistent and efficient estimates, we apply the Maximum Likelihood method estimator developed by Elhorst (2010a) and Lee and Yu (2010) and implemented in Stata by Belotti et al. (2013) under the command "xsmle".

4. Data

We use statutory CIT rates data from the Tax Rate Database of the Fiscal Affairs Department of IMF (IMF-FAD). Our sample includes 19 countries in total for the period 1995-2012 due to data availability. The number of countries in the sample and the period are mainly dictated by the spatial econometric method, which requires balanced panel data, or database with few missing values. Missing data can be problematic for spatial econometric models for two reasons

mainly: i) in a spatial context, the outcome for one observation depends on the outcomes of others, with each observation thus representing a part of the spatial lag for others observations; ii) missing data can complicate the convergence of the model.

To measure tax incentives, we use the statutory CIT rate, which is a highly visible and simple indicator of a tax incentives and which reflects the intent of decisions makers (Chen et al., 2014). As a result, the CIT rate is commonly used to evaluate countries' reaction to changes in international corporate taxation (Klemm and Van Parys, 2012). A possible limitation of this indicator is that a country could also be attractive because of its special regimes and not because of low statutory corporate tax rate only. Unfortunately, data that captured special regimes are not available for a large number of African countries and over the years. Nonetheless, it is worth pointing out that there is high correlation between the statutory CIT rate, effective rate, and special regime (IMF, 2014), which are alternative measures used in the empirical literature on tax incentives but difficult to implement in an African context. The impact of CIT rate on FDI is therefore difficult to predict. Because it negatively affects after-tax returns, a higher CIT rate reduces the amount of FDI inflows (Gordon and Hines, 2002). Yet, a low corporate tax burden cannot always compensate for an unattractive business environment, with weak institutions and poor public infrastructure (OECD, 2008).

We took data on FDI net inflows (in percentage of GDP) from the World Development Indicators (WDI). Table 1 in Appendix list additional control variables that are included in our regression and provide summary statistics. Control variables taken from WDI are: trade openness (as (X+M)/GDP), fixed phone subscriptions (per 1,000 inhabitants) used as a proxy of infrastructure (see Asiedu, 2002), annual inflation rate as a proxy for the country's macroeconomic conditions, financial development (domestic credit provided by financial sector in percentage of GDP), population to measure market size, natural resource rents (percentage of GDP) to proxy natural resources endowment come from WDI. Political rights, taken from the Freedom House database, are used to proxy institutions ; while nominal exchange rate and human capital measures come from the Penn World Table version 9.0 (Feenstra et al., 2015). Data on total tax revenues as a percentage of GDP was extracted from the ICTD Government Revenue Database (ICTD-GRD) (Prichard et al., 2014).[7]

[7] Where missing, ICTD-GRD tax revenues data have been fulfilled by tax revenues data as a percent of GDP from the recent IMF's World Revenue Longitudinal Data set (WoRLD). For Cameroon this concerns the years 1990, 1991, 1992, 2007, and 2008; for Nigeria, the years 2010, 2011, 2012; for Tunisia, the years 1990 and 2012; for South Africa, the period 1990-1995; and finally for Swaziland, the year 2012. Furthermore, for Nigeria again, data

5. Results

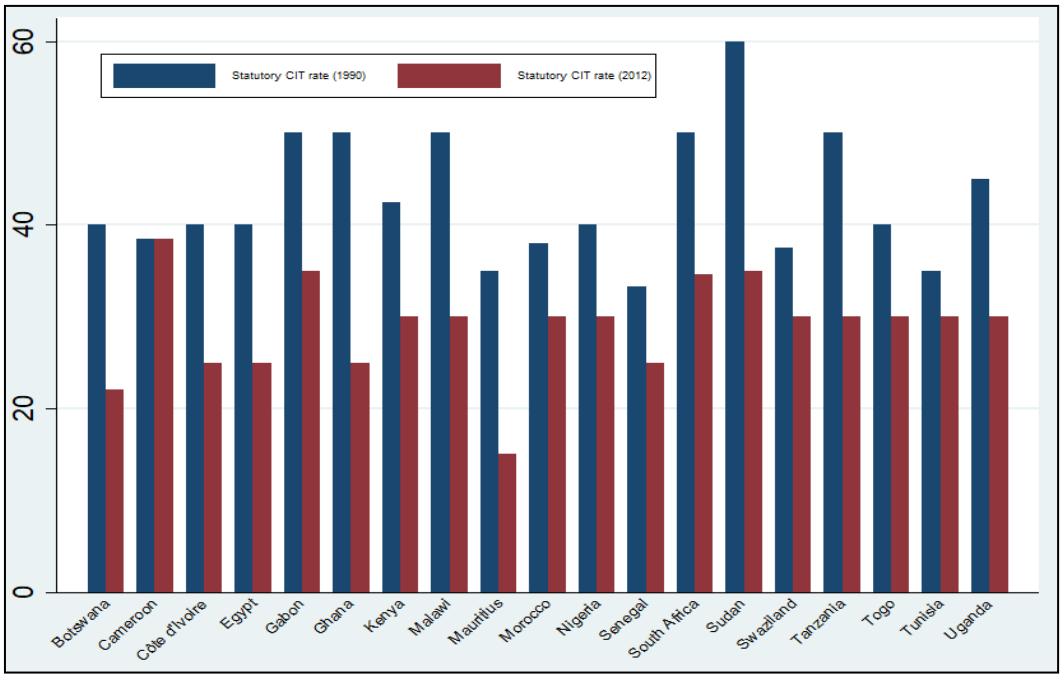
We start by presenting descriptive statistics and results from specification tests, before discussing regression results on the impact of cuts in CIT rates on FDI inflows.

5.1 Trends in FDI Net Inflows and CIT Rate in Africa

The average FDI net inflows in our sample of 19 African countries is 2.24% of GDP while the average statutory CIT rate is 33.68%, with the lowest rate at 15% and the highest at 60% (applied in Sudan in 1990). On average over the observation period, Nigeria, Ghana, Uganda, Sudan, Tanzania and Botswana are the major recipient countries for FDI flows. The average highest CIT rates are observed in Sudan, Togo, Cameroon and Gabon, while Mauritius has the lowest rate.

Figure 1 shows the statutory CIT rate for each country, in 1990 and 2012. Except Cameroon, all other countries have reduced their CIT rates. Sudan is the country that cut its CIT rate the most during the period, from 60% in 1990 to 35% in 2012. At the same time, FDI inflows to these Africa countries increased from 0.8% of GDP in 1994-1999 to 3.06 % of GDP in 2005-2009.

Figure 1: Statutory CIT rates in Africa



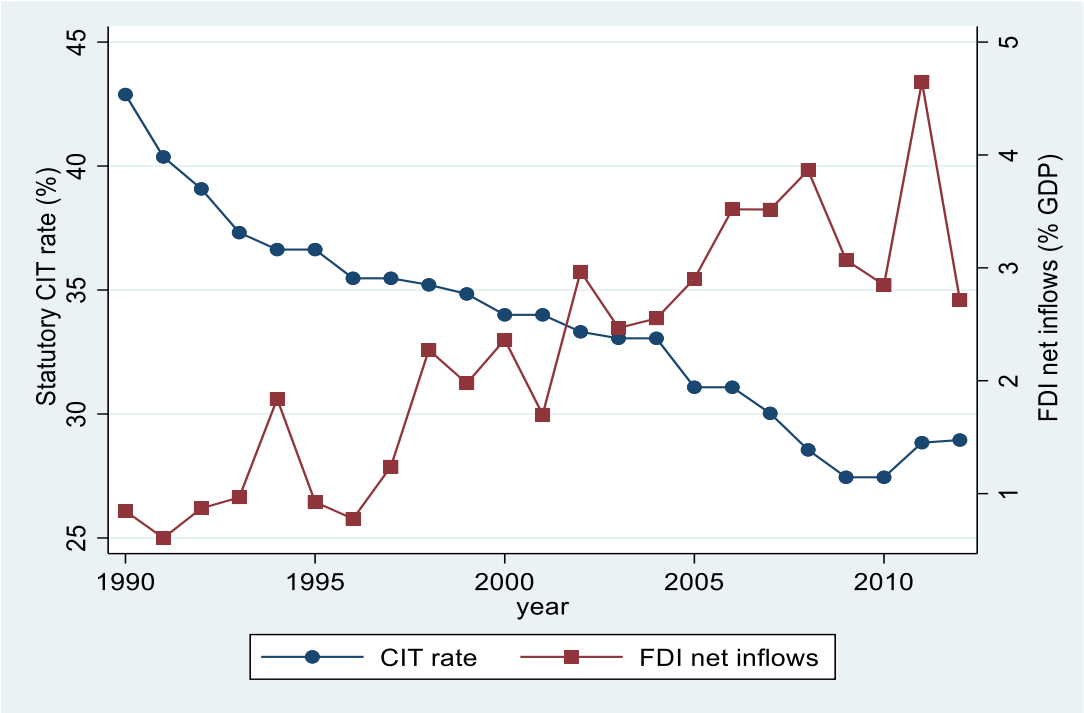
Source: Authors' calculations from IMF-FAD.

on tax revenues for the years 1990 and 1991 have been extracted from the database on tax revenue in sub-Saharan Africa (Mansour, 2014) because these data are missing in both the ICTD-GRD and IMF-WoRLD datasets.

All regions except Western Africa experienced an increase of their net inflows of FDI from 1995-1999 to 2000-2004 (Table 2). Similarly, all regions except Eastern Africa recorded a decrease of their FDI inflows between 2005-2009 to 2010-2014, likely due to the 2009 financial crisis and the instability in oil and commodity prices over the period 2010-2014.

As highlighted in Figure 2, even if there are some episodes where reductions in CIT rates are followed by reduction in FDI inflows, the overall picture suggests that FDI inflows to Africa have increased with reductions in CIT rates over the period 1990-2012.

Figure 2: FDI net inflows and CIT rates in Africa



Source: Authors calculations from IMF-FAD and WDI.

5.2 Specification Tests

In order to confirm the choice of the DSDM, we test the suitability of the Dynamic Spatial Autoregressive Model (DSAR) and SEM models for analyzing the impact of CIT rates on FDI against the DSDM. According to LeSage and Pace (2009), the DSDM specification is reduced to DSAR specification if the coefficients of the spatially lagged explanatory variables are not significantly different from zero. Thus, to assess the appropriateness of the DSDM against the DSAR, we test the joint nullity of the coefficients of the spatially lagged explanatory variables ($\beta_2 = \theta_2 = 0$, see Equation 1). This test, significant at the 1% level ($\chi2$ (9) = 317.48, Prob > $\chi2$ = 0.00), leads to the rejection of the null hypothesis, thereby rejecting the DSAR specification.

The SEM can also be viewed as a special case of the DSDM if $\rho\beta_1 + \beta_2=0$ and $\rho\theta_1 + \theta_2 =0$ in equation 1 (Burridge, 1981). We reject the null hypothesis that $\rho\beta_1 + \beta_2=0$ and $\rho\theta_1 + \theta_2 =0$ (χ (9) = 383.79, Prob > χ2 = 0.00) at the 1% level of significance, suggesting that the DSDM is preferable than the SEM.[8] The two likelihood ratio tests comfort the DSDM with respect to the SEM and DSAR specifications. Finally, we use the Hausman test to choose between the fixed effects and the random effects DSDM. The result of the Hausman test (χ (19)=887.42, Prob>χ2 = 0.0000) points to the rejection of the null the hypothesis of independence between the unobserved individuals effects and the explanatory variables. Therefore, a fixed effects DSDM is chosen in the present study.

5.3 Pattern of Spatial Autocorrelation, Direct and Indirect Effects

Our main empirical results are presented in Table 3 below. The presence of spatial interactions in FDI is confirmed by a significant value of ρ. Specifically, $\rho > 0$ suggests that in Africa, an increase in the amount of FDI in a particular country is likely to be a factor of attractiveness for its neighbors. Moreover, as shown in Column 1 of Table 3, the estimated coefficient for the FDI variable in year t-1 is positive and statistically significant at the x% level, suggesting that the success of past FDI matters in attracting more FDI to African countries.

Following LeSage and Pace (2009), we break down the impact of the explanatory variables on the dependent variable into direct and indirect effects. The direct effects of CIT rate variable measures the impact of a change in the CIT rate in country i on the amount of FDI in country i. The indirect effect measures the impact of a change of the CIT rate in country i on the amount of FDI in the others countries. Indirect effects are global spillovers because they affect all countries (not just neighboring countries), but their impacts decrease with the distance between two countries. Marginal direct, indirect, and total effects are presented in Columns 3 to 8 of Table 3. The direct and indirect effects associated with the CIT rate are negative and significantly different from 0 at the 1% level. A 1 percentage point reduction in the CIT rate will increase not only inflows of FDI by 0.05 percent points of GDP in the policy-initiating country (direct effect), but also by 0.1 percentage point of GDP in its neighboring countries (indirect effect).

[8] Abate (2016) and Elhorst (2010b) mentions that even if the true data generator process fits in a SEM, the SDM still produces unbiased estimates because the SEM is nested in the SDM so that the error dependence is taken into account in the variance-covariance matrix of the specification SDM

5.4 Short-Term and Long-Term Effects

Using a DSDM also allows computing both short-term and long-term effects of CIT changes on FDI flows. Short-term effects are computed as partial derivatives of FDI with respect to an explanatory variable at a particular point in time, while ignoring δ in equation (1). Long-term effects are computed as partial derivatives of FDI with respect to an explanatory variable at a particular point in time, while setting $FDI_{i,t-1} = FDI_{i,t} = FDI^*$ and $W.FDI_{i,t} = W.FDI^*$ (see Elhorst 2014, p.106 for details). Long-term effects are similar to a steady-state where the share of FDI in GDP remains constant in all countries.

In the short term, a 1-percentage-point cut in the CIT contributes to increasing not only the FDI-to-GDP ratio of 0.04 percentage points (direct effect) in the country that implemented the policy but also the FDI-to-GDP ratio of the neighboring countries of 0.09 percentage points (indirect effect). Thus, the total effect of the cut in the tax is 0.14 percentage points. Failure to take into account spatial interactions would have contributed to underestimating the effect of the CIT.

These results suggest that a change in national CIT policy has both domestic and cross border impacts on FDI. Typically, each country will benefit both from the competitiveness and attractiveness gains associated with a reduction of its own CIT rate and from spillovers effects that could result from a reduction in the CIT rates of its neighbors. These spatial spillovers effects stem from the region's overall attractiveness gains, as well as from better knowledge of the region's business environment by foreign investors.

In the long term, a CIT cut of a 1-percentage-point brings about an increase in the FDI to GDP ratio of 0.06 percentage point in the country, 0.12 percentage point in the neighboring countries for a total effect of 0.19 percentage point. The short-term and long-term effects are in the same direction, although the long-run effects are slightly larger. Our findings support proponents of tax incentives, according to which the cuts in taxes could be effective in attracting FDI in low-income countries since such reductions support the economic profitability of the companies subjected to a generally unfavorable economic and business environment (institutional deficiencies, poor quality of the infrastructures and labor force). In the long term, the cut in taxes will favor the installation of new companies, increase the activity of the companies already in place, and boost job creation, which will lead to an increase in the tax base and compensate for the initial losses in tax revenues.

5.5 Control Variables

Regarding the traditional determinants of FDI inflows in Africa (see Columns 3 and 6, Table 3), in line with our theoretical predictions, we find that GDP growth, government consumption, and financial development are important for attracting FDI in Africa. In addition, our results show that trade openness increases the attractiveness of a country in the long run. In the short run, trade openness tends to have a negative effect on FDI attraction in Africa, likely due to the fact that the policy environment is characterized by persistence trade barriers (Cantah et al., 2016). Similarly, We find that population size used as a proxy market size in the host country negatively affects FDI in short run but acts as an engine of FDI in long run. Furthermore, we find that macroeconomic instability proxied by inflation rate reduces FDI net inflows. An increase in the nominal exchange rate (appreciation of the domestic currency, direct quote) is positively related to FDI inflows. This result may be explained by the fact that an appreciation of the domestic currency may be interesting for foreign investors aiming to transfer profits in their origin country. The estimated coefficient for the "Infrastructure" variable, measured by fixed phone subscribers per 1,000 inhabitants, is not statistically significant.

5.6 Robustness Check

In the following sub-sections, we undertake two series of robustness checks. First, we check the sensitivity of our baseline results to the spatial weight matrix choice. Specifically, we use either geographic distance or economic distance as weighting matrices, noting that the baseline results are based on a mixed (economic and geographic) weight matrix. Second, we add additional controls to the baseline specification and check if our main results remain unchanged.[9]

Weighting matrices

The results discussed in Table 3 are based on a mixed (economic and geographic) weight matrix. In Table 4 (in the Appendix), we report results obtained from the estimation of our baseline specification using the inverse economic distance as the spatial weight matrix. Our main findings remain unchanged. In the short run, a cut in CIT rate increases FDI, while in the longer run, a reduction in CIT rate decreases the net inflows of FDI in both the host country and the neighboring countries.

[9] While we report results for tax revenues, quality of institutions and natural resources, those for human capital, capital account openness are available upon request from the authors.

A country may also have strong incentives to cut the statutory CIT rate if its geographical neighbors lower their statutory CIT rates (Heinemann et al., 2010). As a result, the inverse geographical distance has been commonly used as a weighting matrix in empirical studies on tax incentives (Heinemann et al., 2010; Klemm and Van Parys, 2012). We therefore estimate the baseline model using the inverse distance between countries as a weighting matrix. [10] The estimation results are displayed in Table 5. Again, we find that, a reduction of the CIT rate increases FDI net inflows in the short run but decreases FDI inflows in all the countries engaged in CIT rate reduction in the long run.

Control variables

We run another robustness check through the inclusion of additional controls in the baseline specification (institutions, natural resources, education, total taxes, and capital account openness). Cuts in CIT rates for attracting FDI are likely to result in losses in CIT revenue and therefore in total tax revenue. Thus, policy makers from a country engaged in reducing CIT rate may implement measures aiming at compensating for losses in tax revenue in order to ensure proper provision of public goods and services. These measures range from broadening the corporate taxation base to increasing the tax burden of other tax instruments in the economy (Devereux et al., 2002). One could argue that countries may temporarily rely on debt to avoid underprovision of public goods and services, if they face downward pressure on tax revenues due to cuts in CIT rate. However, this solution is more difficult for African economies due to the relative scarcity of external funding. To control for all of the adjustments in other taxes and in the CIT base induced by CIT rate reduction in a context of tax competition, we follow Arcalean (2016) by including the total tax revenues in the baseline specification. Table 6 (in the Appendix) provides the results obtained when total taxes are included in the baseline model.

Our main results are robust. A reduction of CIT rate increases FDI inflows in the short run (Table 6; columns 3, 4, and 5) but decreases them in the long run in the host economy and in other neighboring economies (Table 6; columns 6, 7, and 8). In the short run, total tax revenue negatively affects FDI in the host country, while in the long run, total tax revenue is positively correlated with FDI net inflows in Africa, suggesting that there is compatibility between the objectives of tax revenues mobilization and FDI attractiveness in Africa in the longer run. Moreover, in both the short run and the long run, we find that an increase in total tax revenues in a host country does not significantly affect FDI net inflows in neighboring countries (see

[10] Geographic distance between countries i and j is the Euclidian distance between the capitals of countries i and j.

Table 6, columns 4 and 7). Plausibly, if the increase in total tax revenues is not a consequence of a CIT rate increase, other things being equal, domestic capitals will not move to other countries.

As previously discussed (see the section on the determinants of FDI), political risk can affect FDI net inflows in Africa. We therefore control for the impact of political instability on FDI using the political rights index from Freedom House (2014). We find that in the short run, an improvement in political rights (reduction of political rights index) is likely to stimulate FDI inflows in Africa (Table 7 in Appendix) while in the long run, the political rights index has no significant impact on FDI inflows.

Natural resources also affect FDI inflows in Africa. Resource-rich countries may for instance be able to attract more FDI than non-resource-rich countries even when the CIT is lower in the non-resource rich countries. We take this into account by controlling for the impact of natural resources in the baseline specification using data on natural resources rents from WDI. Where missing, natural resource rents are calculated as the sum of oil rents as a percent of GDP, mineral rents as a percent of GDP, and natural gas rent as a percent of GDP also using WDI data. We find that natural resources rents are positively associated with FDI inflows in Africa (Table 8, columns 3 and 6).

We also control for the impact of human capital in attracting FDI in Africa, which is assumed to enhance a country's FDI attractiveness. Annual data on human capital is obtained from Penn World Table version 9.0 (PWT9.0) (Feenstra et al., 2015). We find that lowering the CIT rate increases FDI inflows in the both short and long term for African economies.

As documented by Asiedu and Lien (2004), control of capital flows across countries can affect FDI inflows. We consider this situation by testing for the impact of capital account liberalization on FDI inflows in Africa using capital account openness data (KAOPEN) from Chinn and Ito (2006). In theory, capital account liberalization increases FDI inflows. However, despite relatively low restrictions on capital flows, developing countries, including some

African countries, have only attracted low levels of FDI inflows, making the impact of capital account liberalization on FDI inflows in Africa somehow unpredictable (Kose and Prasad, 2012). Controlling for the impact of capital account openness does not change our main results qualitatively. In the short run, CIT rate reduction increases FDI inflows while it reduces FDI net inflows in the long run in Africa. The estimates show that capital account liberalization is positively associated with FDI inflows in the short run; while in the long run, it has no significant impact on FDI inflows in Africa.

We already outlined that previous FDI affects the current level of FDI in a given country. Beyond borders, the history of FDI in neighboring countries could affect the attractiveness of a host country. Indeed, if previous FDI in neighboring countries has produced good results (bad results), foreign investors will consider these countries more attractive (less attractive) than a host country. To examine this hypothesis, we include in the baseline specification a-year lag of the weighted average FDI in neighboring countries ($WFDI_{t-1}$). Table 9 in the Appendix shows the results obtained from this model (called Full DSDM). Our main results remain robust: in the short run, CIT rate reduction positively affects FDI inflows while it reduces FDI net inflows in the long run. The estimates also indicate that previous FDI in neighboring countries stimulates the attractiveness of a host country (Table 9, column 1).

6. Conclusion

This paper evaluates the effectiveness of cuts in CIT rates in attracting FDI for a balanced panel of 19 African countries over the period 1990-2012. In contrast to previous similar studies, our study takes into account spatial autocorrelation in FDI between countries by estimating a dynamic spatial durbin model with fixed effects.

The empirical results are twofold. First, we find that cuts in statutory CIT rate increase FDI net inflows to the host country and in the other neighboring countries in the short and long terms. Therefore, lowering the tax is an economic policy instrument that can attract more FDI. However, to reduce the negative effects of lower tax revenues, governments can broaden the tax base and strengthen tax collection capacities to finance development needs. Indeed, many African countries still have weak tax revenue in relation to their tax potential. In 2014, the average tax-to-GDP ratio in Africa was only about 17.1 percent, which is much lower than the estimated level of about 25 percent required for financing basic development needs (AEO, 2018). Second, we find that an increase in FDI in a host country is likely to improve its neighboring countries' attractiveness to FDI. Furthermore, our results show that FDI in previous years positively affect FDI in current period. These results are robust to changes in weighting matrix and additional controls. In line with theoretical predictions, we find that GDP growth, government consumption, and financial development stimulate FDI net inflows to African countries.

While the results from this paper are in line with the view that a reduction in corporate tax burden could be effective for attracting FDI in low-income countries context, they also suggest putting emphasis on structural factors that boost economic growth and develop the financial sector for attracting FDI. Indeed, the CIT level is not the only determining factor. For

instance, a number of African countries (Nigeria, Morocco, Gabon, Côte d'Ivoire, Cameroon, South Africa and Kenya) with relatively large domestic output and FDI's structural drivers have relatively higher corporate income tax rates. Indeed, the long-term profitability of a project is also influenced by access to markets and profit opportunities; predictable and nondiscriminatory legal and regulatory framework; macroeconomic stability; skilled and responsive labour markets; and well-developed infrastructure (OECD, 2008) so that countries with high levels of tax can continue to attract FDI in the long run.

In Africa, multinational enterprises operating in mining and extractive sector typically require a stability clause in their contracts indicating that the tax regime in force at the time of signing the contract will remain stable over a given period (mining period).[11] Thus, it appears reasonable to think that extractive companies are not very sensitive to changes in statutory corporate tax rates in Africa. However, we do not have disaggregated data on FDI flows to the mining and petroleum sectors, making it impossible to test this hypothesis in the present study.

Furthermore, as the highest proportion of FDI inflows to Africa is oriented towards resource sectors, it would be interesting to test the robustness of our results using FDI in natural resource sector as the dependent variable. To be consistent in the analysis, such approach will accordingly require using the corporate tax rate applied for the mining and/or petroleum projects instead of the standard statutory corporate tax rate. While data on corporate tax rates applied to mining companies for 14 African countries can be collected from Laporte (2017), data on FDI in natural resources sectors in Africa are not available for a large number of countries over a long period. In fact, to our knowledge, the International Trade Center (ITC) and the UNCTAD[12] are the only datasets that provide data on FDI in natural resources sectors, but these datasets covers a very limited number of African countries over short periods making them somewhat unsuitable for our methodology. The above extensions are therefore left for future research on the relationship between tax policy and FDI inflows in Africa.

6

[11] Mansour and Nakhle (2016) discuss in detail stabilization clauses in oil and gas contracts for Mexico and 20 developing countries including African countries.

[12] The OECD provides data on FDI in natural resources sectors only for its member countries and no African country is a member of this international organization.

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Appendix

Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
FDI_net_inflows (%GDP)	2.237	2.673	-8.589	20.049	437
CIT rate	33.685	7.167	15	60	437
Nominal exchange rate	275.912	432.847	0.013	2522.746	437
GDP growth	3.989	3.955	-15.096	33.736	437
Gov. consumption (%GDP)	14.33	4.21	4.833	31.554	437
Political rights	4.597	1.875	1	7	437
Human capital	1.798	0.359	1.185	2.762	437
Trade openness (X+M)/GDP	71.172	30.88	11.087	202.85	437
Fixed phone subscriptions (per 1000 inhabitants)	4.063	5.862	0.107	31.503	437
Inflation	11.075	16.378	-11.686	132.824	437
Financial development	36.415	41.077	-79.092	192.66	437
Population	25.725	30.315	0.863	168.24	437
Natural resources rents (%GDP)	0.463	1.366	0	12.011	437
Tax revenues (%GDP)	14.435	6.339	3.206	38.487	437

Source: Authors calculations from IMF-FAD, Freedom House, PWT9.0 and WDI.

Table 2: Annual averages of FDI net inflows (% GDP) to Africa, 1990-2014[13]

Region	1990-1994	1995-1999	2000-2004	2005-2009	2010-2014
Africa	0.797	1.518	2.242	3.066	2.287
Western Africa	1.843	2.353	1.886	2.855	2.502
Central Africa	0.525	2.945	7.275	2.517	1.792
Eastern Africa	0.505	1.969	2.200	3.078	4.815
Southern Africa	0.169	1.156	1.879	2.329	1.679
Northern Africa	0.874	1.003	1.775	3.857	1.753

Source: Authors' calculations from UNCTAD.

Table 3: Impacts of tax incentives on FDI: results from the baseline specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.270***							
	(0.0971)							
CIT_rate	-0.0547***	-0.114***	-0.0491***	-0.0984***	-0.147***	-0.0646***	-0.128***	-0.193***
	(0.00839)	(0.0174)	(0.00819)	(0.0161)	(0.0214)	(0.0111)	(0.0217)	(0.0288)
Nominal exchange rate	0.00184***	0.00372***	0.00166***	0.00324***	0.00490***	0.00218***	0.00423***	0.00641***
	(0.000259)	(0.00125)	(0.000279)	(0.00118)	(0.00113)	(0.000405)	(0.00158)	(0.00147)
GDP growth	0.0764***	0.0617*	0.0738***	0.0472	0.121**	0.100***	0.0581	0.158**
	(0.0219)	(0.0373)	(0.0203)	(0.0311)	(0.0498)	(0.0270)	(0.0401)	(0.0646)
Gov. consumption	0.0911***	0.00415	0.0926***	-0.00903	0.0836***	0.128***	-0.0184	0.109***
	(0.0235)	(0.0171)	(0.0241)	(0.0129)	(0.0314)	(0.0331)	(0.0165)	(0.0407)
Trade openness	-0.0220***	-0.00618	-0.0219***	-0.00257	-0.0245	-0.0301***	-0.00201	-0.0321
	(0.00576)	(0.0134)	(0.00513)	(0.0126)	(0.0165)	(0.00681)	(0.0167)	(0.0216)
Fixed phone subscr.	0.00241	0.0917	-0.00165	0.0837	0.0820	-0.00457	0.112	0.108
	(0.0216)	(0.0914)	(0.0230)	(0.0827)	(0.0758)	(0.0327)	(0.111)	(0.0995)
Inflation	-0.00713***	0.0374***	-0.00935***	0.0356***	0.0263***	-0.0140***	0.0483***	0.0343***
	(0.00270)	(0.0102)	(0.00233)	(0.00933)	(0.00998)	(0.00313)	(0.0125)	(0.0129)
Financial dev.	0.0150***	0.00974	0.0146***	0.00727	0.0219**	0.0199***	0.00873	0.0286**
	(0.00357)	(0.0107)	(0.00375)	(0.00965)	(0.00896)	(0.00528)	(0.0130)	(0.0117)
Population	-0.0655***	0.0116	-0.0665***	0.0198	-0.0468***	-0.0921***	0.0309*	-0.0612***
	(0.0107)	(0.0143)	(0.0102)	(0.0128)	(0.0171)	(0.0139)	(0.0168)	(0.0224)
rho	0.146***							
	(0.0226)							
sigma2_e	4.394***							
	(0.815)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-920.0	-920.0	-920.0	-920.0	-920.0	-920.0	-920.0	-920.0

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

[13] FDI attractiveness performance recorded in Central Africa over the period 2000/2004 was mainly driven by Equatorial Guinea (the same observation is in Avom and Ngo Nkoa , 2013) and Chad, two major oil-producing countries. In fact, the oil industry has significantly stimulated the economic growth of Equatorial Guinea over the period 2000-2004 (70% in 2001), resulting in an increase in FDI in the country (*African Economic Outlo*ok, 2013).

Table 4: Impact of cuts in CIT rate on FDI: inverse economic distance interaction matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.261**							
	(0.102)							
CIT_rate	-0.0553***	-0.170***	-0.0485***	-0.123***	-0.172***	-0.0630***	-0.152***	-0.215***
	(0.00938)	(0.0361)	(0.00874)	(0.0296)	(0.0357)	(0.0116)	(0.0380)	(0.0457)
Nominal exchange rate	0.00199***	0.00685***	0.00170***	0.00512***	0.00682***	0.00219***	0.00633***	0.00851***
	(0.000268)	(0.00246)	(0.000269)	(0.00194)	(0.00190)	(0.000390)	(0.00245)	(0.00235)
GDP growth	0.0793***	0.122	0.0750***	0.0791	0.154*	0.100***	0.0920	0.192*
	(0.0240)	(0.0842)	(0.0207)	(0.0607)	(0.0798)	(0.0268)	(0.0744)	(0.0987)
Gov. consumption	0.0857***	-0.0262	0.0893***	-0.0437**	0.0456	0.123***	-0.0660**	0.0569
	(0.0263)	(0.0279)	(0.0271)	(0.0202)	(0.0340)	(0.0372)	(0.0261)	(0.0423)
Trade openness	-0.0205***	0.00128	-0.0210***	0.00655	-0.0144	-0.0288***	0.0106	-0.0182
	(0.00662)	(0.0306)	(0.00553)	(0.0246)	(0.0285)	(0.00713)	(0.0312)	(0.0357)
Fixed phone subscr.	-0.00835	0.0826	-0.0112	0.0682	0.0569	-0.0169	0.0881	0.0712
	(0.0241)	(0.123)	(0.0239)	(0.0930)	(0.0932)	(0.0328)	(0.119)	(0.117)
Inflation	-0.00336	0.0827***	-0.00727***	0.0674***	0.0601***	-0.0117***	0.0867***	0.0750***
	(0.00270)	(0.0181)	(0.00211)	(0.0132)	(0.0136)	(0.00280)	(0.0165)	(0.0166)
Financial dev.	0.0154***	0.0293	0.0142***	0.0205	0.0347**	0.0189***	0.0245	0.0433**
	(0.00368)	(0.0238)	(0.00407)	(0.0187)	(0.0171)	(0.00579)	(0.0240)	(0.0213)
Population	-0.0572***	0.0377	-0.0595***	0.0454*	-0.0141	-0.0822***	0.0646**	-0.0176
	(0.0112)	(0.0293)	(0.0110)	(0.0232)	(0.0270)	(0.0147)	(0.0293)	(0.0337)
rho	0.311***							
	(0.0400)							
sigma2_e	4.310***							
	(0.787)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-938.6	-938.6	-938.6	-938.6	-938.6	-938.6	-938.6	-938.6

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

Table 5: Impact of CIT rate reduction on FDI: inverse geographical distance weighting matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.249***							
	(0.0797)							
CIT_rate	-0.0553***	-0.264***	-0.0427***	-0.133***	-0.176***	-0.0535**	-0.151***	-0.204***
	(0.0133)	(0.0640)	(0.0164)	(0.0388)	(0.0309)	(0.0234)	(0.0479)	(0.0356)
Nominal exchange rate	0.00111***	-0.00235***	0.00130***	-0.00196***	-0.000661	0.00183***	-0.00260***	-0.000767
	(0.000283)	(0.000797)	(0.000272)	(0.000441)	(0.000525)	(0.000375)	(0.000527)	(0.000610)
GDP growth	0.0771**	0.258	0.0662**	0.118	0.184*	0.0860**	0.127	0.213*
	(0.0352)	(0.172)	(0.0280)	(0.0841)	(0.110)	(0.0355)	(0.0947)	(0.126)
Gov. consumption	0.0579***	0.114	0.0551**	0.0364	0.0915	0.0739**	0.0324	0.106
	(0.0187)	(0.160)	(0.0226)	(0.0948)	(0.0858)	(0.0324)	(0.116)	(0.0997)
Trade openness	-0.0236***	0.0591***	-0.0280***	0.0473***	0.0192**	-0.0396***	0.0619***	0.0223**
	(0.00321)	(0.0175)	(0.00305)	(0.00952)	(0.00937)	(0.00421)	(0.0115)	(0.0108)
Fixed phone subscr.	-0.0375**	-0.0175	-0.0376**	0.00472	-0.0329	-0.0513**	0.0130	-0.0383
	(0.0181)	(0.206)	(0.0158)	(0.115)	(0.113)	(0.0224)	(0.137)	(0.131)
Inflation	-0.00885*	0.0578**	-0.0126***	0.0391**	0.0266	-0.0183***	0.0492***	0.0309
	(0.00477)	(0.0292)	(0.00396)	(0.0154)	(0.0182)	(0.00517)	(0.0179)	(0.0211)
Financial dev.	0.0153***	-0.140***	0.0237***	-0.0926***	-0.0688***	0.0353***	-0.115***	-0.0798***
	(0.00536)	(0.0360)	(0.00537)	(0.0200)	(0.0194)	(0.00768)	(0.0241)	(0.0224)
Population	-0.0870***	0.114	-0.0974***	0.112*	0.0142	-0.136***	0.153**	0.0166
	(0.0163)	(0.111)	(0.0124)	(0.0581)	(0.0667)	(0.0160)	(0.0675)	(0.0773)
rho	0.817***							
	(0.0559)							
sigma2_e	3.931***							
	(0.710)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-988.6	-988.6	-988.6	-988.6	-988.6	-988.6	-988.6	-988.6

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

Table 6: CIT rate and FDI in Africa: controlling for the impact of substitution in total tax composition

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.270***							
	(0.0944)							
CIT_rate	-0.0531***	-0.114***	-0.0474***	-0.0981***	-0.146***	-0.0624***	-0.128***	-0.191***
	(0.00845)	(0.0200)	(0.00812)	(0.0190)	(0.0239)	(0.0110)	(0.0256)	(0.0320)
Nominal exchange rate	0.00187***	0.00374***	0.00248	0.00324*	0.00572	0.00331	0.00418	0.00749
	(0.000256)	(0.00120)	(0.0286)	(0.00179)	(0.0273)	(0.0394)	(0.00406)	(0.0358)
GDP growth	0.0758***	0.0607*	0.0733***	0.0458	0.119**	0.0995***	0.0561	0.156**
	(0.0209)	(0.0366)	(0.0194)	(0.0307)	(0.0484)	(0.0258)	(0.0396)	(0.0629)
Gov. consumption	0.0904***	0.00332	0.0918***	-0.00977	0.0820***	0.127***	-0.0194	0.107***
	(0.0220)	(0.0179)	(0.0223)	(0.0141)	(0.0318)	(0.0307)	(0.0178)	(0.0414)
Trade openness	-0.0219***	-0.00539	-0.0219***	-0.00178	-0.0237	-0.0302***	-0.000922	-0.0311
	(0.00563)	(0.0130)	(0.00594)	(0.0124)	(0.0161)	(0.00800)	(0.0165)	(0.0212)
Fixed phone subscr.	0.00483	0.0984	0.000428	0.0908	0.0912	-0.00202	0.122	0.120
	(0.0205)	(0.0893)	(0.0220)	(0.0793)	(0.0727)	(0.0313)	(0.107)	(0.0953)
Inflation	-0.00783***	0.0381***	-0.00996**	0.0368***	0.0268**	-0.0149**	0.0499***	0.0350**
	(0.00288)	(0.01000)	(0.00493)	(0.00874)	(0.0107)	(0.00674)	(0.0117)	(0.0138)
Financial dev.	0.0146***	0.00999	0.0141***	0.00743	0.0216**	0.0192***	0.00897	0.0282**
	(0.00367)	(0.0102)	(0.00392)	(0.00953)	(0.00917)	(0.00550)	(0.0128)	(0.0119)
Population	-0.0668***	0.0131	-0.0677***	0.0215	-0.0462***	-0.0938***	0.0334*	-0.0604***
	(0.0105)	(0.0147)	(0.0105)	(0.0133)	(0.0171)	(0.0144)	(0.0175)	(0.0223)
Political instability	-0.0504**	0.0292	-0.0513**	0.0314	-0.0199	-0.0714**	0.0456	-0.0258
	(0.0240)	(0.0814)	(0.0248)	(0.0748)	(0.0746)	(0.0345)	(0.100)	(0.0975)
rho	0.147***							
	(0.0209)							
sigma2_e	4.392***							
	(0.798)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-919.9	-919.9	-919.9	-919.9	-919.9	-919.9	-919.9	-919.9

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

Table 7: CIT rate incentives and FDI in Africa: controlling for the quality of institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.256***							
	(0.0983)							
CIT_rate	-0.0519***	-0.117***	-0.0456***	-0.100***	-0.146***	-0.0586***	-0.129***	-0.187***
	(0.00933)	(0.0191)	(0.00915)	(0.0172)	(0.0239)	(0.0122)	(0.0227)	(0.0314)
Nominal exchange rate	0.00203***	0.00402***	0.00181***	0.00346***	0.00527***	0.00234***	0.00443***	0.00677***
	(0.000247)	(0.00140)	(0.000250)	(0.00128)	(0.00125)	(0.000355)	(0.00168)	(0.00158)
GDP growth	0.0742***	0.0577*	0.0717***	0.0423	0.114***	0.0954***	0.0507	0.146***
	(0.0199)	(0.0312)	(0.0185)	(0.0259)	(0.0425)	(0.0242)	(0.0327)	(0.0541)
Gov. consumption	0.0654***	-0.0243	0.0686***	-0.0327**	0.0358	0.0935***	-0.0476**	0.0459
	(0.0253)	(0.0165)	(0.0263)	(0.0145)	(0.0284)	(0.0357)	(0.0196)	(0.0363)
Trade openness	-0.0197***	-0.00116	-0.0199***	0.00197	-0.0179	-0.0269***	0.00388	-0.0230
	(0.00471)	(0.0122)	(0.00424)	(0.0112)	(0.0138)	(0.00558)	(0.0147)	(0.0177)
Fixed phone subscr.	-0.0245	0.0914	-0.0291	0.0892	0.0601	-0.0418	0.119	0.0772
	(0.0206)	(0.0922)	(0.0221)	(0.0834)	(0.0744)	(0.0309)	(0.110)	(0.0956)
Inflation	-0.00978**	0.0346***	-0.0120***	0.0335***	0.0215**	-0.0173***	0.0448***	0.0275**
	(0.00313)	(0.0110)	(0.00262)	(0.00958)	(0.0106)	(0.00341)	(0.0126)	(0.0135)
Financial dev.	0.0219***	0.0122	0.0214***	0.00805	0.0295***	0.0286***	0.00913	0.0378***
	(0.00451)	(0.0118)	(0.00437)	(0.0105)	(0.0114)	(0.00591)	(0.0137)	(0.0144)
Population	-0.0838***	0.00364	-0.0844***	0.0153	-0.0691***	-0.114***	0.0256*	-0.0887***
	(0.0117)	(0.0128)	(0.0117)	(0.0119)	(0.0143)	(0.0157)	(0.0155)	(0.0186)
Tax revenues	-0.132***	-0.0818*	-0.128***	-0.0573	-0.186***	-0.171***	-0.0666	-0.238***
	(0.0276)	(0.0469)	(0.0243)	(0.0358)	(0.0560)	(0.0320)	(0.0448)	(0.0706)
rho	0.157***							
	(0.0249)							
sigma2_e	4.299***							
	(0.788)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-923.9	-923.9	-923.9	-923.9	-923.9	-923.9	-923.9	-923.9

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

Table 8: CIT incentives and FDI in Africa: controlling for the impact of natural resources

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.252***							
	(0.0901)							
CIT_rate	-0.0358***	-0.101***	-0.0307***	-0.0888***	-0.119***	-0.0389***	-0.114***	-0.153***
	(0.00727)	(0.0133)	(0.00708)	(0.0122)	(0.0159)	(0.00942)	(0.0161)	(0.0208)
Nominal exchange rate	0.00212***	0.00448***	0.00189***	0.00391***	0.00580***	0.00243***	0.00501***	0.00744***
	(0.000302)	(0.00118)	(0.000306)	(0.00110)	(0.00112)	(0.000423)	(0.00143)	(0.00143)
GDP growth	0.0725***	0.0575	0.0699***	0.0433	0.113**	0.0926***	0.0523	0.145**
	(0.0230)	(0.0350)	(0.0216)	(0.0285)	(0.0486)	(0.0283)	(0.0358)	(0.0618)
Gov. consumption	0.0867***	0.0168	0.0873***	0.00371	0.0910***	0.117***	-0.000502	0.117***
	(0.0223)	(0.0147)	(0.0231)	(0.0117)	(0.0269)	(0.0311)	(0.0153)	(0.0342)
Trade openness	-0.0280***	-0.00939	-0.0278***	-0.00471	-0.0325**	-0.0373***	-0.00454	-0.0418**
	(0.00527)	(0.0110)	(0.00484)	(0.0104)	(0.0141)	(0.00630)	(0.0136)	(0.0183)
Fixed phone subscr.	0.0209	0.116	0.0161	0.105	0.121	0.0191	0.137	0.156
	(0.0205)	(0.0976)	(0.0221)	(0.0885)	(0.0814)	(0.0306)	(0.117)	(0.105)
Inflation	-0.00543*	0.0341***	-0.00745***	0.0324***	0.0250**	-0.0109***	0.0428***	0.0319**
	(0.00288)	(0.0102)	(0.00238)	(0.00891)	(0.00994)	(0.00307)	(0.0116)	(0.0126)
Financial dev.	0.0135***	0.00809	0.0131***	0.00584	0.0189**	0.0174***	0.00684	0.0242**
	(0.00379)	(0.0101)	(0.00389)	(0.00901)	(0.00887)	(0.00529)	(0.0118)	(0.0113)
Population	-0.0308***	0.0222	-0.0321***	0.0253	-0.00681	-0.0438***	0.0350*	-0.00874
	(0.0106)	(0.0172)	(0.0102)	(0.0155)	(0.0237)	(0.0135)	(0.0200)	(0.0304)
Natural ressource rents	0.0746***	0.0254	0.0739***	0.0144	0.0882***	0.0987***	0.0145	0.113***
	(0.0186)	(0.0207)	(0.0194)	(0.0192)	(0.0214)	(0.0262)	(0.0253)	(0.0277)
rho	0.146***							
	(0.0241)							
sigma2_e	4.321***							
	(0.820)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-916.8	-916.8	-916.8	-916.8	-916.8	-916.8	-916.8	-916.8

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

Table 9: Tax incentives and FDI in Africa: Full DSDM estimation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FDI net inflow	Estimate		Short-run marginaleffects			Long-run marginaleffects		
Variables	Main	WX	Direct	Indirect	Total	Direct	Indirect	Total
L.FDI_net_inflows	0.275***							
	(0.0960)							
L.W.FDI_net_inflows	0.0523**							
	(0.0231)							
CIT_rate	-0.0534***	-0.108***	-0.0477***	-0.0928***	-0.141***	-0.0666***	-0.130***	-0.197***
	(0.00840)	(0.0178)	(0.00749)	(0.0170)	(0.0216)	(0.0105)	(0.0244)	(0.0310)
Nominal exchange rate	0.00171***	0.00360***	0.00150***	0.00313***	0.00463***	0.00210***	0.00438***	0.00647***
	(0.000241)	(0.00124)	(0.000268)	(0.00118)	(0.00110)	(0.000371)	(0.00162)	(0.00153)
GDP growth	0.0774***	0.0647*	0.0754***	0.0496	0.125**	0.104***	0.0702*	0.174***
	(0.0221)	(0.0379)	(0.0203)	(0.0304)	(0.0489)	(0.0281)	(0.0422)	(0.0677)
Gov. consumption	0.0920***	0.00258	0.0932***	-0.0112	0.0819***	0.128***	-0.0138	0.114***
	(0.0239)	(0.0164)	(0.0233)	(0.0130)	(0.0307)	(0.0322)	(0.0181)	(0.0425)
Trade openness	-0.0221***	-0.00633	-0.0216***	-0.00255	-0.0242	-0.0299***	-0.00403	-0.0339
	(0.00554)	(0.0129)	(0.00482)	(0.0119)	(0.0153)	(0.00670)	(0.0167)	(0.0216)
Fixed phone subscr.	0.00221	0.104	-0.00259	0.0931	0.0905	-0.00266	0.129	0.127
	(0.0216)	(0.0912)	(0.0229)	(0.0821)	(0.0757)	(0.0312)	(0.114)	(0.106)
Inflation	-0.00745***	0.0341***	-0.00935***	0.0330***	0.0236**	-0.0126***	0.0456***	0.0329**
	(0.00281)	(0.00996)	(0.00254)	(0.00855)	(0.00942)	(0.00349)	(0.0118)	(0.0130)
Financial dev.	0.0148***	0.00756	0.0144***	0.00514	0.0196**	0.0199***	0.00742	0.0274**
	(0.00355)	(0.0103)	(0.00384)	(0.00899)	(0.00829)	(0.00525)	(0.0124)	(0.0115)
Population	-0.0660***	0.0130	-0.0670***	0.0209*	-0.0461***	-0.0921***	0.0276	-0.0645***
	(0.0108)	(0.0145)	(0.0110)	(0.0123)	(0.0162)	(0.0151)	(0.0169)	(0.0226)
rho	0.148***							
	(0.0206)							
sigma2_e	4.389***							
	(0.815)							
Observations	418	418	418	418	418	418	418	418
Number of countries	19	19	19	19	19	19	19	19
Log-pseudolikelihood	-920.5	-920.5	-920.5	-920.5	-920.5	-920.5	-920.5	-920.5

*, **, and *** represent statistical significance at the 1, 5, and 10 percent level, respectively

List of countries

Botswana | Cameroon | Côte d'Ivoire | Egypt | Gabon | Ghana | Kenya | Malawi | Mauritius |

Morocco | Nigeria | Senegal | South Africa | Sudan | Swaziland | Tanzania | Togo | Tunisia | Uganda |