THREE ISSUES IN INTERGOVERNMENTAL GRANTS: IMPERFECT DATA, ACCESS CRITERION, AND MINIMUM SIZE OF INVESTMENTS*

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INTRODUCTION

The design of intergovernmental grants in developing countries is fraught with problems. One of them is that the desired data is not available. How to overcome this by using imperfect data has been studied in recent years (Vaillancourt, 2001; Boex and Martinez-Vasquez, 2007). Both papers use data collected in parts of developed countries that exhibited economic conditions akin to those of developing countries for the period studied. The first part of the paper adds a third set of results to this simulation literature but does so using data from a developing country, India. Another problem is that potential recipients of grants do not all have the required capacity to properly use them. Steffensen and Larsen (2005) report for five countries what the *Minimum Access Conditions* are for capital grants to local governments (LGs). An issue not examined by them is what are the factors that explain LGs meeting or not these conditions; this is the object of the second part of this paper. Finally we examine in the third part of the paper how to set the level of capital grants when there is a minimum amount required for efficient use of funds.

TRANSFERS WITH IMPERFECT DATA

Vaillancourt, (2001) and Boex and Martinez-Vazquez (2007) examined, using good data from poor parts of developed countries—Newfoundland and Prince Edward Island provinces in Canada (1951 and 1961), Georgia in the United States (1957-1960)—how the use of imperfect data can yield more or less appropriate indicators. The key contribution of this paper is that it uses data from a developing country, India. It comes from the World Bank study of the performance of local organizations in India; see Alsop and Kurey (2005) for more information on the data. The study was conducted in the states of Karnataka, Madhya Pradesh, and Uttaranchal; we work with data for 28 villages (Gram Panchayat) from Karnataka. Sixteen villages in the sample of that state had to be dropped due to data issues (missing values, improbable numbers, etc.).

We use the same methodology as in Vaillancourt (2001). Thus:

- We define as the best possible allocation the one obtained using per household income;
- We set as targets for redistribution purposes both the best off village (maximum value-MAX) and the average village (mean value-MEAN);
- We compute the difference between these reference distributions of a given pool of transfers (1,000,000) and those obtained using fifteen indicators of disparities. The data available dictates their choice;
- We use as a measure of difference both the absolute value difference (AD) and the sum of square difference (SSQ).

We thus have four comparisons which we present in Table 1. We find that for a given indicator, using MAX as target for equalization rather than MEAN yields a better fit, as was the case in Vaillancourt (2001). Why? Because using MAX as a target reduces the need to correctly match transfers equal to zero to one recipient unit. For any given indicator, the AD reported when MEAN was used as a target was from 2 to 5 times larger than the comparable MAX AD.

Population is the best performing indicator when using either AD or SSQ, with the MAX as a target. When using MEAN as a target, it places fifth using AD and second using SSQ. The performance of population is reassuring since many countries already use such an indicator in setting transfers.

Average revenue collections per capita constitute the second best performing indicator when using

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Table 1
Simulation of Transfers with Imperfect Data, state of Karnataka: Ranking by Measure of Fit and Target

Indicators	*MAX- SSQ rank*	*MAX-AD rank*	*MEAN- SSQ rank*	*MEAN- AD rank*	*MAX-AD, $ differences*
% population that is literate	5	**5**	8	**9**	291,763
% poor	8	**10**	1	**1**	387,188
% in pucca housing	14	**13**	12	**11**	452,297
% owning radio	10	**12**	5	**6**	398,776
% owning tv	4	**4**	7	**7**	259,298
% owning wall clock	6	**6**	11	**10**	301,797
% owning iron box	7	**7**	4	**2**	312,085
% owning land	9	**8**	9	**3**	363,639
% owning sheep/goat	12	**11**	14	**14**	393,041
% no water connection	3	**3**	6	**8**	244,441
% child sick last 6 months	13	**14**	13	**13**	516,495
distance from water source	15	**15**	15	**15**	708,419
public revenues per capita	2	**2**	3	**4**	184,267
public revenues per capita (t-1)	11	**9**	10	**12**	380,441
Population	1	**1**	2	**5**	148,818

Source: Laporte (2007, Table 3, p. 14).

MAX as a target for either AD or SSQ. It places 3rd or 4th using the MEAN. Boex and Martinez-Vazquez (2007) found similar results. The presence of a water connection is the third best performing indicator. Indicators that perform particularly badly are distance from a water source, percent child sick in the last six months and percent households with sheeps/goats.

MEETING THE MINIMUM CAPACITY CRITERION

Steffensen and Larsen (2005) examined minimum access conditions of local governments to grants for five countries*:* Bangladesh, Kenya, Nepal, Tanzania, and Uganda. For each of them, one finds a requirement that at least one financial type document has been prepared: development plans (3), budgets (2) or annual accounts (3). We have data for the case of Madagascar where it was decided that the 1549 local governments (communes) would gain the right to submit a project to the Municipal Development Fund (FDL) if they had submitted both a budget and a set of annual accounts (compte administratif). Data from a 2007 municipal census funded by the World Bank, and whose data were made available to us, allowed us to examine the determinants of having submitted annual accounts for 2006. In Table 2, we estimate four probits with an increasing number of variables:

1. The first has population of the commune and its square, the fact that the commune is or is not a regional administrative center (there are 109) and three characteristics of the communal treasurer-training, experience, and education;
2. The second sees 21 regional dichotomous variables added;
3. The third sees the education level of the population added;
4. The fourth sees the production or not of an account in 2005 added.

Our key findings are that:

- Population size has no impact on the likelihood of producing an account for 2006;
- Having a trained treasurer increases significantly in all probits the likelihood of producing annual accounts. This is specialized training in financial matters provided by various bodies. A commune with a more experienced treasurer is less likely to pro-

Table2
Determinants of Having Submitted (=1) or Not (=0) an Annual Account, 2006 Malagasy Local Governments

Variables	*Probit 1*	*Probit 2*	*Probit 3*	*Probit 4*
Population (000)	0.003158	0.001173	0.001043	0.000812
	(0.002236)	(0.001712)	(0.001632)	(0.001223)
Population (000)²	-0.000003	-0.0000009	-0.0000008	0,0000004
	(0.000002)	(0.000001)	(0.000001)	(0.000001)
Locality is regional headquarters	0.079561	0.121345**	0.116985**	0.046988
(1=yes)	(0.047704)	(0.042125)	(0.042762)	(0.049493)
Training of treasurer has taken place	0.161408***	0.168200***	0.166182***	0.112102***
(1=yes)	(0.036819)	(0.038874)	(0.038799)	(0.042352)
Experience of treasurer (years)	-0.001554	-0.001366	-0.001508	-0.004069**
	(0.001723)	(0.001735)	(0.001731)	(0.001801)
Education of treasurer (primary as reference category)				
Secondary	0.108891**	0.055585	0.054228	0.007791
	(0.043562)	(0.043351)	(0.043335)	(0.043026)
Tertiary	0.155255***	0.082492	0.081755	0.047755
	(0.039827)	(0.047351)	(0.047395)	(0.052619)
Regions (Reference: Analamanga capital region)				
Bongolava		0.159918*	0.170011*	0.074074
		(0.068382)	(0.064691)	(0.103158)
Itasy		0.041975	0,045361	0.057320
		(0.074812)	(0.073978)	(0.064671)
Vakinankaratra		0.188438***	0.192079***	0.140275*
		(0.047032)	(0.046037)	(0.059240)
Diana		-0.257789***	-0.235218***	-0.220546***
		(0.084373)	(0.084922)	(0.089239)
Sava		-0.149339**	-0.137578*	-0.160741**
		(0.077324)	(0.077394)	(0.088201)
Amoron'Imania		0.054876	0.059220	-0.040497
		(0.072228)	(0.071888)	(0.087393)
Atsimo Atsinanana		0.043132	0.068044	0.047937
		(0.064703)	(0.062435)	(0.069425)
Haute Matsiatra		-0.089908	-0.083350	-0.077567
		(0.074938)	(0.074362)	(0.074537)
Ihorombe		0.201819*	0.215179***	0.165825
		(0.066052)	(0.056801)	(0.087141)
Vatovavy Fitovinany		-0.024748	-0.000099	-0.049100
		(0.061721)	(0.060879)	(0.068128)
Betsiboka		-0.209623**	-0.189933*	-0.095171
		(0.106079)	(0.106734)	(0.117646)
Boeny		-0.219751**	-0.183599***	-0.074286
		(0.096084)	(0.097161)	(0.101337)
Melaky		0.019379	0.054519	0.053158
		(0.090968)	(0.085096)	(0.085244)

Table2 (continued)
Determinants of Having Submitted (=1) or Not (=0) an Annual Account, 2006 Malagasy Local Governments

Variables	*Probit 1*	*Probit 2*	*Probit 3*	*Probit 4*
Sofia		-0.369581***	-0.365405***	-0.198739***
		(0.068673)	(0.069069)	(0.07804)
Alaotra Mangoro		-0.080793	-0.061588	-0.052349
		(0.072772)	(0.072013)	(0.079406)
Analanjirofo		-0.068309	-0.058632	-0.066559
		(0.080804)	(0.079983)	(0.08339)
Atsinanana		-0.089241	-0.076348	-0.042101
		(0.072336)	(0.071625)	(0.069057)
Androy		-0.280223***	-0.229563***	-0.171081*
		(0.088016)	(0.093265)	(0.100945)
Anosy		-0.228917***	-0.188025**	-0.097946
		(0.084149)	(0.087118)	(0.084437)
Atsimo Andrefana		-0.397846***	-0.363127***	-0.142028*
		(0.067705)	(0.072234)	(0.079596)
Menabe		-0.265757***	-0.229698***	-0.223008**
		(0.088179)	(0.089685)	(0.100645)
50% or more of the communal population is literate=1			0.047328*	0.043502
			(0.028329)	(0.029708)
Account was produced (1) or not (0) for 2005				0.596438***
				(0.028976)
Pseudo R-square	0.0270	0.1158	0.1173	0.3139
Maximum likelihood	-892.82	-811.40	-810.01	-629.53

Source: Diaconu (2008, Table7).

***significant at the 99 percent level of confidence.

**significant at the 95 percent level of confidence.

*significant at the 90 percent level of confidence.

duce such accounts perhaps because they are set in unproductive ways but this is significant only in the last probit. The impact of a better educated treasurer is positive but significant in the first probit only when few other variables are present;

- Communes who are regional headquarters are more likely to produce annual accounts, significantly so when regions are taken into account. Access to central government offices and pressure from them may both explain this;
- There are differences between regions; focusing on the second probit, an examination of the results shows that communes located at both extremities of the island that is South-South West (Androy, Atsimo Andrefana, and Menabe) and North-Northwest (Diana, Sofia) are less likely to produce an account for 2006 than others. They are the furthest away from the capital;
- A better educated population has little impact on the production of annual accounts (no demand impact);
- The production of an account in 2005 has an important impact on the likelihood of producing one in 2006; including this variable dampens the impact of other variables.

CAPITAL TRANSFERS WITH A MINIMUM SIZE

Steffensen and Larsen (2005) address the issue of the size of the grant to be made to LGs: one of the five criteria is the "minimum size required

for meaningful investments." (p. 25) What we examine here is the choice between a *minimum continuous* grant (MCG) and a *minimum lump sum* grant (MLG) approach; this does not appear to have been addressed previously. We again present results for Madagascar on this point using various data sets provided by the World Bank and the Malagasy government. We were informed by experts in communal investment in that country that a minimum value of $40,000 was appropriate. There were $86,000,000 to distribute.

MCG formula: Unconstrained continuous transfers were generated by the following transfer formula : *Transfer commune i* = 0.25*X official population*(*i*) + 0.20 *area*(*i*) + .30 *enclaved population*(*i*) + 0.25 *regional poverty(i)*.[1]

Constraints of a minimum of $40,000 and a maximum of $250,000 were imposed with continuous amounts in between. The financing of the $40,000 minimum is done by reducing proportionally the amounts communes with a grant above $40,000 are entitled to and by imposing a maximum transfer;

MLG formula step 1: IF MCG <60,000=>MLG1=40,000, IF 60,000 ≤MCG <100 000=>MLG1=80,000 and so on until MLG1=240,000 if 220,000< MCG. Thus, we set lump sums which are multiples of 40,000 by splitting the interval between each multiple of 40 000$ in two equal parts. Doing this leads to a sum of transfers in excess by $4,120,000 (103 projects) of the total transfer budget of $86,000,000.

We must thus modify our formula to meet the budget constraints. We do this as follows:

*MLG formula step2 (Final: F):*_IF MLG1 = (240,000; 200,000; 160,000) => MLGF= (200,000; 160,000; 120,000) and IF MLG1 = 120,000 then if MCG< 120,282 = MLGF= 80,000.

So we withdrew one project from communes with four, five or six projects irrespective of their needs; the reasoning was that these reductions were

Table 3
MCG and MLG Amounts and Number of Local Governments at Minimum Amount, Madagascar 22 Regions

Regions:	*Analamanga*	*Bongolava*	*Itasy*	*Vakinankaratra*	*Diana*	*Sava*
MCG$	6,466,963	1,733,962	2,954,871	5,864,690	3,030,217	4,017,906
MLG$	6,360,000	1,680,000	3,080,000	5,800,000	3,000,000	4,040,000
MCG: #LG=$40,000	91	11	21	30	45	44
MLG: #LG=$40,000	114	13	29	38	51	58

Regions	*Amoron'Imania*	*Atsimo Atsinanana*	*Haute Matsiatra*	*Ihorombe*	*Vatovavy Fitovinany*	*Betsiboka*
MCG$	3,369,838	3,906,490	4,526,337	1,513,357	6,760,675	2,008,704
MLG$	3,400,000	3,880,000	4,520,000	1,560,000	6,680,000	2,120,000
MCG: #LG=$40,000	19	67	40	10	98	16
MLG: #LG=$40,000	29	84	55	14	115	20

	Boeny	*Melaky*	*Sofia*	*Alaotra Mangoro*	*Analanjirofo*
MCG$	2,722,522	2,096,580	5,962,772	4,197,969	4,553,767
MLG$	2,680,000	2,080,000	6,120,000	4,280,000	4,520,000
MCG: #LG=$40,000	18	14	46	41	13
MLG: #LG=$40,000	27	24	70	55	24

	Atsinanana	*Androy*	*Anosy*	*Atsimo Andrefana*	*Menabe*
MCG$	5,021,418	2,768,225	3,315,999	6,112,325	3,094,411
MLG$	5,040,000	2,720,000	3,280,000	6,000,000	3,160,000
MCG: #LG=$40,000	38	32	31	52	20
MLG :#LG=$40,000	50	36	48	72	27

Source: Diaconu (2008, Tables 10-13).

proportionally small; respectively 1/6th, 1/5th and 1/4th of the original allotment. Second, we use the value of the MCG to identify the communes with the greatest need within the $120,000 group, we reduce the number of projects from three to two for those that had the smallest MCG on the basis that the higher the MCG, the higher the need.

We present in Table 3 the transfers received by the communes regrouped in the 22 Malagasy regions and the number of communes with a $40,000 grant. Going from MCG to MLG increases the number of communes receiving $40,000 from 797 to 1053, from 51 percent to 68 percent of communes; this is a 32 percent increase. Gains vary by regions from 12.5 percent in Androy to 84.6 percent for Analanjirofo. Regions with a greater increase in this share tend to have more communes within their territory, with these communes having smaller populations and areas and thus smaller MCGs. Betsiboka sees the largest relative increase in grants of 5.5 percent while Bongolava the largest relative decrease of -3.1 percent. We ordered communes according to a poverty indicator from the 2007 Madagascar communal census (the percent of the population in a commune that suffered from uncertainty in feeding itself in 2006). We find similar pro-poor Gini coefficient of -0.013 for the MCG and -0.011 for the MLG.

CONCLUSION

Three sets of results are presented in this paper. The first one shows that results obtained using data for developed countries on the use of imperfect indicators for equalization transfers are supported when data from a developing country, India, are used. The second set of results shows that the capacity of local governments to meet minimum requirements to produce financial type documents to access grants can be predicted by past behavior and can be improved by training local finance officials. The first finding may be useful in estimating the plausible impact of new programs while the second confirms the effectiveness of one type of capacity building activity.

The third set of results indicates that using minimum continuous grants or minimum lump sum grants yields similar distributional outcomes (Gini coefficients) but dissimilar (share of recipients receiving the minimum amount) number of communes with a grant above $40,000. From the perspective of 346 communes, the MLG is less generous than the MCG and will presumably generate political opposition Why consider it then? One reason is that may result in a more efficient use of resources given lumpiness in capital investments; communes granted $45,000 or $50,000 instead of $40,000 may not be able to make good use of the extra $5,000 or $10,000. Thus this reduces wastage (country perspective) or unused funds (donor perspective). Also it probably makes more sense given the geographical dispersion of population in villages (fokonolas) within communes (10 on average by commune in Madagascar) to assume that the minimum size project would be repeated rather than scaled up. One issue is the formula proposed to adjust the MLGs to the budget constraint .We simulated a formula that started with the recipients of the highest number of grants, the top grant level and reduced by the same number of projects, that is one, the grant of each commune for each grant level. This was used when all communes of a given grant level had to contribute to meeting the budget constraint. But when we had to reduce the number of projects for a given grant level for a subset of communes, we added a needs criterion as measured by the MCGs to leave grants unchanged to neediest communes and thus those in the upper range of that grant level group, the 120,000 grant level in this case. This is a workable approach and the logic of small proportional losses can be defended. It seems preferable than cutting from the bottom up, given that it would be extremely hard to go from one to zero project. One would need to go from two to one project, a ½ reduction that is proportionally harsher. Still, using the MCG indicator to select what communes from the 120,000 level group lose one project is a bit unsatisfactory since here we protect those with higher needs while we took from communes with higher grant levels and thus higher needs in the first phase of the cuts. This needs further thought but note that the formula to be implemented in Madagascar is the MCG one.

Note

[1] Population data is obtained from projections done by the Institut national de la statistique that are provided to the decentralisation directorate; area data is from a World Bank data base; enclaved population was determined by Malagasy authorities using input from local officials; regional poverty rate is from the 2005 poverty study of the INS. See Diaconu (2008) for details.

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