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# Local Government Fiscal Competition in Developing Countries: The Case of Indonesia<sup>1</sup>

Javier Arze del Granado\*, Jorge Martinez-Vazquez\*\* and R. Renata Simatupang\*\*

*This paper explores the role and significance of spatial fiscal competition among local governments in the developing world. Although there is now a large literature on local fiscal competition in North America and Western Europe, little is known about the extent and significance of fiscal interaction among local governments in the many developing countries that have undergone fiscal decentralization process over the last decade. This paper, in particular, examines whether jurisdictional competition (in the forms of expenditure externalities, tax competition, and yardstick competition) has been present in Indonesia, a country that was strongly decentralized starting in 2001. Our empirical results strongly suggest the relevance of fiscal competition in the case of Indonesia.*

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*Este artículo explora el papel e importancia del modelo de competencia fiscal espacial entre gobiernos locales en países en vías de desarrollo. A pesar de que existe ahora una literatura significativa sobre competencia fiscal espacial en América del Norte y Europa Occidental, poco se conoce sobre la relevancia del modelo de competencia fiscal espacial en países en vías de desarrollo que han experimentado grandes avances en el proceso de descentralización fiscal durante la última década. En este artículo, en particular, examinamos la presencia de competencia fiscal espacial (en sus formas de externalidades del gasto, competencia impositiva y competencia de marca) en Indonesia, un país que ha estado embarcado en un fuerte proceso de descentralización desde 2001. Nuestros resultados empíricos*

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*sugieren de una forma significativa la relevancia del modelo de competencia fiscal espacial en Indonesia.*

Key words: Fiscal Competition, Spillover Effects, Yardstick competition, Tax competition, Spatial Lag Model, Spatial Interaction, Decentralization in Indonesia

JEL classification: H71, H72, H75, H77, C21

## I. INTRODUCTION

This paper explores the role and significance of spatial fiscal competition among local governments in the developing world. An increasing number of papers in the fiscal competition literature, as reviewed below, have established the importance of spatial interaction among local governments in the United States and several Western European countries. Although over the last two decades many developing and transitional countries have been involved in deep decentralization reforms, providing local governments with different degrees of fiscal autonomy, little is known about the extent and significance of fiscal interaction among local governments in those countries.

Fiscal and other forms of spatial interactions among local governments can help shape important institutional features and outcomes of decentralization. Although the goals of decentralization may not differ that much between industrialized and developing countries, the forms of decentralization and the institutional and budgetary constraints with which local governments operate in those two categories of countries may mean that the role played and the outcomes produced by local fiscal competition may differ considerably between the developing and developed worlds.

However, the potential of fiscal competition, in particular some forms of it such as yardstick competition, can be of much more significance in the developing world because other forms of voice (such as, elections and referenda), and exit (such as, household and firm mobility) are likely to work less effectively in shaping the behavior of local governments in developing countries than in western democracies. The decentralization theorem (Oates, 1972) argues that decentralized governance can improve overall efficiency in public service delivery by bringing greater diversity into the supply of public services, thus enabling government to better serve heterogeneous preferences for public goods. Along with this *efficiency or preference matching* argument for decentralization, it is also argued (Shah, 1999) that decentralization can facilitate political participation of the citizens and improve

government's *accountability* to citizens. But, whether greater accountability is a pre-condition for decentralization to yield efficiency benefits in developing countries that have decentralized or whether it constitutes an additional desirable outcome of decentralization in these countries is still open to debate. There is merit to both views and this is not the place to attempt to reconcile them.<sup>2</sup> But in the context of decentralization in many developing countries, we would expect that the presence of some forms of competition among jurisdictions will affect local government accountability and therefore the overall effectiveness of decentralization.

The literature on spatial fiscal competition has identified at least three forms of interactions among local governments: expenditure spillovers, tax competition, and yardstick/benchmark competition. Each of these forms of jurisdictional competition can have a significant impact - both positive and negative - on how a decentralized system actually works. Several empirical conclusions could be drawn from the existing literature (McLure, 1986; Wilson, 1999). First, due to benefit spillover from local expenditure, local government may set less spending than would be required for welfare maximization. This assumes that public spending in one jurisdiction can substitute for public spending in other jurisdictions, allowing these other jurisdictions to free ride. However, some of the spillovers may involve some complementary services; for example, better public amenities and better highways. The externality effect may also involve imitation behavior. Better parks and amenities in one jurisdiction may induce similar expenditures in other jurisdictions. Second, competition for mobile tax bases may result in sub-optimal levels of expenditure; some taxes are kept too low or resources are employed to finance government programs (creating incentives to attract mobile capital) that do not benefit production. However, some forms of tax competition may also lead to less waste or less Leviathan-type behavior (Brennan and Buchanan, 1977).

The question that particularly interests us is how fiscal competition may affect accountability. Although tax competition and expenditure spillovers may have effects on accountability, it is yardstick competition that

<sup>2</sup> However, it is interesting to note that critics of decentralization in developing countries (Bahl and Linn, 1992, Prud'homme, 1995; Tanzi, 1996) typically have argued that decentralization may not be able to deliver the benefits it promises because local governments in these countries lack accountability, or in addition, that they are vulnerable to elite capture, have limited technical capacity or human and financial resources, are too corrupt, and so on.

is likely to have the largest impact on accountability. With decentralization, local governments come to manage larger amounts of budget resources with no supervision, or limited supervision, from the central government but residents are expected to become more vocal on how resources should be managed either because some of the resources come from local taxes or because other resources (shared revenues and transfers) are to be spent for their benefit. On the other hand, assuming that local politicians are vote seekers, local government choice of policies will affect their chance of being re-elected. Even with an imperfect flow of information, we would expect citizens to have some information on the performance of local governments in nearby jurisdictions. In particular, citizens may be able to compare policy decisions by their own government with those of neighboring jurisdictions. The incumbent will need to answer to its constituents if its policy is deemed less favorable compared to that of similar or nearby localities. Hence, one way to gauge the effectiveness of the accountability mechanism in decentralized developing countries is by examining the presence or significance of fiscal competition among local jurisdictions. This is the main objective of this paper.

To the best of our knowledge, studies for fiscal competition in developing countries are non-existent. We aim to fill the gap in the literature by examining whether jurisdictional competition has been present in Indonesia, a country that was strongly decentralized starting in 2001. The choice of Indonesia to carry the study reflects not only the fairly dramatic and well-known effort to transform one of the most centralized countries in the developing world into one of the most decentralized, but also the facts that Indonesia's system is representative among developing countries and that fair amounts of data are available to conduct the demanding empirical analysis.

The rest of this paper is organized as follows. In section two we explain briefly the decentralization process in Indonesia and the challenge the country has faced in moving from highly centralized to highly decentralized regimes. In section three we review the literature on models and empirical findings for different forms of competition. In section four we apply the empirical models to Indonesia and discuss our findings. In the last section we conclude.

## II. DECENTRALIZATION IN INDONESIA

After its independence in the post World War II period, Indonesia remained a highly centralized country for many years under the tight control

of the Suharto dictatorship. Following the transition to a democratic regime after the fall of the Suharto in the late 1990s, full scale decentralization reform started in Indonesia in 2001 with a package of sweeping policy reforms that became known as the “Big Bang”.<sup>3</sup> Almost overnight Indonesia went from being one of the most centralized countries in the world to being one of the most decentralized, especially on the expenditure side of the budget. Although the original fears about the potential chaos that could follow such a rapid decentralization process did not materialize, the transition was far from smooth. Over the last six years there has been a continuous process of reform and fine tuning of the initial reforms.

The main feature of the “Big Bang” reform involved a massive delegation of responsibility for the provision of public services. The central government retained for itself only five basic functions and decentralized all other expenditure assignments. Specifically, this meant the reassignment of two thirds of the central government’s civil servants (over one and an half million employees) and over 16,000 service delivery facilities to the provincial and municipal government levels, mostly the latter.<sup>4</sup> As a result the share of local and provincial government in total government expenditure almost doubled (Table 1); in fact, in terms of expenditures, Indonesia became one of the most decentralized countries in the world. In East Asia, only China has more decentralized expenditures than Indonesia.

However, decentralization on the expenditure side was less than complete. An important fact is that, for a variety of reasons including several political issues, the central government still pays all the wages and salaries of public employees at the sub-national level, controlling the number of official employees and to a large extent salary levels.<sup>5</sup> Sub-national governments have found ways to get around these constraints by hiring non-official workers and by paying a variety of bonuses, but nevertheless autonomy on the expenditure side is somewhat limited.

<sup>3</sup> See Alm, Martinez-Vazquez and Mulyani (2004) and Hofman and Kaiser (2004).

<sup>4</sup> Because of fears of political disintegration, most of the expenditure powers went to the local governments or municipalities as opposed to the provincial or regional governments. The new decentralized order also called for little or no hierarchical relation between the provinces and the municipalities.

<sup>5</sup> Employee salaries are financed by allocating a portion of the large unconditional grant program originally designed for equalization purposes and known as the DAU (*Dana Alokasi Umum*), to finance wages and salaries.

**Table 1. Share of Central, Province and District Government Budgets**

Share	Before decentralization		After decentralization	
	1994	1999	2001	2004
<b>Revenues</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Central government	94%	96%	94%	90%
Province	4%	2%	3%	6%
Kabupaten (municipalities)	2%	2%	3%	4%
<b>Expenditures</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Routine expenditures	60%	77%	79%	73%
Development expenditures	40%	23%	21%	27%
<b>Central government</b>	<b>69%</b>	<b>80%</b>	<b>74%</b>	<b>66%</b>
Routine expenditures	42%	64%	62%	52%
Development expenditures	27%	16%	12%	14%
<b>Province</b>	<b>15%</b>	<b>6%</b>	<b>6%</b>	<b>7%</b>
Routine expenditures	10%	3%	3%	3%
Development expenditures	5%	3%	3%	4%
<b>Kabupaten</b>	<b>16%</b>	<b>14%</b>	<b>20%</b>	<b>27%</b>
Routine expenditures	8%	9%	14%	18%
Development expenditures	8%	5%	6%	9%
<b>Balance as % of National Exp.</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
Central government	36%	23%	11%	24%
Province	-10%	-4%	-3%	-1%
Kabupaten	-14%	-12%	-18%	-22%

Source: Public Expenditure Review Indonesia 2007 (World Bank)

On the revenue side, the decentralization process was much less ambitious. Sub-national governments were given little autonomy in the sense that all major tax sources were kept by the central authorities, including the property tax, and revenue sharing and transfers constitute the most important finance sources for sub-national governments.<sup>6</sup> In particular, sub-national governments depend largely on the unconditional

<sup>6</sup> Initially, sub-national governments were given authority to introduce their own taxes provided they did not overlap with existing central government taxes. This open list approach to local taxes gave rise to many awkward and inefficient tax forms even though the new taxes were supposed to be approved by the central authorities. Eventually, these sub-national powers were significantly curtailed.

equalization grant or DAU, a large portion of which goes to finance wages, and less so from the conditional grant of DAK (*Dana Alokasi Khusus*). The extensive role played by revenue sharing and transfers provides incentives for regional governments not to use their own sources of revenue but instead to ask for more transfer/revenue sharing as financing needs increase.

**Table 2. Provincial and Municipal Government Revenue (in Trillion Rupiah)**

	Before decentralization		After decentralization	
	1994	1999	2001	2004
<b>Provincial Government Revenues</b>				
Own source revenue	2,977	4,364	10,005	22,696
Balancing funds (salaries)	6,000	7,324	14,447	19,823
Shared taxes	475	1,277	4,348	8,759
Shared natural resources revenue	275	896	3,366	2,833
Autonomous region subsidy (SDO)	4,003	2,218	-	-
Presidential grants (INPRES)	1,246	2,933	-	-
DAU (Unconditional grants)	-	-	6,575	8,217
DAK (Conditional grants)	-	-	158	13
Other revenue	28	5	1,033	3,482
<b>Total Revenue (excl. balancing funds)</b>	<b>9,004</b>	<b>11,693</b>	<b>25,485</b>	<b>46,000</b>
<b>Municipal Government Revenues</b>				
Own source revenue	1,219	2,791	5,267	10,131
Balancing funds (salaries)	8,388	24,082	70,609	101,935
Shared taxes	1,349	2,874	5,849	13,706
Shared natural resources revenue	176	534	8,575	8,773
Autonomous region subsidy (SDO)	3,372	14,118	-	-
Presidential grants (INPRES)	3,490	6,555	-	-
DAU (Unconditional grants)	-	-	55,301	75,794
DAK (Conditional grants)	-	-	885	3,661
Other revenue	61	280	2,822	10,055
<b>Total Revenue (excl. balancing funds)</b>	<b>9,667</b>	<b>27,152</b>	<b>78,699</b>	<b>122,120</b>

Source: Public Expenditure Review Indonesia 2007 (World Bank)

In summary, the current decentralization system in Indonesia is fairly typical of decentralized systems in other developing countries, which



are characterized by the following: (i) considerable decentralization on the expenditure side of the budget in terms of the competences to be implemented and the autonomy to make expenditure decisions, with the important exception of employment and compensation issues for civil servants; (ii) limited revenue autonomy in terms of own taxes with discretion to change rates and collect significant levels of revenues and heavy revenue dependence on revenue sharing and other forms of transfers. Politically, Indonesia is also fairly decentralized with all legislative councils and executive bodies being democratically elected. However, administrative decentralization is limited to the extent that the central government still pays for the salaries of local civil servants and controls the hiring and firing. Sub-national governments get around these controls by hiring non-permanent employees and paying salary bonuses. The extent and forms of political and administrative decentralization in Indonesia is also fairly representative of that in other decentralized developing countries.

### III. LITERATURE REVIEW

The behavior of decentralized government units at different levels can lead to various forms of externalities or inter-jurisdictional effects. Depending on what levels of government are involved, externalities are typically classified as horizontal externalities when spillover effects are at the same tier of government, and vertical externalities, when the spillover effects involve different tiers of government. Our interest here is exclusively on *horizontal fiscal externalities*.

As Boadway (2001) emphasizes, horizontal fiscal externalities can be positive or negative; that is, they can provide an incentive for sub-national governments at the same level to set too high or too low a level of taxes and/or expenditures. These externality interactions generally receive the name in the literature of jurisdiction fiscal competition. To distinguish between the different types of government interaction and navigate the body of literature that has explored each of these interaction types, in this section and the next we will follow closely to the categorization and model specifications used by Brueckner (2003) and Revelli (2006).

#### EXPENDITURE SPILLOVER EFFECTS

This form of competition exists when a decision made by a government (typically assumed to be local welfare maximizing) affects the preferences

of another government (Gordon, 1983). Each jurisdiction  $i$  chooses the level of its decision variable ( $g_j$ ), but its welfare (apart from private consumption  $c_j$  and a vector of own characteristics  $X_j$ ) also affected both by its own expenditure for local public services ( $g_j$ ) and on spending in a nearby jurisdiction  $n(g_n)$ :

$$u_j = u[c_j(y_j, g_j, l_j), g_j, g_n, X_j]$$

where private consumption  $c_j$  depends on income ( $y_j$ ), level of public spending ( $g_j$ ) and grants from central government ( $l_j$ ). Depending on the type of spillover,  $(\delta u_j / \delta g_n)$  could be positive for complementary public services or negative for substitutive services.

The welfare maximizing solution for the optimal level of public service in jurisdiction  $i$  then also depends on the neighbor's expenditure  $g_n$ :

$$g_j = g[g_n, y_j, l_j, X_j]$$

Or as expressed in linear specification:

$$g_j = \theta_1 + \theta_2 g_n + \theta_3 y_j + \theta_4 l_j + X_j \kappa + \zeta_j \tag{1}$$

where  $\zeta_j$  is a random term,  $\kappa$  is a vector of parameters,  $\theta_3$  is the response of local spending to income and  $\theta_4$  is the response of local spending to grants from central government. The parameter of interest is  $\theta_2$  which captures the relationship between local public expenditure decision and jurisdiction  $n$ 's choice of expenditure.

The literature on expenditure spillovers is fairly rich in empirical evidence, especially for the United States and European countries. Empirical results show that some types of public services, such as public infrastructure, education, training and environmental services tend to have spillover effect to neighboring jurisdictions.

One of the earliest studies in fiscal interaction that incorporates spatial econometrics methods is by Case, Rosen and Hines (1993). They find that a state's expenditures in the United States on roads, education and welfare are positively affected by the expenditure levels of its neighbors. Cohen and Paul (2003) and Pereira and Andr az (2004) draw similar conclusion while Kelejian and Robinson (1997) and Boarnet (1998) found no evidence of quantitatively important productivity spillover

from state highway expenditure. However, Cohen and Paul (2004) found that airport expansion in one state has considerable impact for other states, and Murdoch, Rahmatian and Thayer (1993) conclude that the benefit from recreation expenditures by local governments in California is also enjoyed by non residents. For European cases, Sole-Olle (2006) found benefit spillovers arising from municipal expenditure on suburban public goods in Spain. Hanes (2002) found that Swedish municipalities free ride to benefit from neighbors' rescue expenditure, while Revelli (2003) studied the spillover impacts of English districts' environmental and cultural services expenditures. On the other hand, research on this issue for developing countries is very limited. Ferreira (2002), finds that under-provision of public health services in the Rio de Janeiro metropolitan area (Brazil) is due to the failure to internalize the expenditure spillover benefits generated by city of Rio to its surrounding cities.

Another strand of literature involving expenditure spillover effects is the welfare competition model<sup>7</sup>. In order to avoid being a welfare magnet, jurisdictions are likely to set their welfare benefits to be less attractive compared to their neighbors'. Although there is no significant evidence of welfare-seeking population migration in the United States (Walker 1994; Levine and Zimmerman 1995), it is observed that a state's responses to its neighbor's decrease in welfare is significantly larger in magnitude than its response to its neighbor's increase in welfare (Figlio et al 1999). There is additional evidence of strategic behavior among states regarding welfare expenditures in the United States (Saavedra 2000; Baicker 2005) and in Norway (Fiva and Rattso, 2006).

#### TAX COMPETITION

This form of fiscal competition focuses on how the tax policy of a particular jurisdiction  $i$  influences the size of 'resources' available for the neighboring jurisdiction (Brueckner 2003). As a result, jurisdiction  $i$ 's policy affects indirectly the fiscal policy of its neighbors, thus creating competition for mobile resources (Wilson 1999).

Due to indirect interaction with a neighboring jurisdiction's choice of fiscal policy, the tax base (or resources) in one jurisdiction  $i(b_i)$  is a

<sup>7</sup> Some of the literature (for example, Brueckner, 2000 and Revelli 2006) place the welfare competition model under the tax competition framework, and treat welfare seekers as a (negative) mobile resource.

function of its own vector of jurisdiction characteristic  $Y_i$ ; own policy  $i(t_i)$  as well as jurisdiction  $n$ 's policy  $n(t_n)$ :

$$b_i = b[t_i, t_n, Y_i]$$

We could expect that  $(\delta b_i / \delta t_i) < 0$  and  $(\delta b_i / \delta t_n) > 0$ ; a tax increase in jurisdiction  $i$  will make that jurisdiction less attractive to mobile resources since it will depress the capital's net return. Welfare of jurisdiction  $i$  depends on its vector of characteristics (such as demographic variables)  $X_i$  as well as residents' private consumptions  $c_i$  and the local public goods available  $g_i$ . It is assumed that both consumption and public goods depend on the size of resources  $b_i$  available locally:

$$u_i = u[c_i(b_i), g_i(b_i), X_i]$$

By maximizing local welfare subject to the size of resource base, the solution for optimal tax policy in jurisdiction  $i$  is a function of its own characteristics  $(X_i, Y_i)$ , as well as jurisdiction  $n$ 's tax policy:

$$t_i = t[t_n, X_i, Y_i]$$

which is usually written in linear function as:

$$t_i = \rho_1 + \rho_2 t_n + \beta X_i + \delta Y_i + \varepsilon_i \quad [2]$$

where  $\beta$  and  $\delta$  are the parameter vectors and  $\varepsilon_i$  is a random term. The variable of interest is  $\rho_2$  which shows the responsiveness of jurisdiction  $i$  fiscal policy to its neighbor's policy. If tax competitions among jurisdictions exist, we would expect  $\rho_2 \neq 0$ .

The empirical literature shows the existence of horizontal tax competition among jurisdictions at the same level (Ladd 1992; Brett and Pinkse 2000; Brueckner and Saavedra 2001; Feld and Reulier 2005).<sup>8</sup> The results from studies on competition for mobile resources (including Tiebout-

<sup>8</sup> Other studies have also explored the presence of vertical tax competition among different levels of government (Besley and Rosen 1998; Goodspeed 2000; Hayashi and Boadway 2001; Esteller-More and Sole-Olle 2002) while a particular section of literature deals with regional or international tax competitions (Devereux, Lockwood et al. 2002; Zodrow 2003; Wilson and Janeba 2005).

like competition for residential location of mobile taxpayers) show that the location choice of mobile resources (enterprises, voters or taxpayers) is tied to how fiscal policies of a jurisdiction compares to its neighbors. Brett and Pinkse (2000) examined the competition for tax bases in British Columbia; Buettner (2001) observed the significant competition among local jurisdictions in Germany for business taxes; while Feld and Kirchgassner (2003) found that canton's corporate and income tax rates affect corporate location choice in Swiss. The literature also suggests that competition for business may ignite "fiscal wars" where jurisdictions reduced their taxes in order to attract new business. Ferreira et al (2005) report that states in Brazil reduced value added taxes to attract new investment, although the practice has been unlawful since 1975. Otherwise, there seems to be limited evidence on the existence of a 'race to the bottom' in inter-jurisdiction tax competition.

#### YARDSTICK COMPETITION

Yardstick competition is based upon the existence of informational externalities among neighboring jurisdictions; in the general setting, imperfectly informed voters in a jurisdiction use information on government performance in nearby jurisdictions as a yardstick or benchmark to evaluate their own government (Besley and Case, 1995). Standards of performance can take different forms and can include taxes; for example, voters can look at the neighbor's tax policies as a proxy for the cost of public services. As a result of this information spillover, public officials in any one jurisdiction will try to keep up with the policies of nearby jurisdictions.

The literature on yardstick competition presents two main sets of empirical results. First, neighboring jurisdictions tend to mimic each other's tax policy. Ladd (1992) finds evidence of tax mimicking among counties in the United States, while Besley and Case (1995) and Rork (2003) find similar behavior across states also in the United States. The empirical literature also finds evidence of tax mimicking in European countries. Heyndels and Vuchelen (1998) find tax mimicking behavior among municipalities in Belgium; Revelli (2002) for local property tax in England; Sole-Olle (2003) for Spanish municipalities; Feld and Reulier (2005) for Swiss cantons; Allers and Elhorst (2005) for municipalities in Netherland.

Second, evidence from yardstick competition suggests that both own tax rates and neighboring tax rates may affect electoral outco-

mes. Besley and Case (1995) find that in the presence of asymmetric information concerning the cost of providing public services, voters can use the information on tax policy in neighboring jurisdictions to decide whether or not to re-elect the incumbent politicians. Revelli (2002b) draws similar conclusions from observing that an English municipality's own property tax increase has a negative impact on incumbent's popularity while a neighbors' tax increases have a positive impact. Vermeir and Heyndels (2006) also report similar conclusions for the Flemish municipalities of Belgium, Bosch and Sole-Olle (2007) for municipalities in Spain, and Bordignon et al. (2003) observe similar behavior for municipalities in Italy when mayors are running for re-election.

#### IV. EMPIRICAL MODEL AND ESTIMATION RESULTS

##### GENERAL APPROACH

Our goal is to examine the presence of fiscal competition in Indonesia using budgetary data for local governments for 2004 or three years after the big decentralization effort. Besides budget data, we also use the results from Governance and Decentralization Survey (GDS 2) in 2004 and other socio-demographic variables and indicators from the Bureau of Statistics in Indonesia.

Our empirical approach is to test for the presence of all three forms of fiscal competition identified in the review of the literature: expenditure spillover effects, tax competition and yardstick competition. However, our ability to carry out these tests is somewhat limited by several institutional restrictions and issues of data availability. These issues are discussed below for each of the estimations.

##### ECONOMETRIC MODELING AND DEFINITION OF THE WEIGHTING MATRIX

At the core of the empirical relationship for fiscal competition lies the concept of spatial autocorrelation: the existence of a systematic pattern on the spatial distribution of a variable of interest that occurs when the units of observation are distributed geographically in a given space (Cliff and Ord, 1981). In these cases standard OLS estimation is usually miss-specified due to spatial dependence among observations which can take the form of a spatial autoregressive process on the error term (spatial error model) or, if a spatially lagged dependent variable is included as a regressor, the spatial dependence takes the form of a mixed regres-

sive spatial autoregressive process corresponding to the following spatial regression model:

$$Y = \rho WY + X\beta + \mu$$

where  $\rho$  denotes the autoregressive parameter,  $W$  a weight matrix,  $\beta$  is the  $(k \times 1)$  vector of regressive parameters,  $X$  the  $(k \times 1)$  vector of explanatory variables, and  $\mu$  is a spatial white noise field such that  $u \approx N(0; \sigma^2 I_n)$ . This is referred as a spatial lag model.<sup>9</sup>

Estimating the parameters of the spatial weighting matrix would be desirable, but this approach is unfortunately unfeasible. An alternative way to address this issue is to define a parametric representation of the covariance structure of  $W$  following assumptions made on the spatial auto-correlation of the observations. Different approaches have been followed in the literature, among others, the inverse distance (Anselin 1988), income and ethnic composition (Case et al, 1993), the structure of a social network (Doreian, 1980), or a fixed amount of nearest neighbors (Pinkse and Slade, 1998).

For Indonesia we use two alternative types of neighboring definitions. The first is based on geographic distance and the second is based on inter-jurisdictional migration patterns. If we denote  $d_{i,j}$  as the distance between the centroid of the local districts  $i$  and  $j$ , the distance-weighting matrix can be defined as  $w_{i,j} = 1/d_{ij}$  for all districts  $j$  that have their centroid within a radius of 150 km from district's  $i$ 's centroid. See Figure 1. The weighting matrix  $W$  is row standardized so that

$$\sum_j w_{i,j} = 1$$

which ensures that the neighbors' influences on each district are the same regardless of their number.

It can be argued that a district's direct geographic neighbors may not necessarily be the benchmarks of inter-jurisdictional competition. Local districts may imitate, or compete with jurisdictions that are higher in the hierarchical structure of the country such as competition with the nearest provincial capital or districts with larger economic activity. Neighboring hierarchical structure in this sense could be proxied by similarity in gross domestic product (Case et al, 1993). While defining neighboring districts by income level has its virtues, it also has the drawback that it fails to capture the geographic dimension, as the distributions of districts

<sup>9</sup> Arbia (2006) provides a full derivation of the log likelihood function for this model.

with comparable levels of income per capita over a country's area are uncorrelated to geographic proximity. Preserving to some degree the geographic dimension of the weights is desirable as geographic derived weights are clearly exogenous to the model, and thus less likely to generate identification problems. Migration patterns are arguably able to capture the hierarchical structure as economically thriving districts attract migrants from districts with lower ranges of services available and with lower employment opportunities, while it is likely inversely correlated to the distance between any two districts. Therefore, we explore a second weighting approach by defining  $m_{i,j}$  as the share of population born in district  $i$  residing in district  $j$  in total population born in  $i$  residing out of it. Migration flows are asymmetric, and so,  $(w_{i,j} = w_{j,i})$  is defined so that it contains the largest of the two shares.<sup>10</sup> In order to determine the cut-off point (the criteria defining a limit above which interactions are assumed negligible) we rank (by row) the flows of migration for each district and define the top ten destinations for each district as its neighbors.

#### TESTING FOR EXPENDITURE SPILLOVER EFFECTS

In order to identify the presence of expenditure spillovers it is necessary to assume that sub-national governments have discretion on how to spend their resources. This is an assumption that is not always met in developing decentralized countries. In the case of Indonesia, despite devolution of public spending in 2001, the intergovernmental structure in Indonesia determines that *de facto* local districts have limited autonomy over the use of some of their public resources. As we already mentioned, a large portion of the general allocation transfer (DAU) is aimed at covering the full amount of the district's civil service wage bill, while the central government has retained the authority to manage the sub-national civil service.

Therefore, for Indonesia, the current structure determines that expenditures on salaries for civil service are non-discretionary for district governments and thus not subject to strategic competitive behavior. In practice, district governments have circumvented this by hiring contractual employees to cover additional needs in different sectors. Unfortunately the current bud-

<sup>10</sup> This assumption may be questioned; for example, while a capital city may absorb a significant share of a smaller neighbor migrant population, the inverse would often be close to zero. Alternative ways of weighting both shares were considered but the results seem to undermine the degree of correlation between observations.



get classification does not allow for the separation of those expenditures from civil servants' salaries. In order to test the predictions of the expenditure spillover model, we separate discretionary from non-discretionary expenditures at the sub-national level by defining non-discretionary expenditures as: capital expenditures plus non-personnel routine expenditures (goods and materials, operations and maintenance, other routine expenditures, others).

Since the benefits of public services in one jurisdiction may spill over in neighboring jurisdictions, we theorize that district's  $i$ 's per capita expenditures ( $y_i$ ) depend on its own characteristics - a ( $k \times 1$ ) vector  $X_i$  of explanatory variables, and also on the expenditures of its neighbor districts  $y_j$  (with  $j \neq i$ ). The nature of this interaction is examined by introducing a *spatial lag operator*, which is essentially a *weighted average* of the dependent variable of neighboring districts. The reaction function for spending category  $k = 1, \dots, K$  of district  $i$  can be written as follows:

$$Y_i^k = \rho \sum_{j \neq i} w_{i,j} y_{j,t} + \alpha X_i + u_i \quad [4]$$

where  $\rho$  and  $\alpha$  are parameters to be estimated and  $u_{i,t}$  is a random error, and  $w_{i,j}$  are weights defined according to pre-defined alternatives of neighborliness discussed in the previous section. For each row  $i$  in the weight matrix (a district) columns  $j \neq i$  with non-zero values denote neighboring districts as specified by the two types of criteria (distance and migration), and  $w_{i,i}$  is set to zero by convention.<sup>11</sup>

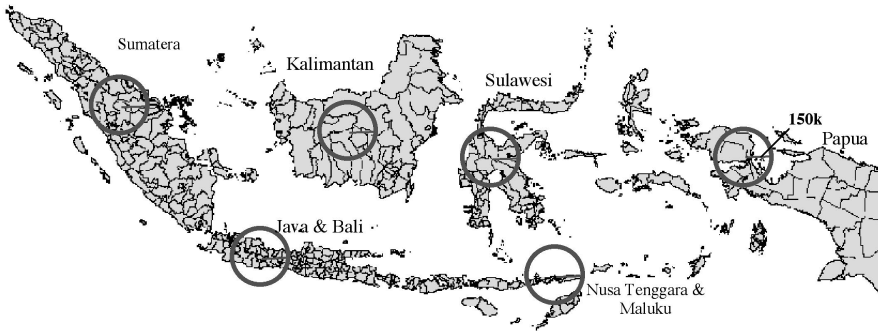
The vector of covariate includes population density, transfers from central government, state income per capita (excluding oil and gas), proportion of population in school age, proportion of population above 65 years, and a set of geographic variables. The geographic variables included are of particular interest in this model as Indonesia is a country formed by 13,000 islands of which six are of considerably larger size. Thus the geography of Indonesia is fundamentally different from that of previous studies in the United States or Europe. Considering this geographical set up, it is particularly interesting to test several dimensions of geographic connectivity. We introduce variables to examine the specific characteristics of geographically isolated island-districts, and districts without a coast, and also by differences among the main islands (relative to Java). Figure 1 presents Indonesia's map and outlines districts that have some of the geographic characteristics aforementioned.

<sup>11</sup> See Anselin (1988) for further discussion on spatial weights.

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**Figure 1. Neighboring districts within 150 km ring**

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The estimation results shown in Table 3 present the estimates of districts' log public expenditure per capita (total and sectoral expenditure) as a function of its own characteristics and neighbor's expenditure, using the distance weight matrix.

The coefficient of the spatially lagged variable for total expenditures is positive and significant at the 10% confidence level, suggesting the existence of a positive spatial interdependence in total discretionary expenditures. However, the relation appears to be relatively inelastic ( $0 < \epsilon < 1$ ) as 1% point increase in total discretionary expenditures of neighboring districts increases a given district's own expenditures by 0.07%. Among the analogous coefficients at the sectoral level only that of expenditures on discretionary government administration is significant and positive.<sup>12</sup> This is of particular interest as expenditures in the government sector account for the largest share in sub-national expenditures in Indonesia. The estimated spatial elasticity for sub-national administrative services is almost twice as large as that of discretionary total expenditures. Some sort of an imitation effect, and not necessarily of the good kind, would appear to go on among Indonesia's local districts. Spending by neighboring districts on local buildings, cars and so on leads to imitation by other districts.

The remaining coefficients for spatially lagged sectoral expenditures have a negative sign but are not statistically significant. Transfers per

<sup>12</sup> The lack of statistical significance of the coefficients for the remaining sectors is not surprising as many of the studies conducted in other countries have also failed to find a spatial interdependence on expenditure estimations based on distance weight matrices (e.g., Case et al, 1993).

**Table 3. Total and sectoral expenditure spillover with distance weight matrix**

	Total Exp	Agriculture	Industry
Neighbor's (sector) log exp/capita	0.0701 <sup>+</sup> (1.73)	-0.1092 (-1.08)	-0.1068 (-0.93)
Log GDRP/ capita	0.0019 (0.14)	0.0140 (0.09)	0.2152 (0.86)
Population density	2.6e <sup>-5</sup> * (2.72)	-1.98e <sup>-4</sup> <sup>+</sup> (-1.92)	-2.57e <sup>-4</sup> (-1.54)
Log transfer per capita	1.2213** (34.20)	1.5879** (4.05)	1.2137 <sup>+</sup> (1.92)
% population in school age	0.7635 (1.19)	7.2036 (1.02)	2.9300 (0.26)
% population over 65	-4.6374** (-4.09)	8.5419 (0.69)	-13.3065 (-0.66)
Landlocked	-0.0746* (-2.01)	0.0268 (0.07)	0.9670 (1.46)
Isolated Island	0.0975 (1.20)	-2.8254** (-3.29)	-2.0625 (-1.49)
Ethic Fractionalization	0.0531 (0.84)	0.0593 (0.09)	0.6749 (0.60)
Dummy Sumatra	-0.3322** (-4.84)	-0.4994 (-0.69)	-1.4550 (-1.26)
Dummy Kalimantan	-0.2182** (-2.65)	0.2923 (0.34)	-1.0751 (-0.77)
Dummy Sulawesi	-0.2645** (-3.98)	-1.2316 <sup>+</sup> (-1.72)	-1.4365 (-1.25)
Dummy Nusa Tenggara & Maluku	-0.2342** (-2.90)	-0.3450 (-0.40)	0.1210 (0.09)
Dummy Papua	-0.6169* (-2.50)	-0.9618 (-0.44)	-0.1631 (-0.05)
Constant	-4.4430 (-6.78)	-13.1885 (-2.29)	-8.6853 (-0.94)
Obs.	266	267	267

Note: z statistic in parentheses, <sup>+</sup> significant at 10%, \*significant at 5%, \*\*significant at 1%

Infrastructure	Housing	Health	Education	Government
-0.0793 (-0.77)	-0.0269 (-0.25)	-0.1217 (-1.17)	-0.1021 (-1.00)	0.1329* (2.28)
0.1429 (0.83)	0.0030 (0.17)	0.0937 (0.60)	0.0951 (0.59)	-0.0107 (-0.61)
-4.18e <sup>-5</sup> (-0.37)	1.53e <sup>-4</sup> (0.83)	-5.48e <sup>-5</sup> (-0.52)	-6.85e <sup>-5</sup> (-0.64)	5.25e <sup>-5**</sup> (4.32)
1.6631** (3.85)	1.6631** (3.85)	1.6588** (4.18)	1.6979** (4.19)	1.1129** (24.35)
2.0215 (0.26)	2.0215 (0.26)	5.8740 (0.82)	8.7376 (1.20)	-1.1419 (-1.42)
-4.7749 (-0.35)	-4.7749 (-0.35)	4.7333 (0.38)	6.4257 (0.50)	-6.9109** (-4.86)
0.4767** (1.05)	0.4767** (1.05)	0.2986 (1.08)	.4082 (0.96)	-0.0769 <sup>+</sup> (-1.66)
-2.0566* (-2.17)	-2.0566* (-2.17)	-3.0246** (-3.47)	-2.9785** (-3.34)	0.1121 (1.15)
-0.2489 (-0.32)	-0.2489 (-0.32)	-0.3536 (-0.50)	-0.3547 (-0.49)	0.1142 (1.44)
-1.0031 (-1.27)	1.4647 (1.11)	-1.3347+ (-1.84)	-0.8585 (-1.15)	-0.3156** (-3.66)
-0.4138 (-0.43)	-1.3471 (-0.86)	-0.7811 (-0.90)	-0.50411 (-0.57)	-0.2663** (-2.60)
-1.4190 <sup>+</sup> (-1.80)	0.5041 (0.38)	-1.8637** (-2.57)	-1.5964* (-2.16)	-0.1074 (-1.25)
-1.4327 (-1.49)	1.9725 (1.24)	-0.9755 (-1.11)	-0.5527 (-0.62)	-0.1919 <sup>+</sup> (-1.88)
-1.1191 (-0.46)	1.2934 (0.33)	-1.4976 (-0.68)	-1.6729 (-0.74)	-0.4640 (-1.59)
-10.7683 (-1.68)	-13.6031 (-1.27)	-12.3620 (-2.10)	13.9318 - (-2.33)	-3.9773 (-4.67)
267	267	267	267	267

**Table 4. Total and sectoral expenditure spillover with migration weight matrix**

	Total Exp	Agriculture	Industry
Neighbor's (sector) log exp/capita	0.0499 (0.93)	-0.1092 (-0.56)	-0.1769 (-0.94)
Log GDP/ capita	-0.0022 (-0.16)	-0.0293 (-0.18)	0.1993 (0.75)
Population density	2.24e <sup>-5</sup> * (2.45)	-2.26e <sup>-4</sup> * (-2.05)	-2.75e <sup>-4</sup> (-1.55)
Log transfer per capita	1.2284** (37.83)	1.5064** (3.82)	0.5756 (0.91)
% population in school age	0.4021 (0.65)	3.1901 (0.43)	2.3795 (0.20)
% population over 65	-5.7932** (-5.23)	4.8945 (0.38)	-8.7146 (-0.42)
Landlocked	-0.0752* (-2.05)	0.0959 (0.22)	1.3298 <sup>+</sup> (1.46)
Isolated Island	0.0445 (0.70)	-2.8614** (-3.71)	-2.6079* (-2.09)
Ethic Fractionalization	0.0491 (0.79)	0.1847 (0.25)	1.0900 (0.90)
Dummy Sumatra	-0.2987** (-4.68)	-0.4677 (-0.63)	-1.2048 (-1.01)
Dummy Kalimantan	-0.2023** (-2.65)	0.2212 (0.24)	-1.0528 (-0.72)
Dummy Sulawesi	-0.2516** (-3.70)	-0.9432 (-1.27)	-0.5554 (-0.47)
Dummy Nusa Tenggara & Maluku	-0.2257** (-2.82)	0.2665 (0.30)	0.3586 (0.25)
Dummy Papua	-0.4163** (-3.07)	-3.1195* (-1.96)	-0.6909 (-0.27)
Constant	-4.1267 (-4.95)	-10.7748 (-1.76)	-0.3665 (-0.04)
Obs.	279	279	279

Note: z statistic in parentheses, <sup>+</sup> significant at 10%, \*significant at 5%, \*\*significant at 1%

Infrastructure	Housing	Health	Education	Government
-0.1013 (-0.51)	0.0472 (0.26)	-0.1739 (-0.88)	-0.0913 (-0.61)	0.0426 (0.72)
0.1179 (0.65)	0.0901 (0.32)	0.0223 (0.13)	0.0743 (0.43)	-0.0143 (-0.82)
$-7.45e^{-5}$ (-0.62)	$1.29e^{-4}$ (0.70)	$-7.05e^{-5}$ (-0.59)	$-9.96e^{-5}$ (-0.87)	$4.48e^{-5**}$ (3.84)
1.6166** (3.75)	1.8059** (2.71)	1.2929** (3.04)	1.5757** (3.87)	1.1521** (27.47)
-1.9781 (-0.24)	-9.2091 (-0.73)	2.8912 (0.36)	3.8869 (0.50)	-1.4161 <sup>+</sup> (-1.77)
-10.0736 (-0.71)	-0.9927 (-0.05)	4.7305 (0.34)	2.6037 (0.19)	-7.9090** (-5.68)
0.4352 (0.89)	-1.4661 <sup>+</sup> (-1.95)	0.4422 (0.92)	0.4585 (0.99)	-0.0662 (-1.40)
-2.7023** (-3.20)	-4.3479** (-3.35)	-4.2064** (-5.04)	-3.021** (-3.79)	0.1593 <sup>+</sup> (1.96)
-0.1491 (-0.18)	0.7804 (0.62)	-0.0892 (-0.11)	-0.1183 (-0.15)	0.1333 <sup>+</sup> (1.68)
-0.9469 (-1.17)	1.2694 (1.01)	-0.9647 (-1.21)	-0.8124 (-1.06)	-0.3002** (-3.64)
-0.6347 (-0.65)	-0.4495 (-0.30)	-1.1814 (-1.22)	-0.4351 (-0.47)	-0.2267* (-2.24)
-1.2601 (-1.56)	0.7920 (0.63)	-1.2495 (-1.56)	-1.1944 (-1.56)	-0.1152 (-1.30)
-0.7009 (-0.72)	2.0928 (1.38)	0.0628 (0.07)	-0.0637 (-0.07)	-0.1693 (-1.63)
-3.6292* (-2.09)	-1.1593 (-0.43)	-2.8238 <sup>+</sup> (-1.65)	-3.3722* (-2.05)	-0.0975 (-0.57)
-8.4279 (-1.26)	-14.6098 (-1.48)	-6.3759 (-0.95)	-10.9530 (-1.77)	-3.3278 (-3.82)
279	279	279	279	279

capita are statistically significant and positive, with elasticity coefficients larger than one, a result that confirms the presence of the “fly paper” effect in Indonesia. The dummy variable for isolated island is negative and significant in several sectors including agriculture, infrastructure, housing, health, and education. The dummies used to control for differences among the main six islands relative to Jawa are all significant and negative for overall expenditures, with Papua and Sumatra having the largest coefficients.

Table 4 presents the results based on the migration-weight matrix. Note that none of the spatially lagged variables are significant in this model, while the remaining control variables show similar results as in the previous model.

#### TESTING FOR YARDSTICK COMPETITION

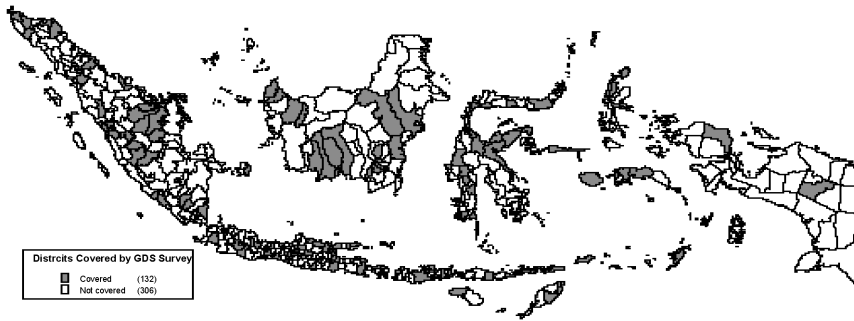
To test for the presence of yardstick competition we have no voting data. Instead we test the political economy of tax-setting and voters’ choices by an approximation to “incumbent’s popularity”. As discussed in the review of the literature, in the presence of yardstick competition, it would be expected that, other things equal, an incumbent mayor’s popularity will be negatively correlated to the taxes (tax rates) levied in its own district and positively correlated with the tax rates in neighboring districts. Hence, the mayors would face a trade-off between higher revenues through higher tax rates, on the one hand, and a lower opportunity of re-election on the other. Another form of yardstick competition would consist of making the “incumbent’s popularity” dependent on the quality of public services in his own jurisdiction vis-à-vis the quality of those services in neighboring jurisdictions.

Lacking voting data, we construct sector-specific satisfaction indicators from data from the World Bank’s Governance and Decentralization Survey (GDS 2), covering a sample of 137 districts<sup>13</sup>. Figure 2 presents a map with the districts covered by this survey.

In the survey, respondents were asked to express their satisfaction about government services. In general, they were asked whether they are satisfied, quite satisfied, quite unsatisfied or not satisfied at all about the quality of health, education and local administrative services. If the individual surveyed answers: “satisfied” or “quite satisfied”, we assumed that

<sup>13</sup> A previous version of this survey is available online. The version used herein will become available in next few months.

**Figure 2. Coverage of Governance and Decentralization Survey 2004**



the individual would have voted “yes” for the incumbent government if an election had taken place at the time of the survey. If the individual responded “quite unsatisfied”, or “not satisfied” then we assume the individual would have voted “no” for the incumbent mayor. Thus, by using the survey’s data we are assuming that an incumbent’s popularity can be proxied by resident voters’ satisfaction with the quality of public services but it will also be affected by how resident voters of neighboring jurisdictions felt about the quality of the services in their jurisdictions. In order to test these hypotheses regarding the level of satisfaction with local services and the level of taxes, we estimate a model with the following empirical specification:

34 | 35

$$Y^k_i = \rho \sum_{j \neq i} w_{i,j} y_j + \phi_1 t_i + \phi_2 \sum_{j \neq i} w_{i,j} t_j + \alpha X_i + u_i \quad [5]$$

where  $Y^k_i$  is defined as the percentage of respondents that scored “satisfied” or “quite satisfied” with service dimension  $k$  (1 = education; 2 = health, 3 = administrative),  $t_j$  are a proxy for tax rates in district  $i$  (own revenues over total revenues), and  $\rho$ ,  $\phi_1$ ,  $\phi_2$ , and  $\alpha$  are parameters to be estimated. The parameter  $\rho$  denotes the spatial autoregressive parameter aimed to reveal whether the satisfaction or approval level in jurisdiction  $i$  is interdependent with that of its neighbors. Note that as for district  $i$ , since data for other district tax rates are not available, we use several proxies to capture tax rate: own source revenue as percentage of GRDP; own source revenue per capita; and own source revenue as percentage of total revenues. Table 5 presents the results of this model of yardstick competition for health, education and administrative services,



respectively using the distance weight matrix. Table 6 reproduces the results with the migration weight matrix.

**Table 5. Satisfaction of government services with distance weight matrix**

	Health		Education		Administrative Services	
	(1)	(2)	(3)	(4)	(5)	(6)
Neighboring districts' satisfaction	0.3659 (1.40)	0.2029 (0.75)	0.6089** (3.15)	0.2998 (1.15)	0.4461 <sup>+</sup> (1.74)	0.2506 (0.85)
Tax rate (own source rev./ total revenue)	0.1932 (1.58)	0.0296 (0.25)	-0.1278 (-0.78)	-0.2099 (-1.29)	0.0323 (0.16)	-0.3463 <sup>+</sup> (1.71)
Neighbor's tax rate	0.0370 (0.74)	0.0831* (2.85)	0.3012** (4.75)	0.0417 (1.06)	-0.0518 (-0.66)	0.0657 (1.39)
GDRP/capita	0.0036 (0.55)	0.0079 (1.24)	0.0094 (1.06)	0.0186* (2.13)	0.0133 (1.28)	0.0249* (2.32)
Unemployment	-0.0381 (-0.31)	0.0056 (0.05)	0.2973 <sup>+</sup> (1.83)	0.1898 (1.26)	-0.2853 (-1.49)	-0.3098 (-1.66) <sup>+</sup>
ELF	-0.0389 (-2.38)*	-0.0189 (-1.18)	-0.0412* (-1.98)	-0.0343 (-1.58)	-0.0429 <sup>+</sup> (-1.69)	-0.0101 (-0.37)
Dummy Sumatra		-0.0205 (-1.23)		-0.0452 (-1.82)		-0.0611* (-2.17)
Dummy Kalimantan		-0.0598** (-3.28)		-0.0901** (-3.65)		-0.0855** (-2.84)
Dummy Sulawesi		0.0017 (0.10)		0.0198 (0.84)		-0.0483 (-1.60)
Dummy Nusa Tenggara & Maluku		-0.0489** (-2.59)		-0.0094 (-0.42)		-0.0474 <sup>+</sup> (-1.66)
Dummy Papua		0.0159 (0.27)		-0.3059** (-3.98)		0.0861 (0.89)
Constant	0.5424 (2.34)	0.6585 (2.66)	0.0038 (0.02)	0.5830 (2.54)	0.5489 (2.55)	0.6324 (2.53)
Obs.	96	99	96	99	96	99

Note: z statistic in parentheses, + significant at 10%, \*significant at 5%, \*\*significant at 1%

**Table 6. Satisfaction of government services with migration weight matrix**

	Health		Education		Administrative Services	
	(1)	(2)	(3)	(4)	(5)	(6)
Neighboring district's satisfaction	0.1762 (0.99)	0.0258 (0.15)	0.4357* (2.45)	0.2773 (1.58)	0.4377** (2.84)	0.3561* (2.18)
Tax rate (own source rev./total revenue)	-1.5569 (-1.01)	-1.5116 (1.09)	-3.1027 (-1.34)	-4.1984* (-2.28)	-3.2286 (-1.40)	-3.3064 (-1.48)
Neighbor's tax rate	1.6581 (1.13)	1.4893 (1.13)	3.0535 (1.39)	3.7967* (2.17)	3.1319 (1.43)	2.9574 (1.40)
GDRP/capita	0.0044 (0.65)	0.0083 (1.28)	0.0006 (0.06)	0.0158 <sup>+</sup> (1.79)	0.0109 (1.04)	0.0188 <sup>+</sup> (1.77)
Unemployment	-0.0294 (-0.22)	0.0248 (0.21)	0.1164 (0.58)	0.1494 (0.90)	-0.3641 <sup>+</sup> (-1.81)	-0.3977 (-1.99)*
Ethnic Linguistic Fragmentation	-0.0635 (-3.87)**	-0.0356* (-2.12)	-0.0826** (-3.33)	-0.0438 <sup>+</sup> (-1.94)	-0.0546* (-2.19)	-0.0183 (-0.66)
Dummy Sumatra		-0.0187 (-1.18)		-0.0649** (-3.04)		-0.0589* (-2.24)
Dummy Kalimantan		-0.0689** (-3.76)		-0.1072** (-4.41)		-0.0865** (-2.92)
Dummy Sulawesi		-0.0009 (-0.05)		0.0147 (0.65)		-0.0468 <sup>+</sup> (-1.69)
Dummy Nusa Tenggara & Maluku		-0.0534** (-3.27)		-0.0169 (-0.78)		-0.0485 <sup>+</sup> (-1.86)
Dummy Papua		-0.0964* (-2.05)		-0.3749** (-5.93)		-0.0226 (-0.29)
Constant	0.7656 (4.55)	0.9151 (5.40)	0.5043 (3.11)	0.6627 (4.12)	0.5150 (3.00)	0.6198 (4.27)
Obs.	93	93	93	93	93	93

Note: z statistic in parentheses, + significant at 10%, \*significant at 5%, \*\*significant at 1%

The results in Tables 5 and 6 show evidence of yardstick competition. The popularity for the incumbent as proxied by satisfaction with services depends positively on neighboring districts' satisfaction in the cases of education and administrative services. In the case of taxes, for seve-

ral of the services, but specially education services, the incumbent's popularity decreases with the district's tax rate but it increases with the tax rates in neighboring districts. The latter results reproduce quite well some of the yardstick competition results found in the literature for the United States and Europe. The results for the neighboring districts' satisfaction indicate increased popularity of the incumbent in a district with increased satisfaction in neighboring districts. This sign is the reverse of what we had expected to in terms of yardstick competition; at this time we do not have an intuitive explanation for the result. The coefficient for Ethnic Linguistic Fragmentation takes a negative sign in all the equations and it is often statistically significant. The results for the regional dummy variables indicate as before that satisfaction with local services in the other major islands of the country are relatively lower than in Java, which is the richer and more developed island.

#### TESTING FOR TAX COMPETITION

Here we use the proxies for tax rates already explained above: own source revenue as percentage of GRDP; own source revenue per capita; and own source revenue as percentage of total revenues. The results presented in Table 7 correspond to the last measure, "own source revenue as percentage of total revenues." We should point out that, as discussed in Revelli (2006), "tax competition" and "yardstick competition" theories yield the same reduced form estimating equation. If one wants to differentiate between them, we need to test for additional predictions of the theory in the form of an auxiliary estimating equation (like the popularity of the incumbent in the case of yardstick competition or *changes in tax bases* as in the case of tax competition). Since we actually estimate yardstick competition through the "incumbent vote" as just discussed above we will proceed to test for the presence of tax competition.<sup>14</sup>

We estimate a model with the following specification:

$$Y_i = \beta \sum_{j \neq i} w_{i,j} Y_j + \alpha X_i + u_i \quad [6]$$

where  $Y_i$  is defined as district  $i$  tax rates and  $Y_j$  district  $j$  tax rates (both proxied by own revenues as a percentage of total revenues). Table 7 presents results for this model. The coefficient for the spatially lagged variable is

<sup>14</sup> However, without data on tax base changes we cannot entirely separate the results for those for yardstick competition.

**Table 7. Tax competition**

Dependent variable:	Migration weight matrix		Distance weight matrix
<b>Own tax rate</b>			
Neighbor's tax rates (Neighbor's own source rev./ total revenues)	0.2890* (2.27)	-0.0220 (-0.15)	0.1279 (0.88)
Population density	1.37e <sup>-4</sup> ** (8.65)	9.27e <sup>-06</sup> (6.19)**	1.259e <sup>-4</sup> ** (7.73)
Log transfers per capita	-0.3162** (-4.71)	-0.0059 (-0.82)	-0.2049* (-2.47)
Log GDRP per capita	2.68e <sup>-9</sup> + (1.67)	1.92e <sup>-15</sup> ** (4.83)	1.88e <sup>-9</sup> (1.15)
Isolated island	0.1245 (1.01)	-0.0014 (-0.11)	0.1268 (1.01)
Landlocked	-0.0489 (-0.72)	-0.0003 (-0.05)	-0.0536 (-0.74)
Ethnic Fractionalization	-0.0863 (-0.84)	0.0112 (0.97)	0.0178 (0.16)
Dummy Sumatra		-0.0678** (-3.88)	-0.3039** (-2.79)
Dummy Kalimantan		-0.0634** (-3.19)	-0.1759 (-1.29)
Dummy Sulawesi		-0.0599** (-3.23)	-0.2709* (-2.19)
Dummy Nusa Tenggara & Maluku		-0.0615** (-3.19)	-0.2570 <sup>+</sup> (-1.94)
Dummy Papua		-0.0855** (-2.79)	-0.4279 <sup>+</sup> (-1.77)
Constant	1.2109 (1.67)	0.2004 (1.05)	-0.2429 (-0.26)
Obs.	275	275	275

Note: z statistic in parentheses, + significant at 10%, \*significant at 5%, \*\*significant at 1%

positive and statistically significant for the migration weight models without regional dummies. This means that there would appear to be some form of tax mimicking. When the regional dummies are included in the regression the coefficient for the spatially lagged variable becomes negative and insignificant, indicating that tax interactions, competition or mimicking, may not exist. Given the very limited scope for tax rate

competition in Indonesia because of the limited tax decentralization and the small share of own source revenues in total revenues, this result is somewhat expected. It is interesting to note, however, that the heavier use of own revenues, of the higher local tax effort as limited as it may be, is a determinant for the popularity of the incumbent as discussed above for our estimations for yardstick competition.

## VI. CONCLUSION

There exist now vast literatures about jurisdictional competition spanning over several decades. The advent of spatial econometrics has enriched this literature with new estimation methods to analyze the existence and various forms of fiscal competition. Although there has been a lot of study on jurisdictional competition in North America and some European countries, there has been much less research on its presence and effects in the developing world.

The main question addressed in this paper is how effective are models of jurisdiction competition to explain local government accountability in the context of decentralized developing countries. This question has received little attention in the past literature. This paper contributes to filling the gap in the literature by examining whether jurisdictional competition has been present in Indonesia, a country that was strongly decentralized in 2001. In particular, we research for the presence and significance in post-decentralization Indonesia of three different forms of fiscal competition that have been examined in the previous literature for developed countries: expenditure externalities, tax competition, and yardstick competition.

What we find is that, despite institutional and data constraints, we can detect some forms of local government fiscal competition in Indonesia after the Big Bang decentralization reform. Although we cannot detect the presence of tax competition, we do find evidence of yardstick competition and expenditure spillover effects. The results for yardstick competition are, we believe, of particular significance since they suggest that accountability mechanisms in decentralized developing countries may be reinforced through the presence of inter-jurisdiction competition in terms of local government performance.

This paper makes several contributions to the local fiscal competition literature. First, the paper provides the first systematic study of the presence of and relevance of fiscal competition models to decentralized developing countries. Second, the paper suggests a way to use survey data

on the quality of public resources to test for the presence of yardstick competition. Future research for other developing countries will be needed to confirm the relevance of fiscal competition processes in developing countries.

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