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WORKING PAPER

Empirical Evidence on the Effects of Tax Incentives

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Abstract

This paper considers two empirical questions about tax incentives: (i) are incentives used as tools of tax competition and (ii) how effective are incentives in attracting investment? To answer these, we prepared a new dataset of tax incentives in over 40 Latin American, Caribbean and African countries for the period 1985–2004. Using spatial econometrics techniques for panel data to answer the first question, we find evidence for strategic interaction in tax holidays, in addition to the well-known competition over the corporate income tax (CIT) rate. We find no evidence, however, for competition over investment allowances and tax credits. Using dynamic panel data econometrics to answer the second question, we find evidence that lower CIT rates and longer tax holidays are effective in attracting FDI in Latin America and the Caribbean but not in Africa. None of the tax incentives is effective in boosting gross private fixed capital formation.

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1. INTRODUCTION

Tax incentives are common around the world, especially in developing countries. Governments try to reallocate or attract domestic and foreign capital using tax incentives that give a more favorable tax treatment to certain economic activities. Common examples of this practice are reduced corporate income tax rates, temporary exemptions on corporate taxes (tax holidays), tax deductions through tax credits or investment allowances, etc. Whatever their intentions, the use of tax incentives in developing countries is controversial, as they come with significant, and sometimes overlooked, costs. Apart from financial costs, such as foregone revenue and administrative costs, they include important welfare costs through inefficient allocation of capital, especially if badly designed. A growing literature discusses their likely effects, including their benefits and risks.¹ While economists are generally skeptical about the use of tax incentives, they remain popular policy tools because policy makers—possibly unaware of their costs—tend to stress the potential benefits in terms of higher investment and related spillovers. There is, however, little empirical evidence about the impact of tax incentives on investment in developing countries. This paper aims to fill this gap and provide empirical evidence on the effectiveness of tax incentives to attract investment using a panel of developing countries.

The theoretical work that explains why investment would react on tax incentives goes back to the neoclassical investment theory, pioneered by Jorgenson (1963). The basic argument goes that firms accumulate capital as long as the benefits exceed the costs. According to this theory, if tax reductions decrease the user cost of capital, investment goes up. The existing empirical literature on the relationship between taxes and investment has generally found that while other factors are also (and sometimes more) important determinants of investment, taxes have significant effects.² Building on the neoclassical investment theory, international tax competition models investigate how countries set corporate tax rates in an international context. In an international context, when capital is mobile, the sensitivity of capital to the tax burden leads countries to undercut each other's tax rate to attract capital (Zodrow and Mieszkowski 1986).³ The international tax competition literature has been tested by estimating strategic tax reaction functions, in which the tax rate of one jurisdiction depends on the weighted average of the tax rates in the other competing jurisdictions. Devereux et al. (2008) and Altshuler and Goodspeed (2002), for example, report significant interactions between countries' corporate tax rates.

The contribution of this paper is to test two theoretical predictions about tax incentives in developing countries. First, we test whether positive spatial interaction also exists between tax incentives in addition to tax rates. In a rapidly globalizing world, governments in developing countries often use the strong international competition as an argument for using tax incentives. We confirm that spatial interdependence exists for the statutory corporate income tax (CIT) rate and tax holidays, but not for investment allowances. Second, we test whether the prediction that higher tax incentives – through a decrease of the user cost of capital - lead to higher investment, holds in developing countries. We find that lowering the

¹ Examples include Bird (2000), Shah (1995), OECD (2001), Zee, Stotsky and Ley (2002), and Klemm (2010).

² See surveys by Hassett and Hubbard (2002), Hines (1999) and De Mooij and Ederveen (2003).

³ See Wilson (1999) for an overview of tax competition models.

cit rate and extending tax holidays is effective in attracting FDI in Latin America and the Caribbean (LAC) but not in Africa. We find no evidence of the effectiveness of tax incentives for total private investment.

These two questions are not only interesting in their own right, but also interrelated. The first question looks at the issue from the perspective of the country, while the second looks at it from the firms' angle. The finding that the CIT rate and the holiday appear to be relevant for FDI in LAC while it is also used as a strategic tax competition tool, suggests that policy makers take firms' perspectives into account when setting the CIT rate. It suggests that LAC countries are indeed competing over footloose FDI, rather than just in a beauty contest over low tax rates. The finding that the CIT rate and the holiday are less relevant in Africa while also African countries strategically interact, suggests that the strategic interaction in Africa has rather political than economic grounds.

The investigation of tax incentives for investment in developing countries deserves special attention:

- First, there is little empirical evidence on the effectiveness of tax incentives to attract investment. Econometric techniques have been used to study certain tax incentives that are popular in advanced economies, such as R&D tax credits and special enterprise zones.⁴ For developing countries, apart from a recent study by Van Parys and James (2010) on tax incentives in the CFA Franc Zone in Africa, the evidence does not go beyond case studies on particular countries, surveys, or the calculation of marginal effective tax rates (METRs).⁵ While case studies are often interesting and come to plausible conclusions, it is hard to generalize their findings, which were obtained by observing one country and the development of its incentive system. The caveat of surveys is that, even if they are well designed, an objective assessment of the effect of tax measures is not possible since they do not provide data on observed behavior before and after a policy change. Concerning the calculation of METRs, again, these are often useful exercises, as they can reveal the incentives for investment created by the tax system (at least at the margin), and document the variation of tax rates across sectors or regions, subject to different tax rules. But, while this approach can reveal incentives created by the tax system, it does not provide evidence on actual investment outcomes.
- Second, the existing evidence on the relationship between tax and investment in industrial countries cannot just be extrapolated to developing countries. Several studies show that the elasticities between FDI and its determinants, including corporate taxation, vary with the level of host country development.⁶ This has been established by splitting samples or using interaction coefficients. Moreover, Asiedu (2002 and 2006) finds that even within developing countries tax effects on FDI might be different in sub-Saharan Africa. This points to the need to control for enough

⁴ On R&D tax credits, see for example: Bloom, Griffith and Van Reenen (2002). On enterprise zones see for examples: Chapter 4 of OECD (2001) or Bondonio and Greenbaum (2007).

⁵ Examples of case studies include papers in Shah (1995) or Wells and Allen (2001); two well designed recent investor surveys are done by Bolnick (2009) for Mozambique, and Nguyen, Hoang, Cun, Freeman and Ray (2004) for Vietnam; Shah (1995) also contains examples of METR calculations.

⁶ See for example Mutti and Grubert (2004), Azemar and Delios (2008), and Blonigen and Wang (2004).

institutional and political variables in the regressions and/or use ‘within groups’ or country fixed effects estimation. There are also theoretical arguments why the relationship between tax and investment may differ between developed and less developed countries. New economic geography (NEG) models show that the reaction of investment to corporate taxation does not need to be linear. The typical core-periphery NEG models emphasize the role of business concentration that is self-reinforcing leaving the world with a core region (which could be thought of as industrialized countries) that attracts all mobile activities and a periphery region (developing countries) with only basic activities. Then, policy shocks, such as tax changes, at least along some range, have no effect on investment, because of the stickiness of capital in the core.⁷

- Third, tax incentives are widespread in developing countries, where they often constitute an important part of the general corporate tax policy. Moreover, some tax incentives, such as tax holidays, are more popular in developing countries than in the industrial world.⁸ Therefore, it is interesting to look at the impact of separate tax incentive variables. Different tax incentives have also different impacts on the user cost of capital. For example Mintz (1995) points to the ambiguous impact⁹ of tax holidays on the cost of capital depending on the duration of the investment, the evolution of the revenues and the extent to which the invested capital is deductible.

The rest of the paper is structured as follows: Section II describes the data set collected for this study. Section III discusses the evidence on fiscal reaction functions for tax rates and tax incentives. Section IV considers the effect of tax instruments on FDI, gross private investment, and economic growth. Section V concludes.

2. DATA

To address the research questions econometrically, we need to combine data on tax incentives and macroeconomic data. The latter are readily available, but data on tax incentives are difficult to collect. Information on tax incentives is typically contained in legislation and is not standardized. It is thus necessary to devise a way of summarizing the information in a few quantitative variables.

Our main source of corporate tax data are the Price Waterhouse worldwide summaries of corporate taxes, published between 1985 and 2004.¹⁰ Because of our focus on developing countries, we extracted information for all African, Latin American and Caribbean countries,

⁷ For example, Devereux, Griffith and Simpson (2007) show that the effectiveness of fiscal incentives depends on the presence of agglomeration externalities. Grants are more effective in attracting plants in regions where the investors find more existing plants in their industry.

⁸ See for example Keen and Mansour (2009) on the evolution of tax incentives in Africa.

⁹ If the objective of the country is to encourage investment in durable capital, the effectiveness of the tax holiday is ambiguous. If a firm must write off tax depreciation allowances during the holiday, the firm may face a relatively high effective tax rate if the allowances that remain after the holiday are inadequate in relation to the income-generating capacity of the asset.

¹⁰ Between 1999 and 2004, they were only published biannually. Since 2005 data are published online, with only the most recent year available.

for which data are available for the majority of years (see Table A.1). This yields an initial unbalanced panel dataset of 47 countries over 20 years, but this is further reduced by the availability of macroeconomic data.

As to the precise variables, we focus on the most common incentives provided in the manufacturing and export sectors, which we consider to be the sectors most susceptible to tax competition. From those two we pick the most advantageous of the rules available, which can be justified by noting that they overlap and that treatment between both does not vary much. Table 1 lists the tax variables we construct, and the main underlying assumptions.

Table 1: Tax variables assumptions and calculation.

Variable	Assumptions and calculation
CIT rate	If multiple rates exist, the manufacturing rate for the most profitable firms is used.
Tax holidays	The longest available corporate income tax holiday of the manufacturing or export sector in years.
Investment allowance / tax credit	The most generous investment allowance of the manufacturing or export sector in percent of the investment. If a tax credit is offered, it is divided by the tax rate for comparability.

The macroeconomic data are from the IMF World Economic Outlook (WEO) and the World Bank World Development Indicators (WDI) databases. We collected data for the same 47 countries for which we have data on tax incentives. Given a 20-year period, that leaves us with a maximum of 940 observations per variable. As shown in Table 2, all variables, except population, have some missing values.

We use two measures of investment: FDI and private gross fixed capital formation (for brevity “private investment” henceforth). The difference between them is that FDI includes takeovers, while private investment covers only new capital formation. Moreover, private investment is not restricted to foreign investment. We divide both by GDP to make them comparable across countries.

As control variables we use the rate of inflation, general government consumption expenditure, GDP, population size, and openness. For openness, we use a measure proposed by Squalli and Wilson (2006), which combines trade intensity and the relative importance of a country’s trade level to total world trade to avoid biasing the measure upwards for small countries.¹¹ Finally, we also include two institutional variables, a score for the rule of law and for corruption obtained from Political Risk Services (PRS),¹² with higher scores indicating more effective rule of law and less corruption. Descriptive statistics on these variables are also provided in Table 2.

¹¹ The measure is defined as: $\frac{n(X + M)_i^2}{GDP_i \sum_{j=1}^n (X + M)_j}$, where X and M are exports and imports of country i ,

and n is the number of countries in the world.

¹² Available at www.prsgroup.com.

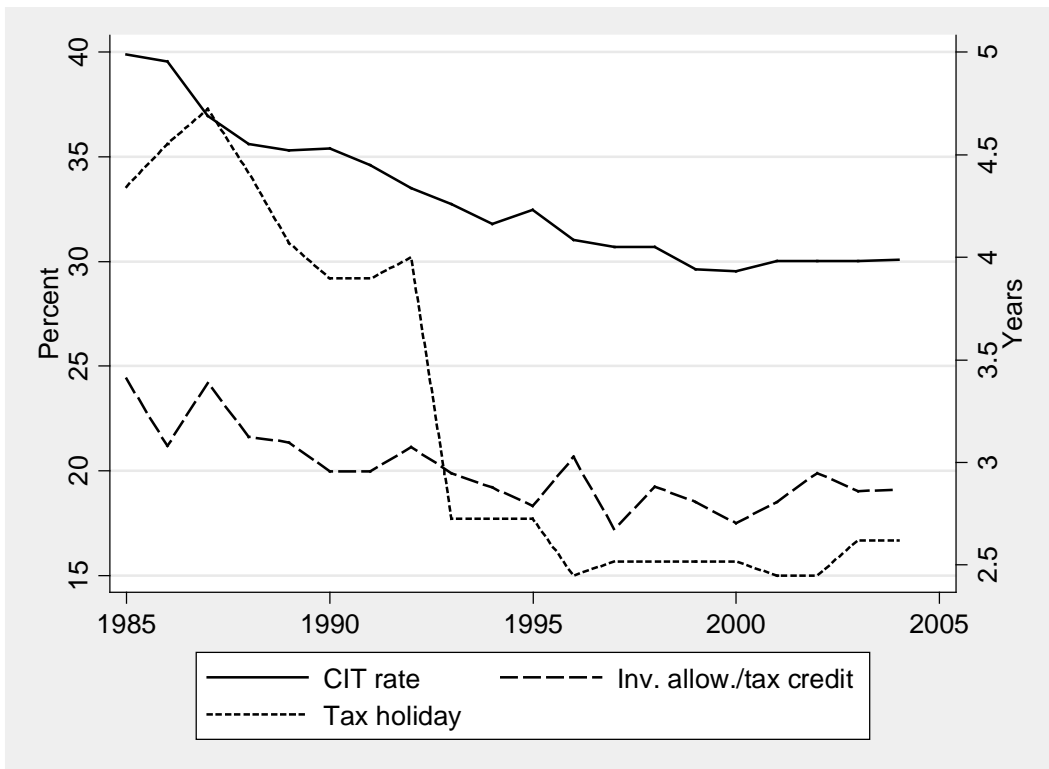
Table 2: Descriptive Statistics.

Variable	Unit	Mean	Std. Dev.	Min	Max	Obs.	Source
CIT rate	Percent	34.6	9.9	0.0	56	828	PWC
Tax holiday	Years	3.5	5.0	0.0	20	821	PWC
Inv. allow./tax credit	Percent	22.6	33.4	0.0	185.7	828	PWC
FDI	Percent of GDP	2.9	7.4	-82.9	90.7	910	WDI
Private Investment	Percent of GDP	14.3	6.6	0.0	50.2	864	WEO
Population	Millions	18.4	30.2	0.1	184.3	940	WEO
Openness (exports + imports / GDP)	Percent of GDP	74.0	41.0	12.1	250.0	925	WEO
Openness (Squalli & Wilson, 2006)	Percent of GDP	20.0	52.5	0.9	571.2	925	WEO
GDP growth	Percent	3.0	6.4	-51.0	106.3	932	WDI
GDP per capita	1000s const. US\$	2.5	2.8	0.1	16.5	933	WDI
GDP	Bn. const. US\$	42.9	112.3	0.1	717.3	933	WDI
Gov. Consumption	Percent of GDP	14.6	5.7	2.9	43.5	901	WDI
Inflation	Percent	135.0	1152.0	-29.2	26762.0	932	WDI
Law and order		2.9	1.2	0	6	835	PRS
Corruption		2.7	1.1	0	6	835	PRS

Source: Authors' calculation based on Price Waterhouse Coopers (PWC), World Economic Outlook (WEO), and World Development Indicators (WDI) data.

Figure 1 provides an overview of the development of tax variables over the time period covered. It shows averages for the three tax variables, calculated from a perfectly balanced panel of 29 countries (see Table A.1), so that changes in the average reflect tax policy rather than changes in the composition of the data.¹³ The figure reveals a downward trend in statutory corporate income tax rates. It also shows that there was some base broadening in that tax holidays have become shorter and investment allowances smaller. Note that the value of the allowances to taxpayers has fallen even more, as this is obtained by multiplying the allowance with the tax rate. The combination of reductions in tax rates and base broadening is in line with developments in advanced economies, although base broadening mainly took the form of reduced depreciation allowances, given the lesser importance of tax incentives in those economies (see *inter alia* Devereux et al 2002). The shorter average tax holidays may seem surprising, given recent evidence of further spreading of tax holidays in Sub-Saharan Africa (Keen and Mansour 2009). A possible explanation for this may be that even though the number of tax holidays keeps increasing, their average length has shortened.

¹³ A chart based on the full set of unbalanced data reveals very similar patterns for tax rates and holidays, but marks a temporary increase in investment allowances between 1999 and 2002. This is caused by the addition of Mozambique in 1999, which has an enormous allowance of 186 percent of the investment until 2002.

Figure 1: Average Tax Rates and Incentives over the Years.

Source: Authors' calculation based on PWC data.

Notes: Unweighted averages over a fully balanced panel of 29 countries.

3. EMPIRICAL EVIDENCE ON TAX COMPETITION

3.1. Methodology

International tax competition models have been tested by estimating tax reaction functions. Such reaction functions are usually specified as the regression of one country's tax rate on the weighted average rate of its competitors. Brueckner (2003) surveys this literature and discusses the main theoretical issues and econometric challenges. The main theoretical question in such models is how to interpret the result, because not only tax competition models but also other models lead to the same tax reaction functions.

Recent examples of attempts to estimate reaction functions for corporate income tax rates in developed countries include Devereux et al. (2008) and Altshuler and Goodspeed (2002). In this paper, we extend this to developing countries and tax incentives.

3.1.1. Specification

Our specification assumes a contemporaneous reaction to other countries' choices, and allows for dependence on a few control variables. Given that tax reforms are typically pre-announced, this contemporaneous specification remains valid, even if countries need some time to implement reforms. Such model is also known as a spatial lag model. To allow for unexplained heterogeneity across countries, we specify such a model with fixed country effects:

$$y_{it} = \rho(W_{NT}y)_{it} + X_{it}\beta + \eta_i + T_{it} + \varepsilon_{it} \quad (1)$$

where y is the tax variable (CIT rate or a tax incentive) and Wy is the spatial lag of variable y , with W the weighting matrix.¹⁴ Coefficient ρ is the interaction coefficient. X is a vector of control variables, with coefficient vector β . η are country fixed effects and T is either a general time trend or a vector of country specific time trends, explained below. ε is an independently and identically distributed error term. Subscripts i and t indicate the country and time period, with N and T the total number of countries and time periods.¹⁵

An important decision concerns the choice of weights. Tax competition models show that interaction is stronger the higher the mobility of capital. As a result, a common assumption is that geographically close countries interact more strongly. This can be implemented by using inverse distances as weights.¹⁶ We adopt two such matrices. In the first, each element w_{ij} of the weight matrix W equals the inverse of the distance (d) between countries i and j , i.e. $w_{ij}=1/d_{ij}$. In the second, we take account of the likely fact that tax competition is stronger among countries of the same region or continent. Since our data contain countries from Africa, Latin America and the Caribbean, we only allow for tax interaction within each of these three regions. Consequently the second weight matrix gives a value of $1/d_{ij}$ to the elements of the weight matrix if i and j are countries of the same region, and a value of zero otherwise.

The two weight matrices are row normalized and have zero diagonals.

As control variables we include GDP per capita, population, openness, and general government consumption expenditure as a percentage of GDP. GDP per capita serves as a measure of the income level, as higher incomes are generally related to stronger demand for public services. GDP per capita, in combination with population, also proxy for agglomeration rents that could be taxed by the government (see Baldwin and Krugman, 2004), as well as for size, as larger countries are under less pressure from tax competition (inter alia Bucovetsky, 1991). Openness points to the exposure of a country to trade and competition for capital. As explained above, we use an openness measure that is not biased towards greater openness for small countries. Finally, government consumption is included to control for preference for public goods and the government's revenue requirement. We lag

¹⁴ Specifically, this weight matrix is the result of the Kronecker product $W \otimes I_T$, where I_T is the identity matrix with rank T and W is the $N \times N$ spatial weight matrix.

¹⁵ While we estimate equation (1) independently for each tax variable of interest, one could argue that these three tax variables are set simultaneously and jointly by governments. A country could react to a change of one of the tax variables in another country by adjusting any of its tax instruments. As a result, ideally, one would estimate the interaction functions of the different tax variables at the same time with each reaction function including the other tax variables as explanatory variables. Unfortunately, this approach would go beyond what is currently econometrically feasible. Kelejian and Prucha (2004) developed an estimator for cross-sectional data, but to the best of our knowledge, no methodology for simultaneous systems of spatially interrelated panel equations has been developed. We therefore have no choice, but—like the other papers in this literature—to rely on the existing spatial econometric techniques and estimate the reaction functions separately. Future research on tax reactions could be refined in line with econometric progress.

¹⁶ An alternative is to use a contingency weight matrix, which gives a weight of 1 to neighbors and zero weights otherwise. We do not employ this approach, because (i) competition for capital is likely to go beyond first order neighbors and (ii) our dataset is incomplete, which would leave some countries with few or no neighbors.

the control variables by one year because the decision on the tax rate in year t is based on information available in year $t-1$.

3.1.2. Estimation

Checking econometrically for spatial interaction on tax variables is achieved by testing the null-hypothesis $H_0: \rho = 0$. The estimated coefficient should be smaller than one, as the interaction game would otherwise be explosive. But before running this test, a few econometric issues need to be addressed to allow an unbiased estimation of this equation.

Endogeneity of spatial interaction term

The most important concern is the obvious endogeneity of the spatially lagged tax variable, as countries influence each other's tax policies reciprocally. It is well known (Anselin 1988) that estimating the spatial lag and spatial error model by OLS leads to biased results. To circumvent this problem, we use the instrumental variables approach of Kelejian and Prucha (1998), using a selection of the competitors' covariates to instrument the spatially lagged dependent variable. This estimation methodology is consistent even in the presence of spatial correlation in the error term.

The instruments are constructed by pre-multiplying the control variable X with the same weight matrix that was used to spatially lag the dependent variable, which yields the vector of instruments WX . The instruments are only valuable if they are strong enough predictors of the spatially lagged dependent variable, and if they are independent from the error term. Therefore we subject them to weak identification tests and to the standard test of overidentifying restrictions. The variables that we use as instruments are the spatial lags of GDP per capita, population and openness. For the same reason as the control variables they are also lagged by one year.

Missing observations

Unfortunately our data set is not complete. While missing observations typically do not cause major problems beyond the reduction of the sample size, an unbalanced panel is of greater concern in reaction functions as specified above. This is because an unbalanced panel would cause the main regressor, i.e., the average of tax variables in other countries, to vary from year to year because of a changing sample composition. To avoid this problem, we calculate the weighted averages only on a panel that is fully balanced in terms of the tax variables, thus ensuring that all variability in the weighted average is the result of tax policy, not sample composition. In some cases, however, it is not the tax but a control variable that is missing. In these cases we only drop that observation, after having calculated the weighted average of the tax variables. Our resulting panel is thus not fully balanced, but the calculated tax averages are based on a balanced panel.

Given the different availability across countries and years, our aim is to use the largest possible balanced panel (on tax variables). The data offer two relatively large balanced data subsets: 38 countries over 11 years (1988-1998) or 37 countries for 12 years (1991-2002). Given our particular interest in spatial interaction, our results are based on the first set, which has more countries.

Time effects

In principle we would also like to include time dummies to control for shocks in each year that are common to all countries. However, if time dummies are added, this is equivalent to including the average tax of all countries. As a result one would estimate the following equation: $tax_{it} = \rho Wtax_{it} + t\bar{a}x_t + X\beta + \varepsilon$, with tax_{it} the tax rate of country i in year t ; and $Wtax_{it}$ the weighted average of all countries except i in year t and $t\bar{a}x_t$ the average of all countries in year t . Obviously, $Wtax_{it}$ and $t\bar{a}x_t$ are highly correlated, It is thus hard to identify the true impact of each variable.¹⁷ Therefore, instead of using time dummies, we follow two approaches to allow for unobserved factors varying over time. First, we estimate the regression with a linear time trend that is the same for all countries. Second, we follow the approach of Devereux et al. (2007) by including country specific time trends.

3.2. Results

3.2.1. Baseline results

We present the IV results, using the instruments explained above. To evaluate the validity of the instruments we show the Anderson canonical correlation test statistic's P value and the Cragg-Donald F test statistic for weak identification, and the Hansen J test for overidentifying restrictions. We start with the estimation results using the second inverse distance weight matrix, which allows countries to interact with each other only if they belong to the same region (Africa, Latin America, Caribbean), because we believe this is the most plausible weight matrix. The results are displayed in table 3. The three columns for each dependent variables consist of one without time effects, one with the general time trend, and one with the country specific time trend.

[insert table 3]

Starting with the CIT rate as dependent variable we find a positive and significant spatial interaction coefficient for all specifications, even when including country-specific time trends. The spatial lag coefficients range from 0.44 to 0.92. These results are similar to results on corporate income tax interaction of Devereux et al (2008) and Altschuler and Goodspeed (2002) for OECD countries.¹⁸ This indicates that developing countries are also interacting strategically using the CIT rate.

Concerning the control variables, we find that the CIT rate decreases as the population rises within a country. Also higher government expenditures within a country cause the CIT rate to rise, as expected. Both effects disappear when adding country specific time trends, which might coincide with the population trend and the government expenditure trend. The instrument tests support the instruments' validity.

¹⁷ Elhorst (2010) also explains this problem.

¹⁸ Devereux et al. (2008) find a spatial interaction coefficient for the statutory income tax rate of around .7 using a uniform weight matrix for a sample of OECD countries. Altschuler and Goodspeed (2002) find spatial interaction coefficients for the corporate tax (corporate taxation divided by GDP) between .4 and 1 for their most general equations using a weight matrix based on neighborhood.

Turning to the corporate income tax holiday, we again find significantly positive spatial interaction coefficients, now ranging between .72 and 1. The rather high coefficients point to strong strategic interaction on tax holidays¹⁹. Apparently developing countries are taking account of each other when deciding on the length of the tax holiday.

Higher population within a country causes the length of tax holidays to rise. Apart from that, the low R^2 indicates that the variance of tax holidays within countries over time is hard to explain.

Finally, on the investment allowance and tax credits we find no evidence of spatial interaction in developing countries. This suggests that countries do not consider this type of tax incentive as sufficiently effective or visible tax competition tool.

An increase in the population size causes higher investment allowances. In the equations with time effects, a higher GDP per capita causes the investment allowance to increase. This could point to more sophisticated tax regimes as countries move up the development path. Note that the instruments do not fulfill the Hansen J test when no time effects are included. This points to an omitted variables problem that is solved when the time effects enter the equation.

Next, because in a globalised world tax interaction might as well occur across continents, we run the same regressions using the first inverse distance weight matrix that allows tax interaction among all countries irrespective of the fact that they are located on another continent or separated by water. The estimation results are presented in table 4. We observe that qualitatively the results are very similar, though with slightly higher interaction coefficients. The results confirm the presence of strategic interaction on the CIT rate and on the holiday, and the absence of strategic interaction on the investment allowance. The results are again robust to the inclusion of time effects. The tests on the instruments are also satisfactory, except for the first investment allowance regression, as previously.

[insert table 4]

3.2.2. Extensions

We perform two additional robustness checks by analogy with the robustness checks that we do for the investment equations in the next section. This will allow us to better link the results in the next section with the results in this section.

In the first robustness check, we leave out the Caribbean countries from the sample. Since many Caribbean islands are known for being tax havens with exceptional corporate tax regimes, it is interesting to see whether tax interaction still exists when these countries are left out. Table 5 shows the estimation results for the reduced sample, leaving out the Caribbean countries. To save space we only present the results for the coefficients on the spatially

¹⁹ Note that the spatial coefficient should theoretically be smaller than one to avoid an explosive system of ever increasing or decreasing tax rates or incentives. Still, the point estimates higher than one do not necessarily imply an explosive system because the confidence intervals indicate that they are not significantly higher than one. We can only conclude that they are positive. In addition, the interference with the time effects, that can also incorporate spatial interaction (see time effects discussion), can explain the higher spatial interaction coefficients in the equations with time effects.

lagged dependent variable, which is of interest.²⁰ The upper results are based on the second weight matrix, not allowing for interaction across continents. The lower results are based on the first inverse distance weight matrix, allowing for interaction across all sample countries. The strategic interaction on the CIT rate persists, except when using the second weight matrix (upper row) and country-specific time trend. The spatial interaction on the tax holiday is also robust to the exclusion of the Caribbean, except when adding the country specific time trends. For investment allowances, again none of the regression results shows evidence of spatial interaction.

[insert table 5]

The second robustness check consists of interacting the spatially lagged variable with a dummy for LAC countries to see whether the spatial interaction is different in Africa than in LAC. The results are presented in Table 6²¹. Next to the spatial lag coefficients we also show the coefficient on the interaction term between the spatial lag and the LAC dummy. The most important observation is that the interaction term between the spatial lag and the LAC dummy never turns out significant. As a result, the basis spatial interaction coefficient remains robust. Only in the upper part, when using the common time trend, spatial interaction on the tax holiday becomes insignificant. We conclude that generally, tax interaction is not different in Africa compared to LAC.

[insert table 6]

3.2.3. Discussion

Overall, we find strong and robust evidence of strategic interaction among developing countries on CIT rates and corporate tax holidays, with or without the Caribbean, and allowing for interaction across different continents or not.

Yet, so far we cannot conclude which interaction mechanism underlies it. As mentioned above, there are two main candidates as explanations for spatial interaction: a spillover or a resource-flow model (see discussion in Brueckner 2003). In the context of our research, the spillover model could mean that a country's government takes the other governments' tax policy as a yardstick to judge its own policy (as in the yardstick competition model of Besley and Case 1995). The resource flow model, on the other hand, predicts that governments strategically interact to attract resources, such as mobile capital. While the evidence on spatial interaction cannot help discriminating between both models, the following section, which addresses the effect of the three tax instruments on investment, may shed further light on this. Finally, apart from the two possible interaction mechanisms, the observed developments could also be the results of a common trend, and, unfortunately, it is difficult to discriminate between this and the other explanations.

²⁰ The complete results are available upon request. In all presented cases, the Anderson canonical correlations and the Hanssen J test are fulfilled. For the investment allowance equation, we do not present the results without time effects because the tests are not fulfilled.

²¹ Again, in all presented cases, the Anderson canonical correlations and the Hanssen J test are fulfilled. For the investment allowance equation, we do not present the results without time effects because the tests are not fulfilled.

4. EMPIRICAL EVIDENCE ON THE EFFECT ON INVESTMENT

We now turn to the question of the extent to which the CIT rate and tax incentives are effective in raising investment. This question certainly has its own interest but is also relevant with respect to the interpretation of the tax interaction results obtained in the previous section. Finding that investment is affected by the CIT rate or tax holidays, where we also found evidence of strategic interaction, would point towards a resource flow model interpretation of the results.

4.1. Methodology

4.1.1. Specification

To test for the impact of tax instruments on investment, as described in the neoclassical investment theory, we specify an ad hoc dynamic panel model. This kind of specification has proven useful in assessing the impact of taxation on investment when the only available data are aggregate investment, as in the many studies reviewed by de Mooij and Ederveen (2003):

$$Inv_{it} = \delta Inv_{i,t-1} + Tax_{it}\gamma + X_{it}\beta + \mu_t + \eta_i + \varepsilon_{it} \quad (2)$$

where Inv is the investment (or growth) variable, Tax a vector of the tax instruments (made up of some or all of the y above), μ are time effects and all other items are as before.

Note that we systematically control for country and year effects. The inclusion of year effects does not pose the problem encountered in the spatial reaction model above.

The dependent variable

We consider two investment variables, FDI and total private investment. In both cases, we divide it by GDP for comparability across countries. As noted above (section II), these variables cover different, but overlapping, definitions of investment. The regressions on FDI are of obvious interest, given that tax incentives are often tied to FDI or at least presented as measures to boost FDI. Still the ultimate policy goal of a country is likely to be an increase in the capital stock, which justifies a look at total investment.

Unfortunately we do not have more disaggregated investment data, such as a breakdown of FDI into real and financial flows, or breakdown by sector or source country. A distinction between real and financial investment component of FDI would allow us to see how differently the components react to our tax variables, which could be interesting, given that many of the investment allowances and tax credit incentives are designed for investment in property, plant and equipment. Distinguishing between different sectors (as in Swenson 1994) would have made it easier to identify the impact of incentives targeted at particular sectors. The use of aggregate investment data rather than bilateral investment flows makes it impossible to account for some important home country effects, such as relative tax rates and double taxation regimes.²² All of these issues remain to be explored in future research.

²² As for example in Azemar, Desbordes and Mucchielli (2007), or Azemar and Delios (2008)

Explanatory variables

Apart from a lagged dependent variable, which allows for persistence of investment and reduces autocorrelation in the residuals, we add a vector of tax variables, and controls. The tax variables are the same as in the previous section. Other investment studies sometimes use effective (average or marginal) tax rates, rather than the statutory rate presented here. We do not follow this approach, because we do not have the detailed depreciation data necessary to calculate effective tax rates for our large sample of countries. Moreover, by considering variables on tax holidays and investment allowances, we have also allowed to some extent for differences in the tax base, just that we cover them in separate variables, rather than one combined measure.

The three tax variables interact with each other, as, for example, the value of investment allowances would be reduced to nil in the presence of tax holidays. Therefore, the specification should arguable not only include the three tax instruments, but also their interactions. When experimenting, however, it turned out that interactions were not significant and, moreover, that their inclusion did not affect coefficients. We therefore dropped them from our specification.

Drawing on the existing empirical literature, we also add a set of control variables. To capture the market potential of a country we include the country's GDP in US dollars at constant prices. GDP per capita controls for the country's development level. However this variable can also be seen as a proxy for productivity and wage rates. Inflation and the exchange rate are measures of macroeconomic stability. Hasset and Hubbard (2002) demonstrate that low inflation also stimulates investment by reducing the user cost of capital. A weak currency can make firms more likely to invest but on the other hand it can be seen as a signal of instability and generate risk aversion. We also control for a country's openness to international trade using the adjusted openness measure, and we control for the marginal benefits of public goods to investors, by including the general government's consumption expenditure as in percent of GDP. Apart from these usual control variables, we also explicitly control for institutional quality and political stability by adopting the variables corruption and 'law and order' (like in Asiedu (2006)). Both are ratings ranging from 0 to 6, a higher rating implying less potential or actual corruption and a better enforcement of law and order respectively. Unfortunately, these two variables are not available for most of the Caribbean countries, and will only be used in the regressions excluding the Caribbean from the sample. In the System GMM estimations, which do not include country fixed effects, we also add a dummy for Africa and a dummy for the Caribbean.

We believe that other time-varying country differences, such as infrastructure, for which we could not find sufficiently complete data, are sufficiently reflected in the control variables that we do use and in the country fixed effects.

To allow for some delay between investment decisions and implementations, we lag all explanatory (tax and control) variables by one year.

4.1.2. Estimation

As is well known, the inclusion of a lagged dependent variable in panel data leads to biased results if OLS (upward bias) or fixed effect estimators (downward bias, see Nickell 1981) are used. To solve this, we also use the "system GMM" estimator suggested by Blundell and Bond (1998). In addition to using lagged levels to instrument current differences (as in difference GMM), this approach also uses lagged first differences to instruments levels.

Blundell and Bond (1998) provide Monte Carlo simulation results showing that this procedure leads to a more efficient and robust estimator than difference GMM.

When estimating our model with OLS, within groups, difference GMM and system GMM, we found that the system GMM estimator outperforms the difference GMM estimator with respect to the lagged dependent variable's coefficient, as predicted by theory.²³

The GMM estimators are consistent for panel data as the number of groups (i.e., here countries) goes to infinity. They are therefore the estimators of choice for wide panels (i.e., large N and small T). For long panels (i.e., small N and large T), however, the within-group estimator may be a better choice, because its bias decreases as more periods are added (Nickel 1981). Moreover, the within-groups estimator tends to have a relatively small variance, especially compared to consistent GMM-type estimators (Harris et al. 2008). Furthermore, Judson and Owen (1999) show that the biases of within-groups estimates of coefficients on variables other than the lagged dependent variable are relatively small.

For all these reasons, and considering that our dataset is neither particularly wide nor long, we consistently present both the within-groups and system GMM estimation results.

We apply System GMM with the following specificities. The data are transformed using forward orthogonal deviations (see Arellano and Bover 1995) to minimize data loss in our unbalanced dataset. To limit the instrument count we restrict the lags to three years and collapse the instrument matrix. Thanks to the robust option the standard errors are consistent with panel-specific autocorrelation and heteroskedasticity in one step estimation. The Hansen J test for instrument exogeneity is reported for each equation, just like the Arellano Bond test for autocorrelation AR(2).

For both the within and system GMM estimation the GDP related control variables (GDP, GDP per capita, and government consumption expenditure) are instrumented by their one year lag.

4.1.3. Data

We use the same data set as above, but because a perfectly balanced panel is not required for this specification, we can use a much larger sample. We drop Bolivia because their investment pattern seems to be determined mostly by the extractive industries sectors.²⁴ All other countries are included in principle, although for lack of macroeconomic data all regressions excluded Bahamas and Mozambique.

²³ Only the system GMM estimator of the lagged dependent variable is consistently within the predicted bounds of the OLS and within-groups estimators. Another weakness of the difference approach is that it magnifies gaps in unbalanced panels (as remarked by Roodman, 2006), which is the case in our sample.

²⁴ Venezuela and Nigeria are also a major oil producers, but results are unaffected by their inclusion, so we do not drop them.

4.2. Results

4.2.1. Baseline results

Table 7 shows the regression results for the whole sample. In the first two columns FDI is the dependent variable, in the last two private investment (i.e., gross fixed capital formation) is the dependent variable. The uneven columns are based on the within countries estimation, the even columns on System GMM.

Starting with FDI, we observe a significantly positive coefficient of the lagged dependent variable. As predicted by econometric theory, the point estimate is lower for the within estimation than for the system GMM estimation.

Regarding the tax variables, we find that the CIT rate has a significantly negative impact on FDI irrespective of the estimation technique. This result is in line with theory and previous empirical results showing a negative relationship between investment and the after tax cost of capital (see, *inter alia*, Hasset and Hubbard 2002). Our results indicated that a 10 percentage point increase of the CIT rate lowers FDI by between 0.31 percentage points of GDP (within groups) and 0.32 percent points of GDP (system GMM). For the tax incentive variables, the same investment theory would predict a positive impact of tax holidays and investment allowances and tax credits. The tax holiday indeed enters the equation significantly when using System GMM, but not when using the within-groups estimator. The system GMM results imply that adding ten years of tax holidays increases FDI by about 0.7 percent of GDP. Since the within-groups estimator is not significant, we conclude that it is the variance across countries that accounts for this effect and not the variance within a country. Investment allowances or investment tax credits, on the other hand, seem not to explain any of the variance in FDI within countries, but have a negative impact on FDI using System GMM, be it only significant at the 10 percent level. This result is counterintuitive and its robustness will be questioned in the next tables.

[insert table 7]

Regarding the control variables, we find that none is significant using the within-groups approach. Using System GMM, the Africa and Caribbean dummies are significant at the 5 percent level. On average, in Africa FDI relative to GDP is around 0.9 percent points lower than in Latin America, while in the Caribbean it is on average 1.5 percentage points higher. Apart from the dummies, only the coefficient on inflation is slightly significantly positive. While we cannot explain it, the effect is economically insignificant. The Hansen J test confirms the exogeneity of instruments while the AR(2) test confirms the absence of autocorrelation.

For total private investment we find again that the lagged dependent variable is very informative about current levels. With respect to the tax policy variables, however, we find a different picture. The CIT rate seems to have no impact on private fixed capital formation. Regarding the tax incentives we observe that neither the tax holiday, nor the investment allowance affects private investment.

Inflation has a negative impact on private investment, as suggested by Hasset and Hubard (2002) who point to the positive impact of inflation on the user cost of capital. An appreciation of the currency has a positive impact on private investment, indicating that the signaling effect of a strong currency with respect to the economic stability dominates the cost

effect of a more expensive currency. The regional dummies for Africa and the Caribbean are not relevant to private fixed capital formation.

4.2.2. Is Africa different?

Although the primary purpose of this paper is not to cast special light on the difference between the impact of taxation on investment in Africa compared to other developing countries, for several reasons we cannot just ignore this issue. First, it is well known and confirmed in the System GMM results above, that Africa did benefit less than Latin America and the Caribbean from the FDI boom to the developing world. Second, Asiedu (2002) finds that certain factors that affect FDI in developing countries affect countries in Sub-Saharan Africa differently, and suggest that policies that have been successful in other regions may not be equally successful in Africa. As a result, we want to account for the possibility that tax policies might affect investment in Africa differently from investment to other developing countries. Contrary to Asiedu (2002) who uses cross sectional data, we can explore this issue using panel data with or without fixed country effects. Third, a recent study by Van Parys and James (2009) shows that in countries with a worse investment climate FDI is less sensitive to changes in the tax burden.

To find out whether Africa is different, we interact the tax variables with the LAC dummy that is zero for Africa and one for Latin America and the Caribbean. We present the results for FDI (columns 1 and 2) and private investment (columns 3 and 4) in table 8. Starting with FDI, the results are remarkable. The estimated coefficients of the non interacted tax variables represent the results for Africa. We find that neither the CIT rate, nor the holiday or the investment allowance has an impact on FDI to Africa. This result holds for the within and the System GMM estimation. On the contrary, the coefficients on the interacted tax variables demonstrate that FDI to LAC countries is significantly more sensitive to the CIT rate and to tax holidays. Assuming that the coefficients on the non interacted CIT and holiday are zero (because not significant), a 10 percent point decrease of the CIT rate causes FDI to fall by 4.5 (System GMM) to 9.3 (Within) percent points of GDP. An extension of the holiday with 10 years causes FDI in Latin America and the Caribbean to rise with around 1 percent points of GDP, according to both the within and System GMM estimation. The coefficient on the investment allowance is not significant. The control variables results remain similar and the Hansen J test and AR(2) tests are satisfied.

[insert table 8]

Concerning the private investment equation, the only change compared to the baseline specification results, is a significant positive impact of the CIT rate on private investment, when using the within estimator. Even though this result is counterintuitive, it is theoretically possible. For example Sinn (2003) shows that this is possible if the marginal value of the public good – through productivity enhancement – is higher than the marginal cost of the tax rate. Especially in countries with very low levels of public goods, like in Africa, this is a plausible explanation.

4.2.3. Leaving out the Caribbean

One can argue that the characteristics of the Caribbean countries are too specific for them to be part of the full sample of Caribbean countries. Many of them are tax havens and they are small islands with important touristic trumps. Therefore, although we already partly

controlled for their particularities by including individual country dummies (the within estimations) or a Caribbean dummy (system GMM estimations), we decide to repeat the regressions without the Caribbean countries. An additional advantage is that we can add the institutional control variables (following Asiedu 2006) that are not available for most of the Caribbean islands.

The results of the baseline equation excluding the Caribbean are displayed in table 9. The dependent variable is visible on top of each column. The within estimation results for FDI are very similar to the results with the Caribbean in table 7. Apparently the country fixed effects were sufficient to neutralize the possible particular effects of the Caribbean. The significantly negative impact of the CIT rate on FDI is even exactly the same as in the estimation with the Caribbean. The only difference is that GDP becomes positive at the 10% level, pointing to a market size effect, and that government consumption expenditures have a slightly negative impact on FDI, which suggests that public expenditure is used for spending that does not benefit foreign investors. The institutional variables, corruption and law and order do not enter significantly in the second column, indicating that they are already incorporated by other control variables or fixed effects. Their inclusion only makes the CIT rate coefficient slightly more negative and significant.

[insert table 9]

Leaving out the Caribbean has a bigger impact on the System GMM results. Compared to table 7, only the CIT rate's coefficient remains significant. The significance of the tax holiday and the investment allowance disappears. The relatively high FDI to GDP ratios of Caribbean countries combined with the relatively high holidays but relatively low investment allowances can explain the significance of the holiday and the investment allowance for investment in the full sample estimations using system GMM. It indicates that these System GMM results on the holiday and the investment allowance are purely based on cross sectional variance between Caribbean and non Caribbean countries. The institutional variables again do not enter significantly, but they cause the CIT rate's coefficient to drop and become insignificant. We can only technically attribute this result to the fall of number of observations and the rise of the number of variables.

The results for private investment are very similar to those with the Caribbean in table 7. Except for a slightly positive effect of the CIT rate on private investment in the first within regression, none of the tax variables has an impact on private investment. Also here the institutional variables do not enter significantly. Of the control variables, again inflation has a negative impact, the exchange rate has a slightly positive effect, and within countries government consumption expenditures have a negative impact.

[insert table 10]

Finally, we also repeat the interaction analysis excluding the Caribbean in table 10. For FDI the results are qualitatively the same as in table 8 when using the within estimation technique (column 1). The CIT rate has a significantly more negative impact on FDI in Latin America than in Africa, and the holiday has a significantly more positive impact on FDI in Latin America than in Africa. We do not find this result again when using system GMM. Here, the significance of the interaction coefficients disappears. As a result, the within estimation results are more robust than the System GMM estimation results.

For the private investment equations, the results do not differ qualitatively from the results with the Caribbean in table 8.

4.2.4. Discussion

The results suggest that the relationship between investment and tax incentives in developing countries depends on the definition of investment, on the type of tax incentives and on the region.

Concerning the definition of investment, we only find evidence of tax incentives affecting FDI, but not (or not robustly) total private investment. A few possible explanations are the following: first, remembering the differences in the definition of FDI and private investment, it could be that these two tax instruments affect the part of FDI that is not included in investment, notably mergers and acquisitions. If this is the reason for the finding, than it would appear that the tax system mainly affects the ownership rather than amount of capital in an economy. Second, it is possible that higher FDI crowds out domestically-financed investment.²⁵

With respect to the type of tax incentives, investment allowances do not seem to affect FDI or private investment, while the CIT rate and tax holidays are effective for FDI in some cases. A possible explanation of this finding is that countries may be trying (successfully) to compete for rent-earning FDI, because very profitable investments would benefit far more from a tax holiday than from an allowance, which would only be worth a small share of the rent. This could also explain countries' reluctance to move away from tax holidays, and to offer instead investment allowances or accelerated depreciation as often advised by economists.

Finally, we observe that for those tax incentives that do affect FDI, i.e. the CIT rate and the tax holiday - although the economic significance of the holiday is rather low-, lowering the tax burden has a significantly bigger impact on FDI in Latin America and the Caribbean than in Africa. The impact of tax incentives of investment in Africa is even insignificant. This result corresponds with the finding of Van Parys and James (2010) that tax incentives are ineffective for FDI in the CFA Franc zone in Africa. A probable explanation is that the investment climate in Africa is so poor that granting tax incentives is not sufficient to compensate for the poor investment climate. Consequently, the cost of tax incentives in Africa in terms of lost revenue is likely to be higher than the benefit in terms of additional investment.

²⁵ This raises the question of whether there could be any positive impact on economic growth. We also ran the regressions with growth as the dependent variable, which revealed that none of the incentives have positive effects, while the tax rate has a negative effect in some specifications. Such regression is econometrically problematic, though. Few variables can be identified to be systematically correlated with growth due to simultaneity and multicollinearity problems that are very hard to tackle (see for example Levine and Renelt 1992, and Mankwin et al. 1995), Hence we only mention these as indicative results.

5. CONCLUSION

This paper has tackled a number of separate, but related questions. We have shown that strategic interaction over taxes is not restricted to tax rates, but is equally present on tax incentives, notably tax holidays. This is not to say that countries compete over every aspect of their tax systems, as there is no evidence on interactions on investment allowances. We found that these interaction forces are equally at work in Africa and in Latin America and the Caribbean.

We have also shown that tax holidays, just like statutory tax rates, do appear to affect FDI in some cases, while investment allowances do not. In particular, in Latin America and the Caribbean lowering the tax rate or extending tax holidays help to attract FDI, but not in Africa. In combination with the findings on spatial tax reactions, the results for Latin America and the Caribbean suggests that LAC countries compete only over tax instruments that also affect FDI. This can be interpreted as evidence—though clearly not proof—of the resource-flow model of fiscal interactions, as opposed to pure tax mimicking, which would cover all taxes. For Africa, on the contrary, the spatial interaction on the CIT rate and the holiday cannot be explained by pure tax competition for FDI, since FDI is not affected by these two instruments. This suggests that the strategic interaction is rather of political nature with countries mimicking others' policies.

These results will hopefully add to the debate about tax incentives. They suggest at the same time that tax incentives may work in some cases, as their clearly is a measurable effect on FDI, but also that their economic impact may be limited.

While the previous literature has mainly focused on case studies or evidence that focused on incentives used mainly in developed countries, such as R&D tax credits, this study provides the first econometric panel analysis of tax incentives in developing countries. It will hopefully not be the last, as a number of interesting extensions would merit further research. Notably, the analysis should be extended to Asia, as incentives are also rampant in that region. Moreover, it could be interesting to distinguish by sectors and, for FDI, by source country, provided the necessary data can be collected.

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REFERENCES

- Altshuler, R., Goodspeed, T.J. (2002). Follow the Leader? Evidence on European and US Tax Competition. *Rutgers University Department of Economics Working Papers*, 200226.
- Anselin, L. (1988). *Spatial Econometrics: Methods and Models*. Hingham, MA: Kluwer Academic Publishers.
- Arellano, M., Bover, O. (1995). Another look at the instrumental variables estimation of error components models. *Journal of Econometrics*, 68, 29-51.
- Asiedu, E. (2002). On the Determinants of Foreign Direct Investment to Developing Countries: Is Africa Different. *World Development*, 30(1), 107-119.
- Asiedu, E. (2006). Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability. *The World Economy*, 29(1), 63-77.
- Azemar, C., Delios, A., (2008). Tax Competition and FDI: The Special Case of Developing Countries. *Journal of Japanese International Economics*, 22, 85-105.
- Azemar, C., Desbordes, R., Mucchielli, J.-L. (2007). Do Tax Sparing Agreements Contribute to the Attraction of FDI in Developing Countries? *International Tax and Public Finance*, 14, 543-462.
- Baldwin, R., Krugman, P. (2004). Agglomeration, Integration and Tax Harmonization. *European Economic Review*, 48, 1-23.
- Besley, T., Case, A. (1995). Incumbent Behavior: Vote-Seeking, Tax-Setting, and Yardstick Competition. *American Economic Review*, 85, 25-45.
- Bird, R.M. (2000). Tax Incentives for Investment in Developing Countries. in G. Perry, J. Whalley, and G. McMahon (eds.), *Fiscal Reform and Structural Change in Developing Countries Vol. 1* (pp. 201-221). McMillan Press.
- Bloningen, B.A., Wang, M. (2004). Inappropriate Pooling of Wealthy and Poor Countries in Empirical FDI Studies. *NBER Working Paper*, 10378.
- Bloom, N., Griffith, R., Van Reenen, J. (2002). Do R&D Tax Credits Work? Evidence from a Panel of Countries, 1979-1997. *Journal of Public Economics*, 85, 1-31.
- Blundell, R., Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87, 11-143.
- Bolnick, B., (2009). Investing in Mozambique: the Role of Fiscal Incentives. Nathan Associates Inc., Arlington VA. Produced for USAID under the Mozambique Trade and Investment Project.
http://www.tipmoz.com/library/resources/documents/NATHAN-226267-v1-Mozambique_Fiscal_Incentives.pdf

Bondolino, D., Greenbaum, R.T. (2007). Do Local Tax Incentives Affect Economic Growth? What Mean Impacts Miss in the Analysis of Enterprise Zone Policies. *Regional Science and Urban Economics*, 37, 121-36.

Brueckner, J.K. (2003). Strategic Interaction among Governments: An Overview of Empirical Studies. *International Regional Science Review*, 26, 175-88.

Bucovetsky, S. (1991). Asymmetric Tax Competition. *Journal of Urban Economics*, 30, 167-181.

De Mooij, R.A., Ederveen, S. (2003). Taxation and Foreign Direct Investment: A Synthesis of Empirical Research. *International Tax and Public Finance*, 10(6), 673-93.

Devereux, M. P., Griffith, R., Klemm, A. (2002). Corporate Income Tax Reforms and International Tax Competition. *Economic Policy*, 17(35), 451-495.

Devereux, M. P., Griffith, R., Simpson, H. (2007). Firm location decisions, regional grants and agglomeration externalities. *Journal of Public Economics*, 91, 413-435.

Devereux, M., Lockwood, B., Redoano, M. (2008). Do Countries Compete over Corporate Tax Rates. *Journal of Public Economics*, 92, 1210-35.

Elhorst, J.P (2010). Spatial Panel Data Models. In Fischer MM, Getis A (Eds.), *Handbook of Applied Spatial Analysis* (pp. 377-407). Springer: Berlin Heidelberg New York.

Harris, M.N., Matyas, L., Sevestre, P. (2008). Dynamic Models for Short Panels. in L. Matyas, *The Econometrics of Panel Data: Fundamentals and Recent Developments in Theory and Practice* (pp. 249-278). Berlin, Springer-Verlag.

Hasset, K. A., Hubbard, R. G. (2002). Tax Policy and Business Investment. in A. Auerbach and M. Feldstein (eds.), *Handbook of Public Economics Vol. 3*. Elsevier.

Hines, J.R, (1999). Lessons from Behavioral Responses to International Taxation. *National Tax Journal*, 52(2), 305-322.

Jorgenson, D.W. (1963). Capital Theory and Investment Behavior. *American Economic Review*, 53, 247-259.

Judson, R.A., Owen, A.L. (1999). Estimating Dynamic Panel Data Models: A Practical Guide for Macroeconomists. *Economics Letters*, 1, 9-15.

Keen, M., Mansour, M. (2009). Revenue Mobilization in Sub-Saharan Africa: Challenges from Globalization. *IMF Working Paper*, WP/09/157.

Kelejian, H.H., Prucha, I.R. (1998). A generalized spatial two-stage least squares procedure for estimating a spatial autoregressive model with autoregressive disturbances. *Journal of Real Estate Finance and Economics*, 17, 99-121.

- Kelejian, H.H., Prucha, I.R. (2004). Estimation of Simultaneous Systems of Spatially Interrelated Cross Sectional Equations. *Journal of Econometrics*, 118, 27-50.
- Klemm, A. (2010). Causes, Benefits and Risks of Tax Incentives. *International Tax and Public Finance*. DOI: 10.1007/s10797-010-9135-y.
- Levine, R, Renelt, D. (1992). A sensitivity analysis of cross country growth regressions. *American Economic Review*, 82(4), 942-963.
- Mankwin, N.G, Phelps, E.S., Romer, P.M. (1995). The Growth of Nations. *Brookings Papers on Economic Activity*, 1995(1), 275-326.
- Mintz, J.M. (1995). Tax Holidays and Investment. in A. Shah (ed.), *Fiscal Incentives for Investment and Innovation* (pp. 165-194). New York: Oxford University Press.
- Mutti, J., Grubert, H. (2004). Empirical Asymmetries in Foreign Direct Investment and Taxation. *Journal of International Economics*, 62, 337-358.
- Nguyen, T.C., Hoang, T.P., Cung, T.V., Freeman, N.J., Ray D. (2004). An Empirical Study of Corporate Income Tax Investment Incentives for Domestic Companies in Vietnam. Vietnam National University. USAID.
http://www.fiscalreform.net/images/vn_cit_incentives.pdf
- Nickell, S. (1981). Biases in Dynamic Models with Fixed Effects. *Econometrica*, 49(6), 1417-1426.
- OECD (2001). Corporate Tax Incentives for Foreign Direct Investment. *OECD Tax Policy Study*, No. 4.
- Price Waterhouse / PriceWaterhouseCoopers, various years. *World Corporate Tax Guide*.
- Roodman, D., (2006). How to Do xtabond2: An Introduction to “Difference” and “System” GMM in Stata. *Center for Global Development Working Paper*, 103.
- Shah, A. (1995). *Fiscal Incentives for Investment and Innovation*. Oxford University Press.
- Sinn, H.-W. (2003). *The New Systems Competition*. Blackwell, Oxford.
- Swenson, D.L. (1994). The Impact of US Tax Reform on Foreign Direct Investment in the United States. *Journal of Public Economics*, 54, 243–266.
- Squalli, J, Wilson, K. (2006). A New Approach to Measuring Trade Openness. *EPRU Working Paper*, 06-07.
- Van Parys, S., James, S. (2010). The Effectiveness of Tax Incentives in Attracting Investment: Panel Data Evidence from the CFA Franc Zone. *International Tax and Public Finance*, DOI: 10.1007/s10797-010-9140-1.

Van Parys, S., James, S. (2009). Why Tax Incentives May be an Ineffective Tool to Encouraging Investment? The Role of the Investment Climate. mimeo World Bank, December 2009.

Wilson, J.D. (1999). Theories of tax competition. *National Tax Journal*, 52 (2), 269-304.

Wells, L.T., Allen, N. (2001). Tax Holidays to Attract Foreign Direct Investment: Lessons from Two Experiments. in L.T. Wells, N.J. Allen, J. Morisset and N. Prinia, *Using Tax Incentives to Compete for Foreign Investment – Are they Worth the Costs?*. Foreign Investment Advisory Service, Occasional Paper 15.

Zee, H.H., Stotsky, J.G., Ley, E. (2002). Tax Incentives for Business Investment: A Primer for Policy Makers in Developing Countries. *World Development*, 30(9), 1497-1516.

Zodrow, G.R., Mieszkowski, P. (1986). Pigou, Tiebout, Property Taxation and the Underprovision of Local Public Goods. *Journal of Urban Economics*, 19, 356 – 370.

Table 3: Estimation results interaction equation using the inverse distance weight matrix not allowing for interaction between continents (Africa, Latin America, and the Caribbean).

dependent variable y:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	CIT rate	CIT rate	CIT rate	Tax holiday	Tax holiday	Tax holiday	Inv. allowance	Inv. allowance	Inv. allowance
Wy	0.440*** (2.75)	0.592* (1.78)	0.917** (2.18)	0.897*** (2.98)	0.721** (2.10)	1.073* (1.70)	-0.391 (-0.97)	0.206 (0.79)	0.162 (0.32)
GDP per capita	-0.675 (-0.59)	-0.067 (-0.05)	-0.184 (-0.08)	0.247 (0.46)	1.048* (1.89)	-0.177 (-0.37)	-0.014 (-0.68)	0.125*** (3.63)	0.057 (1.56)
Population	-0.595*** (-3.94)	-0.494*** (-3.10)	-2.553 (-1.36)	0.082* (1.84)	0.195*** (3.15)	-0.695 (-0.78)	0.025*** (3.80)	0.041*** (6.60)	0.410*** (3.88)
Openness	2.395 (1.08)	1.989 (0.84)	-3.742 (-1.27)	-0.507 (-0.28)	-0.954 (-0.56)	-1.639 (-1.06)	-0.159 (-0.80)	-0.142 (-0.79)	-0.130 (-0.60)
Gov. Consumption expenditure	0.308*** (2.99)	0.271*** (2.70)	-0.028 (-0.37)	0.053 (1.01)	0.022 (0.46)	-0.013 (-0.26)	0.005* (1.73)	-0.001 (-0.27)	-0.002 (-0.78)
Common time trend		-0.050 (-0.16)			-0.205* (-1.72)			-0.022*** (-5.32)	
Common time trend?	no	yes	no	no	yes	no	no	yes	no
Country spec. time trends?	no	no	yes	no	no	yes	no	no	yes
Observations	403	403	403	403	403	403	403	403	403
R-squared	0.20	0.18	0.66	0	0.05	0.58	0.12	0.24	0.61
Anderson test P-value	0	0	0	0	0	0	0	0	0
Cragg-Donald F test	91.83	48.92	13.18	43.01	29.04	7.728	16.14	46.57	7.633
Hansen J test P-value	0.983	0.177	0.358	0.313	0.668	0.584	0.00339	0.272	0.278

Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4: Estimation results interaction equation using the inverse distance weight matrix allowing for interaction between continents (Africa, Latin America, and the Caribbean).

dependent variable y:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	CIT rate	CIT rate	CIT rate	Tax holiday	Tax holiday	Tax holiday	Inv. allowance	Inv. allowance	Inv. allowance
Wy	0.583*** (3.32)	1.183*** (2.66)	1.063** (2.38)	1.214*** (4.40)	1.247*** (2.83)	1.022* (1.70)	0.569 (0.90)	0.408 (1.10)	0.916 (1.10)
GDP per capita	-0.122 (-0.10)	-0.524 (-0.35)	-0.186 (-0.08)	0.723 (1.49)	0.948* (1.67)	0.006 (0.02)	0.018 (0.73)	0.125*** (3.69)	0.074* (1.84)
Population	-0.531*** (-3.67)	-0.519*** (-3.26)	-2.744 (-1.51)	0.154*** (3.22)	0.182*** (2.95)	-0.501 (-0.60)	0.027*** (4.05)	0.041*** (6.62)	0.410*** (3.85)
Openness	2.605 (1.26)	1.916 (0.85)	-3.709 (-1.24)	-0.673 (-0.44)	-0.649 (-0.40)	-1.962 (-1.37)	-0.121 (-0.61)	-0.138 (-0.77)	-0.179 (-0.83)
Gov. Consumption expenditure	0.290*** (2.89)	0.281*** (2.75)	-0.025 (-0.33)	0.029 (0.58)	0.019 (0.39)	-0.013 (-0.27)	0.004 (1.28)	-0.001 (-0.34)	-0.002 (-0.87)
Common time trend		0.384 (1.04)			-0.033 (-0.24)			-0.022*** (-5.17)	
Common time trend?	no	yes	no	no	yes	no	no	yes	no
Country spec. time trends?	no	no	yes	no	no	yes	no	no	yes
Observations	403	403	403	403	403	403	403	403	403
R-squared	0.22	0.16	0.67	0.06	0.05	0.61	0.14	0.24	0.60
Anderson test P-value	0	4.15e-10	8.45e-09	0	1.36e-10	2.52e-08	0.000428	1.20e-08	0.00101
Cragg-Donald F test	133.3	77.05	59.85	70.38	28.77	6.653	10.53	46.05	7.099
Hansen J test P-value	0.718	0.145	0.343	0.665	0.510	0.823	2.30e-05	0.203	0.137

Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5: Estimation results interaction equation leaving out the Caribbean countries.

dependent variable y:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CIT rate	CIT rate	CIT rate	Tax holiday	Tax holiday	Tax holiday	Inv. allowance	Inv. allowance
W: inverse distance, without interaction across continents								
Wy	0.469*** (2.99)	0.614* (1.91)	0.601 (1.56)	1.233*** (3.93)	1.044** (2.26)	1.076 (1.16)	0.419 (1.12)	0.501 (0.79)
W: inverse distance, with interaction across continents								
Wy	0.550*** (2.95)	0.866** (2.06)	0.728* (1.67)	1.362*** (4.06)	1.401** (2.24)	1.680 (0.98)	0.651 (1.33)	1.505 (1.51)
Common time trend?	no	yes	no	no	yes	no	yes	no
Country spec. time trends?	no	no	yes	no	no	yes	no	yes
Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 6: Estimation results interaction equation with tax variables interacted with LAC dummy.

dependent variable y:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	CIT rate	CIT rate	CIT rate	Tax holiday	Tax holiday	Tax holiday	Inv. allowance	Inv. allowance
W: inverse distance, without interaction across continents								
Wy	0.454*** (3.02)	0.713* (1.82)	1.047** (2.34)	1.141* (1.74)	0.398 (0.53)	0.911* (1.67)	0.381 (0.49)	-0.314 (-1.09)
Wy*LAC	-0.209 (-0.47)	0.436 (1.06)	-0.011 (-0.02)	-0.286 (-0.44)	0.281 (0.45)	-0.409 (-0.40)	-0.275 (-0.25)	1.985 (1.21)
W: inverse distance, with interaction across continents								
Wy	0.611*** (3.54)	1.400*** (2.89)	0.786* (1.88)	1.235** (2.50)	1.074* (1.69)	1.109* (1.85)	1.272 (0.77)	-0.341 (-0.81)
Wy*LAC	-0.132 (-0.41)	0.235 (0.75)	0.378 (0.54)	-0.129 (-0.25)	0.058 (0.11)	-0.882 (-0.66)	-1.162 (-0.57)	1.674 (1.61)
Common time trend?	no	yes	no	no	yes	no	yes	no
Country spec. time trends?	no	no	yes	no	no	yes	no	yes
Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Table 7: Baseline estimation results investment equation.

	(1)	(2)	(3)	(4)
Dependent variable y:	FDI	FDI	Private Investment	Private Investment
Estimation method:	Within	syst GMM	Within	syst GMM
Y_{t-1}	0.352*** (5.42)	0.373*** (4.88)	0.578*** (10.32)	0.789*** (10.56)
CIT rate	-0.031* (-1.87)	-0.032** (-2.32)	0.045 (1.63)	-0.005 (-0.20)
Holiday	0.000 (0.02)	0.069** (2.68)	-0.046 (-0.68)	0.070 (1.64)
Inv. Allowance	-0.314 (-1.11)	-0.786* (-1.86)	-0.287 (-0.51)	-0.620 (-1.15)
Inflation	0.000 (0.23)	0.000* (1.69)	-0.000*** (-2.84)	-0.000* (-1.94)
Exchange rate	0.026 (0.38)	-0.012 (-0.12)	0.283* (1.70)	0.324* (2.00)
Openness	-0.246 (-0.40)	0.545 (1.66)	1.144 (1.23)	0.098 (0.22)
GDP	0.007 (1.13)	-0.000 (-0.33)	0.001 (0.10)	0.001 (0.69)
GDP per capita	-0.124 (-0.45)	-0.116 (-0.92)	-0.052 (-0.16)	0.068 (0.59)
Gov. Consumption expenditure	-0.067 (-1.40)	0.045 (1.30)	-0.171** (-2.03)	-0.036 (-0.78)
Africa dummy		-0.939** (-2.62)		0.114 (0.33)
Caribbean dummy		1.559** (2.34)		0.342 (0.63)
Constant		3.007*** (3.45)		3.614** (2.55)
Observations	709	709	688	688
Number of country_code	42	42	42	42
R-squared	0.29		0.38	
Hansen J test P-value		0.360		0.319
AR(2) P-value		0.545		0.0691
Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1				

Table 8: Estimation results investment equation with interacted tax variables.

	(1)	(2)	(3)	(4)
Dependent variable y:	FDI	FDI	Private Investment	Private Investment
Estimation method:	Within	syst GMM	Within	syst GMM
Y_{t-1}	0.348*** (5.32)	0.394*** (4.56)	0.546*** (9.99)	0.753*** (10.29)
CIT rate	0.028 (1.16)	-0.006 (-0.33)	0.093** (2.13)	0.007 (0.21)
Holiday	-0.046 (-0.99)	0.019 (0.60)	-0.021 (-0.12)	0.076 (1.18)
Inv. Allowance	-0.173 (-0.41)	-0.300 (-0.77)	0.034 (0.05)	-0.270 (-0.46)
CIT rate * LAC	-0.093*** (-2.66)	-0.045* (-1.75)	-0.081 (-1.63)	-0.036 (-0.85)
Holiday * LAC	0.104** (2.07)	0.098** (2.34)	-0.024 (-0.14)	0.019 (0.21)
Inv. Allowance * LAC	0.223 (0.50)	-0.995 (-1.53)	-0.012 (-0.02)	-0.969 (-1.07)
Inflation	0.000 (0.14)	0.000* (1.72)	-0.000** (-2.47)	-0.000* (-1.96)
Exchange rate	0.037 (0.52)	-0.004 (-0.05)	0.307* (1.85)	0.366** (2.49)
Openness	-0.148 (-0.24)	0.480 (1.58)	1.240 (1.40)	0.169 (0.33)
GDP	0.002 (0.29)	0.000 (0.14)	-0.004 (-0.43)	0.001 (0.70)
GDP per capita	-0.237 (-0.82)	-0.094 (-0.86)	-0.074 (-0.23)	0.117 (0.87)
Gov. Consumption expenditure	-0.070 (-1.39)	0.043 (1.27)	-0.162* (-1.88)	-0.024 (-0.60)
Africa dummy		-2.374** (-2.18)		-1.228 (-0.81)
Caribbean dummy		1.103** (2.02)		0.212 (0.32)
Constant		3.531*** (3.88)		4.619*** (2.75)
Observations	695	695	675	675
Number of country_code	42	42	42	42
R-squared	0.31		0.35	
Hansen J test P-value		0.419		0.161
AR(2) P-value		0.709		0.0952
Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1				

Table 9: Baseline estimation results investment equation leaving out the Caribbean.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	FDI	FDI	FDI	FDI	Private Investment	Private Investment	Private Investment	Private Investment
Estimation method:	Within	Within	syst GMM	syst GMM	Within	Within	syst GMM	syst GMM
Y_{t-1}	0.289*** (3.52)	0.279*** (3.16)	0.354*** (3.80)	0.356*** (3.47)	0.526*** (8.33)	0.521*** (8.15)	0.730*** (9.23)	0.724*** (9.25)
CIT rate	-0.031* (-1.76)	-0.037** (-1.98)	-0.024* (-1.71)	-0.017 (-1.14)	0.049* (1.67)	0.047 (1.52)	-0.004 (-0.15)	0.004 (0.14)
Holiday	-0.004 (-0.15)	0.002 (0.06)	0.005 (0.16)	0.005 (0.18)	-0.058 (-0.63)	-0.063 (-0.67)	0.037 (0.76)	0.044 (0.85)
Inv. Allowance	-0.228 (-0.77)	-0.197 (-0.66)	-0.118 (-0.40)	-0.104 (-0.36)	-0.313 (-0.54)	-0.324 (-0.56)	-0.519 (-1.03)	-0.545 (-1.07)
Inflation	0.000 (0.03)	0.000 (0.23)	0.000 (1.34)	0.000* (1.90)	-0.000*** (-2.99)	-0.000*** (-2.88)	-0.000*** (-2.74)	-0.000** (-2.05)
Exchange rate	0.009 (0.12)	0.008 (0.10)	-0.023 (-0.22)	-0.016 (-0.15)	0.296* (1.69)	0.286 (1.59)	0.303* (1.93)	0.319* (1.89)
Openness	-0.511 (-0.80)	-0.599 (-0.97)	0.691* (1.84)	0.719* (1.85)	0.977 (1.04)	0.958 (0.99)	0.310 (0.62)	0.393 (0.73)
GDP	0.011* (1.72)	0.011 (1.58)	-0.001 (-1.34)	-0.001 (-1.30)	0.009 (0.95)	0.010 (1.05)	0.001 (0.92)	0.002 (1.24)
GDP per capita	0.058 (0.19)	0.127 (0.38)	-0.132 (-1.35)	-0.161 (-1.64)	-0.286 (-0.83)	-0.257 (-0.66)	-0.014 (-0.16)	-0.070 (-0.83)
Gov. Consumption expenditure	-0.090* (-1.88)	-0.081* (-1.70)	0.014 (0.55)	0.003 (0.11)	-0.234** (-2.45)	-0.235** (-2.46)	-0.066 (-1.36)	-0.067 (-1.38)
Corruption		0.269 (1.27)		0.107 (0.84)		-0.000 (-0.00)		-0.059 (-0.34)
Law and order		-0.019 (-0.12)		0.119 (0.82)		0.211 (1.28)		0.202 (1.45)
Africa dummy			-0.783** (-2.28)	-0.817** (-2.27)			0.215 (0.61)	0.009 (0.02)
Constant			3.228*** (4.46)	2.697*** (3.65)			4.788*** (3.53)	4.546*** (3.35)
Observations	599	571	599	571	599	571	599	571
Number of country_code	36	34	36	34	37	35	37	35
R-squared	0.26	0.29			0.35	0.34		
Hansen J test P-value			0.277	0.559			0.384	0.271
AR(2) P-value			0.729	0.765			0.138	0.146

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 10: Estimation results investment equation leaving out the Caribbean and with interacted tax variables.

	(1)	(2)	(3)	(4)
Dependent variable y:	FDI	FDI	Private Investment	Private Investment
Estimation method:	Within	syst GMM	Within	syst GMM
Y_{t-1}	0.286*** (3.47)	0.366*** (3.36)	0.479*** (7.84)	0.679*** (8.51)
CIT rate	0.016 (0.69)	-0.010 (-0.48)	0.091** (2.01)	0.017 (0.45)
Holiday	-0.049 (-1.08)	0.012 (0.38)	-0.048 (-0.28)	0.078 (0.96)
Inv. Allowance	-0.124 (-0.29)	-0.253 (-0.64)	0.007 (0.01)	-0.736 (-1.13)
CIT rate * LA	-0.073* (-1.95)	-0.018 (-0.66)	-0.083 (-1.61)	-0.046 (-0.98)
Holiday * LA	0.119** (2.20)	-0.003 (-0.07)	-0.049 (-0.28)	-0.131 (-1.37)
Inv. Allowance * LA	0.158 (0.34)	0.166 (0.33)	-0.143 (-0.21)	0.216 (0.31)
Inflation	-0.000 (-0.03)	0.000 (1.35)	-0.000*** (-2.64)	-0.000** (-2.68)
Exchange rate	0.022 (0.28)	-0.002 (-0.02)	0.324* (1.82)	0.373** (2.45)
Openness	-0.433 (-0.67)	0.639* (1.75)	1.270 (1.36)	0.519 (0.92)
GDP	0.006 (0.85)	-0.001 (-1.30)	0.003 (0.28)	0.001 (0.42)
GDP per capita	0.056 (0.17)	-0.115 (-1.21)	-0.197 (-0.57)	0.005 (0.05)
Gov. Consumption expenditure	-0.091* (-1.73)	0.015 (0.54)	-0.218** (-2.22)	-0.053 (-1.22)
Africa dummy		-1.395 (-1.25)		-1.657 (-0.98)
Constant		3.310*** (4.15)		6.227*** (3.61)
Observations	585	585	586	586
Number of country_code	36	36	37	37
R-squared	0.28		0.32	
Hansen J test P-value		0.362		0.231
AR(2) P-value		0.953		0.199
Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1				

APPENDIX

Table A1: Countries and Periods Covered in the Corporate Tax Dataset.

	Africa	Period¹	Latin America	Period¹	Caribbean	Period¹
1.	Botswana	all	Argentina	all	Antigua and Barbuda	all
2.	Cameroon	88-02	Bolivia	all	Bahamas	all
3.	Congo, Rep.	88-00	Brazil	all	Barbados	all
4.	Gabon	88-98, 01-02	Chile	all	Dominican Republic	all
5.	Ghana	91-04	Colombia	all	Jamaica	all
6.	Ivory coast	all	Costa Rica	all	St. Lucia	all
7.	Kenya	all	Ecuador	all	Trinidad and Tobago	all
8.	Liberia	85-91	El Salvador	85-98		
9.	Malawi	85-02	Guatemala	all		
10.	Morocco	all	Guyana	88-04		
11.	Mauritius	all	Honduras	85-98		
12.	Mozambique	99-04	Mexico	all		
13.	Namibia	91-04	Nicaragua	85-86,92-97,01-02		
14.	Nigeria	84-02	Panama	all		
15.	Senegal	85-02	Paraguay	all		
16.	South Africa	All	Peru	all		
17.	Swaziland	91-96,01-04	Uruguay	all		
18.	Tanzania	88-04	Venezuela	all		
19.	Uganda	91-04				
20.	Dem. Rep. of Congo	85-96, 01-04				
21.	Zambia	all				
22.	Zimbabwe	all				

Source: Authors' calculation based mostly on data in Price Waterhouse Coopers (various years).

¹ "All" indicates 1985 – 2004.