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**A MODEL OF CENTRAL vs. DECENTRALIZED GOVERNMENT:
SELF-INTEREST AND MIS-ALLOCATION IN BOLIVIA¹**Jean-Paul Faguet²
14 December, 2002**Abstract**

The recent, much remarked upon decentralization in Bolivia produced four important changes in the nation's public finances: (1) a sharp fall in the geographic concentration of investment; (2) a sea-change in the uses of investment away from infrastructure towards the social sectors; (3) a significant increase in government responsiveness to local needs; and (4) increased investment in poorer municipalities. Existing theoretical treatments of decentralization cannot account for these phenomena. This paper develops a model of government which relies on political bargaining between municipal representatives and central government agents over the allocation of public resources. By invoking central government self-interest, I can explain the Bolivian experience. Lastly I introduce the concept of residual power, which underpins the model, as key to understanding decentralization. Analyzing the location of residual power in a political system can help cut through the thicket of contradictory claims that fill the decentralization literature.

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1. Introduction

A number of authors have commented recently on the large and growing trend towards decentralization across the world. Campbell (2001), Manor (1997), Piriou-Sall (1998) and Smoke (2001), among others, document the efforts of literally scores of countries in Africa, Asia and Latin America to devolve resources to lower levels of government and/or deconcentrate their administrations in various ways.³ And in Europe and North America too, decentralization occupies an important place in the policy debate under the guises of subsidiarity and federalism. Such a widespread, vigorous enthusiasm for decentralization is predicated on proponents' claims that decentralization can make government more responsive to citizens' needs by "tailoring levels of consumption to the preferences of smaller, more homogeneous groups" (Wallis and Oates 1988, 5). By "bringing government closer to the governed", decentralization is thought to make government work better (Ostrom *et.al.* 1993, Putnam 1993, World Bank 1994a, UNDP 1993). The opponents of decentralization, apparently in retreat everywhere, counter that the poverty, inequality, bigotry and ignorance of local government and local society distort public decision making so much that centralization is preferable (*e.g.* Crook and Sverrisson 1999, Samoff 1990, Smith 1985).

A curious paradox of this debate is that this strong international enthusiasm is unsubstantiated by empirical evidence. The vast majority of scholarly studies on decentralization's effects have yielded ambiguous results; in country after country, decentralization improved some aspects of public services, worsened others, and left the remainder largely unchanged (see Rondinelli, *et.al.* 1983 for an exhaustive review). Theoretical claims based on inductive reasoning from particular instances (*i.e.* cities,

³ Manor (1999) states that "over 80 percent of developing and transition countries... are experimenting with decentralization." (p.viii)

regions) of success are not supported across larger samples – often from the same countries. Such evidence is not encouraging, and does not support reformers’ continuing efforts.

An exception to this rule is Faguet’s (forthcoming) close study of the Bolivian experience, which finds that decentralization changed public investment patterns in ways which made government more responsive to real local needs. Before decentralization national government concentrated investment in transport, hydrocarbons and energy in Bolivia’s largest, wealthiest municipalities. After decentralization the country’s smallest, poorest districts redirected investment toward social services and agriculture, allocating it much more evenly throughout the national territory. Even the most isolated municipalities benefited. These changes were sufficiently strong to cause dramatic shifts in national investment aggregates.

The case of Bolivia thus provides an important, fresh starting-point for inductive theorizing about decentralization and how government works. A useful theory of decentralization must be capable of explaining at least one case in which decentralization produced clear benefits. This paper offers a model which can explain essential aspects of the Bolivian experience. The rest of the paper is organized as follows. Section 2 reviews Bolivia’s decentralization program, laying out the main policy changes that resulted as key stylized facts. Section 3 uses game theory to develop a model of central vs. decentralized government, featuring political bargaining over public resources. Section 4 summarizes the results and draws out implications for the broader decentralization debate.

2. Decentralization in Bolivia

2.1 Popular Participation and the Decentralization Reform

Before 1994 Bolivia boasted one of the most centralized state apparatuses in the region. The nationalist revolution of 1952 had mounted a state-led bid to modernize a poor, backward nation marked by extreme inequality and presided over by a “typical racist state in which the non-Spanish speaking indigenous peasantry was controlled by a small, Spanish speaking white elite, [their power] based ultimately on violence more than consensus or any social pact” (Klein 1993, 237; my translation). Revolutionaries expropriated the “commanding heights” of the economy – land and mines – and mobilized the resulting public corporations in a determined drive to transform social relations and create a modern, industrial, more egalitarian society (Dunkerley 1984). In government too, the President directly appointed Prefects, who in turn designated entire regional governments and associated dependencies. This formed a national chain of cascading authority that emanated from the capital and was dedicated to breaking down provincial fiefdoms and the oligarchical power of the old elite.

Centralization increased throughout the 1950s and 1960s, as successive governments promoted the unionization of miners, laborers, peasants, public servants and professionals into a hierarchical “peak association”, whose representatives negotiated national policies directly with those of the private sector and government (Dunkerley 1984, 43). Together these three planned the development of new industries, the exploitation of Bolivia’s natural resources, and sectoral and regional policy in a bid to orchestrate a rapid development process from the capital. The military governments that overthrew elected administrations with increasing frequency from the 1960s onwards accelerated this tendency, as did the intellectual trends of the 1950s-1970s: Dependencia theory, Import Substitution Industrialization, and Developmentalism (Klein 1993). With political power so concentrated in La Paz, there was little point in

establishing the institutions and legal framework of local government. As a result, beyond 30-odd regional capitals and provincial towns, Bolivian local government existed only in name, as a ceremonial institution devoid of administrative capability and starved for funds. And in most of the country it did not exist at all.

Against this unpromising background, Bolivia's decentralizing Law of Popular Participation – drafted quietly by a small group of technocrats – was announced in 1994 to a skeptical nation. It was met initially with surprise, followed by derision, and then by the determined opposition of an unlikely alliance representing a large segment of society.⁴ Introduced in January, the bill moved rapidly through Congress and became law in July. At its core were four points:

1. **Resource Allocation.** Central government funds devolved to municipalities doubled to 20 percent of all national tax revenue, and allocation switched from *ad hoc*, highly political criteria to a strict per capita basis.
2. **Responsibility for Public Services.** Title to all local health, education, roads, irrigation, culture and sports infrastructure was transferred to municipalities free of charge, along with the responsibility to administer, equip and maintain it, and invest in new infrastructure.
3. **Oversight Committees** (*Comités de Vigilancia*) were established to oversee municipal spending and propose new projects. Composed of representatives from

⁴ “Injertos Tramposos en ‘Participación Popular’”, *Hoy*, 19 January 1994; “La Declaratoria de Guerra del Primer Mandatario”, *La Razon*, 27 January 1994; and “Arrogancia Insultante”, *Presencia*, 27 February 1994 are only three of the many articles which appeared in the Bolivian press documenting popular reaction to the “Damned Law”. These are documented in Unidad de Comunicación (1995).

local, grass-roots groups, these comprise an alternative channel for representation and voice in the policy-making process.

4. **Municipalization.** 198 new municipalities (out of 310) were created, comprising the entire national territory.

The reform ushered in a new era of local government for the vast majority of Bolivia's cities and towns. Where before the state was present, if at all, in the form of a military garrison, local schoolhouse, or perhaps a health post, each reporting to a central ministry, elected local government accountable to local voters suddenly sprouted throughout the land.

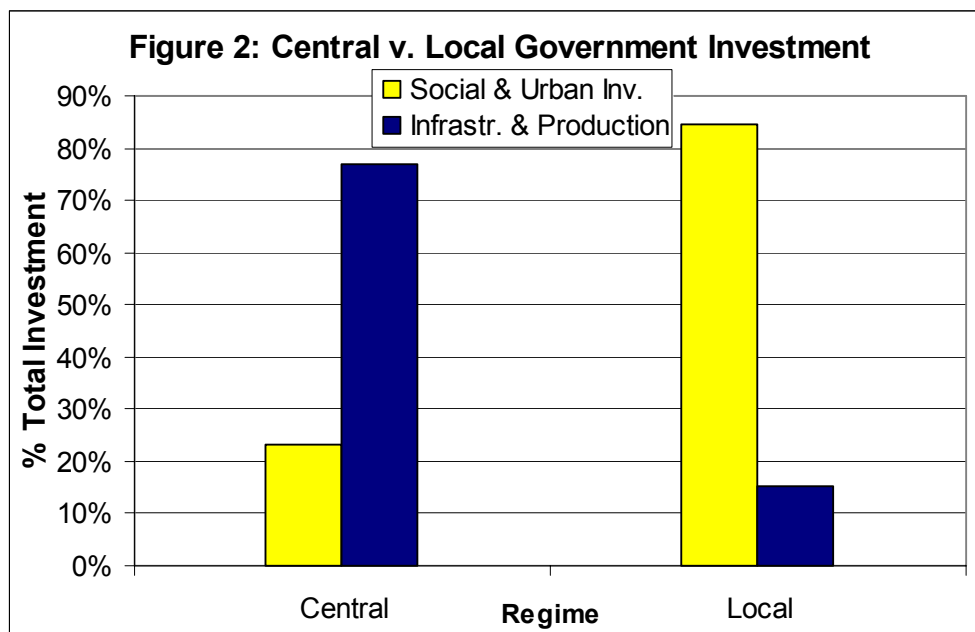
2.2 Descriptive Statistics

To fully understand the effects of decentralization in Bolivia, consider the changes in resource flows it catalyzed. Figure 1 shows central and local government investment by sector for the periods 1991-93 and 1994-96 respectively. During the three years before decentralization, central government invested heavily in transport, hydrocarbons and energy; during the three years following decentralization, local governments invested most in education, urban development and water & sanitation.

Figure 1
Public Investment by Sector,
1991-93 v. 1994-96

Sector	Central	Local
Education	1%	29%
Urban Development	3%	29%
Water & Sanitation	4%	13%
Transport	31%	9%
Health	7%	6%
Energy	9%	4%
Agriculture	6%	4%
Water Management	1%	2%
Multisectoral	9%	2%
Communication	5%	1%
Industry & Tourism	0%	1%
Hydrocarbons	24%	0%
Mining & Metallurgy	1%	0%
TOTAL	100%	100%

Figure 2 makes the pattern clearer by aggregating these thirteen sectors into two categories: “Social Investment & Urban Development” (education, water & sanitation, health, agriculture and urban development), and “Economic Infrastructure & Production” (transport, energy, communications, industry & tourism, hydrocarbons, and mining & metallurgy).⁵ The graph shows that decentralization coincided with a large shift in resources away from economic and towards social investment. Whereas central government invested 77% of its resources in economic infrastructure, local governments chose to invest only 15% here and 85% in social investment and human capital formation. This is the first stylized fact, and constitutes strong evidence that central and local government have very different investment priorities.



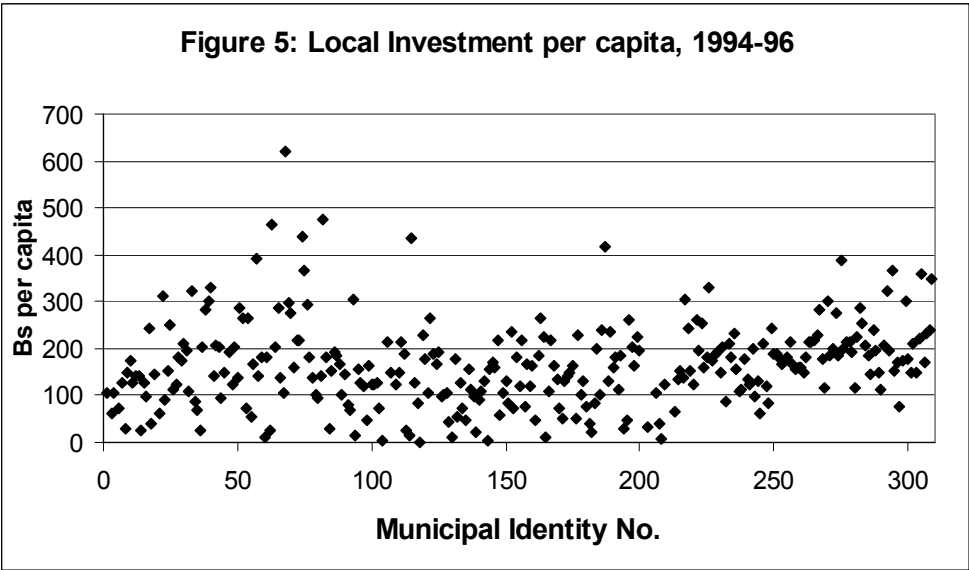
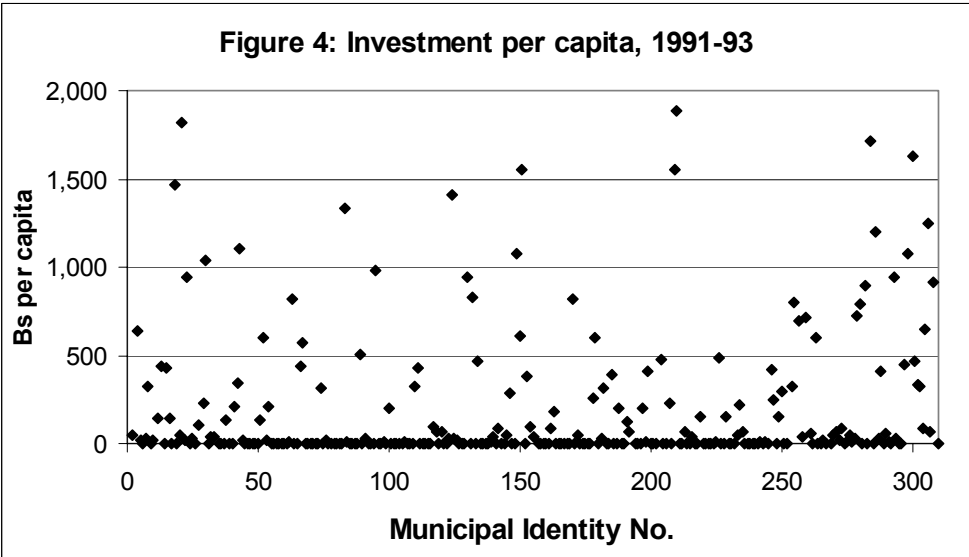
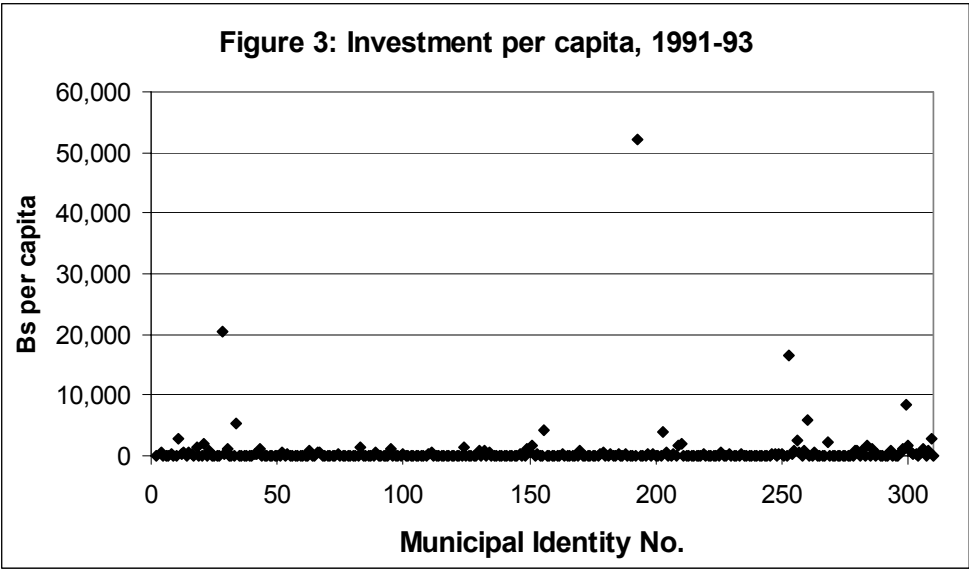
The second stylized fact concerns the geographical distribution of investment across Bolivia’s municipalities before and after decentralization. Figures 3-5 illustrate this by placing Bolivia’s municipalities along the horizontal axis and measuring investment per capita as vertical displacement. A highly skewed allocation would

⁵ I exclude multisectoral, a hodgepodge that includes feasibility studies, technical assistance and emergency relief, that is difficult to categorize.

appear as a few points strewn across the top of the graph, with most lying on the bottom; an equitable distribution would appear as a band of points at some intermediate level.

How does Bolivia compare? Figure 3 shows that per capita investment before decentralization was indeed highly unequal, with large investments in three districts and the vast majority on or near the horizontal axis. Figure 4 corrects for the skewing effect of the highest observations by excluding the upper twelve and showing only those below Bs.2000/capita. Though the distribution now appears less unequal, there is still monotonically increasing density as we move downwards, with fully one-half of all observations at zero investment. Central government policy was thus hugely 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/capita, a broad band with greatest density between Bs.100-200/capita, and only a few points touching the axis. Average municipal investment for this period is Bs.208/capita, and thus the band contains the mean.⁶ Thus 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.

⁶ Investment sums here are much lower because they exclude central government funds.



The third stylized fact come from Faguet (forthcoming), which uses econometric models of public investment to show that decentralization increased government responsiveness to real local needs. After 1994, investment in education, water & sanitation, water management, and agriculture was a positive function of illiteracy rates, water and sewerage non-connection rates, and malnutrition rates respectively.⁷ That is to say, although investment in these sectors increased throughout Bolivia after decentralization, the increases were disproportionate in those districts where the objective need for such services was greatest. Faguet argues that these changes were driven by the actions of Bolivia's 250 smallest, poorest, mostly rural municipalities investing newly devolved public funds in their highest-priority projects.

The fourth stylized fact come from a companion paper (Faguet 2002), which uses a similar technique to show that centralized investment was economically regressive, concentrating public investment in richer municipalities and ignoring poorer ones. Under decentralization, by contrast, local governments acted progressively, investing greater sums where indicators of wealth and income are lower. These four stylized facts can be summarized as follows. Under *central government*, public investment was:

- i. concentrated in economic infrastructure and productive activities, at the expense of social services and human capital formation;
- ii. concentrated in space, leading to a very unequal geographic distribution;
- iii. regressive in terms of need;
- iv. economically regressive – i.e. favoring wealthier districts.

Under decentralization, the opposite patterns obtained.

⁷ Need coefficients have the opposite sign for urban development, and are insignificant elsewhere.

3. Theory: A Problem of Agency and Control Rights

How can we explain these four facts? We turn now to theory, and to the structural factors which can explain the differences between central and local government policy making.

3.1 The Literature

The classic economic treatment of decentralization is Tiebout's (1956) "A Pure Theory of Local Expenditures", which spawned a large number of theoretical extensions and empirical applications. Tiebout posits a world of well informed individuals who move costlessly amongst localities that offer different levels of provision of a public good. Each locality finances its public goods through efficient taxation of local residents. The ensuing competitive equilibrium in locational choices produces an efficient allocation. But Tiebout's paper makes no attempt to model central government, either as coexisting alongside local governments or as their precursor.⁸ Thus, although the efficient allocation it derives can explain needs-responsive local government – stylized fact (iii), the model can offer little insight into why the spatial and sectoral allocation of resources might differ between the two regimes; and its prediction that wealthier districts invest more under decentralization is contradicted by stylized fact (iv).

More generally, the highly mobile population and fixed governments at the model's core are at odds with both anecdotal evidence from Bolivia and studies of even the highly mobile United States (Bardhan 2001). A better assumption would seem to be that government is the mobile element in most local democratic systems, changing with relative frequency, whereas the population is essentially fixed over typical, four or five

⁸ Indeed, Rubinfeld (1987) and others have pointed out that Tiebout's model is not really about decentralization at all, despite the large number of studies which interpret it that way.

year electoral periods. European countries' notably low rates of internal migration are consistent with this view. Tiebout-style "voting with your feet" is surely a relevant mechanism for preference revelation at the margins, and may be more important for particular services, such as education. But the principal mechanism for joining demand and supply for public goods must involve the political process. Indeed this is arguably why local government exists at all. This critique extends to a large part of the economic literature on decentralization, which does not engage with politics in any meaningful sense.

Oates (1972) builds on Tiebout by modeling central and local governments explicitly in order to examine heterogeneity in tastes and spillovers from public goods. Here, 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. This is contradicted by stylized fact (ii) – in Bolivia public investment actually became more uniform *after* decentralization. And while this model would expect local government to be more responsive to local needs, it cannot explain why central government would be actively regressive in terms of both need and wealth. A theory which does not restrict central government choice so strongly would appear to be preferable.

Besley and Coate (1999) provide a model in which this restriction is lifted. Like Oates, they invoke uniform taxation to finance public goods provision. But they 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. Their underlying logic is that heterogeneity creates conflicts of interest between citizens of different districts. This affects the selection and behavior of representatives, leading to degraded legislative performance in choosing public policies. This model is both more representative of how real central governments operate, and more in keeping with the facts of Bolivia's transition to decentralization. It is generally consistent with stylized facts (i) and (iii), less so with (ii) or (iv), without directly addressing any of them.

Bardhan and Mookherjee (1998) develop a model of public service provision which examines the implications of decentralization for the targeting and cost-effectiveness of public expenditure. They find that for provision of a merit good available on competitive markets to the poor, decentralization dominates with respect to inter-community targeting and cost-effectiveness, though not necessarily for intra-community targeting. For the provision of infrastructure, decentralization dominates only if local governments are not vulnerable to capture, local government has adequate financing, inter-jurisdictional externalities do not exist, and local governments have all the bargaining power vs. public enterprise managers. This model can thus explain stylized facts (iii) and (iv), but not (i) or (ii).

And lastly Faguet (forthcoming) proposes a model of public investment in which local government can detect local needs more accurately than central government, but the center has a technical or organizational advantage (economy) in the provision of public services. In this system, a given district will be better off under central government when the center's cost advantage dominates its inaccuracy in ascertaining

local preferences; where inaccurate detection dominates, local provision is preferred.

This model can explain stylized fact (iii), and perhaps (i), but not (ii) nor (iv).

More generally this model – and many others – assumes that resource allocation is essentially a function of external parameters, and the differences between central and local government do not have to do with the structure of government and the processes by which decisions are taken. If central economies dominate, welfare will be maximized under central government as it disinterestedly distributes a bigger pie amongst districts according to its objective function, without regard to external considerations. But the evidence above implies that a more sophisticated approach is needed to explain the Bolivian experience. The fact that half of all Bolivian municipalities received no investment at all in the years before decentralization, even in sectors such as energy and transport where *a priori* we expect the center to have a cost advantage, suggests that policy is the product of a competition amongst interest groups, and that more complex institutional factors are at work than those proposed in most of these models.

This model builds a mechanism of political bargaining onto the simple framework of Faguet (forthcoming) in order to provide a more refined portrayal of the ways in which central and local governments interact. It assumes the same political-geographic context as Faguet, but diverges from it in the way it conceptualizes central government's problem. Here, central and local government are not mutually exclusive social planners with parametrically varying objective functions; rather both are immersed in a bargaining framework that explicitly models interactions between the two and permits Pareto-improving cooperation. The choice between centralization and decentralization concerns the way each interacts with the other. Specifically, under decentralization there is no policy cooperation between center and periphery, while under centralization mutually beneficial cooperation is possible but not assured.

Municipalities' allocation of public goods under centralization is the result of bargaining in a national legislature in which a district's representatives negotiate with central government officials, representing all other districts, in a zero-sum game⁹ centered on the public purse. This mimics real-world political horse-trading, where central government politicians bargain with local leaders for political support in exchange for commitments of public expenditure, locally-favorable policies, or other political rewards in the center's gift.

3.2 The Model

A country is made up of T districts, each with population n_j where subscript j denotes district. Local welfare is defined as median utility, $U_{mj} = x_{mj} + \theta_{mj}b(g_j)$, where θ_{mj} denotes local median preference for the public good g in district j , and x_{mj} is the median consumption of private good x in district j . The function of government is to provide public goods, which it finances with a local head tax. Central government has 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.¹⁰ Hence central government's unit price is lower than local government's for a given quality of output. Under central government each district has weight λ_j in the

⁹ The allocation of resources within central government is zero-sum, while the shift from local to central government is not.

¹⁰ 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.

national parliament where policy is made,¹¹ where $\lambda_j \geq 0$ and $\sum \lambda_j = T$.¹² Local government ascertains θ_{mj} accurately, whereas central government ascertains θ_{mj} with probability p and θ_{-mj} with probability $(1-p)$. Probability varies as $p \in [0,1]$, and θ_{-mj} is defined as an unrestricted value of θ other than θ_{mj} .

Each district j has a local government which coexists with central government, itself located in a particular district c . Under decentralization all local public goods are produced by local government, and the central government dedicates itself to other pursuits. These other pursuits may be thought of as “national public goods”, as in national defense, but they are extraneous to the model and not of concern here. Under decentralization, local government’s problem in district j is

$$\max_g \left[\theta_m b(g) - \frac{g}{n} \right] \quad (3)$$

where for simplicity I drop all subscripts j . Taking first-order conditions and rearranging yields

$$b'(g) = \frac{1}{n\theta_m} \quad (4)$$

The level of public good provided by local government is thus an implicit function of θ_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.

Under centralization, government takes on a cooperative form where the job of local government is to relay information on local needs to the center, while central government, with its cost advantage, produces public goods cheaply. Central

¹¹ In this framework policy is understood to mean the level of public good provided.

¹² Thus if central government gives a particular district, such as the capital, a large weighting, average $\lambda < 1$ for all the remaining districts in the country.

government then allocates public goods across districts.¹³ I assume that central government's cost advantage is an increasing function of the number of municipalities that cooperate with it, $\alpha=\alpha(t)$, $\alpha'>0$. This follows from the characterization of cost advantage α , which will tend to increase in t whether we think of it as an economy of scale, technical knowledge or organizational ability.

Under centralization, districts' locally-elected representatives bargain in a national legislature over the allocation of public goods. Central government's problem is represented by the Nash Maximand

$$\text{Max}(V_j - \underline{V}_j)^{\lambda_j} (V^* - \underline{V}^*)^{\lambda^*} \quad (5)$$

where V_j represents median utility in district j under central government's equilibrium allocation of g , and \underline{V}_j represents the district's outside option. The negotiation takes place between a given district, j , and central government representing the rest of the country.¹⁴ The outside option is simply district j 's median utility under the decentralized equilibrium allocation of g , V_j^D , minus the cost of transition, k_j , from a centralized to a decentralized regime. V^* is the sum of median utilities in the $T-1$ districts which comprise the rest of the country under centralization, and \underline{V}^* represents the sum of $T-1$ districts' outside options. λ^* is the sum of $T-1$ districts' political weights. That is to say,

¹³ This model is generally similar to Ostrom, *et. al.*'s (1993) polycentric model of government, where different public functions are allocated across hierarchical levels of government.

¹⁴ In practical terms, central and local government can be thought to negotiate over the head tax h_j which central government charges the residents of district j for the public goods it provides, where $\alpha g_j/n_j \leq h_j \leq g_j/n_j$. The center keeps the difference $(h_j - \alpha g_j/n_j)$ for itself.

$$V_j = (p\theta_{mj} + (1-p)\theta_{-mj})b(g_j) - \alpha(t)\frac{g_j}{n_j}$$

$$\underline{V}_j = V_j^D - k_j$$

$$V^* = \sum_1^{T-1} V_j, \quad \underline{V}^* = \sum_1^{T-1} \underline{V}_j, \quad \lambda^* = \sum_1^{T-1} \lambda_j \quad \text{and so on.}$$

Transition cost k can be thought of as the cost incurred in returning to local production of public goods, including attracting outside technical experts, training local officials, setting up the infrastructure and organizations necessary to provide and administer local services, and the like. I assume k is observable by both center and periphery. Central government's problem can thus be interpreted as a negotiation over how to divide the productive surplus from moving from local production to lower-cost central production of public goods. Note that Faguet's preference structure is retained here, folded into a bargaining structure.

Taking first-order conditions and re-arranging yields

$$\frac{(V_j - \underline{V}_j)}{(V^* - \underline{V}^*)} = \frac{\lambda_j}{\lambda^*} \frac{\partial V_j / \partial g_j}{\partial V^* / \partial g^*} \quad (6)$$

and

$$\frac{\partial V_j / \partial p}{\partial V^* / \partial p} = - \frac{\lambda^*}{\lambda_j} \frac{(V_j - \underline{V}_j)}{(V^* - \underline{V}^*)} \quad (7)$$

Equation (6) shows that district j and the rest of the country divide the surplus in proportion to their respective political weights and the marginal utility of the public good in each. Equation (7) states that the ratio of marginal utilities in district j and the rest of the country from increasing probability p is negative. Hence a unit increase in the probability that θ_{mj} is assessed correctly, which by definition must improve welfare in

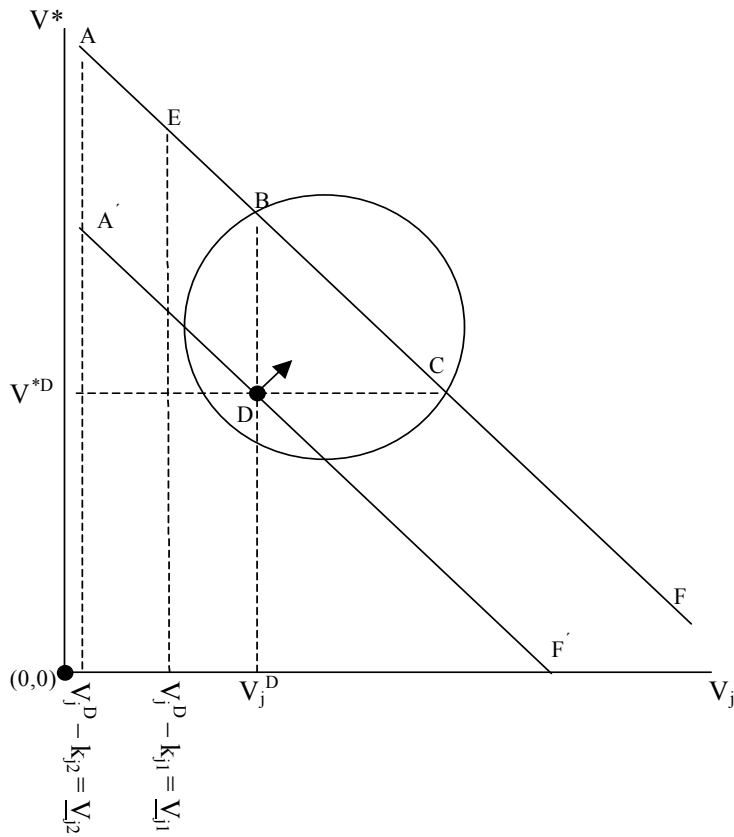
district j , must decrease welfare in the rest of the country – including district c where central government resides.

We can interpret this as an implicit cost of coordination which the center must incur to liaise with district j and use information on j 's preferences accurately. Doing so reduces the size of the surplus, providing the center with an incentive to mis-assess local preferences. Note that this is not an explicit assumption, but emerges from the structure of the model. Thus in the aggregate, taking account of multiple negotiations, the center will tend to provide a policy mix different to that preferred by the T districts. At this point the model can already explain stylized facts (i) and (iii) above – the shift in the sectoral composition of investment, and the increasing responsiveness to need.

Figure 6 illustrates equilibrium allocations under both centralized and decentralized regimes. For convenience I assume $\lambda_j = T/2$ and draw the welfare frontier as a straight line.¹⁵

¹⁵ If λ_j is allowed to vary, then lines $A'F'$ and AF become curves.

Figure 6: Centralized and Decentralized Equilibria (for $\lambda_j = T/2$)



Under decentralization, the equilibrium solution for district j and the rest of the country is located at point $D (V_j^D, V^{*D})$. The move from local to central provision generates a productive gain which shifts the welfare frontier (in terms of aggregate utility) out from $A'F'$ to AF . Note that the size of the welfare gain ($A'F' \rightarrow AF$) increases with central government's cost advantage and decreases with the cost of coordination. Triangle BCD northeast of point D contains all combinations of V_j and V^* that are Pareto-superior to (V_j^D, V^{*D}) . The two parties will negotiate over points in this triangle. Line segment BC represents feasible allocation sets that Pareto-dominate all other sets in BCD , including the decentralized optimum D . BC thus describes all of the solutions that can occur in equilibrium. As the graph illustrates, the number of admissible solutions is infinite. This is a product of the unstructured form that negotiation has taken thus far. Adding a

simple structure along the lines of a Nash bargaining game permits the reduction of an infinite set to an equilibrium that is unique.

A Nash Bargaining Game

Representing central government's problem as a Nash bargaining game permits the incorporation of a participation constraint for district j , which provides the key to solving the model. The game is structured so that the negotiation over dividing up the centralization surplus involves central government offering district j enough incentive to cooperate. Three facets of the model are salient. First, the fact that central government is located in a given district c implies that its employees live in c and benefit from the public goods available there. Second, centralized production implies that the residents of c appropriate any part of the productive surplus not allocated to other districts in the country. They hold *residual power* in this political system, a point to which we return below. Locating central government in a particular district ensures it is selfish. Third, the fact that $\alpha = \alpha(t)$ gives central government an incentive to induce as many districts as possible to cooperate. District j , meanwhile, seeks to improve upon its decentralized allocation V_j^D . This combination of incentives generates a game in which the center offers districts the minimum allocation necessary to ensure the cooperation of the largest number, thereby maximizing its own allocation of public goods.

Bargaining takes the form of a repeated four-period, single-offer game.

Negotiations between central government and all districts j occur simultaneously. In a negotiation with any given district j , central government represents all $T-1$ remaining districts. The four periods simulate a typical electoral cycle. Centralizing agreements take effect with a lag of one period. Defection from central to local government,

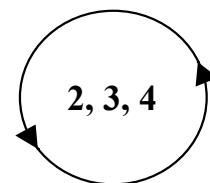
however, can take place within a single period.¹⁶ Districts know the number of periods between elections, and form their expectations about the next period's allocation based on current and past allocations. The structure of the game is as follows:

steps **Origination**

0. The game originates.
1. Central government invites all decentralized districts j to join the “club” of centralized provision of public goods, and offers to allocate g_j . The offer will only take effect in the following period.
2. Decentralized districts j accept or reject the offer.

Periods 1 to 4

3. Central government allocates g to all cooperating districts. Local government allocates g to all non-cooperating districts. All districts under both regimes observe their allocations and all V_j 's are realized.
4. Districts under central government choose to remain or defect to local government based on their centralized allocation of public good g . In districts under local government the decentralized equilibrium persists.
5. Steps (3) and (4) repeat during periods 2, 3, and 4.
6. The game repeats from step (1).



The first three periods consist of decisions over allocation and cooperation/defection, with central government making new offers at the end of period four. As the game is symmetric for all districts j , if one district chooses cooperation then all do, and if one district chooses decentralized provision then all do. The fact that central government makes the offer gives it a structural advantage which appears to be realistic and in keeping with stylized facts from around the world (see discussion below). But it is important to note that district j has a significant advantage too – its ability to

¹⁶ Negotiation and coordination amongst numerous districts is assumed to take longer than a unilateral decision to return to local production of public goods. This has the effect of increasing district j 's bargaining power compared to central government.

break agreement unilaterally at any time. Between these two aspects of the model the latter would seem to be less realistic, making the model biased somewhat in favor of the periphery.

With Credible Commitment

I initially assume that central government can credibly commit to g_j from the outset of the game. The solution to this problem is a standard result in game theory.

Proposition 1: *If $k_j = 0$, $V_j = V_j^D = \underline{V}_j$. The center appropriates the entire efficiency gain from centralization.*

This is easily proven: District j has no incentive to accept a lower allocation than it receives under decentralization, and thus its payoff space has lower bound V_j^D .¹⁷ Central government has no incentive to offer more than the $V_j^D + \varepsilon$ necessary to obtain j 's agreement. Equilibrium thus occurs at point B in figure 6.

Allowing k_j to take on nonzero values increases central government's bargaining power at the expense of j . At cost k_{j1} , the default allocation set $(\underline{V}_j, \underline{V}^*)$ shifts leftwards, suggesting an equilibrium at E. With high cost k_{j2} , $k_{j2} > k_{j1}$, the implied equilibrium shifts back to A, with j 's welfare close to the origin. But j will not accept offers at A and E, as both are below V_j^D . Central government must offer a level of g_j such that $V_j \geq V_j^D$ in order to secure the agreement of j , and we return to point B on figure 6.¹⁸ The result implies that district j can never improve on its decentralized optimum, V_j^D , despite the center's cost advantage in service provision, credible commitment, and the possibility of

¹⁷ For ease of expression, I refer hereafter to g and V interchangeably as the *allocation* received under central or local government, although in strict terms g refers to the allocation and V to the resulting welfare.

¹⁸ Note that this may entail a lower level of g_j than under decentralization, as the unit cost of g may now be lower.

accurate preference assessment by the center. Only district c can improve its welfare under central government. The presence of credible commitment, however, does keep j 's welfare from falling below V_j^D despite non-zero transition costs.

With Limited Commitment

Suspending the assumption of credible commitment changes the problem significantly. If commitment is completely absent and all parties know this *ex ante*, cooperation will be impossible as individual districts' expected allocation will be less under self-interested central government than under decentralization. Local government will prevail. Under different types of limited commitment, however, central government is possible.

The concept of limited commitment is problematic, however, as different limitations may inherently conflict with the very concept of a commitment that is credible. Commitment with uncertainty, where the center commits to an agreed allocation of public goods which it can provide only with a given probability, is one such example.¹⁹ More generally, any form of limited commitment where the object of the commitment – in this case a level of g_j – cannot be fully specified in advance should not be regarded as a commitment in the formal sense. I focus instead on commitment that is limited in time rather than in kind. For the sake of simplicity I examine commitment limited to one period in a multi-period game. Such commitment is both credible and specifiable, but limited in that parties may only make promises about outcomes one period in advance. This has practical relevance to the extent that it mimics negotiation in an uncertain political climate with shifting alliances. Other, more sophisticated forms of

¹⁹ Following the earlier example, we can give this the form $(\pi g_j + (1-\pi)g_{-j})$, where g_{-j} is some level of g other than g_j and π is a probability, $\pi \in [0,1]$.

limiting commitment are possible, but for the sake of brevity I do not consider them here.

Proposition 2: *The equilibrium solution to the repeated Nash game with limited commitment is for central government to offer district j an allocation such that $V_j = V_j^D + 1^5/6k_j$ in period one, $V_j = V_j^D - 1/3k_j$ in period two, $V_j = V_j^D - 1/2k_j$ in period three, and $\underline{V}_j = V_j^D - k_j$ in period four.*

The proof is as follows, and is illustrated in figure 7a below. The game occurs over four-period cycles where agreement is implemented in period one, and negotiations are conducted over the following cycle in period four.²⁰ Periods one to four thus represent the continuing sequence of plays where a stable equilibrium may be found. Analyze the sequence of plays in reverse, beginning with period four, for a repeated-game equilibrium. Once central government is implemented, j will defect if $V_j < \underline{V}_j$, as by defecting it can achieve \underline{V}_j immediately and V_j^D thereafter. Hence central government will offer $\underline{V}_j = V_j^D - k_j$ in period four. In period three, however, the center must offer $V_j > \underline{V}_j$, as an allocation of \underline{V}_j in period three implies the same in period four and j is better off defecting. Its decision to cooperate or defect can be characterized as $2V_j = 2V_j^D - k_j$, and the center must offer at least $V_j = V_j^D - 1/2k_j$ for j to cooperate. The offers for periods two and one are derived by the same logic.²¹

Limiting commitment in this way thus alters the stream of allocations that district j obtains from central government from an even pattern to one where public goods are

²⁰ I consider this feature realistic, but the results are not sensitive to it.

²¹ This is easily derived by equating $4V_j^D$ to the stream of centralized allocations.

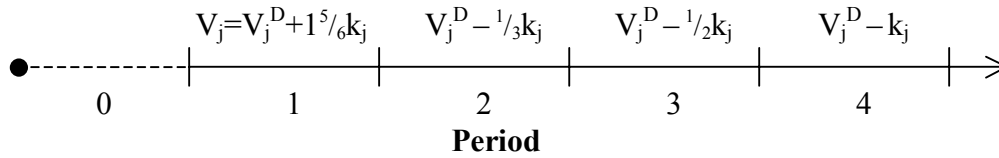
front-loaded in the first period and then decrease steadily through the cycle.²² Aggregate welfare over the cycle is equal to that under local government, as well as that under central government with credible commitment. But the temporal distribution changes significantly. The experience of Bolivian municipalities under centralization, most of which saw investment levels vary wildly from large sums down to nothing, supports this result. Once again, district j cannot improve on its decentralized optimum despite the center's cost advantage and the ability to elicit accurate information on preferences, and only district c gains from centralization. But the presence of limited commitment once again keeps j 's welfare from falling below $4V_j^D$ over the cycle. Note that V_j rises with the cost of transition, leaving less for central government to appropriate for itself. Note also that the solution's parameters depend on the periodicity of the game, and that extending or compressing its temporal structure will increase or decrease equilibrium allocations accordingly.

²² Investment flows varying predictably with the electoral cycle mirrors the political business cycle literature (*e.g.* Alesina and Roubini (1992)), although derived from a different starting point.

Figure 7

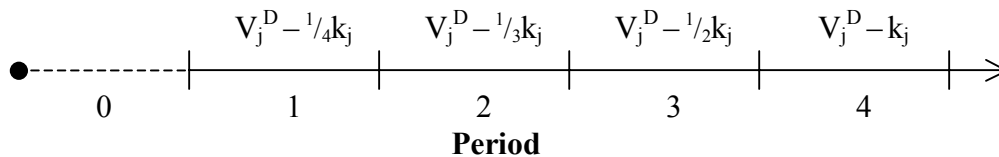
(a) With Limited Commitment

Allocation (in welfare terms)



(b) Without Commitment

Allocation (in welfare terms)



When the Center Can Renege

In many countries the question of central government submitting itself to an enforceable commitment, even a limited one, may be quite unrealistic. By definition, the transition from local to central government involves not just a change in fiscal regime but a fundamental change in the allocation of political power. Whereas before centralization the residents of j administered their own affairs, afterwards it is the central government that holds political power and administers resources on their behalf. They are the government, they make decisions, they uphold rules as they see fit. In countries where the legal and constitutional instruments for enforcing the center's commitment are not available to counterbalance the pure political power of the center, making an *ex ante* commitment on allocation bundles which central government is bound to honor may not be possible. Where checks and balances are weak, central government will have every incentive and complete liberty *ex post* to renege on its promise and increase its own allocation, and will face no sanction for doing so.

Proposition 3: *Where central government can renege on its commitment, district j's allocation over the four-period cycle will be such that $\Sigma V_j = 4V_j^D - 2^{1/2}k_j$. Districts will be worse off under centralization than under decentralization.*

The proof is straightforward. Once district j has joined central government in such a setting, we can expect the allocation in period one to fall to $V_j = V_j^D - 1/4k_j$, with allocations in periods two to four remaining the same as before (see figure 7b). Under the logic explained above, district j will have no incentive to defect from centralization in any given period, but the center can renege on any offers of front-loaded benefits. Hence in a context of a strong central government and weak countervailing powers brought about by a weak legal and institutional framework, self-interested central government will systematically under-invest in public goods in non-central districts by an amount that depends on transition cost k.

But this outcome depends on the center essentially fooling district j, convincing it to join central government and incur potential cost k in the absence of guarantees that the agreed V_j will be provided. Why would localities agree to such a game? I note first that district j will not agree to such a game if accurately characterized *ex ante*. That it finds itself in such a situation is a product of the center changing the rules in mid-game, or its own ignorance or mistake. But whatever the cause, assume path dependency obtains and in a given period district j finds itself in the midst of an inherited, welfare-inferior centralization scheme. The question then becomes: why does the equilibrium persist?

With the payoff structure of figure 7b, j has no incentive in a given period to return to decentralization as its welfare will immediately fall in that period. Over several periods, of course, a short-term loss will lead to a long-term gain, and j should defect. But timing may be crucial. Elected officials in j – those responsible for the decision to defect – face a short time horizon given by the electoral cycle, and may have too high a

discount rate to incur the cost of a transition which will mainly benefit future politicians. If their electoral cycle does not coincide with that of central government, they might prefer to wait for a general election in the hope of faring better under new leadership. Or they may take time to settle into office and comprehend their situation – and as the payoff to defection declines over time, they may not be ready to make such a decision until it is no longer worthwhile.

External factors may also intervene. Defection may be perceived as less prestigious than remaining in central government, and might leave elected officials open to charges of political weakness, poor negotiation skills, etc. Lastly, the center may offer local leaders opportunities for graft, future allocations of public goods, or other benefits if they cooperate. These possibilities are all beyond the confines of the model, and some violate its assumption of rationality. I will not pursue them further except to indicate that when surveying countries' fiscal arrangements, a number of complex factors may help explain the persistence of low centralized equilibria when districts would be better off decentralizing.

4. Conclusions

This paper differs from most of the literature on decentralization in the way that it conceptualizes the role of central government. Analytical models of decentralization typically treat central government as either an enlightened social planner (Oates, 1972), or a neutral forum in which the representatives of different localities vote (Pande, 1999) or bargain (Besley and Coate, 1999) over policy choices. Here we treat central government as an independent political actor in its own right, with its own constituency, bureaucratic interests and policy goals. Such an approach is common in the political science and public choice literatures on bureaucratic (budgetary) maximization (see

especially Niskanen (1971) and Tullock (1965)), but has been ignored in the economic literature on decentralization.

The model shows that in a framework of legislative bargaining, where central government can provide public services more cheaply than local government and has access to accurate information on local preferences, districts on the periphery can never improve upon their decentralized allocations even when credible commitment is possible. And without commitment districts are worse off under centralization as the center hoards the resource pool.

By modeling central government as an independent actor analytically distinct from local governments, with a privileged constituency and its own incentives and bureaucratic interests, the model can explain the four key stylized facts of decentralization in Bolivia. The first of these, significant changes in the sectoral composition of investment, occurs because the center has different preferences from the periphery, and – moreover – can increase its own welfare by failing to ascertain the sorts of investment that the periphery prefers. This comes out of the structure of the model, and can be interpreted as the straightforward result of differing spatial preferences in a political context of competition over resources. If large construction companies and oil & gas firms are based in the capital, for example, the center will naturally prefer resource-rich transport and energy projects to health and education, regardless of where the latter are physically located.²³

²³ This is obviously a simplification of how central government works. A more nuanced view would begin recognizing that it is not the residents of the capital *per se*, but those interests able to organize and place representatives in the capital that benefit disproportionately. Faguet (2001) provides a more sophisticated model along these lines.

The second stylized fact – severe inequality in the geographic concentration of investment, including the complete abandonment of half the country’s municipalities – can be explained by the center’s preference for accumulating resources in the capital in a context where few other districts have significant political weight. Over time, the cumulative effect of both types of choices will be a concentration of wealth and infrastructure in a small number of places at the expense of everywhere else. Widespread regressiveness in terms of need and wealth logically follow, hence stylized facts (iii) and (iv).

Now return for a moment to the broader decentralization debate. As noted above, the policy discussion continues to wander fruitlessly along paths that are both well-trodden and confused. There is no resolution in large part because both concepts – centralization and decentralization – are unstable in the literature. Hence the dozens of studies that begin with multiple definitions of “decentralization”, inevitably including under the same rubric such disparate phenomena as devolution, delegation, deconcentration and privatization (*e.g.* Rondinelli *et.al.* 1984; Ostrom *et.al.* 1993). These four concepts – to go no further – are fundamentally different, and to treat them as synonymous drains the term “decentralization” of any useful meaning. The resulting conflation of data from dissimilar social experiments leads inevitably to indeterminate, contradictory evidence such as that which fills most of our literature. This goes a long way towards explaining why scores of decentralization studies have yielded so little knowledge about what it can and cannot achieve.

It is here that the most important contribution of this paper lies: in its characterization of centralized and decentralized government, and the fundamental difference between the two. As conceived in the model, the key difference between the two regimes is the question of *residual power*. In the spirit of Alchian and Demsetz

(1972), Hart (1995), Williamson (1995) and others, residual power here refers to authority over all resources which are not explicitly allocated. In a democratic system, many public resources will be explicitly allocated to particular uses and places as a result of political negotiation (legislative bargaining above). Those with authority to dispose freely of all remaining resources hold residual power. The key question of decentralization is thus where residual power lies.

Decentralization can accordingly be defined as the division of the national resource pool amongst a country's subnational districts, and the allocation of residual powers to independent and accountable governments in each. Residual power is spread throughout the system, even if resources are distributed unevenly. By contrast, the definition of centralization is that both resources and residual power are consolidated into national-level aggregates. This vastly increases the premium to holding residual power, and vastly increases the bargaining power of the district where it lies. In this context it is not surprising that the capital in a centralized system will benefit disproportionately from the division of the pie. This simple fact explains three of the four main results of decentralization in Bolivia; the fourth, needs-responsiveness, falls neatly out of the model.

The lesson that emerges is a simple one: residual power must lie in the periphery in order for a system to be decentralized. Where this is not the case, the country in question is not decentralized and should not be studied as if it were. This is true regardless of whether it has been deconcentrated, delegated, privatized, or any of a number of other categories that fill the public management taxonomy.

Lastly, the most interesting results that emerge from the model hinge upon the question of credible commitment. In the real world, the mechanisms used and the degrees of commitment achieved appear to vary greatly across countries. In countries

without a strong and independent judiciary, where the constitution does not protect districts, and/or where institutions are too weak to oppose the political will of the executive, the model would predict resource accumulation in the capital, with considerably less accruing to the periphery. Nigeria, Mexico, Egypt, Thailand, and until recently Bolivia would seem to be a few examples. Elsewhere, however, the mechanisms of government seem designed to produce a different outcome. In Europe for example, regional aid and structural funds are explicitly designed to favor poorer countries and regions, which on the whole receive more EU funds than they pay in. Indeed, the fact that European integration is advancing slowly, within the framework of institutions where national interests are finely balanced and an elaborate set of side agreements and opt-outs exist, suggests that nations are aware of the danger of central confiscation and keen to avert it. Similar claims can be made for the distribution of federal funds among US states and German *länder*, where the rights and privileges of states and *länder* are enshrined in law and safeguarded by the constitution.

The fact that all three of these examples are federations of strong regions with comparatively weak centers, and the previous examples are the opposite, suggests that a robust legal and institutional framework can help to protect the power of the periphery against central encroachment. The unification of Germany and attendant relocation of the capital to Berlin could be seen in this context as a social experiment, a tug-of-war between an entrenched framework favoring the regions and an ascendant “new” capital which unites the economic, cultural and social elite of the nation. A number of past and present wars may also be understood in this light. The North and South American wars of independence, wars of decolonization, the US Civil War, and the recent wars of Yugoslav disintegration, may be viewed to varying degrees as violent attempts by

regions to throw off the yoke of central governments that ignore their preferences and expropriate their resources.

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