

**DOES DECENTRALIZATION INCREASE GOVERNMENT  
RESPONSIVENESS TO LOCAL NEEDS?**

**Decentralization and Public Investment in Bolivia**

Jean-Paul Faguet<sup>1</sup>

Centre for Economic Performance and Development Studies Institute  
London School of Economics

22 March, 2001

**Abstract**

This paper examines whether decentralization increases the responsiveness of public investment to local needs using a unique database from Bolivia. Empirical tests show that investment patterns in human capital and social services changed significantly after decentralization. These changes are strongly and positively related to objective indicators of need. Nationally, these changes were driven by the smallest, poorest municipalities investing devolved funds in their highest-priority projects. The findings are consistent with a model of public investment in which local government's superior knowledge of local needs dominates central government's technical and organizational advantage in the provision of public services.

**Keywords:** decentralization, local government, participation, targeting, Bolivia

**JEL:** D72, D73, H41, H42, H72, O18

---

<sup>1</sup> Centre for Economic Performance and Development Studies Institute, London School of Economics, Houghton Street, London WC2A 2AE, [tels: +44\(20\)7955-7408](tel:+442079557408) (t), 7955-7595 (f), [email: j.p.faguet@lse.ac.uk](mailto:j.p.faguet@lse.ac.uk)

## 1. Introduction

Decentralization has become a public policy fashion in recent years despite a tangle of conflicting evidence concerning its effects on public sector effectiveness and efficiency. Few rigorous, cross-country studies of decentralization, by nature difficult, have been attempted, with most of the arguments in favor resting on anecdotal evidence and logical induction. The radical experience of Bolivia offers the opportunity of conducting a methodologically rigorous study that focuses on a few key questions which have not been answered adequately in the literature. Focusing on one country allows me to control for external shocks, political regime, institutional and cultural effects, and other exogenous factors which have bedeviled past studies in a more systematic way than cross-country studies can. Furthermore, the Bolivian reform coincided with a huge upsurge in the generation of local-level and national data. These are of surprising scope and quality and include political, institutional, administrative and even procedural (good-government type) indicators for all of Bolivia's 311 municipalities. The use of such variables constitutes an innovation of this paper.

The central claims of the decentralization debate can be summarized as follows: opponents assert that local government is too weak institutionally, and too susceptible to interest-group capture, to provide services that respond competently to local needs; proponents respond that distance and multiple objectives render central government insensitive to local needs, whereas local government is made to focus on the same via the local electoral system plus its proximity to demand. This paper seeks to resolve this debate for the case of one developing country: Bolivia. The central question I seek to answer is: Does decentralization increase the sensitivity of public investment decisions to local needs? Secondary questions include: (i) How do variations in districts' social and institutional characteristics affect investment patterns? and (ii) Do the internal procedural characteristics of local government itself affect investment? How do such secondary factors compare in importance to need? In addition, this paper seeks to make a case by example that local government decision-

making is the defining characteristic of decentralization, and must be studied within its own context if the phenomenon is to be properly understood.

I define **decentralization** as the devolution by central (i.e. national) government of specific functions, with all of the administrative, political and economic attributes that these entail, to local (i.e. municipal) governments which are independent of the center within a legally delimited geographic and functional domain, and restrict my focus to decentralization under democratic regimes.

The remainder of the paper is organized as follows. Section 2 discusses Bolivia's decentralization program, and then examines the changes in national resource flows which it brought about. Section 3 develops a model to analyze the trade-off between local government's knowledge of local needs v. central government's technical and organizational advantage in the provision of public services in districts with heterogeneous preferences. Section 4 discusses the empirical methodology, tests whether decentralization changed public investment patterns across Bolivia's 311 municipalities, and then examines the determinants of this change, focusing on variables of need. Section 5 concludes.

## **2. Decentralization In Bolivia**

### **2.1 Popular Participation And The Decentralization Reform**

Bolivia entered the 1990's with one of the most centralized states in the region, a product of its 1952 revolution when the ascendant Nationalist Revolutionary Movement expropriated the "commanding heights" of the economy and embarked upon a state-led modernization strategy. Governing elites in La Paz sought to use the state to erase the social relations of the past and create a new, more egalitarian society.<sup>2</sup> Forty years of military coups punctuated by episodes of civilian rule left the reins of political and economic power firmly in the hands of the president and his cabinet. Against

---

<sup>2</sup> Klein, H., pp.236-240. Klein is one of the classical authorities on Bolivian history.

this general background, decentralization was announced in 1994. The scale of the change in resource flows and political power that it brought about were enormous.

The core of the decentralization reform consists of four points:<sup>3</sup>

1. The share of all national tax revenues devolved from central government to the municipalities was raised from 10 percent to 20 percent. More importantly, whereas before these funds were apportioned according to *ad hoc*, highly political criteria, after decentralization they are allocated strictly on a per capita basis (see below).
2. Title to all local health, education, culture, sports, road and irrigation infrastructure was transferred to municipalities free of charge, along with the responsibility to administer, maintain and equip it, and to invest in new infrastructure.
3. Oversight Committees (*Comités de Vigilancia*) were established to oversee municipal spending of Popular Participation funds, and propose new projects. These are composed of representatives from local, grass-root groups who can petition to have disbursements from central government suspended if they judge that such funds are being misused or stolen.
4. 198 new municipalities – 64% of the total – were created, and existing ones were expanded to include suburbs and surrounding rural areas.

The reform heralded a new era of municipal government for the overwhelming majority of Bolivian towns and cities. In many parts of Bolivia where before the state was present, if at all, in the form of a local schoolhouse, health post and, perhaps, a military garrison or customs office, each reporting to its respective ministry, there was now for the first time elected local government accountable only to local voters.

---

<sup>3</sup> *Ley de Participación Popular, Reglamento de las Organizaciones Territoriales de Base*, Secretaría Nacional de Participación Popular, Ministerio de Desarrollo Sostenible y Medio Ambiente, 1994.

## 2.2 Descriptive Statistics

The extent of the change is perhaps best appreciated by examining the changes in resource flows that it catalyzed. Decentralization multiplied municipalities' share of public investment 17 times and significantly altered its distribution. Figure 1 shows revenue-sharing between central and local governments for 1993, the last year prior to decentralization, and 1995, the first full year it was in effect, for the capital and second city of each of the country's nine departments. Total resources devolved from central to local governments increased by 72%. Before decentralization the nine departmental capitals shared 93% of all funds devolved from the center, leaving 7% for Bolivia's other 302 municipalities. After decentralization their shares were 38% and 62% respectively. The per capita criterion resulted in a massive shift of resources in favor of the smaller, poorer municipalities in Bolivia.

The most important change wrought by decentralization, however, is to the composition of investment. Figure 2 shows the investment patterns of central and local government before and after decentralization. The front row corresponds to central government investment during 1991-3, and the rear row to local government investments during 1994-6. The differences are quite significant. In the years leading up to 1994 central government invested the largest sums in transport, followed by hydrocarbons, multisectoral<sup>4</sup> and energy. Together these four sectors account for 73% of total public investment during 1991-3. But after decentralization local governments invest most heavily in education, urban development, and water & sanitation, together accounting for 79% of municipal investment during this period. Of the sectors accounting for roughly three-quarters of total investment in both cases, central and local government do not have even one in common. The evidence thus indicates that local and central government have very different investment priorities.

---

<sup>4</sup> A hodgepodge of projects difficult to categorize.

**Figure 1: Decentralization and the Regional Distribution of Public Funds**

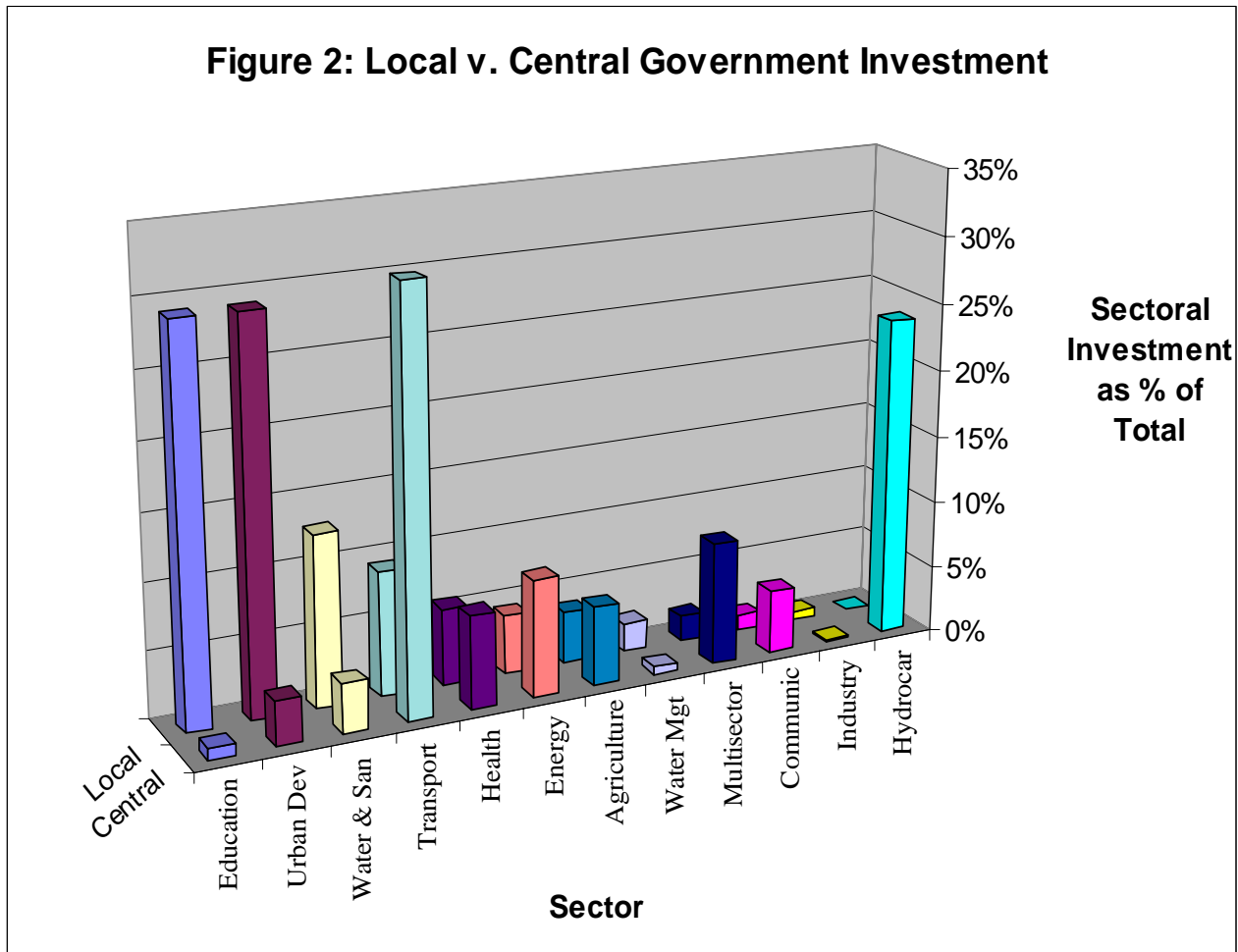
City	Central-to-Local Revenue Sharing (Bs'000)			% of Departmental Total	
	1993	1995	% Change	1993	1995
La Paz	114,292	61,976	-46%	95%	34%
El Alto	5,362	46,326	764%	4%	25%
ROD	1,120	76,170	6704%	1%	41%
<i>total</i>	<i>120,774</i>	<i>184,472</i>	<i>53%</i>		
Santa Cruz(*)	51,278	63,076	23%	95%	51%
Montero	1,106	5,306	380%	2%	4%
ROD	1,774	56,012	3058%	3%	45%
<i>total</i>	<i>54,157</i>	<i>124,394</i>	<i>130%</i>		
Cochabamba(*)	25,856	38,442	49%	88%	34%
Quillacoto	1,315	2,471	88%	4%	2%
ROD	2,108	73,688	3396%	7%	64%
<i>total</i>	<i>29,279</i>	<i>114,601</i>	<i>291%</i>		
Oruro	6,969	15,925	129%	99%	56%
Challapata	29	1,090	3687%	0%	4%
ROD	74	11,198	15022%	1%	40%
<i>total</i>	<i>7,072</i>	<i>28,213</i>	<i>299%</i>		
Potosi	1,208	13,990	1058%	66%	24%
Villazon	233	3,543	1420%	13%	6%
ROD	394	39,813	10009%	21%	69%
<i>total</i>	<i>1,835</i>	<i>57,346</i>	<i>3026%</i>		
Sucre	4,581	21,202	363%	94%	44%
Camargo	244	2,214	809%	5%	5%
ROD	56	24,374	43540%	1%	51%
<i>total</i>	<i>4,881</i>	<i>47,790</i>	<i>879%</i>		
Tarija	3,219	10,063	213%	68%	35%
Yacuiba	648	4,743	632%	14%	17%
ROD	841	13,893	1552%	18%	48%
<i>total</i>	<i>4,708</i>	<i>28,699</i>	<i>510%</i>		
Trinidad	480	4,892	920%	67%	22%
Riberalta	87	6,599	7501%	12%	30%
ROD	154	10,393	6645%	21%	47%
<i>total</i>	<i>721</i>	<i>21,884</i>	<i>2937%</i>		
Cobija	99	502	408%	99%	57%
ROD	1	379	63067%	1%	43%
<i>total</i>	<i>99</i>	<i>881</i>	<i>787%</i>		
<b>Total</b>	<b>223,525</b>	<b>608,280</b>	<b>172%</b>	-----	-----

sources: Ministry of Finance, Ministry of Social Communication

\* 1995 totals estimated due to incomplete reporting of budget data by both cities.

ROD = Rest of Department

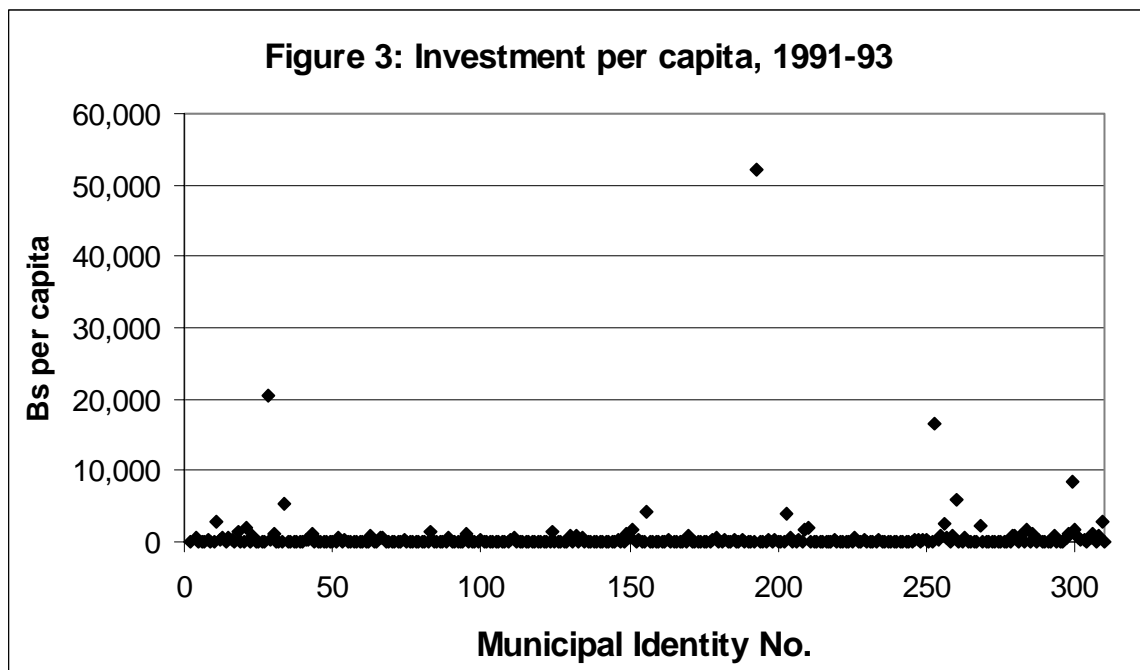
**Figure 2: Local v. Central Government Investment**



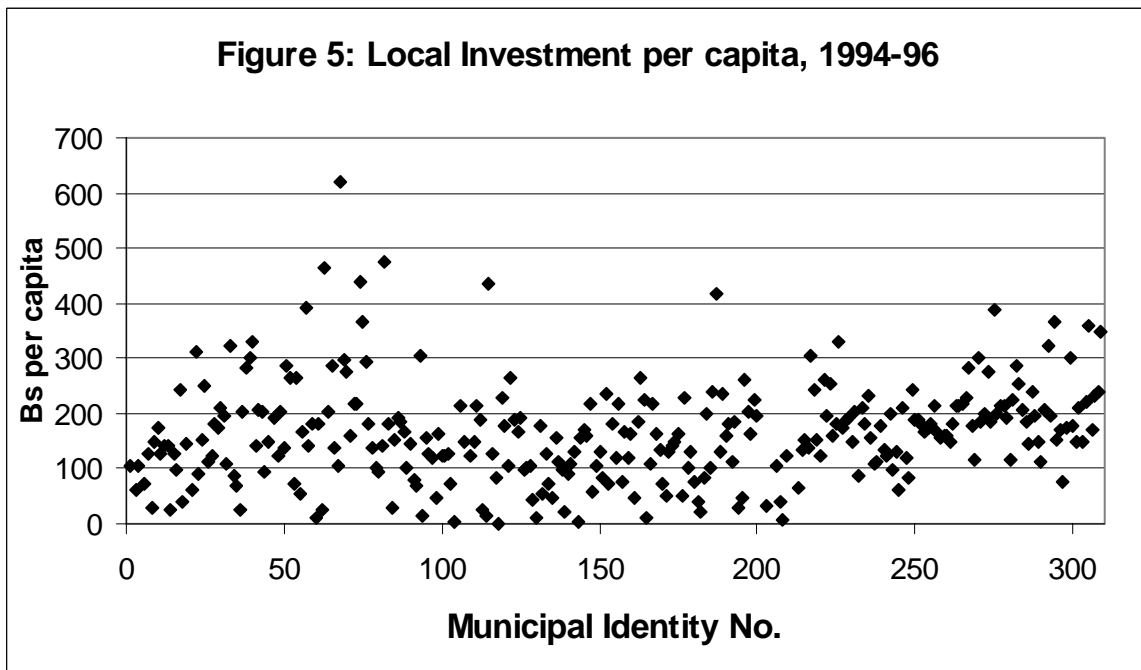
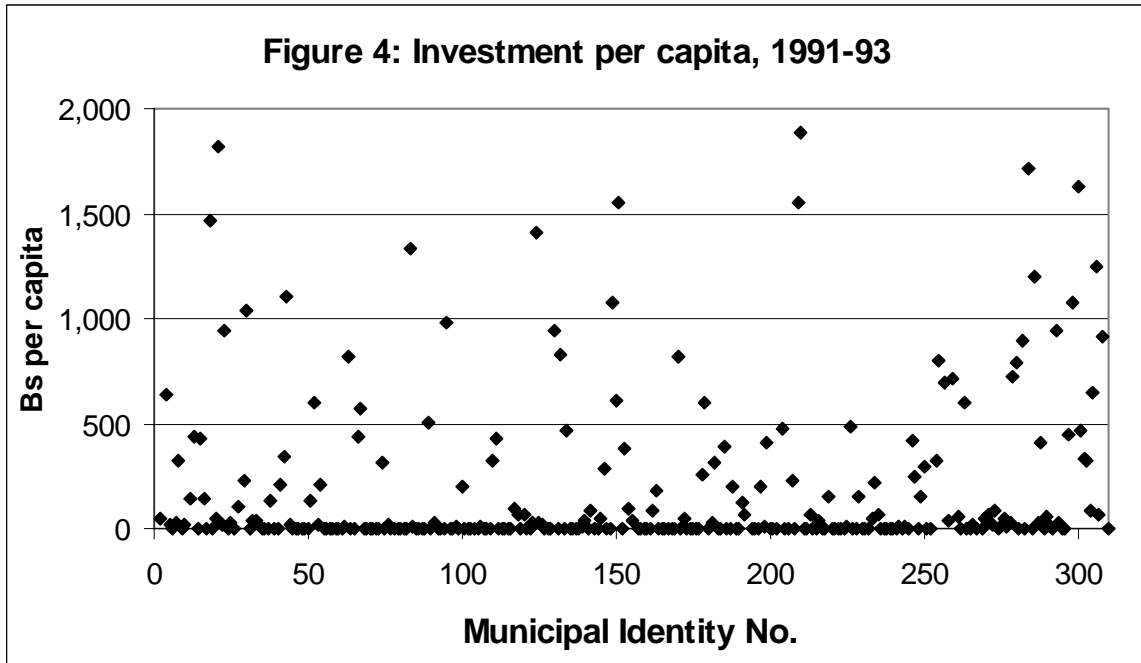
Lastly, it is instructive to examine how investment was distributed geographically among Bolivia’s municipalities before and after decentralization. Figures 3-5 below give us a rough sense of this by placing all of Bolivia’s municipalities along the horizontal axis and measuring investment per capita as vertical displacement. If the allocation of investment were extremely skewed in favor of a few municipalities, we would expect to see most values lying near the bottom of the graph and a few points strewn high above them. If the distribution of investment were reasonably equitable across space, we would expect to see most points in a broad band at some intermediate level.

Figure 3, per capita investment before decentralization, is highly unequal with very high investments in three districts while the vast majority seem to sit on or near zero. Figure 4 corrects for the skewing effect of the highest observations by excluding the upper twelve and showing only those

below Bs.2000 per capita. Though the distribution now appears less unequal, there is still monotonically increasing density as we move downwards, and fully ½ of all observations on or near the horizontal axis. In summary, investment under centralized government was terrifically skewed in favor of a few municipalities which received enormous sums, a second group where investment was significant, and the unfortunate half of districts which received nothing. Compare this with figure 5, which shows municipal investment after decentralization. This chart shows no district over Bs.700 per capita, a broad band with greatest density between Bs.100-200, and only a few points touching the axis. Average municipal investment for this period is Bs.208 per capita, and thus the band contains the mean.<sup>5</sup> These crude indicators imply that central government, with a much larger budget and free rein over all of Bolivia’s municipalities, chose a very unequal distribution of investment across space, while decentralized government distributes public investment much more evenly throughout the country.



<sup>5</sup> Investment sums here are much lower because they exclude central government funds.



### 3. Theory

#### 3.1 The Literature

Economists and political scientists have often disagreed on the question of the needs-responsiveness of central v. local government. This is largely due to the focus that each discipline gives to the problem. Economists such as Oates and Besley and Coate (see below) tend to assume a better match between local government outputs and local preferences, and accordingly find local

government preferable when this advantage is not outweighed by spillovers or inefficiencies in central government provision of public services arising from distortions in their financing or production and allocation. Economists do not agree on how this better matching come about, however, with some ascribing it primarily to the character of the information involved, and others to local elections or institutions. Political scientists, on the other hand, (see for example Crook and Sverrisson (1999) and Smith (1985)) tend to concentrate more on interest group capture of the local political process, and the distortions of political representation in small electoral environments. When these phenomena exist, interest groups will gain a decisive influence over local government, and decentralization will tend to favor these small local groups disproportionately. In this context, centralization can be preferable, as interest groups which are sufficiently big locally to distort the local political process will tend to be small in comparison to national government, which can then match policy to (general) local needs in a disinterested fashion. Specific forms of these insights are incorporated into the model and then tested below.

I first examine the empirical literature on decentralization and then turn to theory. A large part of the empirical work on decentralized provision of public services reports mixed results which, taken together, are inconclusive. Much of this literature approaches the subject from a very broad perspective, examining such issues as fiscal flows, taxation, expenditure and investment alongside very different questions such as managerial efficiency, government responsiveness and political representativeness. The breadth of these studies' scope combined with their and small sample size make controlling empirically for all the exogenous economic, social and institutional factors involved in decentralization impossible. They also generally fail to specify a coherent theoretical framework which credibly links all of the phenomena in question to specific decentralization measures in very different national contexts. Attempting to summarize such work can be a frustrating task as its findings are both numerous and diverse, and isolating cause-and-effect relationships is difficult. Examples of the results in Andersson, Harsman and Quigley, (1997),

Bennet (1993), Cheema and Rondinelli (1983), Rondinelli *et al.* (1984), Rondinelli (1981), and Veira (1967) include:

1. The performance of decentralized administrative units in Algeria, Libya and Tunisia has been positive in some cases, but has not always met the original goals of policy reformers.
2. Decentralization and privatization of state activities have a tendency to create greater inequities among communities and regions with different levels of organizational capacity.
3. Devolution in Papua New Guinea increased popular participation in government, and has improved the planning, management and coordination capacity of provincial administrators, but has added to government bureaucracy and so weakened it's ability to attract foreign investment and stimulate long-term economic growth.
4. Decentralization has increased the access of people in previously neglected rural regions and local communities to central government resources, if only incrementally, in most of the LDCs where it has been tried.
5. Weakness in supporting institutions needed to complement the managerial capacity of local governments, as well as weaknesses in the linkages and interaction between local and central administrations, has led to disappointing results from decentralization in Africa and Asia.

Such studies tend to show that decentralization has achieved moderate success in some countries, moderate failure in others, and both in many, with the underlying reasons poorly identified. It is, as a result, difficult to judge whether specific decentralization "failures" were due to inappropriateness of the policies implemented or weaknesses in their implementation, and more difficult still to recommend improvements.

The theoretical debate on the effects of decentralization on social welfare and efficiency is of higher quality. In terms of productive efficiency, central government should be naturally superior so long as returns are at least slightly increasing. Any economic case for decentralization must therefore invoke a counterbalancing source of efficiency in which local government has an

advantage. Different authors have approached the problem in different ways. Tiebout's (1956) seminal work posits a world where individuals move costlessly among localities that offer different levels of provision of a public good, and finds that the competitive equilibrium in locational choices which results provides an efficient allocation of local public goods. But it assumes a highly mobile population and fixed governments, which, more than unrealistic, this paper considers exactly backward. It seems self-evident that government is the relatively mobile element in most local democratic systems, changing every electoral period or two, whereas the population is essentially fixed over the 4-5 years that electoral periods typically comprise. The extremely low rates of internal migration within the countries of Europe would seem to support this view. By invoking infinitely transportable individuals as the mechanism which joins the supply of public goods to demand, Tiebout fundamentally misses the point. "Voting with one's feet" in this way is undoubtedly a valid mechanism for preference revelation at the margins, and may be more important for particular public goods, such as education. But the principal mechanism for joining demand and supply must involve the political process. Indeed this is arguably why local government exists at all.

Oates (1972) examines heterogeneity in tastes and spillovers from public goods through a model in which local government can tailor public goods output to local tastes, whereas central government produces a common level of public goods for all localities. He finds that decentralization is preferred in systems with heterogeneous tastes and no spillovers; with spillovers and no heterogeneity, centralization is superior on efficiency grounds. But Oates' results rest largely on his assumption of uniform central provision of public goods which, though an empirical regularity, is theoretically ungrounded and problematic when viewed in the Bolivian context (see section 2.2 above). Besley and Coate (1998) provide a model in which this restriction is lifted. Like Oates, they invoke uniform taxation to finance public goods provision. But they then devise a model of central policy-making in which elected representatives bargain over public goods provision in multiple districts. For heterogeneous districts, they find that decentralization continues to be welfare

superior in the absence of spillovers, but centralization is no longer superior when spillovers are present. They also find that higher heterogeneity reduces the relative performance of centralization for any level of spillovers. This model is both more representative of how real central governments operate, and more in keeping with the facts of the Bolivian transition from centralized to decentralized provision. The results below can be interpreted as an indirect test of their findings, given reasonable assumptions about representative local utility functions. Thus construed, my results weakly support their findings.

### 3.2 The Model

A country is made up of  $T$  districts, each with population  $n_j$  where the subscript  $j$  denotes district. Individuals, subscripted  $i$ , have linear utility  $U_i = x_i + \theta_i b(g_j)$  where  $x_i$  is the amount of private good consumed by individual  $i$ ,  $g_j$  is the amount of public good available in district  $j$ , and  $\theta_i$  is individual  $i$ 's preference for public good  $g_j$ . I use  $\theta_{mj}$  to denote the local median preference for the public good in district  $j$ . Local welfare is defined as median utility,  $U_{mj} = x_{mj} + \theta_{mj} b(g_j)$ . The function of government is to provide public goods, which it finances with a local head tax. I allow central government to have a cost advantage in the provision of public goods, such that the head tax needed to finance a given level of provision under central government is  $\alpha g_j / n_j$  with  $0 < \alpha \leq 1$ , whereas the tax under local government is  $g_j / n_j$ . This cost advantage can derive from various sources, such as central government's superior technical knowledge or an organizational advantage which lowers the cost of complex public goods, or traditional economies of scale.<sup>6,7</sup> I also assume that local government ascertains  $\theta_{mj}$  accurately, whereas central government ascertains  $\theta_{mj}$  with probability  $p$

---

<sup>6</sup> Certain types of public health interventions, for example, require specialized technical knowledge which central government may be able to obtain more cheaply than local government.

<sup>7</sup> Note that  $\alpha=1$  implies no cost advantage.

and  $\theta_{-mj}$  with probability  $(1-p)$ . Probability varies as  $p \in [0,1]$ , and  $\theta_{-mj}$  is defined as an unrestricted value of  $\theta$  other than  $\theta_{mj}$ .

Under decentralization, local government's problem in district  $j$  is

$$\max_g \left[ \theta_m b(g) - \frac{g}{n} \right] \quad (1)$$

where for simplicity I drop all subscripts  $j$ . Local government thus maximizes provision of the public good given median local preference, which it finances with a head tax. Taking first-order conditions and re-arranging yields

$$b'(g) = \frac{1}{n\theta_m} \quad (2)$$

The level of public good provided by local government is thus an implicit function of  $\theta_m$ , the median preference for the public good, and of the population  $n$ . Citizens receive the level of public good that they prefer, which they pay for fully.

Central government's problem is

$$\max_{g_1, \dots, g_T} \left[ \sum_j (p\theta_{mj} + (1-p)\theta_{-mj}) b(g_j) - \sum_j \alpha \frac{g_j}{n_j} \right] \quad (3)$$

Solve for district  $j$ . Taking first-order conditions and re-arranging yields

$$b'(g) = \frac{\alpha}{n(p\theta_m + (1-p)\theta_{-m})} \quad (4)$$

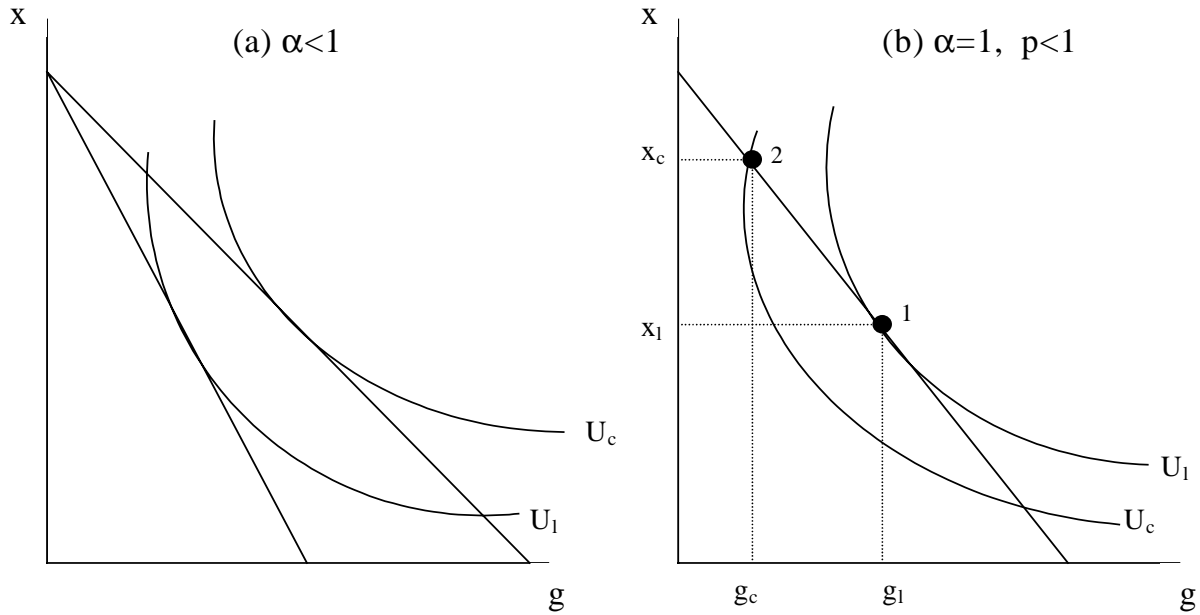
The level of public good provided by central government is thus an implicit function not only of local median preference and population, but also of the probability that central government correctly assesses local preferences, the difference between "true" local preferences and those otherwise ascertained by central government, and central government's cost advantage.

Hereafter the amounts of the public good provided in equilibrium by local and central governments, defined by equations (2) and (4) respectively, are denoted  $g_l$  and  $g_c$ . Utility is a strictly concave function of  $g$ , and hence  $b''(g) < 0$ . Comparing the two equations, it is easy to see that,

*ceteris paribus*, public goods provision under central government will be higher than under local government when the former has a cost advantage ( $\alpha < 1$ ). Citizens will prefer central government which, for a given head tax levied, provides more of the public good than does local government. This is clear from figure 6(a), where central government's cost advantage changes the slope of the budget line, and allows the residents of  $j$  to move from a local-government equilibrium on  $U_1$  to the new tangency on  $U_c$  where  $U_c > U_1$ .

For the sake of simplicity, I assume from this point on that  $\theta_m = 0$  and analyze central government's assessment of local preferences via the  $p\theta_m$  term. The central government equilibrium is now defined by  $b'(g_c) = \alpha / (np\theta_m)$ . Where  $p < 1$ , central government underestimates local preferences, and *ceteris paribus* public goods provision will be lower than under local government. This is equivalent to comparing points 1 and 2 in figure 6(b). Because there is no cost advantage, the budget line remains the same and citizens consume less  $g$  but more  $x$ . Choosing central government entails moving to a lower indifference curve  $U_c < U_1$ , and citizens prefer local government provision. When  $p=1$  the center accurately assesses local preferences, provision is equal to that under local government (point 1 below), and citizens are indifferent between the two regimes.

**Figure 6: Utility Under Central v. Local Government**



By setting  $b'(g_c) = b'(g_l)$  we can find critical values for the indifference points at which the countervailing effects are equal. It is straightforward to see that if  $\alpha = p$ , citizens will be indifferent between central and local government, as the center's inaccuracy in assessing local preferences is counterbalanced by its cost advantage, and provision of  $g_c = g_l$ . If  $\alpha > p$ , the cost advantage is dominated by the center's inaccuracy in measuring local preferences, and  $g_c < g_l$ . Citizens will prefer local government. If  $\alpha < p$ , then the center's cost advantage outweighs its inability to perceive local preferences accurately, and  $g_c > g_l$ . Citizens prefer central government. These results are summarized in figure 7.

**Figure 7**

**Indifference condition:**

$$b'(g_c) = b'(g_l) \Rightarrow \frac{\alpha}{np\theta_m} = \frac{1}{n\theta_m}$$

Assuming	Condition	Result	Preference
$\theta_m = 0$	$\alpha > p$	$g_c < g_l$	Local
	$\alpha < p$	$g_c > g_l$	Central

For simplicity, the analysis above depicts the function of the public sector as the provision of a single public good  $g$ , and examines the effects of competing political and institutional factors on that provision. In reality, of course, local and central governments provide many public and private goods and services, and perform a large variety of functions which this approach is too simple to capture. Cost advantage and assessment inaccuracies are likely to affect these different activities in different ways. Section 4 examines this question empirically by comparing central and local investment patterns across ten different sectors for Bolivia before and after decentralization.

## **4. Empirical Tests: Decentralization and Investment**

### **4.1 Methodology**

The objective is to test whether decentralization changed the pattern of public sector investment in Bolivia, and if so to find the determinants of that change. It is possible that public investment did not change with decentralization. In this case decentralization and centralization would be largely equivalent from an economic perspective, though one might be preferable to the other on political or administrative grounds. If decentralization did change investment patterns it becomes important to try to characterize this change in terms of welfare and distribution, and determine which social and institutional factors were most important in defining it. Ideally public goods would be measured in quality-adjusted units of output, separated by type. But such information is unavailable for Bolivia, and instead I measure investment inputs in the form of resources expended on public investment projects. This approach has the advantage of using natural, non-controversial units, and of facilitating comparisons across different sectors. I separate these flows into 13 distinct sectors, of which I analyze the first ten (see figure 9).<sup>8</sup>

For each of the remaining ten sectors I estimate the model,

---

<sup>8</sup> Multisectoral includes a sufficient diversity of projects as to be functionally meaningless as a category, and thus difficult to interpret. And almost no municipalities invest in Hydrocarbons or Mining, rendering comparisons across regimes impossible.

$$G_{mt} = \beta_1 \alpha_m + \beta_2 \alpha_m^* + \beta_3 \delta_t + \epsilon_{mt} \quad (5)$$

where  $\alpha_m$  and  $\delta_t$  are vectors of state and year dummy variables as per above, and  $\alpha_m^*$  is the product of  $\alpha_m$  and a decentralization dummy variable which takes the values 0 before 1994 and 1 after (i.e. post-decentralization).<sup>9</sup> Investment patterns are thus decomposed into three terms: a state effect,  $\alpha_m$ , which captures all of the characteristics of a state fixed in time, a year effect,  $\delta_t$ , which captures year shocks and time-specific characteristics, and a decentralization-interacted state effect,  $\alpha_m^*$ , which captures state-specific characteristics commencing in 1994 which were previously absent. As decentralized public goods provision began in 1994, this term will capture the effects of local government, local civic associations and other local institutions that sprang up with the reform, and social and political dynamics more generally that impact upon local government but lay dormant under central rule. The data cover the period 1987-1996.

I then perform three tests:

1.  $\beta_1 = \beta_2$  Means test. This is a simple t-test to determine whether the means of the  $\alpha_m$  and  $\alpha_m^*$  coefficients are significantly different for each sector. Significance indicates that decentralization changed national investment patterns through the effects and actions of local governments.
2.  $\beta_{1m} = \beta_{2m}$  Individual tests. This F-test checks municipality-by-municipality whether the decentralization-interacted state coefficients are different from the simple state coefficients for investment in a given sector. A significant F-test constitutes evidence that decentralization caused a change in local investment patterns in a particular municipality. Significance in many municipalities constitutes stronger evidence that decentralization changed national investment patterns.
3. Lastly, I place the *differences* in state dummy coefficients on the LHS and estimate the model

$$\beta_{2m} - \beta_{1m} = \zeta S_m + \eta Z_m + \epsilon_m \quad (6)$$

for each of ten sectors, where  $S$  is a scalar or vector of the existing stock of public services (variously defined, as we will see below) at an initial period, and  $Z$  is a vector of institutional and civic variables, both indexed by municipality  $m$ . This approach isolates those changes in investment patterns resulting from a move to a decentralized regime and then examines its determinants. Notice that equation (6) is a general-form and not structural model, and hence the results will not be sensitive to specific theoretical assumptions.

The LHS variable should by construction be unrelated to all factors which remain constant between the two periods, and thus I omit socio-economic, regional and other variables which do not vary between the centralized and decentralized regimes. I assume that the variables in  $Z$ , as well as the stock of public services in the ten sectors of interest,  $S$ , are constant over the period in question.<sup>10</sup>

To facilitate analysis, and in order to combine very specific variables that might enter  $Z$  into more meaningful and conceptually defensible indicators, I characterize these variables according to the groups in figure 8, and construct principal component variables (PCVs) for each.

**Figure 8: Interpretation of PCVs**

PCV Group	PCV No.	Interpretation - Variable increases in... listed in order of importance, where applicable (see Annex 1 for details)
Civil Institutions	1	Strength of local civil institutions and organizations
Private Sector	1	Dynamism of the local private sector
Training & Capacity-Building	1	Intensity of the local capacity-building efforts undertaken by/for local government
Information Technology	1	IT systems - hardware and software
Project Planning	1	Informed project planning which follows consensual and open procedures

<sup>9</sup> Thus  $\alpha_m^*$  takes the value 0 for all municipalities and all years before 1994, and is identical to  $\alpha_m$  for all years from 1994 onwards.

<sup>10</sup> For most of the demographic and socio-economic variables in question, which tend to show change that is statistically significant only over longer periods of time, this is reasonable. It is less reasonable in the case of the  $S$  variable. Unfortunately the data leave no choice.

The PCVs and their constituent variables, as well as variables of need, are summarized in Annex 1.

Equation (6) can thus be written

$$\beta_{2m} - \beta_{1m} = \zeta S_m + \eta_1 Z_{1m} + \dots + \eta_5 Z_{5m} + \varepsilon_m, \quad (7)$$

where subscripts 1 to 5 denote the groups above.

In theoretical terms, the main coefficient of interest is  $\zeta$ , which is interpreted as an indicator of the degree to which investment is based on need. I define “need” as the marginal utility arising from a particular type of public service,  $N = U'(g)$ , where  $N$  is need and utility is defined as in the model in section 3.2. In the language of the model, let  $\theta_m = U'(g)$ . Hence need falls as the stock of  $g$  rises, and vice versa. I use two types of information as indicators of the stock of public services: (1) the penetration rates<sup>11</sup> of public services or benefits in the local population,  $r$ , or the population without access to the same,  $1-r$ ,<sup>12</sup> and (2) the initial per-capita stock of infrastructure (at the outset of decentralization). Examples of these are: (1) the literacy and illiteracy rates, the share of population without water or sewerage; and (2) the number of sports facilities and markets per capita in 1994. Of these, type 1 variables can be considered truer indicators of need, as they better capture the criterion of public service use by the population and are likely to be better measures of the flow of benefits produced by public investments. Type 2 variables indicate existence more than exploitation by the local population, and hence should be less accurate indicators of need. I use type 2 variables when type 1 variables are unavailable. It is also important to note that need here is a relative concept, rising and falling with  $U'(g)$ . This is an important distinction, as the semantics of its common usage imply that need is an absolute, and even discrete, concept, existing in some places (at some times) but not in others.

Following the argument in section 3.2, I expect  $\zeta$  to be negative and significant when  $S_m$  is measured by the penetration rate  $r$ , and positive and significant when  $S_m$  is measured by  $(1-r)$ . If  $S_m$

---

<sup>11</sup> Note that “rate” here denotes a stock and not flow concept.

<sup>12</sup> I use both for education, and obtain the expected variation in sign in our results (see below).

is measured by  $r$ , a negative coefficient suggests that decentralized government invests more heavily in a type of public good where it is scarce, and hence presumably where it is more strongly preferred. Decentralization would thus lead to a more progressive investment pattern in terms of objective need than obtained under centralized government. A positive coefficient implies that decentralized government behaves regressively, accentuating the pre-existing differences in public goods endowments. I interpret this as evidence that the relationship posited in 3.2 is exactly backwards, and central government allocates public investment with more sensitivity to need than local government. A coefficient equal to zero suggests that local government does not take the existing stock of public goods into account at all in making its investment decisions, implying that the model is misguided and local preferences should not appear in the expression.

The variables in  $Z$  are not included as mere controls, however. Their coefficients,  $\eta$ , are of interest insofar as they help explain the institutional, civic and procedural determinants of decentralized investment decisions, and so constitute indirect tests of the theoretical argument above. The case put forward by political scientists<sup>13</sup> for local government's superior assessment of local preferences and needs includes greater sensitivity to grass-roots demand, greater accessibility of local lobby groups to local government, and greater political accountability to the local populace. Some of the ways in which this can happen include the use of participative planning techniques, and the existence of private sector and civic organizations that are strong and dynamic. Remember that these factors were not relevant to central decision-making, which occurred in the center. Hence I interpret positive coefficients on these PCVs as weak evidence that local government assesses preferences more accurately than central government, implying that the value of  $p$  is less than 1 and the difference between real preferences and those perceived by the center ( $\theta_m - \theta_{-m}$ ) is high.

---

<sup>13</sup> See for example Wolman in Bennet (1990).

## 4.2 Results

Figure 9 shows the results from the means test  $\beta_1 = \beta_2$ . Mean values are significantly different at the 0.1% level for education, water & sanitation, agriculture, transport, urban development and communication, and at the 1% level for industry & tourism and water management. In health, values are significantly different at only the 13% level, and worse for energy. The evidence is that decentralization changed national investment patterns in each of the first 8 sectors. Examination of the  $\beta_2$  values indicates that the effect of local government on average investment under decentralization was to increase investment in education, urban development, water management and perhaps health, no change in energy, and decrease investment in agriculture, transport, communication, industry and tourism, and (puzzlingly given the increase in water management) water & sanitation. But figure 10 shows that the number of municipalities investing in these sectors increased for all except agriculture. This implies that the concentration of investment fell, as more municipalities invested in a large number of (often smaller) projects in 9 sectors.

**Figure 9****Test 1: Coefficients Equal? Test  $\beta_1 - \beta_2 = 0$** 

Sector	Variable	Test			
		Mean	Std Error	t-statistic	P Value
Education	$\beta_1$	0.00128	0.00032	-22.798	0.0000
	$\beta_2$	0.01685	0.00042		
Water & Sanitation	$\beta_1$	0.00374	0.00043	17.343	0.0000
	$\beta_2$	-0.01174	0.00049		
Agriculture	$\beta_1$	0.00867	0.00080	8.667	0.0000
	$\beta_2$	-0.00535	0.00086		
Transport	$\beta_1$	0.05464	0.00890	5.967	0.0000
	$\beta_2$	-0.05152	0.00890		
Urban Development	$\beta_1$	0.00307	0.00049	-5.324	0.0000
	$\beta_2$	0.00791	0.00053		
Communication	$\beta_1$	0.00191	0.00032	4.011	0.0001
	$\beta_2$	-0.00055	0.00031		
Industry & Tourism	$\beta_1$	0.00101	0.00023	3.768	0.0002
	$\beta_2$	-0.00071	0.00023		
Water Management	$\beta_1$	0.00075	0.00018	-2.932	0.0034
	$\beta_2$	0.00182	0.00020		
Health	$\beta_1$	0.00258	0.00038	1.540	0.1238
	$\beta_2$	0.00141	0.00041		
Energy	$\beta_1$	-0.00489	0.00185	1.281	0.2004
	$\beta_2$	-0.00963	0.00186		

**Figure 10**  
**Number of Municipalities Receiving Investment, by Sector** (in municipality-years)

Sector	%		
	Before	After	Change
Urban Development	66	675	923%
Education	75	685	813%
Health	95	484	409%
Water Management	46	175	280%
Communications	38	97	155%
Water & Sanitation	202	506	150%
Energy	180	259	44%
Industry & Tourism	44	60	36%
Transport	357	444	24%
Agriculture	343	309	-10%

Figure 11 shows the number of municipalities where we can reject the hypothesis  $\beta_{1m} = \beta_{2m}$ , that is, the number of municipalities where decentralization changed investment patterns significantly during the first three years. The test is significant in about  $\frac{3}{4}$  of municipalities for water & sanitation and education, and in  $\frac{1}{3}$  of municipalities for urban development and water management, but in only  $\frac{1}{5}$  of municipalities for agriculture and health and fewer in other sectors. This suggests that investment patterns changed significantly for water & sanitation, education, urban development and water management, did not change for industry & tourism, energy, communication and transport, with agriculture and health on the border between significantly different and not. Taking into account the results from test 1, I conclude that agriculture spending did change significantly between the two periods, while for health it may have but the evidence is inconclusive. Thus two sectors can be added to the two above for which decentralization did not significantly change investment patterns across Bolivia's 311 municipalities. From this point the analysis focuses on water & sanitation, education, urban development, water management and agriculture.

**Figure 11**  
**Test 2: Coefficients Equal?**  
**Test  $\beta_{1m} - \beta_{2m} = 0$**

<b>Sector</b>	<b>No. Significant</b>	<b>% Significant</b>
Water & Sanitation	224	76%
Education	209	71%
Urban Development	107	36%
Water Management	105	36%
Agriculture	65	22%
Health	49	17%
Transport	29	10%
Communication	7	2%
Energy	7	2%
Industry & Tourism	7	2%

These results can best be understood by considering the following: (i) One-half of all municipalities in Bolivia received no public investment at all during the three years before

decentralization, and these are for the most part the poorest municipalities. As all municipalities have funds to invest post-decentralization, the most pronounced changes in investment patterns are accounted for by the poorest municipalities. And, (ii) given high levels of poverty and low levels of public investment before decentralization, poor municipalities have a need for investment in more than one sector. Thus, rather than spread resources around thinly, most reasonably choose to concentrate investment in a few, high-priority sectors during the initial years of decentralization.

Hence the results are driven by investment by the poorest districts responding to their greatest needs. By revealed preference we can infer that local administrations in these areas prioritize basic social service projects above productive projects, and productive (i.e. income-enhancing) projects in turn above economic infrastructure. Hence they will tend to invest in education and water before agriculture, and agriculture before transport or communication. Because only a few years of post-decentralization data are available, the F-test is expected to fail in low-priority sectors, as poor municipalities received little or no investment under central government and continue to invest little under decentralization. In high-priority sectors, however, investment will leap upwards from a very low base if decentralization matters. This is indeed what happens. Decentralization leads to an increase in investment in water & sanitation and education in  $\frac{3}{4}$  of all municipalities, and urban development and water management in  $\frac{1}{3}$ . There are moderate changes in investment patterns in agriculture and health, and very little change in transport, communication, energy and industry & tourism. In conclusion, decentralization did change the pattern of Bolivian public investment, and this difference was strongest in the social services and urban development.

Test 3 investigates the determinants of the difference in dummy state variables,  $\beta_2 - \beta_1$ , equivalent to the increase in investment due to decentralization. Results are examined sector-by-sector, beginning with education.

## Education

**Figure 12**

Test 3:  $\beta_{2m} - \beta_{1m} = \zeta S_m + \eta_1 Z_{1m} + \dots + \eta_5 Z_{5m} + \epsilon_m$

Independent Variable	Model*				
	I	II	III	IV	V
Private Sector PCV1	-0.000983 (-2.466)	-0.00121 (-3.004)	-0.00106 (-2.689)	-0.0003 (-1.004)	-0.00056 (-1.619)
Project Planning PCV1	-0.000538 (-0.919)	-0.00049 (-0.830)	-0.00055 (-0.925)	-0.00037 (-0.703)	-0.00052 (-0.879)
Civil Institutions PCV1	0.000973 (1.752)	0.00101 (1.774)	0.00103 (1.839)		
Training & Capacity Building PCV1				-0.00063 (-0.591)	
Information Technology PCV1					0.00118 (1.010)
Illiteracy Rate (Adult)	0.000173 (2.906)			0.00019 (3.116)	0.0002 (3.306)
Illiteracy Rate (Over-6's)			0.00018 (2.505)		
Literacy Rate		-0.00011 (-1.844)			
Local Education Authority	0.005603 (1.421)	0.00534 (1.356)	0.00543 (1.378)	0.0053 (1.354)	0.00479 (1.379)
_constant	0.0075759 (1.814)	0.02037 (3.728)	0.00806 (1.816)	0.00722 (1.862)	0.00704 (1.731)
R-square	0.0176	0.0136	0.0162	0.0155	0.0172
Prob>F	0.001	0.0025	0.0016	0.0128	0.0104

\* OLS regressions reported with robust standard errors

t-stats in parentheses; PCV1 = 1st principal component variable

Investment rises under decentralization where the illiteracy rate is higher, and investment is thus progressive in terms of need. This implies that local government is more sensitive to local need than central government. This finding is not sensitive to specification or to the measure of illiteracy used, as is evident in Figure 12 above, where the literacy rate is significant and negative. In terms of the model of section 3.2, the results imply that  $p < 1$ , and hence that the center assesses local preferences less accurately than local government. Educational investment falls where the private sector is stronger, a finding which is again insensitive to specification. This is most likely because private firms lobby for resources to flow to other sectors where they stand to profit more. The results

for urban development (below) support this interpretation. Civil Institutions, by contrast, lead to an increase in investment after decentralization, suggesting grass roots support for education (i.e. parents worried about their children). Participative planning methodologies have no effect on investment, nor do information technology or local training and capacity-building activities.

## Water & Sanitation

**Figure 13**

Test 3:  $\beta_{2m} - \beta_{1m} = \zeta S_m + \eta_1 Z_{1m} + \dots + \eta_5 Z_{5m} + \epsilon_m$

Independent Variable	Model*			
	I	II	III	IV
Private Sector PCV1	0.000123 (0.130)		-0.000856 (-1.265)	-0.000712 (-1.058)
Project Planning PCV1	-0.003165 (-2.002)		-0.003322 (-2.237)	-0.003517 (-2.205)
Civil Institutions PCV1	-0.001227 (-1.230)			
Training & Capacity Building PCV1			-0.001129 (-1.161)	
Information Technology PCV1				-0.000196 (-0.163)
% Pop. w/out Sewerage	0.000194 (1.881)		0.000170 (1.768)	0.000180 (1.756)
% Pop. w/out Water		0.000157 (1.791)		
_constant	-0.030616 (-3.324)	-0.027167 (-4.492)	-0.028461 (-3.348)	-0.029259 (-3.217)
R-square	0.0323	0.0064	0.0320	0.0302
Prob>F	0.0000	0.0743	0.0000	0.0000

\* OLS regressions reported with robust standard errors  
t-stats in parentheses; PCV1 = 1st principal component variable

Investment rises under decentralization where more people have no sewerage. It also rises where the percent of the population without access to drinking water increases, though this finding is sensitive to specification and drops out when other variables are included in the model. Thus local governments invest more where need is greatest, and investment is progressive in terms of need. This implies that  $p < 1$  in the model above. Participative planning methodologies are significant and negative, thus decreasing investment, and the private sector and civil institutions are both

insignificant. This last result is surprising given the positive effect of civil institutions on investment in education.

## Water Management

**Figure 14**

$$\text{Test 3: } \beta_{2m} - \beta_{1m} = \zeta S_m + \eta_1 Z_{1m} + \dots + \eta_5 Z_{5m} + \varepsilon_m$$

Independent Variable	Model*			
	I	II	III	IV
Private Sector PCV1	0.000171 (0.602)	0.000170 (0.609)	0.000056 (0.405)	0.000155 (0.758)
Project Planning PCV1	-0.000550 (-0.877)	-0.000540 (-0.878)	-0.000533 (-0.906)	-0.000525 (-0.829)
Civil Institutions PCV1	-0.000171 (-0.655)	-0.000182 (-0.655)		
Training & Capacity Building PCV1			-0.000024 (-0.063)	
Information Technology PCV1				-0.000445 (-1.326)
% Pop. w/out Water	-0.000087 (-2.363)		-0.000088 (-2.339)	-0.000088 (-2.412)
% Pop. w/Water (Int. Plumbing)		0.000135 (0.879)		
% Pop. w/Private Standpipe		0.000067 (1.639)		
% Pop. w/Public Standpipe		0.000101 (2.012)		
% Pop. w/out Sewerage	0.000085 (2.217)	0.000110 (1.485)	0.000087 (2.249)	0.000077 (2.097)
% Pop. w/"Other" Sewerage**	0.000113 (1.793)	0.000139 (2.481)	0.000112 (1.850)	0.000103 (1.725)
_constant	-0.001260 (-0.393)	-0.012457 (-1.441)	-0.001367 (-0.404)	-0.000426 (-0.136)
R-square	0.0110	0.0114	0.0103	0.0116
Prob>F	0.0832	0.1422	0.0824	0.0635

\* OLS regressions reported with robust standard errors

t-stats in parentheses; PCV1 = 1st principal component variable

\*\* "Other" Sewerage refers to non-public-utility, non-septic-tank methods of sewerage disposal.

The water management sector is related to water & sanitation but is broader in scope, including reservoirs and wastewater treatment lagoons, levees, and storm drainage works. In general

the degree of overlap between the two sectors is high, and similar indicators of need are used for both. Investment in water & sanitation is lowest where the share of population with no access to water is highest, rises as more people have access to public and private standpipes, and then falls again as internal plumbing becomes widespread. Investment is also highest where few people have access to sewerage, or access to rudimentary sewerage, and decreases as municipal sewerage systems become widespread. These results point to investment that is progressive in terms of need at intermediate and high levels of provision, with a poverty trap amongst the most needy. Within this range, local government fails to respond to need and central government provision is superior. The model can explain this indirectly, if in these neediest districts the costs and complexity of making initial investments in water are so great (*e.g.* from developing water sources, laying water mains and building treatment plants) that local governments cannot undertake them alone, but once these initial investments are made the marginal costs of extending the system are manageable. In the language of the model, central government has a cost advantage over local government for initial investments,  $\alpha < 1$ . But at intermediate and higher levels of provision  $p < 1$  and local government's needs-orientation dominates. Perhaps surprisingly, private sector firms, civil institutions, participative planning methodologies, IT and local training programs have no effect on investment. Only variables of need matter.

## Agriculture

**Figure 15**

**Test 3:**  $\beta_{2m} - \beta_{1m} = \zeta S_m + \eta_1 Z_{1m} + \dots + \eta_5 Z_{5m} + \epsilon_m$

Independent Variable	Model*		
	I	II	III
Private Sector PCV1	-0.000286 (-0.156)	-0.000665 (-0.466)	-0.000837 (-0.657)
Project Planning PCV1	-0.005871 (-1.819)	-0.005644 (-1.727)	-0.005932 (-1.853)
Civil Institutions PCV1	-0.000401 (-0.226)		
Training & Capacity Building PCV1		-0.001492 (-0.420)	
Information Technology PCV1			0.000885 (0.303)
Malnutrition Rate (Low), Males	0.000720 (1.962)	0.000680 (1.987)	0.000702 (1.931)
_constant	-0.032749 (-2.936)	-0.031594 (-2.981)	-0.032157 (-2.918)
R-square	0.0198	0.0209	0.0201
Prob>F	0.0768	0.0818	0.0798

\* OLS regressions reported with robust standard errors

t-stats in parentheses; PCV1 = 1st principal component variable

It is notable that even though agricultural investment decreased after decentralization – fewer municipalities invested here (see Figure 10) and the mean difference in state variables is negative and significant – investment nonetheless increases with the male malnutrition rate, a finding which is insensitive to specification. This implies that those municipalities that did invest in this sector after decentralization did so progressively according to need. Hence  $p < 1$  in the model above. Once again participative planning techniques decrease agricultural investment under decentralization, and the number of private sector enterprises and civil institutions has no effect. Investment is similarly unaffected by local training and capacity-building programs and installed IT capacity.

## Urban Development

**Figure 16**

**Test 3:**  $\beta_{2m} - \beta_{1m} = \zeta S_m + \eta_1 Z_{1m} + \dots + \eta_5 Z_{5m} + \epsilon_m$

Independent Variable	Model*		
	I	II	III
Private Sector PCV1	0.004749 (4.486)	0.004869 (4.804)	0.005125 (4.704)
Project Planning PCV1	-0.000801 (-0.994)	0.000263 (0.219)	0.000175 (0.143)
Civil Institutions PCV1	0.000439 (0.750)		
Training & Capacity Building PCV1		-0.000540 (-0.716)	
Information Technology PCV1			-0.000609 (-0.285)
# Markets per capita (1994)	0.136135 (6.130)	0.124015 (3.048)	0.108250 (2.371)
# Sports Facilities per capita** (1994)	4.728497 (2.815)	4.758151 (2.991)	4.814974 (3.013)
_constant	0.006800 (4.340)	0.005830 (3.244)	0.005801 (3.176)
R-square	0.0684	0.0474	0.0474
Prob>F	0.0000	0.0000	0.0000

\* OLS regressions reported with robust standard errors

t-stats in parentheses; PCV1 = 1st principal component variable

\*\* Defined as other than football fields, multi-use courts and coliseums.

The initial (i.e. pre-decentralization) stock of infrastructure is used directly as the measure of need. Investment under decentralization increases as the initial number of markets per capita increases, and as the number of general sports facilities per capita increases as well. Investment is thus regressive in terms of need in this sector, as opposed to the others considered above, and this finding is not sensitive to specification. Thus it would seem to be central government that more accurately assesses local need in this sector, and local government that mis-estimates it. Investment increases with the number of private sector firms, which is as expected given that urban development projects often result in lucrative contracts for these firms. Investment is unaffected by participative

planning techniques and civil institutions, implying that it is not a high priority at the grass-roots level. Neither training programs nor IT affects investment.

The results show that the changes in investment patterns detected above in education, water, agriculture and urban development are strongly and positively related to indicators of local need. Other plausible variables, including civil and social dynamism, the strength of institutions, and local government procedures, are not consistently significant. These results can be combined with the data of section 2.2 in order to distinguish between the cost advantage and needs-assessment effects posited in section 3. Remember that investment rose by number of municipalities in all of the sectors examined except agriculture, and the effect of local government on average investment was positive in the social sectors and urban development, and negative in economic infrastructure and agriculture. The average rise in investment (*i.e.* across all municipalities) in education, water management and urban development after decentralization can be interpreted as a product of the need-orientation of local government detected above, and evidence that the center cannot produce these services at lower cost than the periphery. The fall in average investment in agriculture, by both volume and number of municipalities, combined with the significance of need, is evidence that the center was over-investing in this sector, and that given the choice municipalities prefer to redirect resources elsewhere. The fall in average investment by value in water & sanitation, combined with an increase in the number of districts investing and the significance of need, implies that the central government concentrated investment in too few projects and districts; local government thus re-allocates resources in a larger number of smaller projects where need is greatest. And lastly, the systematic fall in investment by value throughout Bolivia in transport, communication and industry & tourism, combined with modest increases in numbers of municipalities investing and the irrelevance of need, implies weakly that the center may have had a cost advantage in these sectors, leading volumes to fall after decentralization.

## 5. Conclusions

The results show that decentralization significantly changed national public investment patterns in Bolivia. Investment changed unambiguously in education, water & sanitation, water management, agriculture and urban development after the 1994 reform. And these shifts are strongly and positively related to real local needs. In education, water & sanitation, water management, and agriculture, post-decentralization investments are higher where illiteracy rates are higher, water and sewerage connection rates lower, and malnutrition a greater risk respectively. These changes were driven by the actions of Bolivia's 250 smallest, poorest municipalities investing newly devolved public funds in their highest-priority projects. Decentralization thus led to higher investment in human capital and social services as the poorest regions of the country chose projects according to their greatest needs. In terms of the model of section 3.2, this implies that decentralized provision dominated central provision in these sectors through local government's superior sensitivity to local needs. In transport, communication and industry & tourism, on the other hand, central government may have had a positive cost advantage.

In econometric terms, the most interesting feature of the results is that no terms other than need are consistently significant across the five principal sectors analyzed. Relationships of need are robust and insensitive to specification. By contrast social, institutional and procedural variables are infrequently significant across sectors, and seem to account for little total variation.

Indeed, the only apparent effect of private sector firms is to transfer resources from education to urban development. Civil institutions are significant only for education, where they increase investment, and insignificant everywhere else. Training, capacity-building and IT are insignificant for all sectors. This implies that the differences in investment patterns chronicled above are not related to the number of private enterprises or civil institutions, or driven exogenously by training programs or information technology, but are instead determined by local needs. I conclude that the Bolivian experience, where decentralization led to an investment increase in municipalities with the

worst demographic indicators and infrastructure endowments in the sectors examined, is exactly the opposite of what many academics and policy-makers predict, and what other researchers have found in the past. It is accordingly important to investigate the social and institutional mechanisms that cause these changes. I turn to these questions in Faguet (2000a) and (2000b).

By demonstration, this paper seeks to make a case for conducting empirical research on decentralization and fiscal federalism in the manner employed here. Much of the empirical work on decentralization to date focuses on the share of national expenditures conducted by different levels of government, and ignores the many insights waiting to be uncovered by moving down to the level of the local political economy and conducting a careful comparison of spending and investment patterns with economic, institutional, social and demographic indicators. The data presented here is from one of the poorest countries in the Western hemisphere, and took years to collect, clean and organize. But as this paper demonstrates, its quality is sufficient to permit significant and counter-intuitive results. Applying a similar methodology to more sophisticated countries in the region, not to mention Europe and North America, might prove very fruitful. Lastly, the above analysis leaves open the question of how political power is distributed in a central government, the institutional mechanisms by which governments sense and take up local demand for public services, and the precise nature of the organizational or technical advantages or scale economies which might benefit one level of government over another. That is,  $p$ ,  $\theta_m$  and  $\alpha$  are all exogenous here. Research is needed to understand these processes and endogenize them in our models of public goods provision.

**Acknowledgements:**

The research in this paper was financed by a grant from the World Bank Research Committee. An ORS award and additional financial support were kindly provided by the ESRC. I am very grateful to my advisers Tim Besley and Teddy Brett for invaluable advice and encouragement throughout, and to Gunnar Eskeland for his many insights and constant support. I also wish to thank Roli Asthana, Monica Baumgarten, Shanta Devarajan, Markus Haacker, James Putzel, Nicholas Stern and seminar participants at the IDB, LSE, World Bank and at the LACEA99 conference for their thoughtful suggestions. All remaining errors are my own.

**Bibliography**

- Andersson, A., Harsman, B., Quigley, J., eds. *Government for the Future: Unification, Fragmentation and Regionalism. Contributions to Economic Analysis*, vol. 238. Amsterdam; New York and Oxford: Elsevier Science, North-Holland, 1997.
- Bardhan, P., Mookherjee, D., "Expenditure Decentralization and the Delivery of Public Services in Developing Countries", Working Paper No. C98-104, Center for International and Development Economics Research, Berkeley, 1998
- Bennet, R.J., *Decentralization: Local Governments and Markets*, Clarendon Press, 1990
- Bennet, R.J., *Developments in Decentralization to Local Governments and Markets: Recent Experiences in OECD, Former Communist and Developing Countries*, UN UP 1993
- Bergstrom, T., Goodman, R., "Private Demand for Public Goods", *American Economic Review*, 1973
- Besley, T., Coate, S., "Centralized versus Decentralized Provision of Local Public Goods: A Political Economy Analysis", NBER Working Paper No.W7084, 1999
- Besley, T., Coate, S., "Public Provision of Private Goods and the Redistribution of Income", *American Economic Review*, 77, 1991
- Cheema, G.S., Rondinelli, D., *Decentralization and Development: Policy Implementation in Developing Countries*, Beverly Hills; London: Sage Publications, 1983.
- Coase, R., 1960, "The Problem of Social Cost", *Journal of Law and Economics*, 3, Oct, 1-44

- Crook, R.C., Sverrisson, A.S., To What Extent Can Decentralized Forms of Government Enhance the Development of Pro-Poor Policies and Improve Poverty-Alleviation Outcomes?, typescript, 1999.
- Downs, A., An Economic Theory of Democracy, New York: Harper and Row, 1957.
- Dunkerley, J., Rebellion in the Veins: Political Struggle in Bolivia, 1952-82. London : Verso, 1984.
- Dunkerley, J., Political Transition and Economic Stabilization : Bolivia, 1982-1989 London: Institute of Latin American Studies, 1990.
- Faguet, J.P., "Institutions, Political Competition and Local Government Decision-Making: Decentralization and the Provision of Public Services in Bolivia" (Paper 2), manuscript, 2000a
- Faguet, J.P., "Local Government at the Extremes: The Economic and Social Foundations of Municipal Performance in Viacha and Charagua" (Paper 3), manuscript, 2000b
- Greene, W., Econometric Analysis. Upper Saddle River : Prentice Hall, 1997.
- Heckman, J., Snyder, J., "Linear Probability Models of the Demand for Attributes With An Empirical Application to Estimating the Preferences of Legislators", RAND Journal of Economics, Vol.28, No.0 (1997), pp.S142-S189
- Klein, H., Historia de Bolivia.. La Paz: Libreria-Editorial Juventud, 1993
- Lea Plaza, M., interview, La Paz, 29 September, 1997. Mr Lea Plaza was then Director of Participative Planning in the National Secretariat of Popular Participation, Ministry of Human Development.
- Ley de Participación Popular, Reglamento de las Organizaciones Territoriales de Base, Secretaría Nacional de Participación Popular, Ministerio de Desarrollo Sostenible y Medio Ambiente, La Paz, 1994.
- Maddala, G. S., Econometrics. New York, London : McGraw-Hill, 1977.
- Manor, J., The Political Economy of Democratic Decentralization, Washington, D.C.: The World Bank, 1999
- Mueller, D., Public Choice II, Cambridge: Cambridge University Press, 1989
- Oates, W., Fiscal Federalism, Harcourt Brace: New York, 1972
- Persson, T., Tabellini, G., "Federal Fiscal Constitutions: Risk Sharing and Redistribution", Journal of Political Economy, 1996, vol. 104, no.5: 979-1009.
- Rondinelli, D., "Government Decentralization in Comparative Perspective: Theory and Practice in Developing Countries", International Review of Administrative Science, 47(2), 1981

- Rondinelli, D., G.S. Cheema, Nellis, J., *Decentralization in Developing Countries: A Review of Recent Experience*, World Bank Staff Working Papers No.581, 1984
- Rubinfeld, D., "The Economics of the Local Public Sector", chapter in *Handbook of Public Economics*, Auerbach, A., and M. Feldstein, eds, Oxford: North-Holland, 1987
- Rubinfeld, D., P. Shapiro, Roberts, J., "Tiebout Bias and the Demand for Local Public Schooling", *Review of Economics and Statistics*, 69(3), August 1987, pages 426-37.
- Smith, B.C., *Decentralization: The Territorial Dimension of the State*, London: George Allen & Unwin, 1985.
- Tiebout, C.M., "A Pure Theory of Local Expenditures", *Journal of Political Economy*, 64, 416-424.
- Veira, 1967, in Rondinelli, D., G.S. Cheema, Nellis, J., *Decentralization in Developing Countries: A Review of Recent Experience*, World Bank Staff Working Papers No.581, 1984

## Annex 1

### Summary of Principal Component Variables, PCV Constituents, and Needs Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
<b>Principal Component Variables</b>					
pcps1	302	-3.2400E-09	1.5298	-0.3015	18.0787
eereg_cm	306	202.7255	1229.8060	0	14117
eereg_ea	306	0.5556	2.0973	0	30
eereg_fi	310	2.6097	26.7243	0	454
pcpp1	310	2.3600E-09	1.5915	-2.7175	2.2313
catastur	310	0.1581	0.3654	0	1
dpoacoor	310	0.8548	0.9991	0	4
dpoaotro	310	0.6968	1.1790	0	4
epocham	310	0.8355	0.3713	0	1
evalres	310	0.8226	0.3826	0	1
idenalc	310	0.7968	0.4030	0	1
idencons	310	0.4129	0.4932	0	1
idencv	310	0.7323	0.4435	0	1
idenpdm	310	0.3742	0.4847	0	1
info_ed	310	0.5581	0.4974	0	1
info_sa	310	0.5839	0.4937	0	1
pdm94	310	0.3032	0.4604	0	1
plan_sye	310	0.5839	0.4937	0	1
reconu_a	310	0.6839	0.4657	0	1
pcc1	303	2.4000E-09	2.2150	-2.1130	14.5313
cv	310	0.6419	0.4802	0	1
indig2	310	0.6290	3.5208	0	51
jvec2	310	8.9548	26.2524	0	247
otbregi	308	34.25	41.3093	0	299
otbregi2	310	46.9226	49.6351	0	339
otbs_e	307	50.2280	59.0375	0	520
otbs_pj	305	43.8557	52.5067	0	416
otbsoli	308	40	43.9176	0	323

Variable	Obs	Mean	Std. Dev.	Min	Max
pcr1	310	-5.4000E-09	1.6762	-2.8227	4.2889
capadpe	310	0.2516	0.4346	0	1
capci1	310	0.2	0.4006	0	1
capci2	310	0.5710	0.4957	0	1
capdis	310	0.4871	0.5006	0	1
caplemu	310	0.3452	0.4762	0	1
caporad	310	0.3	0.4590	0	1
capprin	310	0.3613	0.4812	0	1
capprop	310	0.3903	0.4886	0	1
temacz	310	0.5194	0.5004	0	1
temadis	310	0.3161	0.4657	0	1
temaorad	310	0.5065	0.5008	0	1
temaprop	310	0.4290	0.4957	0	1
pbit1	310	1.6400E-08	1.5235	-1.5591	5.0864
sitotal	310	0.4355	0.4966	0	1
siotro	310	0.2226	0.4167	0	1
sisin_ad	310	0.1548	0.3623	0	1
sisin_ai	310	0.6968	0.4604	0	1
sisinidp	310	0.3258	0.4694	0	1
sicom	310	0.2806	0.4500	0	1
impresor	310	0.2903	0.8737	0	10
<b>Need Variables</b>					
sa_minsa	310	32.0264	20.0876	0	85.5147
sa_otro	310	4.3985	7.4206	0	65.2706
desmod	294	8.2202	4.4993	0	26.2548
dilos	310	0.9161	0.2776	0	1
analf	310	30.4638	15.8231	5.5	78.7
ed_alfa	310	69.0462	15.9098	21.2128	94.5433
edana6	310	26.5292	13.1925	6.3780	69.7183
dile	310	0.5032	0.5008	0	1
sin_alca	310	76.1424	21.8893	14.6586	100
sin_agua	310	74.3487	21.1723	17.9204	100
merca4pc	304	0.0014	0.0108	0	0.1517
infot4pc	286	6.0100E-05	0.0006	0	0.0095
deslevh	294	23.0698	7.2684	0	57.1429
sin_luz	310	76.0124	25.4209	5.9936	100
agua_nr	310	67.6176	23.3971	10.4521	100
alca_sin	310	76.2768	21.8418	14.6586	100
alca_otr	310	16.1283	16.3147	0	64.1026
agua_dv	310	8.9680	10.3644	0	56.4501
agua_fv	310	16.7037	13.7505	0	65.9341
agua_ft	310	6.7107	7.1615	0	48.2235
teatr4pc	304	2.8300E-05	8.3400E-05	0	0.0007