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## Expenditure Decentralization and the Delivery of Public Services in Developing Countries

Pranab Bardhan
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Boston University

December 1998

# Department of Economics

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# Expenditure Decentralization and the Delivery of Public Services in Developing Countries

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Key words: capture, centralized bureaucracy, corruption, decentralization, local governments, poverty alleviation, targeting

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## Abstract

This two-part paper provides a theoretical framework for appraising trade-offs between alternative methods of delegating authority over the delivery of public services, on the targeting and cost-effectiveness of public spending programs in developing countries. Authority over these programs has to be delegated owing to absence of information at the central level concerning local needs and costs of specific communities. In a top-down *centralized* system, this authority is delegated to bureaucrats by a central government that has limited ability to monitor their performance with respect to either service delivery or cost control. In a *decentralized* system, it is allocated instead to elected local governments or client groups, which may be subject to capture by local elites. Both systems are thus prone to local corruption and lack of accountability.

Part 1 of the paper studies the relevant tradeoffs in the context of a poverty alleviation program, whose aim is to deliver a private merit good available on competitive markets to the poor. Decentralization generally dominates with respect to inter-community targeting as well as cost-effectiveness. However, the ranking of intracommunity targeting under the two systems is ambiguous, and depends on the relative degree of capture that local and national governments are prone to, besides the nature of uncertainty and preferences of the good by the nonpoor.

Part 2 of the paper considers an infrastructure service provided by a public enterprise which has a natural monopoly. In this context it is shown that decentralization dominates if the following four conditions are satisfied: (i) local governments are not vulnerable to capture; (ii) local governments have access to adequate local financing sources; (iii) there are no interjurisdictional externalities in service provision; and (iv) local governments have all the bargaining power and access to relevant cost information vis-à-vis public enterprise managers. Absent any one of these institutional conditions, however, decentralization may perform worse than centralization. The Appendix develops a model of electoral competition (adapted from Grossman-Helpman (1996)) where parties are prone to capture by special interest groups, which helps identify some of the institutional determinants of the degree of capture of local and central governments.



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# Introduction

Public programs in infrastructure and social services throughout developing countries have been beset by problems of wastage and corruption. These are manifest in the form of inappropriate project choice, high rates of leakages incurred in the process of delivery of relevant goods and services, and poor targeting.[1] This has detracted from the ability of governments or external aid donors from achieving reductions in poverty and promoting growth through public supply of essential productive inputs. While empirical studies indicate that there is some positive link between outlays on such programs, and the level of benefits that trickle down to intended beneficiaries, they also indicate that this link is weak, with abnormally high leakage rates. To some extent these problems stem from lack of coordination or management skills among implementing agencies, inability to gauge local need, or absence of systematic cost-benefit analysis in implementation. But it is undeniable that corruption and malfeasance also play a large role. Government planners, development administrators and economists have traditionally devoted little attention to the design of incentive aspects of delivery mechanisms. In part this is due to the implicit assumption that bureaucrats delegated responsibly for implementing these programs would behave honestly, an assumption which is increasingly suspect in the face of mounting evidence of large amounts of corruption. Given that such bureaucrats were appointed by central governments that were sufficiently far removed from local conditions to be unable to monitor their performance, it is not surprising that centralized delivery systems have been characterized by insufficient accountability.

This problem — as well as a potential solution — is graphically illustrated by Robert Wade (1997) in his comparative case study of the modes of operation of irrigation bureaucracies in India and Korea. Wade's study suggests that limited accountability and associated corruption of the bureaucracy was the key problem in India, owing largely to its overcentralized top-down structure with rules designed to minimize identification between

[1] For some examples see Bardhan (1996a), Besley (1989), Besley and Kanbur (1993), Dreze and Saran (1995), Grosh (1991, 1995), van de Walle and Nead (1995), and the 1990 and 1997 World Development Reports. Lipton and Ravallion (1995) survey some of the empirical evidence.

the irrigation officials and the local farmers. Other exacerbating factors in the Indian context included its special topography which increased the distance between local patrollers and higher level officers, and a poor communication system that inhibited effective supervision. In Korea, construction was functionally separated from operations and maintenance; responsibility for the latter was assigned to local organizations. Officials responsible for delivering irrigation services were local part-time farmers, accountable principally to local village people, that were better able to monitor their performance. This — as well as a more favorable topography, closer supervision, and superior communications systems within the bureaucracy — created a more effective delivery mechanism in Korea.[2]

Increasing decentralization of authority over public spending programs to local governments has recently become a world-wide trend. Accordingly it is a serious policy option for many countries that are still characterized by traditional top-down delivery systems. Despite the numerous advantages (largely flowing from better accountability to the intended beneficiaries of the spending programs), there are many that are critical of this trend, arguing that decentralization gives rise to a number of ancillary problems. These include problems of coordination and equity across jurisdictions, limited exploitation of economies of scale, and weak governance mechanisms at the local level. Clearly there are numerous trade-offs involved.[3] These need to be assessed in order to appreciate the potential pitfalls of decentralization, to predict the circumstances under which decentralization will indeed improve matters, and to understand how such decentralization initiatives ought to be designed by policy makers.

The literature on fiscal decentralization in the context of developed countries — see, for example, Oates (1972), Inman and Rubinfeld (1996), and Besley and Coate (1998) [4] — stresses the trade-off between increased flexibility of public programs with respect to local conditions, and problems of interjurisdictional coordination. This literature views the

[2]Korea, unlike India, did not have a democratic political regime or free press at the time of the Wade study. There is thus no one-to-one relationship between the strength of democracy at the national political level and that of institutions of accountability at the local level.

[3]For a discussion of the trade-offs on a general level, see Bardhan (1996b).

[4]See also the symposium on Fiscal Federalism in the *Journal of Economic Perspectives*, Fall 1997.

problem with centralized systems as excessive standardization, i.e., lack of flexibility with respect to local conditions. Decentralization of authority to local governments enhances flexibility, at the cost of lack of coordination across jurisdictions. In these theories, problems of accountability in delivery mechanisms do not play an important role; the relevant issue is allocation of taxing and spending authority between central and local legislatures. Moreover, the standardization inherent in centralization is assumed, rather than explained from basic principles (with the exception of Seabright (1996), who adopts an incomplete contracting approach to the problem of allocating power).

The classic *ex post* case for decentralization, to use the interpretation of Cremer, Estache, and Seabright (1995), was made by Tiebout (1956): in the latter model population mobility reinforces *ex post* the *ex ante* case of the preceding paragraph based on superior information or flexibility of local government. Consumers vote with their feet and move to regions which provide them with what they want in terms of public services and taxes. The post-Tiebout literature has paid some attention to the limitations of the Tiebout model in terms of imperfections of markets and of political processes. These problems are particularly acute in poor countries: the assumption of mobility of fully informed citizens in search of a perfect match between their preferences and public services is inapplicable in many cases. The public goods in question are much too often site-specific; excluding outsiders from using them is not that difficult, especially in rural areas.

The purpose of this paper is to develop some stylized models that focus instead on the local accountability issue, which seems more germane to developing country contexts.[5] We do not focus on the allocation of taxing authority between central and local governments at all. The key issue is the effect of delegating authority over the delivery of public expenditures to local governments rather than centrally appointed bureaucrats. Indeed, both taxing and expenditure levels may be determined at the central level. The question

[5]Seabright (1996) also examines the issue of accountability, in an incomplete contracting framework, in which each region's welfare is observable (by local citizens) but non-verifiable (by outsiders). This implies that there is no way to reward or punish a government for its performance except by deciding whether or not to elect it. Under decentralization, a region will be able to choose to elect or reject a government at election time purely according to its own view of the government's performance. This has an incentive effect on the government to act in the interests of a region, thus promoting accountability.

is whether bureaucrats or technocrats that are essential to the procurement and delivery process, should be appointed and supervised by local rather than central governments. Or whether local governments rather than bureaucrats should be responsible for key decisions concerning procurement or allocation at the local level.

The origin of the incentive problem in the centralized bureaucracy is the limited ability of central governments to monitor the performance of bureaucrats, owing to costs of communication and supervision, superior information held by bureaucrats concerning delivery costs and local needs, and the conflict of interest between corrupt bureaucrats and elected politicians.[6] We take it as given that it is not possible for the central government to collect detailed local information necessary to overcome these incentive problems.[7] The reason may lie in a variety of factors especially relevant in developing countries: poor communication systems, weak accounting systems, high levels of collusion between inspectors and bureaucrats, and limited administrative capacity of the government to process information concerning local conditions.[8] In this paper we shall consider the extreme scenario where there is absolutely no monitoring or incentive provision for bureaucrats at all, despite which the centralized system will turn out to deliver to the poor to some degree. In practice, of course, monitoring and incentive systems within the bureaucracy will reinforce

[6]See Banerjee (1997) for a related theory of misgovernance in developing countries.

[7]We therefore use the analytical framework of mechanism design theory, subject to exogenous restrictions on the flow of information to the center, motivated either by communication costs or limits on the complexity of the mechanism. These restrictions imply that the Revelation Principle ceases to apply: it is not the case that centralized mechanisms can always be designed to mimic the outcome of any decentralized mechanism. Trade-offs then appear between centralized and decentralized systems: the latter are more flexible with respect to local information, but are subject to a loss of control by the center, as local authority can be abused. For related analyses in the setting of the internal organization of profit-maximizing private firms, see Green and Laffont (1986, 1987), Melumad, Mookherjee and Reichelstein (1990, 1992, 1997), and Laffont and Martimort (1998).

[8]These factors are stressed by Wade in his comparison of the Korean and Indian bureaucracies. Laffont (1994) argues for price-cap forms of regulation rather than rate-of-return regulation for private utilities in developing countries, largely on the basis of weaknesses in their accounting systems. Mookherjee (1998a, 1998b) provides a more general elaboration of weaknesses of information systems within the government sector in developing countries.

this tendency.[9]

The presence of corruption leads to three kinds of potential problems in the delivery mechanism: *cost effectiveness*, *intra-community targeting* and *intercommunity targeting.* Cost-effectiveness refers to the tendency of bureaucrats to overstate or pad costs, thereby reducing the scale of services delivered out of a given budget. Intra-community targeting concerns the allocation of the service across different socio-economic groups *within* any given community. Inter-community targeting pertains to the way that expenditure allotments to different communities are responsive to differential need and cost conditions across such communities. Alternatively, it also refers to the way that the allotment to any given community responds to changes in local cost or need parameters over time, i.e., aspects of group insurance.

In this paper we focus on two different kinds of public programs, both of which are beset by these problems in varying degrees. The first is a purely redistributive poverty alleviation program which seeks to allocate an essential private good available on competitive markets — such as food, medicines, drinking water or housing — to the poor, financed out of central revenues. A model which focuses on this is presented in Part 1 of the paper. The problem with a centralized bureaucracy is their incentive to pad costs and divert supplies to the nonpoor by selling the good on the black market. On the other hand the problem with a local government mechanism is that this government may be prone to 'capture' by the local wealthy, who seek to appropriate the lion's share of local supply. Expenditure allocation across different communities under either system is made by the central government, which is also prone to capture. The decentralized mechanism is more cost-effective than the bureaucratic regime, while neither mechanism manages to achieve any degree of intercommunity targeting.

In contrast, the nature of intracommunity targeting turns out to be qualitatively distinct between the two mechanisms. Under a centralized bureaucracy the good is always

[9]Our model abstracts from the latter for the sake of simplicity. We therefore focus on just one possible explanation for why the centralized system does deliver to some degree. However, as we explain in more detail in Part 1, the main qualitative conclusions are unlikely to be significantly altered in a number of plausible alternative variants.

diverted on a priority basis to the nonpoor, owing to their willingness to pay bribes, with residuals above the market demand of the nonpoor being allocated to the poor. Whereas under decentralization the targeting pattern is more complicated: upto some level of service only the poor are served, following which the nonpoor get served upto their market demand, with sharing between the two groups thereafter. Hence the decentralized system targets the poor better when the scale of the program is small, but could perform worse than the centralized system at larger scales. The welfare ranking of the two systems is correspondingly ambiguous, in general. The greater the degree of uncertainty of costs, for instance, the balance shifts in favor of the decentralized system, owing to its superior cost-effectiveness. The greater the extent to which local governments are prone to capture, on the other hand, the worse the performance of the decentralized system tends to be. If local capture is sufficiently strong, relative to capture at the national level, the decentralized regime can be worse than the centralized one. We explore some special cases in which detailed comparisons can be carried out. In one case there is no uncertainty in local cost or need: there it turns out that the decentralized system dominates even if local capture is greater than at the national level, provided the discrepancy is not too extreme. In the other case the demand of the nonpoor is deterministic and independent of the price — as with goods like schooling or health care where satiation sets in for the well-to-do. There the decentralized system universally dominates the centralized system, irrespective of political distortions or underlying uncertainties. In this context, therefore, decentralization does promote accountability.

These results also suggest the need to explore the underlying determinants of capture at local and national levels. In the Appendix we develop a simple model (adapted from Grossman and Helpman (1996)) of electoral competition between parties whose policy platforms are influenced by campaign contributions from a lobby representing the interests of the nonpoor. The policies of the competing parties trade off the need to secure the votes of the informed poor, with the need to raise funds that help mobilize uninformed voters. The model helps identify some of the features that determine the level of capture: lack of effective political competition, the regularity and fairness with which elections are conducted, the number of competing parties, the fraction of voters of different classes that are informed,

and the sensitivity of uninformed voters to mobilization efforts of political parties. Increased asset and income inequality can therefore result in greater degrees of capture, by lowering the overall fraction of voters that are informed, and limiting the political participation of the poor. Taken together with the results of Section 2, this suggests that decentralization initiatives are more likely to succeed when accompanied by political reforms that enhance local democracy, and land reforms that reduce asset inequality.[10]

The second part of the paper considers a different kind of public program: delivery of a private service whose production is subject to large fixed costs and (possibly) overall capacity constraints, such as electricity, irrigation or telecommunication. We assume there are two categories of users of these services: small and large farmers, with the latter placing a higher valuation on the service. Resale is not possible, and there are no competitive private markets that form an alternative supply source. Bureaucrats in a centralized system then have monopoly over the supply of the services, and accordingly have an incentive to demand discriminatory bribes from the two kinds of users. In the absence of monitoring or incentive mechanisms within the bureaucracy, they end up behaving much like a private unregulated monopoly supplier. The welfare losses then include both losses in efficiency (arising from undersupply of the resource to small farmers) and in distribution (since bribe incomes of bureaucrats typically receive a lower welfare weight than the welfare of users).

Decentralization of authority over procurement and intracommunity allocation to local governments, on the other hand, is subject to a variety of alternative problems, described below. Absent all of these, it is unambiguously superior to the centralized regime. What we show is that *if any one of these conditions do not hold*, then it is possible for decentralization to result in inferior outcomes.

First is the problem of *local capture*: analogous to the context of the poverty alleviation program, large farmers will attempt to skew the allocation of the service to themselves at the expense of local farmers. Suppose that local governments do have the authority and ability to finance the service delivery from local revenue sources or user fees. Then

[10]The Appendix also speculates on some of the factors that affect relative degrees of capture at the national and local levels, that deserve to be studied in future research.

the result is that small farmers are delivered the efficient level of the service, while the large farmers tend to be *over*-provided. The result is an expansion of service level to both categories, accompanied by underpricing of the service to large farmers, while the small farmers get overcharged. The welfare implications (relative to centralization) depend on the precise scope of revenue raising powers of the local government. If it had the ability to levy coercive taxes on small farmers at moderate deadweight cost, it would seek to make them bear the entire burden of financing the program. In that case the greater the extent of local capture, the greater the extent of cross-subsidization and over-delivery to large farmers. For capture levels sufficiently high, welfare (both of small farmers and of the overall community) is lower compared with the centralized regime. These problems are substantially ameliorated, however, if the local government has no ability to levy local taxes, and the service is financed instead by user fees. Then neither group is rendered worse off as a result of decentralization, and increasing capture has no implication at all on the nature of the resulting allocation. Local financing constraints then serve a useful purpose in protecting unorganized groups from being expropriated by local governments, and limit the inefficiencies associated with overprovision to organized interest groups.

In many contexts the nature of *local financing constraints* are even sharper: local governments or user groups lack local revenue raising capacity, whether in the form of local income or property taxes, or user fees. Local procurement must then be funded by fiscal grants from the central government. This has important implications for the nature of intercommunity targeting. To illustrate this problem in isolation, we abstract from local capture considerations. Each local government in pursuing the welfare of its own residents is motivated to maximize grants received from the center, which are funded out of central taxes imposed on all communities. This gives rise to a free-rider problem among communities. The optimal system of intergovernmental grants involves non-tied grants that are not conditioned on local need or cost. This nevertheless provides a measure of intercommunity targeting, since local governments have the option of not spending all of their grants on the the specified service, when their collective need for it is low. But when local need crosses a certain threshold, this flexibility disappears, as the community's aggregate purchase of the service runs up against the local government's budget constraint. The greater the fis-

cal constraints at the center, therefore, the stronger these budgetary constraints on local governments, and the poorer the degree of intercommunity targeting achieved by the decentralized system. In contrast, service delivery under the centralized system is less affected by fiscal constraints. We show that if the fiscal constraints on the central government are sufficiently great, the resulting weaknesses in intercommunity targeting cause the decentralized system to generate lower welfare than the centralized system. Interestingly, this flexibility can be restored if local governments are able to finance the program by user fees, a mechanism which we also noted above helps protect against the dangers of excessive local capture as well.

A third potential problem with decentralization stems from interjurisdictional externalities, arising for instance from *aggregate capacity constraints* on supply to disparate communities. Then different local governments compete with each other for the service while procuring from a common public enterprise that produces or delivers the resource. This competition can result in dissipation of rents: the communities end up tranferring much of their surplus to the public enterprise, which augments the budgetary slack enjoyed by bureaucrats managing the enterprise. This rent dissipation can be avoided if suitable mechanisms for governing interjurisdictional conflict over the common resource are set up, either by the central government or collectively by the local governments themselves.

Finally, if *the allocation of bargaining power and cost information* are skewed in favor of bureaucrats (responsible for production or delivery from the public enterprise) against local governments, then the effective cost of the service and surplus appropriated by bureaucrats may end up higher under decentralization. These have to be offset against the undersupply and rent appropriation by bureaucrats in the centralized regime. The balance between these depend on the relative strength of two different kinds of informational asymmetries: their monopoly over production and cost information versus their lack of knowledge of valuations of individual users.

We conclude, therefore, that transfer of authority over the implementation of public service programs to local governments is no *panacea* for the problems of limited accountability of centralized bureaucracies. In order to be successful, expenditure decentralization requires

appropriate political as well as economic institutions, that insulate it from the dangers of excessive capture of local governments by rural elites, allow community allocations to be sensitive to local need and cost, resolve interjurisdictional conflict over shared resources, and allocate bargaining power and information suitably between local governments and bureaucrats. Absent any of these institutional prerequisites, problems of cost-effectiveness and inappropriate targeting may simply be exacerbated. Whether and to what extent these actually happen is an empirical question, which future research should address.

# 1 A Poverty Alleviation Program

There are $m$ communities $i = 1, 2, ....$ Community $i$ has $N_i$ members, and is comprised of two classes: the poor and nonpoor.[11] Let the proportion of poor in community $i$ be denoted $\beta_i$. There are two goods: a consumption good, and money. A member of class $k(= p, n)$ in community $i$ has a utility function $v_k(y; \eta_i) + x$ defined over external supply (or purchase) $y$ of the good to (by) that person, and $x$, money left over after paying for purchases of this good. The function $v_k$ is smooth, strictly increasing and concave in $y$. Moreover, the good — like milk, drinking water, vitamin supplements or schooling — is a necessity but not essential to survival. Hence total and marginal utility at zero consumption are both finite, while for the nonpoor market market demand will turn out to have zero income elasticity (locally), and a price elasticity less than one. At any given level of consumption, the marginal utility of the poor is no lower than it is for the nonpoor (it could be strictly higher if self-production of the good is higher for the non-poor). Moreover, both total and marginal utility is strictly increasing in $\eta_i$, a parameter of local need that applies to all members of community $i$ (except at the point of zero consumption where $\eta_i$ does not affect the utility level). The realization of $\eta_i$ is known to all members of the community, but unknown to the central government, whose beliefs are represented by a probability distribution over a range $[\underline{\eta}_i, \bar{\eta}_i]$.

The good is available on a perfectly competitive market within each community. Suppliers of the good in community $i$ incur a unit cost $\theta_i$ of delivering this good, independent of the quantity delivered, where $\theta_i$ can vary randomly between $\underline{\theta}_i$ and $\bar{\theta}_i$. Owing to competition among suppliers, this good is supplied in community $i$ at a constant price of $\theta_i$. The local bureaucrat and local residents can costlessly resell the good to others within their own community, so local black markets can open. In particular we assume that they cannot participate in the black markets of other communities (e.g., because the good in question is location-specific, or owing to transaction costs).[12]

[11] The nonpoor could be heterogenous with respect to their assets and preferences: as we shall see this will not matter, as long as their market purchases of the relevant good are not characterized by (local) income effects. We will therefore simplify by assuming that members of each class are homogenous.

[12] Vouchers distributed by the program can be location-specific, as in the case of housing, schooling or

The poor have no money at all (after meeting their subsistence requirements), and can survive without purchasing any of the good (remember $v_p(0, \eta_i)$ is finite). So they will be not to able to purchase the good on the market, and end up with a utility of $v_p(0, \eta_i)$ in the absence of any government intervention. The nonpoor in contrast have sufficient money that their market purchases of the good are independent of their money stocks. Each nonpoor person consumes $y_n^*(\theta_i, \eta_i)$ units of the good, where $v_n'(y_n^*(\theta_i, \eta_i), \eta_i) = \theta_i$, to end up with indirect utility equal to $v_n(y_n^*(\theta_i, \eta_i), \eta_i) - \theta_i y_n^*(\theta_i, \eta_i)$ plus their initial money stocks. Since the good is a necessity, we shall assume that

$$v_n'(0, \underline{\eta}_i) > \bar{\theta}_i, \tag{1}$$

so every nonpoor person always buys positive quantities, but purchases are price inelastic (the elasticity of $y_n^*$ with respect to $\theta_i$ is less than one).

If the government does not intervene, the competitive equilibrium allocation will always leave the poor with a higher marginal valuation of the good compared with the nonpoor. This creates the potential welfare value of public provision of the good to the poor, financed by taxes levied on the nonpoor (assuming that direct income or asset redistributions are not feasible). If the deadweight cost per dollar taxes imposed on the non-poor is $\lambda$, then from an ideal utilitarian standpoint setting up such a redistributive program in community $i$ would be worthwhile as long as (using $\mathcal{E}$ to denote the expectation operator):

$$1 + \lambda < \frac{\mathcal{E} v_p'(0, \eta_i)}{\mathcal{E}\theta_i}, \tag{2}$$

assuming that the program purchases the good at cost $\theta_i$ and distributes it to the poor in community $i$. However, this presumes a number of ideal conditions: that the good is purchased cost-effectively and targeted perfectly, and the government in question actually seeks to maximize a utilitarian welfare function which assigns identical welfare weights to the poor and the non-poor.

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health services. In the case of food, however, the good can conceivably be sold outside the local community. But even this may entail significant transaction and transport costs, which may not make it worthwhile for individual households in isolated communities. Of course, if the financial returns are large enough, intermediaries could form to economize on these costs. In cases where sales in external markets is feasible, it will turn out that the performance of the centralized system will become worse. However, a more detailed examination of this case may be worthwhile in future work.

To illustrate the problems raised by lack of cost-effectiveness and imperfect targeting, assume for the time being that the government in question does indeed maximize such a utilitarian welfare function:

$$\Sigma_{i=1}^{m} N_i[\beta_i v_p(y_{pi}, \eta_i) + (1-\beta_i)\{v_n(y_{ni}, \eta_i) - t_i\}] \tag{3}$$

where $y_{ki}$ denotes the consumption of a class $k$ person in community $i$, and $t_i$ is the net financial cost incurred by the nonpoor as a result of the program. This helps define a set of normative benchmarks that will be helpful in the analysis.

The ideal *first-best allocation* would result if the government had access to all relevant information and faced no implementation problems: a poor individual in a community with local need $\eta_i$ and cost $\theta_i$ would be provided a quantity $y_1(\theta_i, \eta_i)$ of the good that would equate his marginal utility of consumption to the true cost of the good, inclusive of the deadweight costs of the tax revenue required to finance its provision:

$$\frac{1}{\theta_i} v'(y_1(\theta_i, \eta_i), \eta_i) = (1+\lambda). \tag{4}$$

Let the corresponding aggregate supply and procurement cost for community $i$ be given by

$$Y_{1i}(\theta_i, \eta_i) = N_i \beta_i y_1(\theta_i, \eta_i), E_{1i}(\theta_i, \eta_i) = \theta_i Y_{1i}(\theta_i, \eta_i). \tag{5}$$

These are strictly increasing in local need and local cost. Hence implementation of the first-best requires information concerning these parameters.

The *second-best allocation* results when the public program fails to incorporate information concerning the local needs and local costs in apportioning expenditures across communities. The expenditure level $E_i$ for community $i$ is then independent of $\theta_i$ and $\eta_i$. Assume however that the program is cost-effective and targeted perfectly within each community. Then each poor person gets $y_{2i}(\theta_i, E_i) = \frac{E_i}{N_i \beta_i \theta_i}$ units of the good. The optimal expenditure grant $E_{2i}$ for the program in community $i$ then solves:

$$\mathcal{E}[\frac{1}{\theta_i} v_p'(\frac{E_{2i}}{N_i \beta_i \theta_i}, \eta_i)] = (1+\lambda). \tag{6}$$

The welfare gap between the first-best and second-best then corresponds to the problem of *inter-community targeting.*

The *third-best allocation* corresponds to the situation where the the program is not cost-effective, so the good is procured at the maximal cost rate $\bar{\theta}_i$ instead of $\theta_i$. The allocation satisfies the condition

$$\mathcal{E}_{\eta_i}[\frac{1}{\bar{\theta}_i} v_p'(\frac{E_{3i}}{N_i \beta_i \bar{\theta}_i}, \eta_i)] = (1+\lambda) \tag{7}$$

and is smaller than the second-best level. The welfare gap relative to the second-best corresponds to the problem of *cost-effectiveness.*

Finally, the *fourth-best allocation* corresponds to the context where the government additionally fails to target delivery to the poor within any community. Then the good will be provided uniformly to the poor as well as non-poor within each community. The optimal expenditure grant $E_{4i}$ then solves

$$\mathcal{E}_{\eta_i}[\frac{1}{\bar{\theta}_i} v_p'(\frac{E_{4i}}{N_i \beta_i \bar{\theta}_i}, \eta_i)] = (1+\frac{\lambda}{\beta_i}) \tag{8}$$

under the simplifying assumption that $y_n^*(\bar{\theta}_i, \underline{\eta}_i)$ is large enough relative to $\lambda$ to ensure that the resulting scale of per capita public provision is smaller than market demand of the non-poor in all states.[13] The leakage of the good to the nonpoor is reflected in a higher markup factor used for the fiscal cost of the program ($\frac{\lambda}{\beta_i}$ instead of $\lambda$). This results in a shrinkage in the size of the program, depending on the poverty rate. The welfare gap between the fourth-best and third-best allocations thus reflects the problem of *intracommunity targeting.*

## 1.1 Centralized Bureaucracy

Since information regarding local cost and need are socially valuable, the government would like this information to be collected and utilized optimally in the implementation of the program. However, this task must be delegated to bureaucrats. Assume to start with that the central government can employ a set of perfectly honest bureaucrats. They are assigned the task of collecting information concerning local needs and costs, and identifying the poor within each community. The bureaucrats are therefore delegated responsibility over the implementation of the first-best allocation.

[13]Under this condition, public provision displaces market expenditures of the nonpoor, so the marginal value to them equals the market price $\theta_i$, which is smaller than the fiscal cost of the provision. Morever, the marginal value of the good provided to the poor exceeds $\theta_i$.

An ideal bureaucratic hierarchy would then work as follows. Let $B_i$ denote the local bureaucrat assigned to community $i$, whose role is to gather information about $\eta_i$ and $\theta_i$, and send this information to the central government (denoted $CG$). Having received this information, $CG$ will authorize the first-best expenditure $E_{1i}(\theta_i, \eta_i)$ to $B_i$, who would then use this to locally procure supplies of the good at cost $\theta_i$, and then distribute the good to the poor. If $B_i$ were honest, he would report local information to $CG$ honestly, procure the good at true cost, and distribute the good to the local poor.

Suppose now that $B_i$'s values swing to the opposite end of the ethical spectrum, and seeks to maximize personal income instead. Assume that the bureaucrat has lexicographic preferences: maximization of personal income is the primary objective, but if two courses of action generate the same level of personal income then he prefers to do what he is supposed to do: help the poor.

Having collected information concerning $\eta_i, \theta_i$ and who is poor within each community, would it then be in $B_i$'s interest to faithfully implement the first-best allocation? $B_i$ has discretion over reports to submit to CG concerning local conditions, and then over how to spend the allotted budget. We assume that government auditors can verify the physical procurement and delivery level $Y_i$ in each community $i$, but not the realization of local need and costs. So $B_i$ can claim a certain market price of this good : $\tilde{\theta}_i \in [\underline{\theta}_i, \bar{\theta}_i]$, which overstates the true cost, and pocket the difference.[14]

$B_i$ can go further and earn illegal income by diverting part of the supply to community $i$ to the market, instead of delivering it to the poor. Given the nature of the good, $B_i$ cannot utilize any form of nonlinear pricing on the 'black' market: resale is costless, and the discrepancy between discriminatory prices would be eliminated by arbitrage. It is clear that $B_i$ can sell (at a price of $\theta_i$) upto a total quantity of $N_i(1-\beta_i)y_n^*(\theta_i, \eta_i)$ units on the

[14]It is plausible that information concerning physical procurement and delivery levels is 'hard' information, verifiable by third parties, while information concerning local cost and need is nonverifiable. Government record-keeping frequently concerns physical purchases and movement of goods, rather than their temporal market or consumption valuations. We are also assuming that information concerning community supplies $Y_i$ is verified by government auditors, but not utilized by $CG$ to design superior performance based incentive schemes for bureaucrats.

black market, i.e., the total market demand of the nonpoor in this community. In case the available quantity $Y_i$ exceeds this amount, it would not pay $B_i$ to attempt to sell more at a lower price, since the market demand is inelastic. In the event that $Y_i > N_i(1-\beta_i)y_n^*(\theta_i, \eta_i)$, then, the optimal course of action for the corrupt $B_i$ is to sell exactly $N_i(1-\beta_i)y_n^*(\theta_i, \eta_i)$ units on the black market, and (given the assumption of lexicographic preferences) deliver the rest to the poor. In any given state, therefore, the poor do receive some of the good allocated to that community, but only if the aggregate supply is large enough relative to the market demand of the nonpoor.

With reported expenditure $\sum_i \tilde{\theta}_i Y_i$ being reimbursed by the government, the illegal earnings of B from community $i$ equals

$$\Pi_i(\tilde{\theta}_i, Y_i|\theta_i, \eta_i) \equiv (\tilde{\theta}_i - \theta_i)Y_i + \theta_i \min\{Y_i, N_i(1-\beta_i)y_n^*(\theta_i, \eta_i)\}, \tag{9}$$

i.e., the sum of income realized from cost-padding of the supply $Y_i$, and that from black market sales to the nonpoor. Then $B_i$ will optimally want to expand the scale of the program and pad costs to the maximum permissible extent. Realizing that the mechanism gives rise to such incentives, and that only a fraction of expenditures actually reach the poor, the central government in turn will seek to restrict expenditure allotments, even if it is itself not subject to any form of 'capture' by special interest groups (e.g., of the nonpoor that strive to limit the taxes that finance the program).

Let us then examine what actual allocations can realistically be expected to result from a centralized system, i.e., when expenditure allotments are made by a central government that is aware of the leakages inherent in the program, and is also influenced by lobbies of the nonpoor to restrict the program. From the discussion above, it is evident that a local bureaucrat that lacks any accountability to the central government with respect to the actual intracommunity targeting of the good, will allocate a given supply $Y_i$ of the good on a preferred basis to the nonpoor upto their total market demand, and thereafter allocate the remainder to the poor. In a given state $(\theta_i, \eta_i)$, then the net utility gains of the two groups respectively are

$$U_n(Y_i; \theta_i, \eta_i) = 0 \tag{10}$$

and

$$U_p(Y_i;\theta_i,\eta_i) = v_p(\max[\frac{Y_i - N_i(1-\beta_i)y_n^*(\theta_i,\eta_i)}{N_i\beta_i}, 0], \eta_i) \tag{11}$$

The nonpoor derive no advantage whatsoever, since they substitute open market purchases by black market purchases at the same price. The poor do get some of the good delivered in states when there is something left over after meeting the black market demand of the nonpoor. The entire leakage is pocketed by the local bureaucrat.

Suppose that $B_i$ is granted an expenditure limit of $E_i$ for market purchases of the good by the central government. Then $B_i$ has to decide how to use this budget: i.e., must select how much of the good $Y_i$ to purchase, and what cost $\tilde{\theta}_i$ to report on the accounts, subject to the constraint that the expenditure on the books $\tilde{\theta}_i Y_i$ does not exceed $E_i$, and $\tilde{\theta}_i$ does not exceed the maximum possible cost $\bar{\theta}_i$. His problem is to maximize his total income resulting from these decisions, as given by (9), subject to these two constraints. The solution to this problem is easily seen to be: set $\tilde{\theta}_i = \bar{\theta}_i$, and $Y_i = \frac{E_i}{\bar{\theta}_i}$, i.e., pad accounting cost and expenditure of the budget to the maximum permissible limit.[15]

The maximized income of $B_i$ then equals

$$\Pi_i(E_i|\theta_i,\eta_i) = \min[E_i, E_i[1 - \frac{\theta_i}{\bar{\theta}_i}] + \theta_i(N_i - P_i)y_n^*(\theta_i,\eta_i)] \tag{12}$$

which is a strictly increasing, concave function of expenditure allotment $E_i$. For small expenditure levels, $B_i$ can pocket the entire allotment himself, since the actual procurement cost can be recovered completely from black market sales, so that the income of $B_i$ equals the reported expenditure level which is reimbursed by the government. This is always true for instance for expenditure levels smaller than $\underline{E} \equiv \underline{\theta}_i y^*(\underline{\theta}_i, \underline{\eta}_i)$, no matter what state of the world prevails in community $i$. Such expenditure allotments are then entirely diverted to the black market. For expenditure levels higher than $\underline{E}$, black market demand in some states falls below the level of good procured, and the surplus is distributed to the poor.

[15]The optimality of reporting $\tilde{\theta}_i = \bar{\theta}_i$ is evident from (9) no matter what the supply decision $Y_i$ is: it maximizes the income from cost-padding (the first term on the right-hand-side of (9). And given $\tilde{\theta}_i = \bar{\theta}_i$, it is always optimal to increase $Y_i$ as far as the expenditure budget will allow, since this increases cost-padding income by more ($\bar{\theta}_i$ per unit) than it does procurement cost ($\theta_i$ per unit), so even if $B_i$ throws away the incremental supply of the good his income will be higher.

When such states occur, $B_i$'s earnings are smaller on account of his inability to divert the entire supply to the black market. But he continues to earn fraction $s_i(\theta_i) \equiv 1 - \frac{\theta_i}{\theta_i}$ of the expenditure allotment owing to the cost-padding. This income provides the underlying incentive to expand procurement as far as is permitted by the budget, and is the basic reason that the poor end up with something at all.

If bureaucrats are employed on a fixed salary basis, it follows from (12) that there is no way for the local bureaucrat to credibly communicate local cost or needs to the central government. Any attempt by the latter to elicit this information via a reporting or budgeting system would cause local bureaucrats to manipulate these reports to maximize their allocated budgets. Hence actual expenditure allocations made by the central government cannot be conditioned on information about local cost or need. Community grants can be based only on publicly available information, such as relative population sizes and poverty rates. The centralized system then fails to achieve any intercommunity targeting or community insurance.[16]

In addition, the allocation fails to be cost-effective, and realizes a poor standard of intracommunity targeting. Leakages are entirely intramarginal: above a lumpsum amount increased expenditure allotments are targeted one hundred percent to the poor. Expenditure cutbacks therefore hurt the poor, causing such cutbacks to be unpopular among the poor. It is this consideration that keeps the program from being altogether scrapped.

What are the implications for the kinds of intracommunity expenditure allocations that would be favored by political parties at the national level? This requires a model of the policy preferences of the central government. We shall assume that the government maximizes a linear social welfare function defined over the welfare levels of local poor and non-poor, with welfare weights that represent the pattern of 'capture'. The foundations of such a model can be provided by a theory of electoral competition between two parties, based on the recent work of Grossman and Helpman (1996). The Appendix details an adaptation

[16]It will achieve some degree of intercommunity targeting if incentive mechanisms for bureaucrats can be utilized in some form. These could conceivably take the form of explicit performance incentive mechanisms which make compensation contingent on budget size or the aggregate scale $Y_i$ of services delivered. Or they could result from competition for rents between upper and lower level bureaucrats.

of their model to our specific context, in which a given fraction $\alpha_i$ of the poor in community $i$ are 'informed' voters, who cast their vote on the basis of their utility difference from the policies espoused by the two parties. Similarly, a given fraction of the non-poor in all communities are informed voters. Uninformed voters turn out and cast their votes on the basis of relative levels of expenditures incurred by the two parties to mobilize voter support. Finally, the nonpoor form an interest group which forms a lobby that contributes to the election finances of the two parties, and seeks to influence their electoral platforms. The two parties are distinguished by an intrinsic advantage awarded to one party on some ideological or non-economic dimension, or on the basis of past performance. These 'ideological' preferences are dispersed throughout the population according to a given uniform distribution. Informed voters trade off their ideological preference against the utility difference resulting from the electoral platforms of the two parties. This asymmetry implies that the two parties do not select the same policy platforms. Under suitable conditions, the equilibrium of this model of electoral competition is that each party selects a policy to maximize a linear welfare function, where the favored party assigns a greater welfare weight to the utility of the non-poor than the handicapped party, in exchange for higher campaign contributions from the nonpoor lobby. Specifically, party $k = 1, 2$ selects a policy to maximize a welfare function of the form

$$\sum_{i=1}^{m} [\alpha_i \beta_i U_{pi} + (\alpha_n + \chi \phi^k)(1 - \beta_i) U_{ni}] \tag{13}$$

where $U_{pi}$ and $U_{ni}$ respectively represent the utilities of the poor and nonpoor in community $i$, $\chi$ is a parameter which reflects the relative importance of the uninformed voters and how sensitive they are to campaign spending, and $\phi^k$ is the probability that party $k$ wins the election. Under the assumption that a greater fraction of the nonpoor are informed ($\alpha_n > \alpha_i$, all $i$), it follows that the effect of the political distortions is to tilt the relative welfare weight in favor of the non-poor. Let $\delta^k \equiv \frac{\alpha_n + \chi \phi^k}{\alpha_i}$ denote the resulting welfare weight on a nonpoor person, relative to a poor person.

Assuming that bureaucrats form an insignificant proportion of the voting population,

the policy platform of party $k = A, B$ in national elections will then seek to maximize[17]

$$W_k^C(E_1, \ldots, E_m) = \sum_{i=1}^{m} \beta_i N_i \mathcal{E} v_p(\max(0, \tfrac{E_i}{N_i \beta_i \theta_i} - \tfrac{(1-\beta_i)}{\beta_i} y_n^*(\theta_i, \eta_i)), \eta_i) - \delta^k (1+\lambda) \textstyle\sum_{i=1}^{m} E_i \quad (14)$$

under the assumption that different communities are *ex ante* homogenous, or otherwise that vote shares can be aggregated as in (71).[18]

From a political standpoint, therefore, the scale of the program is decided by the trade off between the *vote bank* effect of increased expenditure allotments on the preferences of poor informed voters (the first term on the right-hand-side of (14)), with the cost imposed on the nonpoor that curry special favor with the two parties. Note that there is a nonconcavity with respect to the vote-bank effect, since only expenditures above a minimum scale actually reach the poor. Hence any expenditure allotments that are actually made, must be at a certain minimum scale, and do trickle down to the poor (at least in some states of the world). *From the standpoint of utilitarian social welfare, however, the outcome of a centralized bureaucracy is worse than the fourth-best allocation:* it fails to achieve any cost-effectiveness or intercommunity targeting, and intracommunity targeting is poorer than uniform provision of the good within each community (the standard assumed in the fourth-best). We summarize these results in the following proposition.

**Proposition 1** *The outcome of the centralized bureaucracy is the following:*

[17]Here we assume that the fraction of the nonpoor that are informed voters is the same across different communities: this is entirely inessential.

[18]In deriving (14) we have made use of expressions (10, 11) above for the benefits $U_p, U_n$ obtained by different classes from a given expenditure level, and the fact that the entire fiscal burden of the program is borne by the nonpoor, since they are the only ones paying any taxes. This expression also supposes that political parties at the national level are uncertain about the realization of local cost and need parameters in any given community. Alternatively, expenditure allotments are decided and held fixed for a given period of time, such as the period of incumbency following any election, during which local community costs and needs vary randomly. As explained above, the centralized system does not allow expenditure assignments to be conditioned on the realization of these shocks. Then voters' policy preferences will be based on the expected utility they expect to realize from any given expenditure assignments.

*(i) The expenditure grant $E_i$ allocated to community $i$ by a central government with a capture parameter $\delta$ is independent of the actual realization of $\theta_i, \eta_i$, and selected to maximize*

$$\beta_i \mathcal{E}_{\theta_i,\eta_i}[v_p(\max\{0, \frac{E_i}{N_i\beta_i\bar{\theta}_i} - \frac{(1-\beta_i)}{\beta_i} y_n^*(\theta_i,\eta_i)\}, \eta_i)] - \delta(1+\lambda)E_i. \tag{15}$$

*(ii) Given expenditure grant $E_i$, the good is procured at an 'official' price of $\bar{\theta}_i$, and the total supply of the good to community $i$ is $\frac{E_i}{\bar{\theta}_i}$. Of this, the total amount delivered to the poor equals $\max\{0, \frac{E_i}{N_i\theta_i} - N_i(1-\beta_i)y_n^*(\theta_i,\eta_i)\}$, the remainder being diverted to the black market.*

*(iii) The resulting level of (per capita) welfare in community $i$*

$$\beta_i \mathcal{E}_{\theta_i,\eta_i}[v_p(\max\{0, \frac{E_i}{N_i\beta_i\bar{\theta}_i} - \frac{(1-\beta_i)}{\beta_i} y_n^*(\theta_i,\eta_i)\}, \eta_i)] - (1+\lambda)E_i. \tag{16}$$

*falls below the fourth-best level.*

## 1.2 Decentralization

Now suppose that the responsibility for local procurement and allocation of the good is devolved to elected local governments, that directly receive fiscal grants from the central government. Taxing power as well as authority over intercommunity transfers is retained by the central government, however. The only switch relative to the centralized bureaucracy mechanism is that local authority over procurement and intracommunity allocation is shifted from a local bureaucrat who seeks to maximize illegal income, to a local government that seeks to maximize a welfare function defined over the welfares over local citizens. However, the local government may be subject to capture by the local nonpoor, so there will also be pressure to divert the good to the nonpoor. The mechanism of local capture will depend on electoral competition between contesting parties to the local government, analogous to the nature of competition at the central level.

Consider first what happens within a given community $i$, after it has received grant $E_i$ from the center. First, consider the nature of the procurement decision. In the case where the expenditure grant is tied to purchases of the specific good in question, it is apparent

that the local government will want to maximize the total supply of the good that it has available to distribute among its residents. Hence it will seek to procure the good from the market at the going price $\theta_i$, and will derive no advantage from cost-padding (since any incomes earned thereby from cost-padding cannot be diverted to other goods that are favored by the nonpoor, given that the grant is tied).[19]

Hence the good will be procured cost-effectively. Decentralization will therefore achieve delivery cost economies relative to the centralized bureaucracy outcome. Given grant $E_i$, the local government will be able to procure $\frac{E_i}{\theta_i}$ units of the good. How will it allocate this supply among its residents? To study this, we need to calculate the net benefits of the two classes from receiving the good. These are given by

$$V_n(y_n, \eta_i) = \begin{cases} \theta_i y_n & \text{if } y_n \leq y_n^*(\theta_i, \eta_i) \\ \theta_i y_n^*(\theta_i, \eta_i) + v_n(y_n, \eta_i) - v_n(y_n^*(\theta_i, \eta_i), \eta_i) & \text{otherwise} \end{cases} \tag{17}$$

and

$$V_p(y_p, \eta_i) = \begin{cases} \theta_i v_p(y_p, \eta_i) & \text{if } y_p \leq y_p^*(\theta_i, \eta_i) \\ \theta_i v_p(y_p^*(\theta_i, \eta_i), \eta_i) + \theta_i[y_p - y_p^*(\theta_i, \eta_i)] & \text{otherwise} \end{cases} \tag{18}$$

where the expression for $V_p$ assumes that the aggregate supply of the good is smaller than the first-best level.[20] For the non-poor upto the point that supply is less than their market

[19] A similar conclusion holds (for most states of the world) even if the grant is not tied. Whatever benefits the nonpoor can derive from diverting the funds to their pockets or to other goods they favor, they can equivalently achieve the same result by procuring this good and diverting the allocation of the good in their own favor (assuming that the grant in question does not exceed the value of the total market demand of the good of the nonpoor, which will turn out to be the case in most states in equilibrium). If there is no uncertainty concerning local costs or needs, then this will always be true. If there is some uncertainty, this condition may fail in certain states where local costs are high and needs are low, so that the market demand of the nonpoor falls below the grant. In those states, and only those, there would be pressure from the nonpoor to divert funds if the grant is not tied, e.g., by cost-padding or spending on other goods that they value more.

[20] It is possible, of course, that this condition is not satisfied in equilibrium for some states . Then the value of the good to the nonpoor will take a more complicated form — but this will not alter our main qualitative results.

demand, the marginal value of the good exactly equals its market price $\theta_i$, since public allocation will exactly substitute for market purchases. If they are supplied more than their market demand, they will have no option but to consume the entire supply, since they will be unable to sell it on the market: the poor will be unable to pay, while there is no scope for trades among the nonpoor. Then the marginal utility of the public allocation for the nonpoor falls strictly below the market price $\theta_i$. For the poor, on the other hand, the marginal value of the good will equal the marginal utility of consumption of the good, upto the point that they are allocated less than their own income-unconstrained market demand $y_p^*(\theta_i, \eta_i)$. Over this range, they will value it at more than the going market price $\theta_i$. If they are allocated more than their market demand, they will seek to sell the good on the market. Given our assumption concerning the overall scale of supply to the community, if the poor are supplied more than their first-best allocation, the nonpoor must be supplied less than their first-best allocation (equal to their market purchase). Hence there will be (black) market demand of the nonpoor that the poor can offload their excess supplies to, at the market price $\theta_i$. Over this range the poor's marginal valuation of the good equals the market price. The nature of marginal valuations of the good to the two groups are illustrated in Figure 1.

Given the political compulsions on the local government, it will seek to allocate total community supply $Y_i$ between the two classes in state $(\theta_i, \eta_i)$ to maximize the welfare function

$$\alpha_p \beta_i V_p(y_p, \eta_i) + (1 - \beta_i)(\alpha_n + \chi \phi^k) V_n(y_n, \eta_i) \tag{19}$$

if the local government happens to be occupied by party $k$, subject to the constraint

$$\beta_p y_p + (1 - \beta_i) y_n \leq Y_i. \tag{20}$$

Let $\gamma_i^k \equiv \frac{\alpha_i \beta_i}{\alpha_i \beta_i + (1-\beta_i)(\alpha_n + \chi \phi^k)}$ denote the relative welfare weight of the poor in party $k$'s objective. Also define the following 'capture coefficient'

$$\delta_i^k = \frac{\frac{\beta_i}{1-\beta_i}}{\frac{\gamma_i^k}{1-\gamma_i^k}} \tag{21}$$

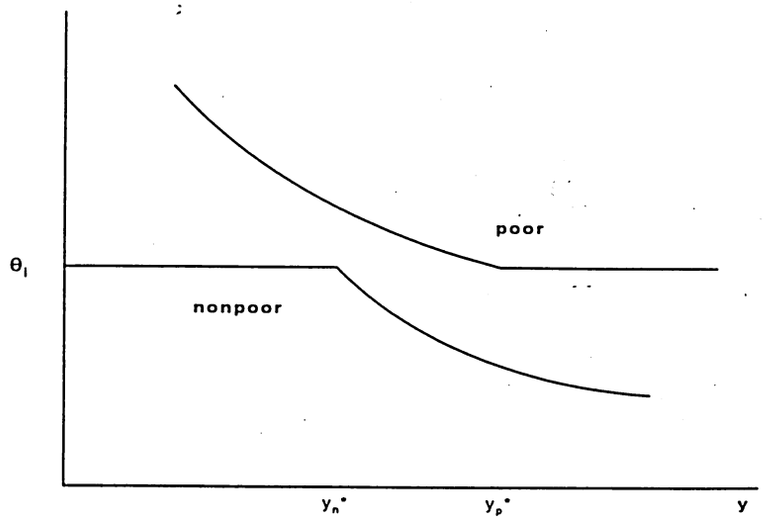


Figure 1: VALUE OF SERVICE TO THE POOR AND NONPOOR

for party $k$ in community $i$, the ratio of the (relative) demographic weight of the poor to the implicit (relative) welfare weight assigned to the poor by party $k$ in that community.[21] This represents the extent to which party $k$ is captured by the local nonpoor. It is seen that this coefficient can be expressed as

$$\delta_i^k = \frac{\alpha_n + \chi\phi^k}{\alpha_i} \tag{22}$$

and is thus greater than 1 in general. It equals one only when there is no capture at all, i.e., $\chi$ equals zero, and equal fractions of the poor and nonpoor are informed voters.

The nature of intracommunity allocation of an aggregate service level $Y_i$ by party $k$ can now be derived. The effect of local capture is to inflate the marginal value of the good to the nonpoor by the capture coefficient $\delta_i^k$. Any given unit of the good will be allocated upon comparing this inflated marginal value for the nonpoor with the marginal value of the good to the poor. Define $\hat{y}(\delta_i^k, \eta_i, \theta_i)$ by the solution to

$$v_p'(\hat{y}, \eta_i) = \delta_i^k \theta_i \tag{23}$$

[21]This is well-defined as long as $\alpha_i > 0$, which we shall assume for all communities.

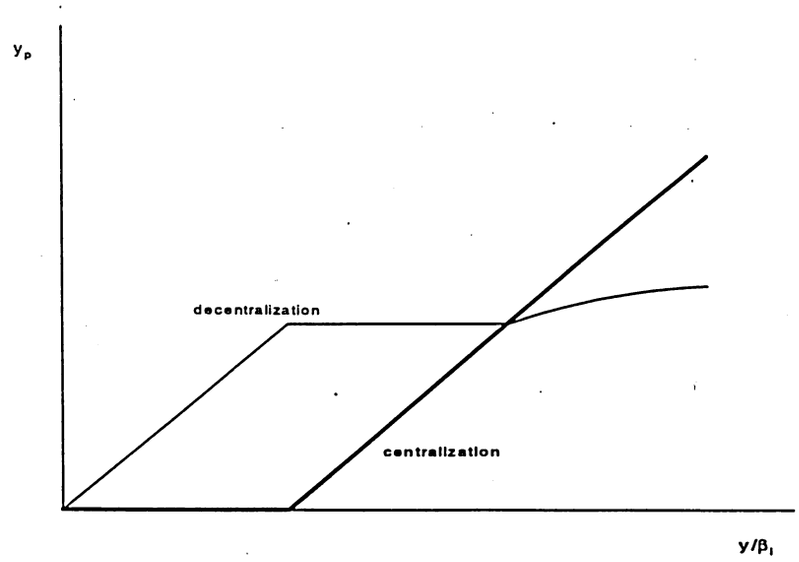


Figure 2: INTRACOMMUNITY TARGETING

if it exists, and 0 otherwise. Then the poor will be served on a preferential basis upto consumption level of $\hat{y}$, following which the nonpoor will be served upto their market demand, with sharing between the two groups thereafter. The pattern of targeting that results is illustrated in Figure 2.

It is apparent from Figure 2 that the nature of intracommunity targeting achieved by the two regimes cannot be ranked in general. For small grants, the decentralized system targets better, as long as local capture is not excessive. For large grants, on the other hand, the centralized mechanism delivers more to the poor: once the black market demand of the nonpoor has been met, the poor get all of the remainder. This result will continue to hold even in other settings where the centralized system ensures some degree of targeting owing to monitoring of bureaucrats.[22]

[22]For example bureaucrats will allocate a constant fraction of expenditure to the poor, if there is a constant probability of being monitored, with linear penalties for diversion, if they have constant relative risk aversion (since then the bureaucrats' diversion decision is exactly analogous to the problem faced by taxpayers concerning how much of their income to disclose on their tax returns, in the standard Allingham-

Finally turn to the nature of expenditure grants decided by the center in the decentralized environment. This raises a number of issues concerning how local and central governments negotiate with one another. For one, if the same party governs both at the local and central level, then it is plausible that the governments at two levels will cooperate with one another, sharing information and working out a common strategy that advances the general interest of the party. But conflict may result if different parties govern at the two levels. Since our main objective is to compare the outcome with that of a centralized bureaucracy, we shall consider the scenario which compares exactly with the nature of intercommunity allocations resulting in the latter mechanism. Specifically, we assume that each local government behaves opportunistically, and does not cooperate with the central government. It therefore seeks to obtain as large a grant as possible for itself from the center, and misrepresents its information about local need and cost in order to manipulate the grant it receives. Moreover, the party in power at the central government decides community grants to serve its political motives at the national level. As a result, community grants in the decentralized regime also fail to achieve any degree of intercommunity targeting, and end up being independent of local shocks. To the extent that the assumption of total noncooperation is not realistic, the local government mechanism may be able to achieve some degree of intercommunity targeting. In that case the balance will tilt further in favor of the decentralized mechanism.

Let $y_k(y;\delta_i,\eta_i,\theta_i), k = p,n$ denote the intracommunity allocation generated by a per capita supply of $y$ to the community, when the local capture coefficient is $\delta_i$. Then the objective of the central government while determining the allocation of expenditure grants across communities is given by

$$\begin{aligned} W_k^L(E_1,\ldots,E_n) = \quad & \textstyle\sum_{i=1}^m N_i\alpha_i\{\beta_i\mathcal{E}[V^p(y_p(\frac{E_i}{N_i\theta_i};\delta_i,\eta_i,\theta_i)) \\ & +\delta(1-\beta_i)V_n(y_n(\frac{E_i}{N_i\theta_i};\delta_i,\eta_i,\theta_i)) \\ & -\delta(1+\lambda)E_i\} \end{aligned} \tag{24}$$

where $\alpha_i$ and *delta* respectively denote parameters at the national level. The first term

Sandmo framework). Small grants will then be targeted better in the decentralized regime, but larger grants could be targeted better under the centralized regime.

on the right-hand-side of (24) is the *vote-bank effect* for the poor. The second and third together represent the loss of support from the nonpoor as a result of the program.

**Proposition 2** *The allocation resulting under expenditure decentralization is the following.*

*(i) Community grant $E_i$ for community $i$ is independent of local shocks, and is chosen to maximize*

$$\beta_i \mathcal{E}[V^p(y_p(\frac{E_i}{N_i\theta_i};\delta_i,\eta_i,\theta_i)) + \delta(1-\beta_i)V_n(y_n(\frac{E_i}{N_i\theta_i};\delta_i,\eta_i,\theta_i)) - \delta(1+\lambda)E_i \qquad (25)$$

*(ii) Given grant $E_i$, the good is procured at true cost $\theta_i$. It is thereafter allocated as follows: it is allocated entirely to the poor uptil a per capita procurement of $\beta_i\hat{y}$, above which the good is supplied entirely to the nonpoor upto their market demand $y_n^*$, with any excess shared between the two groups so as to equate $V_p'$ and $\delta_i V_n'$.*

*(iii) The resulting level of (per capita) social welfare in community $i$*

$$\beta_i \mathcal{E}[V^p(y_p(\frac{E_i}{N_i\theta_i};\delta_i,\eta_i,\theta_i)) + (1-\beta_i)V_n(y_n(\frac{E_i}{N_i\theta_i};\delta_i,\eta_i,\theta_i)) - (1+\lambda)E_i \qquad (26)$$

*equals the second-best welfare level if there is no capture at either central or local levels. If the marginal utility of the good to the nonpoor is positive for any level of consumption, then welfare under the decentralized system tends to* 0 *if the local capture coefficient $\delta^i$ becomes arbitrarily large.*

Part (iii) of this result shows that the level of capture plays a key role in determining the performance of the decentralized system. When there is no capture at either level, it implements the second-best allocation, being perfectly cost-effective, and targets the good to the poor within each community without any leakage to the nonpoor. The latter result owes to the fact that the marginal value of the good to the poor never falls below the marginal value to the nonpoor over the relevant range of provision (ref. Figure 1). Hence when democracy works well at both national and local levels, decentralization must welfare dominate the centralized bureaucracy (since the latter does no better than the fourth-best allocation). At the other extreme as the extent of local capture becomes arbitrarily large,

decentralization serves to divert the good almost entirely to the nonpoor (as long as they always derive positive marginal utility from consuming the good). Knowing this, the center (irrespective of the level of capture at the national level) does not find it worthwhile to allocate any expenditure grants to local communities, since the value of the good to the nonpoor falls below the tax burdens they bear to support the program; the program tends to close down altogether. If the centralized system provides positive community grants, it must then achieve a superior welfare level, owing to its ability to deliver to the poor in some (albeit imperfect) degree.

It is difficult to say more in general about the relative welfare comparison between the two regimes. So it is useful to consider some illustrative special cases.

*Case 1: Suppose that local cost and need parameters are not variable.* In that case the market demand $y_n^*$ of the nonpoor is known to the central government while setting the level of the expenditure grant $E_i$. In the case of a centralized bureaucracy, the leakage to the nonpoor is perfectly predictable, and so is the amount that would actually be delivered to the poor following any expenditure allocation. In this regime the amount provided to the poor in a given community $y^c$ maximizes

$$\beta_i v_p(y) - (1+\lambda)\delta\theta_i[\beta_i y + I(y)(1-\beta_i)y_n^*] \tag{27}$$

where $I(y)$ denotes an indicator function taking the value 1 if $y > 0$, and 0 otherwise. Provision of the good to the poor thus entails a 'fixed' cost consisting of the leakage of the good to the nonpoor, besides the variable cost. The resulting level of (per capita) welfare is

$$w^c \equiv \beta_i v_p(y^c) - (1+\lambda)\theta_i[\beta_i y^c + I(y^c)(1-\beta_i)y_n^*]. \tag{28}$$

Under the decentralized system the nature of leakage to the nonpoor is also predictable. The per capita supply $y^d$ to the community may be set at less than $\beta_i\hat{y}$, in which case it is targeted perfectly. Or it exceeds $\beta_i\hat{y} + (1-\beta_i)y_n^*$, in which case the leakage to the nonpoor exceeds that under the centralized system.[23] In countries with weak fiscal capacity and

[23]Intervening levels of supply are not worthwhile since all units at the margin go to the nonpoor, the benefit of which outweighs the fiscal cost, so then expenditure cutbacks to a per capita provision of $\beta_i\hat{y}$ would occur.

with large black markets (i.e., both $\lambda$ and $y_n^*$ are large), the scale of the program is not going to be large enough to accommodate the entire demand of the nonpoor. In such a case, the program will be set at a level not exceeding $\beta_i \hat{y}$. Assume for the time being that this is indeed the case: it will turn out to not matter for our main conclusion below.

Then the decentralized system will achieve perfect intracommunity targeting, but is constrained in the scale of the program by the ceiling $\beta_i \hat{y}$ that depends on the extent of local capture $\delta_i$ (see Figure 2). As local capture increases this ceiling is lowered. The optimal provision of service to the poor $y^d$ then solves the problem of maximizing

$$\beta_i v_p(y) - \delta(1+\lambda)\beta_i \theta_i y \tag{29}$$

subject to the constraint $y \leq \hat{y}(\delta_i)$. The unconstrained solution to this coincides exactly with the optimal provision $y^c$ in the centralized regime, whenever the latter is positive. The constraint binds if and only if $\delta_i \geq (1+\lambda)\delta$. Hence *as long as local capture is no greater than* $(1+\lambda)$ *times the level of national capture, the decentralized system dominates.* Over this range of parameter values, either both systems provide the same level of support to the poor (in which case the decentralized system targets perfectly while the centralized regime leaks a large amount), or the decentralized regime provides a positive level of support which is targeted perfectly, while the centralized system closes down.

As the extent of local capture rises beyond $(1+\lambda)\delta$, however, the scale of provision in the decentralized system which is given by $\hat{y}(\delta_i)$ (since the objective function (29) is concave), shrinks progressively, converging eventually to 0 as the extent of local capture becomes arbitrarily large (assuming that the marginal utility of the good to the poor never disappears). Welfare in the decentralized system accordingly shrinks to 0 — as postulated in Proposition 2 — and eventually becomes smaller than welfare under the centralized system (assuming the latter is operative).

Fixing the level of capture $\delta$ of the central government, Figure 3 shows the welfare resulting under the two systems as the level of local capture is varied. It is apparent that the decentralized regime dominates if the extent of local capture does not exceed national capture. Even if local capture exceeds it the same happens to be true, as long as it is not

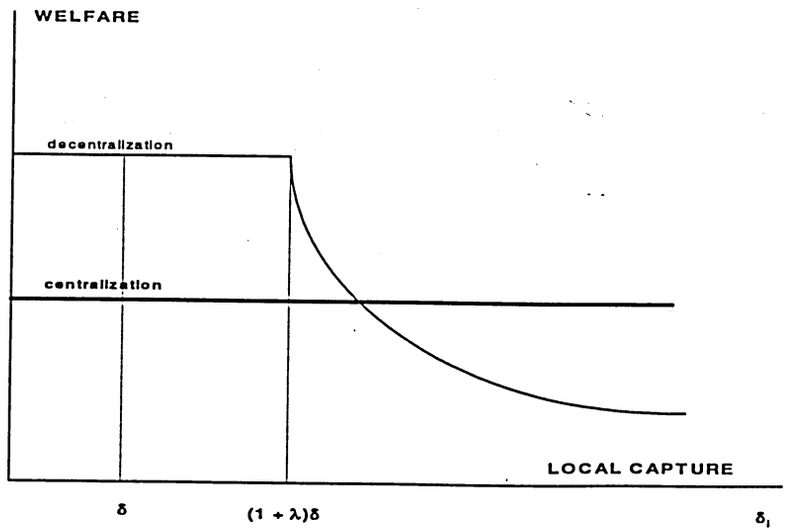


Figure 3: CASE 1: DETERMINISTIC COST AND NEED

excessive. This is particularly the case in a country with low capacity to raise taxes, i.e., where $\lambda$ is large. In such cases the decentralized system provides a smaller level of support to the poor, but is not subject to targeting failures. The centralized system provides a larger support level, but is also characterized by large leakages to the nonpoor. For decentralization to fare worse, the extent of local capture has to be abnormally high relative to capture of the central government, that it shrinks the level of provision to the poor by enough to outweigh its superior targeting efficiency.[24]

These conclusions concerning the relative performance of the two systems are strengthened if we drop the constraint that the decentralized system does not permit any targeting failures. It is easy to check that the effect of dropping this constraint is to further enhance welfare under the decentralized system. For if the central government awards a grant large enough that permits leakage to the nonpoor, the only rationale for this is that the poor vote-bank benefits must outweigh the cost of the expansion to the nonpoor.[25] Since the

[24]Interestingly, the decentralized system always targets perfectly, despite increasing local capture. The reason is that anticipating the response of local government, the central government sets the grant low enough to ensure that the local government in its own interest will not divert the good to the nonpoor.

[25]Remember that the direct benefit of the leakages to the nonpoor are outweighed by the fiscal cost which

true welfare function assigns a lower welfare weight to the welfare of the nonpoor, the social cost of this expansion is lower than the cost perceived by the central government. So the expansion must raise social welfare resulting from the decentralized system.

*Case 2: Demand of the Nonpoor is Deterministic.* In the contexts of certain commodities, such as schooling or health care, it is plausible to suppose that the market demand of the nonpoor does not not vary with the state, since the marginal utility of the service beyond a certain level is zero. Ignoring differences in quality, it is frequently the case that the rich send all their children to school and purchase all the health care they need on private markets, irrespective of what market prices happen to be (i.e., over the range of normal variation of market prices), and would derive no further utility from additional levels of provision. If the local community is sufficiently polarized, the nonpoor consist entirely of such rich households. In such a case, once the market demand of the nonpoor has been met, local governments will not allocate any further units of the good to them, irrespective of the level of local capture. Then intracommunity targeting in the decentralized system is unambiguously better than in the centralized system, as illustrated in Figure 4. It is therefore natural to expect in this case that the decentralized system *always* dominates the centralized one, irrespective of the nature of political distortions, or underlying uncertainties in local cost and need. We have been able to verify this in the case where the utility function of the poor takes the form $v_p(y, \eta_i) = \eta_i v(y)$, where $v(.)$ is a homothetic function.[26]

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they entirely bear.

[26] A formal proof is available on request.

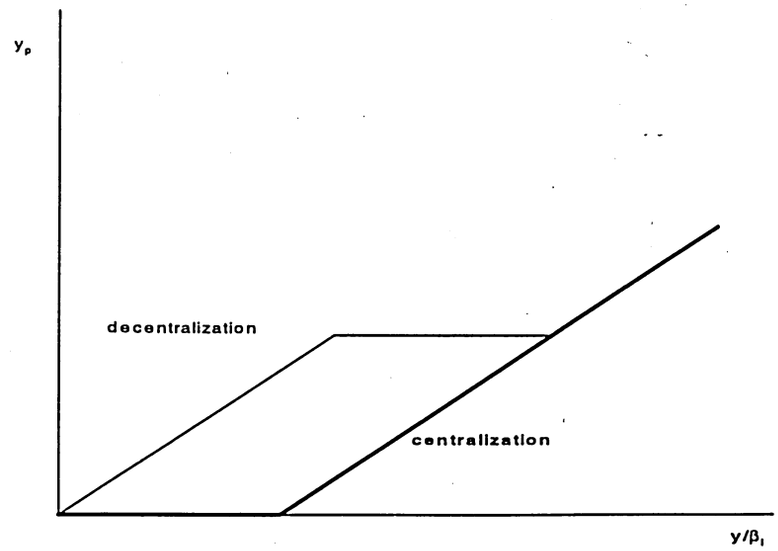


Figure 4: CASE 2: DETERMINISTIC NONPOOR DEMAND

## 2 An Infrastructure Program

We turn now to the context of an infrastructural service which involves a different set of considerations. Suppose the service is a private benefit such as water or electricity, but whose production is subject to a large fixed cost, in the form of setup or overhead expenses. The cost of generating supplies $Y_1, Y_2, \ldots$ to the different communities is given by the sum of a given overhead cost $F$, and operating plus delivery costs $\sum_i \theta_i Y_i$, so $\theta_i$ is the marginal cost of delivery to community $i$. Moreover, production at the central facility may be subject to an aggregate capacity limit $\bar{Y}$ (which could be random).

Owing to economies of scale, different communities must procure the service from the central facility, which we assume is managed and operated by bureaucrats appointed by the central government.[27] The bureaucrats are essential owing to their technical and managerial

[27] For a variety of reasons such as undeveloped capital markets or limited ability of private sellers to recover revenues from users, the incentives for private investment in the plant could be lower than the social return. The central government can then either invest directly in such a plant (with resources generated from tax revenues), or instead subsidize private investment and opt for a private monopoly. As it will turn out, the outcome of a private monopoly will be similar in most respects to that of a centralized bureaucracy. Owing

skills. As a byproduct of their monopoly over technical and managerial expertise, bureaucrats have private information concerning overall capacity and the realization of marginal cost $\theta_i$ of delivery to any community. The central government and local users merely know the probability distributions from which these production parameters are drawn: e.g., $\theta_i$ is drawn from a distribution described by a distribution function $T_i$ over the interval $[\underline{\theta}_i, \bar{\theta}_i]$.

In the mechanism without any devolution of authority to local governments, the bureaucrats are additionally responsible for delivering the service to local users. Owing to their monopoly over provision, and weak accounting and supervisory systems, they are able to demand bribes from users in such a system, in the spirit of Wade's description of the Indian irrigation bureaucracy. When authority is devolved to local governments, authority over intracommunity allocation is ceded by bureaucrats to these governments. The local governments procure the aggregate service level for their community from the public enterprise. In this case, payments made for the service by local governments to the production facility are reflected in official accounts, in contrast to the bribes paid by local users in the system without devolution. Moreover, local governments need access to sources of finance in order to be able to make these payments. These can either take the form of user fees for the service, other sources of local revenue, or fiscal grants from the central government.

Each community has a large number of members, who belong to either of two classes that differ in their valuation of the service. For instance, think of large ($l$) farmers and small peasant ($p$) cultivators both of whom demand electricity and water as essential inputs in farming, complementary to land and labor. Owing to a the larger scale of cultivation, the former will have a higher total and marginal valuation for these inputs. The utility function of a member of class $k = l, p$ in community $i$ is given by $\gamma_k \eta_i v(y) - t_k$, where $\gamma_k$ is a class-specific valuation parameter, $\eta_i$ a community specific parameter, $y$ is the level of service delivered, and $t_k$ is the net financial cost to the user. The utility function $v$ is strictly increasing, strictly concave and thrice differentiable, and will frequently be taken to belong to the homothetic family $v(y) = \frac{1}{\alpha+1} y^{\alpha+1}$ where $\alpha < 0$ and different from $-1$. As in the previous model, the community preference shock $\eta_i$ is distributed according to a

to weak accounting and supervisory systems, and the self-interest of bureaucrats, the latter will operate very similar to unregulated private monopolists.

distribution function $N_i$ on an interval $[\underline{\eta}_i, \bar{\eta}_i]$.

The structure of information is as follows. The realization of community specific common shocks is known to local residents and local bureaucrats, but not the central government. The bureaucrat cannot identify members of the two classes within the community. In particular, attempts to charge the large farmers a higher unit bribe can be circumvented by these farmers splitting up their units among family members, retainers and tenants and masquerading as small peasant cultivators. Local governments may, in contrast, be able to identify the two classes within the community, though it will turn out that this plays no essential role in the analysis. On the other hand, the bureaucrat may be better informed about production conditions: aggregate capacity or local delivery costs.

The central government is more poorly informed than either bureaucrats or local governments: they do not have access to local conditions (i.e., the realization of $\eta_i, \theta_i$), neither can they identify the two groups of users within any community. In addition, they cannot monitor the aggregate service delivered to any given community, not its allocation within the community. Weaknesses in the accounting system also make it impossible for the central government to monitor actual operating and delivery costs of the public enterprise. They can, however, monitor official payments made to the enterprise by local governments. Hence financial transfers between the central government and the enterprise can be conditioned on these revenues, but not on any other variable.

In the centralized system, the budgetary support supplied by the central government to the public enterprise $C$ is meant to cover overhead and operating costs, and these are reimbursed on the basis of some 'standard cost' estimates that do not depend on any endogenous variable (e.g., they could depend on cost reports filled out by bureaucrats, but they would have an incentive to overstate costs to the maximum extent possible). In this system, bureaucrats would have access to two sources of income: (i) budgetary slack $C - F - \sum_i \theta_i Y_i$, the difference between reimbursed and actual cost, and (ii) bribes. Since $C$ and $F$ are fixed, their objective is to maximize the difference between bribe income and actual operating and delivery costs $\sum_i \theta_i Y_i$. Hence there is little difference between the public enterprise and a private monopoly whose rate-setting power is not subject to any

regulation.[28]

In the decentralized system, $C$ can be conditioned on $P$, the total payments received by the enterprise from local governments, according to a simple linear relationship: $C = a - bP$, i.e., a fixed payment of $a$, which is adjusted at a fixed rate $b$ against revenues. Bureaucrats can divert budgetary slack, the gap between revenues (including budgetary support from the central government) and actual costs:

$$a + (1-b)P - \sum_i \theta_i Y_i - F \tag{30}$$

to the consumption of perquisites. Assuming $b$ lies between 0 and 1 (if it exceeded 1 then they would have an incentive to minimize service levels $Y_i$), the bureaucrats will be motivated to maximize $(1-b)P - \sum_i \theta_i Y_i$. This has the effect of inducing the same behavior from the bureaucrats as with a lumpsum budgetary support system, where the variable operating costs are inflated by $\frac{1}{1-b}$. Attempts by the central government to restrict budgetary slack in this manner will therefore tend to restrict the level of service delivered, exactly in the manner that a sales tax on a private monopoly will restrict output. In setting the level of $b$, the central government thus faces a trade-off between rent extraction and efficiency. In what follows we shall assume that $b$ is set at 0, though the consequences of any other level of $b$ can be worked out by correspondingly inflating the marginal cost $\theta_i$.[29]

Finally, we need to specify the objectives of central and local governments. As in the previous section, they could be subject to capture by special interest groups, in a manner that increases the effective welfare weight on the interests of the large farmers. If $\beta_i$ denotes

[28] In this context, privatization of the monopoly is an alternative to the letting the bureaucracy run the public enterprise like an unfettered monopolist. It would have the effect of converting hidden bribe payments made by users to explicit rates charged by a private firm, which could be subject to regulatory oversight. Moreover, auctioning off private monopoly rights could have the effect of transferring rents from the monopoly to the central government. It may also reduce the scope of political influence over the enterprise. We do not go into the pros and cons of privatization as a policy option, however.

[29] Indeed, one advantage of the decentralized system that we do not explicitly address, is this ability of the central government to tax the rents earned by bureaucrats, owing to the observability of revenues $P$ of the public enterprise. In contexts involving sharing of a given stock of joint resource among different communities, such as water, taxation of these revenues do not give rise to any distorting effects. There decentralization has the advantage of permitting taxation of bureaucratic rents at small deadweight costs.

the fraction of citizens in community $i$ that belong to the peasant farmer class, and $\delta_i$ the corresponding capture coefficient of the local government, the latter's objective is to maximize $q^i = \beta_i U_p^i + \delta_i(1-\beta_i)U_l^i$, where $U_k^i$ denotes the net utility of class $k$ farmers in community $i$ from the public service (excluding the burden of central taxes that ultimately finance the service, since these are taken as given at the local level). And the central government maximizes $Q = \sum_i \alpha_i N_i[\beta_i V_p^i + \delta(1-\beta_i)V_l^i]$, where $N_i$ is the population of community $i$, $\alpha_i$ the fraction of small farmers that are informed voters in national elections, $\delta$ is the capture coefficient for the central government, and $V_k^i$ the corresponding net utility of class $k$ farmers in community $i$, inclusive of tax burdens. We assume that $\lambda$ is the deadweight cost of raising central tax revenues.

Note that the welfare of bureaucrats is not given any weight in the objectives of the central government, which is principally concerned about the welfare of local users, and therefore the distribution of rents between users and suppliers. As is well known from the literature on regulation (e.g., Baron and Myerson (1982)), this is a principal source of the incentive problem for regulated entitities. If governments were concerned instead with social efficiency, without regard to distribution of rents between users and producers, there is no need for any regulation at all. Our main results would similarly survive as long as the central government assigned a smaller welfare weight to bureaucrats compared with users.

Welfare levels at either local or national levels are obtained from the objective functions of the corresponding government when there are no political distortions, i.e., capture coefficients equal one, and so does the fraction of informed voters in each community. This helps define the suitable normative benchmark for service allocations. In an ideal first-best setting, bureaucrats would not earn any rents, and the fiscal burden on the government would exactly equal total costs of the public enterprise. The *first-best allocation* then maximizes

$$\sum_i N_i \eta_i [\beta_i \{\gamma_p v(y_{pi}) - (1+\lambda)\theta_i y_{pi}\} + (1-\beta_i)\{\gamma_l v(y_{li}) - (1+\lambda)\theta_i y_{li}\}] \qquad (31)$$

subject to the capacity constraint $\sum_i N_i[\beta_i y_{pi} + (1-\beta_i)y_{li}] \leq \bar{Y}$. Here $y_{li}$ and $y_{pi}$ respectively denote the service delivered to large and peasant farmers in community $i$. If the capacity constraint does not bite, this allocation is described by the first-order condition for farmers

of class $k$ in community $i$:

$$\gamma_k \eta_i v'(y_{ki}^f) - (1+\lambda)\theta_i = 0. \tag{32}$$

When the capacity constraint does bite, the optimal allocation is based on equating the net marginal social value of delivery (the left hand side of (32)) to different users.

## 2.1 Centralized Bureaucracy

As explained above, this system motivates bureaucrats to behave monopolistically, i.e., maximize bribe income, less actual operating costs. Consider first how bribes are set within each community. How would a bureaucrat 'sell' a given level of aggregate service $Y_i$ to a community to its users, when the nature of local need and delivery cost happens to be $(\eta_i, \theta_i)$? It would seek to set bribe and service levels for the two classes (denoted by $b_k$ and $y_k$ respectively) to maximize (per capita) bribe income

$$\beta_i b_p + (1-\beta_i) b_l \tag{33}$$

subject to voluntary participation constraint for each class $k$:

$$\gamma_k \eta_i v(y_k) - b_k \geq 0 \tag{34}$$

the constraint that large farmers do not seek to masquerade as small farmers:

$$\gamma_l \eta_i v(y_l) - b_l \geq \gamma_l \eta_i v(y_p) - b_p \tag{35}$$

and the allocation constraint

$$\beta_i y_p + (1-\beta_i) y_l \leq \frac{Y_i}{N_i}. \tag{36}$$

The solution to this problem is standard: small farmers get expropriated (i.e., the participation constraint (34) binds for them), while large farmers are charged a rate which just makes them indifferent about masquerading as a small farmer (so the incentive constraint (35) binds), which ends up leaving them some surplus:

$$b_p = \gamma_p \eta_i v(y_p), b_l = \gamma_l \eta_i v(y_l) - (\gamma_l - \gamma_p)\eta_i v(y_p). \tag{37}$$

In other words, large farmers are charged a lower per unit rate than are small farmers. Inserting expression (37) for the bribes as a function of the service levels into expression (33), we obtain the following reduced form expression for bribe income as a function of service delivery levels:

$$\beta_i D_p \eta_i v(y_p) + (1-\beta_i) D_l \eta_i v(y_l) \tag{38}$$

where $D_p \equiv \gamma_p - \frac{1-\beta_i}{\beta_i}(\gamma_l - \gamma_p)$ and $D_l \equiv \gamma_l$ represent the 'virtual' valuation parameters for the two classes respectively. The value of delivering an extra unit of service to a small farmer is smaller than $\gamma_p$ because it causes a downward adjustment in the rate that must be charged to large farmers, which offsets the extra bribe income that can be earned from the small farmers. Maximizing (38) subject to (36) yields the optimal allocation of the service: in the homothetic case, this is given by

$$\begin{aligned} y_p^* &= Y_i \frac{D_p^{-\frac{1}{\alpha}}}{\beta_i D_p^{-\frac{1}{\alpha}} + (1-\beta_i) D_l^{-\frac{1}{\alpha}}} \\ y_l^* &= Y_i \frac{D_l^{-\frac{1}{\alpha}}}{\beta_i D_p^{-\frac{1}{\alpha}} + (1-\beta_i) D_l^{-\frac{1}{\alpha}}} \end{aligned} \tag{39}$$

so that the bureaucrat ends up with a total bribe income from this community of

$$N_i B_i \eta_i \frac{Y_i^{-\frac{1}{\alpha}}}{\alpha+1} \tag{40}$$

where $B_i \equiv [\beta_i D_p^{-\frac{1}{\alpha}} + (1-\beta_i) D_l^{-\frac{1}{\alpha}}]^{-\alpha} < 1$.

Intercommunity allocations would subsequently be decided also on the consideration of maximization of the total surplus accruing to bureaucrats. Consider first the case where the entire bureaucracy operates as a team, to maximize their collective income, without regard to distribution of rents between upper and lower levels of the bureaucracy. In the absence of capacity constraints or externalities across communities, they would seek to maximize the difference between bribe income and delivery cost to community $i$: i.e., would set $Y_i$ to maximize

$$N_i B_i \eta_i \frac{Y_i^{-\frac{1}{\alpha}}}{\alpha+1} - \theta_i Y_i \tag{41}$$

resulting in aggregate service level $Y_i^* = (\frac{\theta_i}{N_i B_i \eta_i})^{\frac{1}{\alpha}}$ to community $i$. This outcome can be decentralized within the bureaucracy, by authorizing the local bureaucrat assigned to

community $i$ to maximize local income (41). Alternatively, if the problem was simply of allocating a given capacity of $\bar{Y}$ across the different communities, and marginal delivery costs were zero for every community, the intercommunity allocation would maximize $\sum_i N_i B_i \eta_i \frac{Y_i^{-\frac{1}{\alpha}}}{\alpha+1}$ subject to the constraint $\sum_i Y_i = \bar{Y}$, and is given by

$$Y_i^* = \bar{Y} \frac{(N_i B_i \eta_i)^{-\frac{1}{\alpha}}}{\sum_j (N_j B_j \eta_j)^{-\frac{1}{\alpha}}} \tag{42}$$

This would be implemented by requiring local bureaucrats to report the realization of their local $\eta_i$ parameter to a central bureaucrat, who would then calculate the allocation (42).

However, there may be competition over rents between different levels of the bureaucracy, and higher level central bureaucrats empowered to allocate service levels across different communities may not be informed about the realization of the local valuation shocks $\eta_i, i = 1, \ldots, m$. The central bureaucrats then face a problem in getting local bureaucrats to truthfully reveal their knowledge of these shocks, which affect the bribe potential in any given local community.[30] So the central bureaucrat designs a mechanism for the local bureaucrat of every community $i$, given by $Q_i(\eta_i), Y_i(\eta_i)$, defining the kickback that the local bureaucrat must pay to the central bureaucrat, and the corresponding service level allocated to the local bureaucrat, consequent on a reported valuation parameter $\eta_i$ by the latter.[31] The central bureaucrat selects these mechanisms, one for each local bureaucrat, to maximize their surplus, i.e., the difference between aggregate kickback and production costs

$$\mathcal{E} \sum_i [Q_i(\eta_i) - \theta_i Y_i(\eta_i)] \tag{43}$$

whereas the local bureaucrat is motivated to maximize the difference between local bribe income and the kickback that needs to be paid to their bosses. Hence the maximization

[30] It is presumed here that central bureaucrats are aware of relative population sizes and valuation parameters of users in different communitites, i.e., $N_i$ and $B_i$ for each community. In case they do not, the model can easily to extended to incorporate this extra informational asymmetry: local bureaucrats then report the product $N_i B_i \eta_i$ instead of $\eta_i$ to their superiors.

[31] Equivalently, the central bureaucrat will offer a $Q(Y_i)$ schedule to the local bureaucrat, defining the kickback associated with different levels of service allocation. The local bureaucrat then picks a service level from this menu. By virtue of the Revelation Principle, this is equivalent to the mechanism described above.

(43) is subject to a breakeven and truthful reporting constraints for each local bureaucrat:

$$N_i B_i \eta_i v(Y_i(\eta_i)) - Q_i(\eta_i) \geq 0$$

$$\eta_i \in \arg\max_{\tilde{\eta}_i} [N_i B_i \eta_i v(Y_i(\tilde{\eta}_i)) - Q_i(\tilde{\eta}_i)]$$

and the capacity constraint

$$\sum_i Y_i(\eta_i) \leq \bar{Y}.$$

The solution to this is an intercommunity service allocation $Y_i(\eta_i, \theta_i)$ which maximizes for any given realization of community need and cost parameters $\eta_i, \theta_i, i = 1, 2, \ldots$ the following function

$$\sum_i [N_i B_i J_i(\eta_i) v(Y_i) - \theta_i Y_i] \tag{44}$$

subject to the capacity constraint above. Here $J_i(\eta_i)$ denotes $\eta_i - \frac{1-N_i(\eta_i)}{n_i(\eta_i)}$, i.e., the valuation parameter $\eta_i$ less an adjustment based on its distribution (represented by the distribution function $N_i$ and density function $n_i$).[32] Competition for rents within the bureaucracy then causes the intercommunity allocation to be skewed in favor of communities with a high valuation. Lower level bureaucrats are tempted to understate the $\eta_i$ for their community in order to limit the kickback they have to pay their superiors. This temptation is counteracted by underproviding the service to a community when a low $\eta_i$ is reported. This distortion compounds the distortion resulting from inability of local bureaucrats to price discriminate perfectly (manifested by $B < 1$). The end result is (i) underprovision of service levels to each community (relative to the first-best allocation that corresponds to a zero deadweight cost of taxes).[33], and (ii) the intracommunity distortion whereby service delivery is underprovided to small farmers. We summarize these results below.

**Proposition 3** *The centralized bureaucracy (with internal competition for rents between upper and lower level bureaucrats) results in the following allocation (for any given state of the world* $(\theta_i, \eta_i), i = 1, 2, \ldots$.

[32]We assume here that the density is well defined and positive everywhere, and the standard monotone hazard rate condition that ensures $J_i$ is monotone increasing.

[33]With a positive deadweight cost, whether there is under or over-provision depends on how large $\lambda$ is.

*(i) Inter-community service deliveries are given by the solution to problem (44), and results in underprovision relative to the first-best (corresponding to $\lambda = 0$). The underprovision is more severe for communities with low valuation $\eta_i$ of the good.*

*(ii) Intracommunity allocation (given the aggregate service level $Y_i$) for community $i$ is given by (39), and results in further underprovision to low valuation (i.e., small farmers) users relative to high valuation (i.e., large farmers) users.*

## 2.2 Decentralization

Now suppose authority over intracommunity allocation is devolved to local governments. We first provide a benchmark result concerning a set of conditions under which devolution will lead to implementation of the first-best allocation. We will subsequently relax these conditions one by one, and explore the resulting distortions that arise, especially in comparison with those arising from the centralized bureaucracy.

**Proposition 4** *Consider the decentralized mechanism in which:*

*(i) local governments are not subject to capture, i.e., $\delta_i = 1$*

*(ii) local governments can levy user fees, or alternatively have access to local revenue sources at the same deadweight cost $\lambda$ as at the center*

*(iii) there are no capacity constraints*

*(iv) in procurement of service from the public enterprise, local governments have all the bargaining power vis-a-vis bureaucrats, and know the realization of the cost parameter $\theta_i$.*

*Then it results in the first-best allocation.*

If the local governments are not subject to capture by big farmers, their objective is to maximize the local measure of social welfare. Owing to assumption (ii) they internalize social financing costs, and (iii) ensures absence of any externalities across communities.

Finally, assumption (iv) ensures they can procure service for their community at its social cost $\theta_i$. It then follows that decentralization implements the first-best allocation.[34]

### 2.2.1 Local Capture

Now suppose that local governments are subject to capture, while all other assumptions of Proposition 4 hold. The consequences turn out to depend on the local financing powers of the local government. Suppose to start with that the local governments can levy local taxes at discriminatory rates on the two classes, a the same deadweight cost $\lambda$. Then the problem faced by the government in community $i$ is to select service levels and local taxes $y_k, t_k$ for the two classes $k = p, l$ to maximize

$$\beta_i[\gamma_p \eta_i v(y_p) - t_p] + \delta_i(1-\beta_i)[\gamma_l v(y_l) - t_l] \tag{45}$$

subject to the budget constraint $\beta_i t_p + (1-\beta_i)t_l = (1+\lambda)\theta_i[\beta_i y_p + (1-\beta_i)y_l]$. [35] Note that voluntary participation constraints do not need to be respected, as local governments have the ability to impose coercive taxes.

Note first that capture of the local government by the large farmers implies that small farmers bear the entire financial burden of the service: large farmers get charged nothing ($t_l = 0$ and thus $t_p = (1+\lambda)\theta_i[y_p + \frac{1-\beta_i}{\beta_i} y_l]$). Hence the objective of the local government expressed as a function of the service allocation alone reduces to

$$\eta_i[\beta_i \gamma_p v(y_p) + \delta_i(1-\beta_i)\gamma_l v(y_l)] - (1+\lambda)\theta_i[\beta_i y_p + (1-\beta_i)y_l] \tag{46}$$

[34] More formally, the local government in community $i$ seeks to maximize $\sum_k \beta_{ki}[\eta_i \delta_k v(y_{ki}) - (1+\lambda)t_{ki}]$, where $\beta_{ki}$ denotes the demographic weight of class $k$ in community $i$, and $t_{ki}$ their tax burden or user charge. The constraints include voluntary participation in the case that the service is financed by user fees ($\eta_i \delta_k v(y_{ki}) - t_{ki} \geq 0$), budget balance for the local government ($\sum_k \beta_{ki} t_{ki} \geq \theta_i \sum_k \beta_k y_{ki}$) and incentive constraints in case the local government cannot identify the two classes of farmers. It is evident that the solution to this is precisely the first-best allocation. This can be decentralized within the community (and hence satisfies the incentive compatibility condition in the case that the local government cannot identify the two classes) by a user fee of $\theta_i$, the proceeds of which can be rebated to residents.

[35] Even if the local government cannot identify the large farmers within the community for the same reason as bureaucrats, it will turn out that the incentive compatibility constraints will be automatically satisfied.

The solution then involves supply of the first-best level to small farmers, while it is *over-provided* to the large farmers:

$$\eta_i \gamma_p v'(y_p^d) = (1+\lambda)\theta_i; \eta_i \gamma_l v'(y_l^d) = \frac{(1+\lambda)\theta_i}{\delta_i} \tag{47}$$

Thus service levels to both groups expand, compared with the centralized system. What of the relative welfare comparison? In the centralized system, the small farmers get a surplus of exactly zero, while large farmers retain a positive surplus $(\gamma_l - \gamma_p)\eta_i v(y_p^c)$, where $y_p^c$ denotes the supply to small farmers under centralization. The resulting welfare is

$$w^c = \eta_i(1-\beta_i)(\gamma_l - \gamma_p)v(y_p^c) \tag{48}$$

while that under the decentralized regime is

$$w^d = \eta_i[\beta_i\{\gamma_p v(y_p^d) - (1+\lambda)\theta_i(y_p^d + \frac{1-\beta_i}{\beta_i}y_l^d)\} + (1-\beta_i)\gamma_l v(y_l^d) \tag{49}$$

It is evident that the large farmers are always better off under decentralization: they obtain a larger service level and pay nothing. The small farmers may or may not be better off under decentralization. What is clear that the higher the extent of local capture, the larger the service provided to large farmers, the cost of which is passed on to the small farmers. The service level to small farmers is left unaffected. So increasing local capture reduces the surplus of small farmers: if it is increased sufficiently then they must be worse off compared with the centralized system. The same is true of the level of welfare: as capture increases, the effect is to accentuate overprovision to the large farmers. So for sufficiently strong local capture, the decentralized system will be inferior to the centralized one. Evaluating the two regimes on the basis of service levels alone will then be misleading, since the decentralized regime will appear to be superior owing the improved service delivery levels and the disappearance of bribes paid to bureaucrats (and the service continues to be procured cost-effectively). It will then conceal the overprovision to large farmers and the fact that decentralization serves to make small farmers worse off and increase inequality.

In practice, local governments in most developing countries lack elastic revenue bases, especially with respect to small farmers or middle and low income citizens. Then the scope for such expropriation of these groups is more restricted. Consider therefore an alternative

scenario where local goverments only have the ability to finance the service by levying user fees. Then purchase of services by local users are entirely voluntary, so small farmers can no longer be expropriated. In particular, they cannot then be hurt by decentralization, since at worst they will receive zero surplus, which is what they received under the centralized system.[36] It is easy to check that with any degree of local capture, the fee for small farmers will be set at a level which exactly reduces their surplus to zero, while the service level will be provided to them at the efficient level:

$$y_p = y_p^f, t_f = \gamma_p \eta_i v(y_p^f).$$

This can be implemented by a suitable two part tariff. The financial surplus generated thereby will be used to fund provision of the service to the large farmers. If it pays for a service level $\hat{y}_l \equiv \frac{\beta_i(\gamma_p \eta_i v(y_p^f) - \theta_i y_p^f)}{(1-\beta_i)\theta_i}$ which is larger than the first-best level, this will be the resulting service provided to large farmers. Otherwise the latter will pay the amount necessary to raise provision to the efficient level:

$$y_l = \max\{y_l^f, \hat{y}_l\}, t_l = \theta_i(y_l - \hat{y}_l).$$

So once again the service may be overprovided to the large farmers, though to a lesser degree than the case in which the local governments could levy coercive taxes on the small farmers. Limiting the revenue raising authority of local governments to user fees alone therefore mitigates the damaging efficiency and equity effects of local capture.

### 2.2.2 Local Financing Constraints

While limiting the revenue raising authority of local governments can be useful in ameliorating the effects of local capture, it can impose other costs, pertaining especially to the nature of intercommunity allocations. To illustrate these, we suppose that local governments have no local financing sources whatsoever: neither local income or property taxes, or user fees.

[36] This is no longer true when there are more than two classes. Then intermediate classes can receive positive surplus under centralization, and be reduced to zero surplus under decentralization, if they do not happen to form part of the special interest groups at the local level.

To isolate the role of local financing, in Proposition 4, we consider a context where all of the other assumptions hold, i.e., there is no local capture, nor any capacity constraints, and local governments can procure the service at constant unit cost $\theta_i$. In order to be able to make payments to the public enterprise, however, local governments must receive fiscal grants from the central government. Suppose that the central government provides block grants to each local government, which are not tied to expenditures of this specific commodity. Then the local government can decide what fraction of its grant should be spent on purchases of the service for its citizens, the remainder being rebated to them in a lumpsum manner (or equivalently spent on other local public goods). It will turn out that this flexibility is valuable in ensuring some degree of efficiency in intercommunity allocations.

In this context, the first-best allocation can no longer be implemented. For if it were, it would necessitate providing a grant to a community which exactly allows it to purchase its first-best service level (given $\lambda > 0$, any excess allocations would result in excessive deadweight losses relative to the first-best). Since the latter is strictly increasing in the local valuation parameter $\eta_i$ and local cost $\theta_i$, the local government would have an incentive to overstate local need and cost in order to be eligible for a higher community grant level. If local needs are known privately by local residents, then grants to the community from the center must perforce be independent of local need. This is precisely the case with most grant formulae in practice, which condition only on a few broad demographic and social indicators of local need, such as population, local poverty rates or per capita income.

What is the nature of the optimal intergovernmental mechanism? If the local government receives a grant of $G_i$ and uses $P_i$ from this to purchase the service from the public enterprise, then it follows from reasoning similar to that used in deriving (58) that the resulting level of local welfare is

$$W_i(Y_i, G_i, P_i) = N_i L_i \eta_i v(Y_i) + G_i - P_i. \tag{50}$$

The local government must then decide the level of service $Y_i$ to procure at a cost of $P_i = \theta_i Y_i$, i.e., which maximizes

$$N_i L_i v(Y_i) - \theta_i Y_i \tag{51}$$

subject to the financing constraint that the payment cannot exceed the grant, i.e.,

$$Y_i \leq \frac{G_i}{\theta_i}. \tag{52}$$

The solution to this is

$$Y_i^L(\eta_i, \theta_i, G_i) = \min[Y_i^f(\eta_i, \theta_i), \frac{G_i}{\theta_i}] \tag{53}$$

where $Y_i^f(\eta_i, \theta_i)$ denotes the first-best service level corresponding to $\lambda = 0$ (i.e., which solves $N_i L_i \eta_i v'(Y_i) = \theta_i$). Define the threshold need $\eta_i^*(\theta_i, G_i) \equiv \frac{\theta_i}{N_i L_i v'(\frac{G_i}{\theta_i})}$. Then the mechanism results in under-supply relative to the first-best in high need states ($\eta_i > \eta_i^*$), and the first-best in low need states where the grant is sufficient to cover the expenditure required to procure the first-best level: see Figure 5.[37] The flexibility of the service level delivered to the community with respect to its local need then depends on how large the grant is. For small grant levels, the service level tends to be insensitive, as the community's collective purchases are financially constrained. With higher grant levels this financial constraint disappears, and the local government can then trade-off the value of the service with other goods and services that it can provide its citizens. The fact that the community grant is not tied to the specific service is essential in ensuring this flexibility.

How should the center set community grants in this setting? The center's objective is to set a grant level $G_i$ independent of the realization of $\eta_i$ and $\theta_i$, to maximize the expected welfare of residents of community $i$:

$$\mathcal{E}_{\eta_i,\theta_i}[N_i L_i \eta_i v(Y_i^L(\eta_i, \theta_i, G_i) - \theta_i Y_i^L(\eta_i, \theta_i, G_i) - \lambda G_i]. \tag{54}$$

It has to trade off the benefits of the added flexibility provided by a larger grant to any community, with the deadweight cost of the extra taxes needed to finance it. If the grant is chosen large enough that the local community is not financially constrained in most states of the world, then in all such states the community is being provided a grant which is larger

[37] Note, however, that this compares with the first-best that corresponds to a value of $\lambda = 0$, rather than the actual social deadweight loss of tax revenues. Since local communities procure at cost, they do not internalize the deadweight cost of tax revenues that finance their purchases. Hence supply levels in low need states actually tend to be excessive.

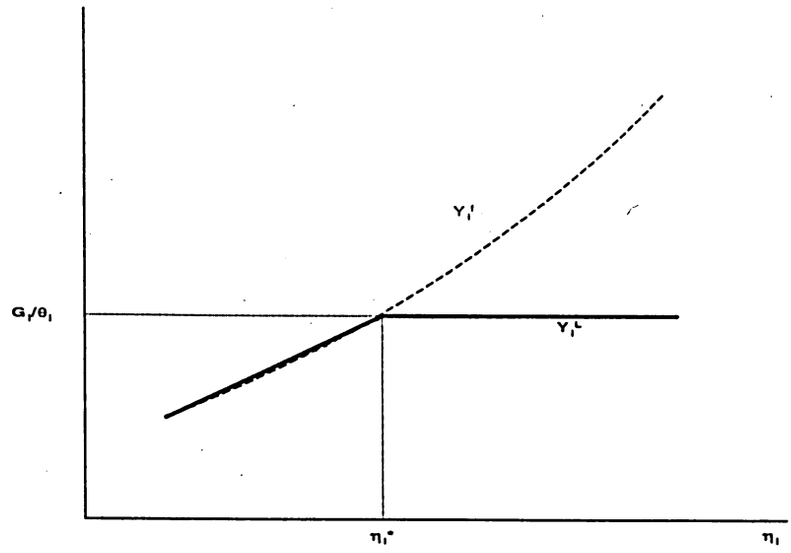


Figure 5: COMMUNITY ALLOCATION WITH FINANCING CONSTRAINTS

than what it really needs to procure the service: in such cases the expected marginal value of further grant increases is small relative to the deadweight costs. It is easily checked that the optimal grant $G_i^*$ is described by the first-order condition

$$\mathcal{E}_{\eta_i,\theta_i} \text{ Prob } [\eta_i > \eta_i^*(G_i^*, \theta_i)] = \lambda. \tag{55}$$

The left-hand-side of (55) is the expected probability that the local government will be financially constrained. It shows that with $\lambda > 0$, it is always optimal to ensure that the local government is constrained with positive probability. The higher is $\lambda$, the greater the likelihood that the service will be underprovided and will be locally insensitive to local need.

The resulting level of expected welfare of residents of this community, after taking into account the tax burdens that ultimately finance the fiscal grants, is then

$$W_i^L(\lambda) = \mathcal{E}_{\eta_i,\theta_i}[N_i L_i \eta_i v(Y_i^L(\eta_i, \theta_i, G_i^*)) - \theta_i Y_i^L(\eta_i, \theta_i, G_i^*) - \lambda G_i^*]. \tag{56}$$

It is evident that $G_i^*$ is decreasing in $\lambda$, and so is $W_i^L$. At $\lambda = 0$, the resulting level of welfare is the first-best level, since in this case local governments are never financially constrained, and the service allocation is consequently first-best. On the other hand, for $\lambda$

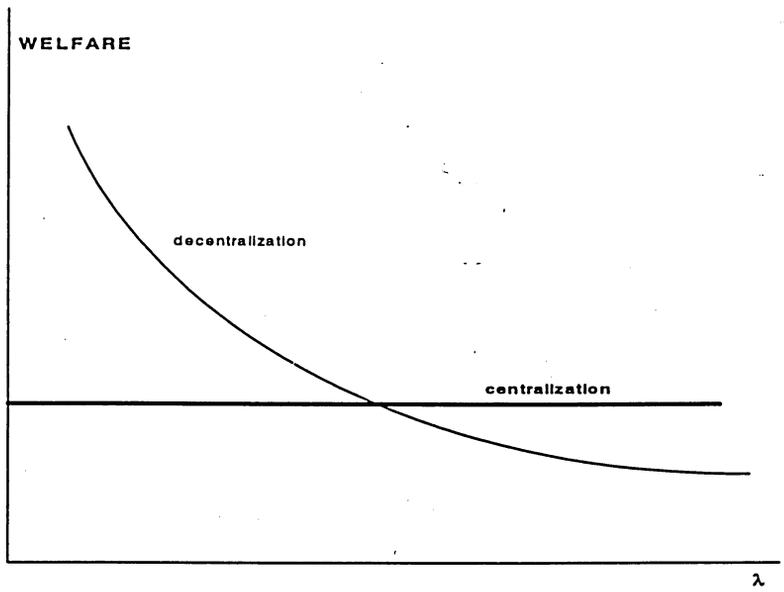


Figure 6: WELFARE RANKING WITH FINANCING CONSTRAINTS

sufficiently large, the community will be financially constrained in most states, and the level of service delivered will fall to an arbitrarily low level. On the other hand, the the welfare resulting from the centralized bureaucracy is independent of $\lambda$, excluding the constant cost of budgetary support to the public enterprise. It follows from this that *the decentralized mechanism works better if and only if the deadweight cost of fiscal resources of the central government is not too large.* See Figure 6.

Hence expenditure decentralization that is not supplemented by decentralization of revenue-raising authority to local governments can actually make matters worse, in countries where the central government has a low administrative capacity to collect taxes, or has limited access to elastic revenue sources. Moreover, instability in central revenues will render corresponding instability in service levels delivered to local communities. While the centralized bureaucracy results in inefficient and inequitable outcomes, it is relatively stable over time, being lubricated by private bribes rather than intergovernmental transfers financed out of central revenues.

On the other hand, there is a potential problem with revenue decentralization: it may

exacerbate the problems arising from local capture, as illustrated in the previous Section. One solution is to allow local governments to levy user fees and finance the service in that fashion: this simultaneously limits the dangers of local capture and allows flexibility of supply to the community with respect to variations in local need and cost. If this is not feasible, then considerations of local capture are likely to further limit the scale of fiscal grants. High levels of local capture relative to capture at the national level may motivate the latter to allocate even smaller grant sizes, exacerbating problems of intercommunity targeting.

### 2.2.3 Intercommunity Externalities Arising from Capacity Constraints

Now consider what happens when there are capacity constraints, while the other assumptions in Proposition 4 hold. In other words, we now abstract altogether from considerations of local capture, or local financing constraints. To illustrate the problem most starkly, suppose there are no variable operating or delivery costs at all: $\theta_i = 0$, all $i$. Then the problem is simply to allocate a given stock of the resource between users in diverse communities.

Given the aggregate service $Y_i$ allocated to community $i$, its local government will allocate this among residents to maximize local welfare $N_i\eta_i \sum_k \beta_{ki}\delta_k v(y_{ki})$, subject to the constraint $N_i \sum_k \beta_{ki} y_{ki} \leq Y_i$, resulting in service allocation

$$y_{ki} = Y_i \frac{\delta_k^{-\frac{1}{\alpha}}}{\sum_m \beta_{mi}\delta_m^{-\frac{1}{\alpha}}}. \tag{57}$$

This allocation can be achieved directly if the local government can identify the two classes within the community.[38] Hence if the aggregate payment made by the local government to the public enterprise for the service $Y_i$ is $P_i$, the net welfare of the community is given by

$$W_i(Y_i, P_i, \eta_i) = N_i L_i \eta_i v(Y_i) - (1+\lambda)P_i \tag{58}$$

where $L_i$ denotes $(\sum_k \beta_{ki}\delta_k^{-\frac{1}{\alpha}})^{-\alpha}$. While procuring the service from the public enterprise, (58) represents the objective function of the local government.

[38] Otherwise, it can be implemented by a uniform user fee, the proceeds of which is rebated lumpsum to residents, or contributes to the fiscal revenues of the local government.

If local governments have all the bargaining power vis-a-vis the bureaucrats, they are able to state the terms on which they are willing to procure the service. Given the aggregate capacity constraint, however, they compete for the aggregate resource with *other* communities. The specific way that this intercommunity competition is structured is then important.

Consider first the case where at the initial stage all local governments move simultaneously and offer the terms on which they are willing to procure the service from the enterprise. So the local government of community $i$ selects a payment schedule conditional on the service level allocated: $P_i = b_i(Y_i)$. Then at the second stage, the bureaucrat selects a service allocation. Payments from local governments must be nonnegative, as the public enterprise cannot be compelled to make reverse transfers to local governments. Clearly, given the bids of different governments, the bureaucrat will subsequently select the allocation that maximizes the net operating surplus of the public enterprise. In this case the intercommunity service allocation will be selected to maximize $\sum_i b_i(Y_i)$. If local governments are fully informed about their respective valuation parameters $\eta_1, \eta_2, \ldots$ this reduces to a *menu auction game* studied by Bernheim and Whinston (1986). They show that there exists a set of truthful Nash equilibria which have some appealing properties: e.g., these equilibria, and only these, are immune to self-enforcing coalitional deviations. In such an equilibrium, each local government would submit a bid exactly equal to its valuation of the service $N_i L_i \eta_i v(Y_i)$ plus or minus a constant. This implies that the resulting intercommunity allocation achieves the first-best level of efficiency (though not necessarily of welfare), since at the second stage the bureaucrat would end up allocating the service to maximize the sum of their reported valuations, which equals the expression for welfare, plus or minus a constant. The fact that the bureaucrat eventually selects an income maximizing allocation forces each local government to internalize the externality imposed on other communities as a result of its securing an additional unit of the service. In order to induce the bureaucrat to award it an additional unit, it has to compensate the latter for income foregone from not allocating it to any other community.

Nevertheless, more relevant for our purposes is the level of welfare, which raises the question of how surpluses are distributed between users and the bureaucrats. This requires

a calculation of the constant terms in the equilibrium bids. Owing to the competition between different communities, the local governments will end up transferring positive rents to the bureaucrat, so that the resulting level of welfare will fall below the first-best level. In the special case of only two communities, Bernheim and Whinston show there is a unique truthful Nash equilibrium outcome, in which each local government pays a Groves-Clarke tax, i.e., an amount which compensates the other community for the service level it obtains. The equilibrium bid of the government of community 1 is $\frac{1}{1+\lambda}N_2L_2\eta_2[v(\bar{Y}) - v(Y_2^f(\eta_1,\eta_2)]$, while that of community 2 is $\frac{1}{1+\lambda}N_1L_1\eta_1[v(\bar{Y}) - v(Y_1^f(\eta_1,\eta_2)]$, where $Y_i^f(\eta_1,\eta_2)$ denotes the first-best allocation to community $i$. The bureaucrats end up with a rent, equal to the sum of these bids, and the resulting level of welfare of users falls below the first-best level by the same amount. In other words, part of the surplus of users is dissipated through competition between communities for the service.

Comparing this with the outcome under a centralized bureaucracy, we see there is an efficiency gain both with respect to inter and intracommunity allocation under decentralization. The allocation is less biased in favor of large farmers and high valuation communities, so they may be interpreted as improvements in vertical equity as well. The only cost to users relative to the first-best arises from rent dissipation owing to intercommunity competition. For a complete comparison, this cost needs to be traded off against the efficiency improvements.

The problem of competitive rent dissipation under decentralization can, however, be substantially eased if the central government were to restructure the process by which the intercommunity allocation of the service is determined. The simplest intervention may simply be to tax the revenues of the public enterprise: if the capacity constraints are binding and variable costs are zero — as in the case of natural resources — such taxation has associated with it no efficiency costs. Alternatively, the center (or a coalition of the local governments) may design an alternative mechanism for intercommunity allocation of the resource, which also secures efficient intercommunity allocation, but avoids the competitive rent dissipation. It is well known from the literature on public goods that such efficient mechanisms can be constructed in a large variety of situations. They would also involve levying Groves-Clarke taxes that help facilitate internalization of intercommunity external-

ities. But the aggregate revenue from such taxes (or parts thereof) can be rebated back to the communities in a way that do not interfere with the incentives for truthful reporting, so as to guarantee that the decentralized outcome does achieve a superior outcome.[39]

### 2.2.4 Allocation of Bargaining Power and Information

Consider now the implications of providing bureaucrats managing the public enterprise with all the bargaining power over sales of the service to local governments. If local governments are financially unconstrained, then the bureaucrats can make take-it-or-leave-it offers to them in a way to completely expropriate the entire surplus of local users, as long as they know the community need parameter $\eta_i$. Indeed, they are rendered better off compared with the centralized outcome, where they were unable to engage in perfect price discrimination. Here they can rely on the local government's knowledge of personal characteristics of its residents to design an efficient intracommunity allocation, and then extract all their surplus, with a payment schedule $P_i(Y_i, \eta_i, \theta_i) = \max[N_i L_i \eta_i v(Y_i), \theta_i Y_i]$. The resulting allocation will be perfectly efficient, but definitely leave users worse off compared with the centralized bureaucracy. The extent to which local communities will actually get expropriated will be limited in practice if they are better informed about local need than the bureaucrats are, and if bargaining power is shared. In the latter respect, again, the design of institutions governing relative authority of local governments and bureaucrats is an important factor governing the success of the decentralization initiative. One particular example discussed by Wade (1997) is the practice of separating construction from operation and maintenance (in Korea but not in India) which permits the creation of a local bureaucracy for the latter that is appointed by and accountable to local goverments.

In similar vein, asymmetry of information concerning production conditions between bureaucrats and local governments will limit the welfare gains from decentralization, even if the latter have all the bargaining power and are financially unconstrained. Suppose, for instance, that the local government does not know the realization of $\theta_i$, but all other

[39] If there are a large number of communities, these essentially reduce to the use of a price mechanism, where the center sets the price and the local governments respond with demands. The revenues from this mechanism can be used to finance capital costs, bolster central finances, or get rebated to local governments.

conditions of Proposition 4 are met. The beliefs of the local government concerning the realization of $\theta_i$ are represented by the distribution function $T_i$. It offers an incentive mechanism $P_i(Y_i)$ to the local bureaucrat, i.e., what it offers to pay for each level of service delivered to it. The bureaucrat then selects a level of service after observing the realization of $\theta_i$. Equivalently, the bureaucrat is asked to report the cost, following which the local government decides on a level of service to procure.

Local bureaucrats can now earn rents owing to their private information concerning the technology. Since local governments will try to limit the rents earned by their bureaucrats, the tendency for the latter to overstate costs will give rise to underprovision relative to the first-best. As is familiar from the incentive literature, this is a consequence of the tradeoff between rent extraction and efficiency. Promoting the welfare of users will necessarily give rise to inefficient production cutbacks. The service delivered in any given state will equal the first-best delivery level corresponding not to the true cost $\theta_i$, but to a marked up version of it: $\theta_i[1 + m_i(\theta_i)]$, where the markup $m_i(\theta_i) = \frac{T_i(\theta_i)}{\theta_i t_i(\theta_i)}]$ reflects the rent earned by the bureaucrat owing to his private information.[40] The degree of undersupply therefore depends on the extent of the informational asymmetry between the bureaucrat and local governments concerning the true cost. In contrast, the undersupply and expropriation of users under the centralized bureaucracy depends on a different asymmetry of information, concerning private valuation parameters of users. The relative seriousness of these asymmetries then influences the relative welfare levels resulting under the two regimes. In particular, when local governments do not have sufficient 'expertise' relative to bureaucrats, the welfare gains from decentralization are muted.

[40]Here $t_i$ denotes the density function of the distribution function $T_i$. This expression assumes that the density is always well-defined and positive, and that the distribution satisfies the familiar monotone hazard rate condition which implies that the marked-up cost is increasing in $\theta_i$.

# APPENDIX

## A1. A Special Interest Capture Model

Here we present a model of electoral competition based on Grossman and Helpman (1996) that underlies the analysis of Section 2. Start by considering a given local community and the policy preferences of an elected local government. Later we shall explain how it can be modified to represent competition at the level of the central government.

While the model of Section 2 had only two classes, we illustrate the model for a slightly more general setting, with three classes instead of two, since this context is of some independent interest. So suppose that in the community in question the three classes of citizens are the landless poor ($p$), middle income peasants or small landowners ($m$) and the rich or large landowners ($r$), in proportions $\beta_p, \beta_m$ and $\beta_r = 1 - \beta_p - \beta_m$ respectively. A fraction of citizens of each class is *informed* or politically aware, and vote for different parties on the basis of the levels of utility they expect to achieve under their respective different policies. The fraction of informed voters of each type are $\alpha_p, \alpha_m$ and $\alpha_r$. It is natural to assume that political awareness is closely related to socioeconomic position and education level, so $\alpha_r > \alpha_m > \alpha_p$. The welfare level of class $c = p, m, r$ is a function $U_c(p)$ of the policy choice $p$.

There are two parties, denoted by $A$ and $B$. Informed citizens engage in 'probabilistic voting', weighing personal utility differences with an intrinsic preference for one party over another, with the latter being distributed randomly in the population according to an exogenous distribution. The intrinsic preference for party $B$ is denoted $\beta$, and this is supposed to be distributed uniformly (with constant density $f$) on the interval $[-\frac{1}{2f} - \frac{a}{f}, \frac{1}{2f} - \frac{a}{f}]$, where $a \in (0, \frac{1}{2})$ is the intrinsic advantage of party $A$ over party $B$, and $\frac{1}{f} > 0$ is a measure of dispersion of these intrinsic preferences. These intrinsic preferences may arise from incumbency (e.g., if party $A$ has traditionally been in power, voters may be unwilling to experiment with an unknown party) or other exogenous differences in ideology on some non-economic dimension (such as attitudes towards religion).

Assume that parties announce policies prior to the election, and parties are committed

to them once elected. An informed voter in class $c$ with intrinsic preference $\beta$ for party $B$ therefore votes for party $A$ if $U_c(p^A) - U_c(p^B) \geq \beta$. Hence the fraction of class $c$ informed voters that vote for party $A$ is $\frac{1}{2} + a + f[U_c(p^A) - U_c(p^B)]$. Letting

$$W_I(p^i) \equiv \beta_r \alpha_r U_r(p^i) + \beta_m \alpha_m U_m(p^i) + \beta_p \alpha_p U_p(p^i)$$

it follows that the total number of informed voters in the constituency that vote for party $A$ equals $\frac{1}{2} + a + f[W_I(p^A) - W_I(p^B)]$.

Uninformed voters are swayed by relative spending of the two parties on mobilization of voter support. These include voters that do not show up to vote, unless induced or persuaded by party cadres or election advertisements. This creates a need for parties to find sources for financing election campaigns. Uninformed voters are also subject to the same distribution of ideological preference for one party over another as are informed voters. Hence given campaign spending levels $C^A, C^B$, the fraction of uninformed voters voting for $A$ equals $\frac{1}{2} + a + h(C^A - C^B)$, where $h > 0$ is a given parameter.

The aggregate vote share of party $A$ is then

$$s^A = \frac{1}{2} + a + f[W_I(p^A) - W_I(p^B)] + h[1 - \beta_r \alpha_r - \beta_m \alpha_m - \beta_p \alpha_p][C^A - C^B] \qquad (59)$$

The election will be decided on the basis of a simple majority vote, so one of the two parties will win, and the policy of that party will end up being selected. The probability that party $A$ wins is given by $\phi(s^A)$, an increasing function of party $A$'s vote share.[41]

It is assumed that each party's objective is to be in power, so they maximize the probability of winning, i.e., their respective vote shares. Hence parties are assumed to be entirely opportunistic; hence they are willing to bend policy platforms in whichever direction will

[41] In case there is just one seat in question, and no other uncertainty, then $\phi(s^A)$ is discontinuous, equal to 1 if $s^A$ exceeds $\frac{1}{2}$, and 0 if it falls below $\frac{1}{2}$. In general, however, there are other uncertainties (e.g., in turnout and vote counting errors). So $\phi$ is typically a smooth, strictly increasing function, though it may be very flat outside a neighborhood of $\frac{1}{2}$, and very steep within this neighborhood. And if there are multiple ($n$) seats being contested, with each seat a point binomial with probability $\phi(s^A)$, then the probability of one party winning a simple majority of the seats is given by the probability that the corresponding binomial distribution of $n$ trials with individual probability of success $\phi(s^A)$ results in over $\frac{n}{2}$ seats going to party $A$.

enhance their prospects of being in power.[42] And the eventual (gross) payoffs for citizens of class $c$ equals

$$\phi(s^A)U_c(p^A) + [1 - \phi(s^A)]U_c(p^B).$$

Finally, assume that there is a single organized lobby, comprised only of the large farmers.[43] This lobby makes campaign contributions to the two parties that are conditioned on their policy platforms: $C^A(p^A), C^B(p^B)$. The lobbying game is as follows: in the first stage, the large farmer lobby offers conditional contributions $C^A(p^A), C^B(p^B)$ which are constrained to be nonnegative. Then at the second stage, each party selects a policy to maximize its vote share, i.e., party $k = A, B$ selects policy $p^k$ to maximize (using (59))

$$W_I(p^k) + \chi C^k(p^k) \tag{60}$$

where $\chi \equiv \frac{h}{f}[1 - \Sigma_c \beta_c \alpha_c]$ is the relative weight on election finance relative to the interests of informed voters in each party's objective.

In the absence of any campaign contributions, both parties will select policy $p^*$ to maximize $W_I$, i.e., the interests of informed voters, which ends up as a linear welfare function with the welfare weight of citizens of class $k$ equal to $\beta_k \alpha_k$. If all citizens are informed then this is the utilitarian welfare function. Then we obtain convergence of policies of the two parties to that which maximizes this welfare function. Intensities of preference count, owing to the smoothing induced by probabilistic voting and multidimensional voter preferences. In the absence of such smoothing, only ordinal preferences would matter and Downsian convergence to the median informed voter would result. Note also that in the absence of any lobbying, party $A$ will win with probability $\frac{1}{2} + a$, since both parties select the same policies.

[42]The analysis can easily be extended to the contexts where one of the two parties has an ideological, inflexible platform, while the other is opportunistic: see further below.

[43]The set of lobbies is exogenous in the Grossman-Helpman framework. The theory can be extended to the case of multiple lobbies, though it loses its simple structure in that case. As it turns out, we apply the model in subsequent sections to the context where there are simply two classes: the poor and the non-poor in this Section, and small and large farmers in the next. So all that we need to assume is that one of these two classes is not organized into a lobby, whereas the other one is.

Now introduce the role of lobbying. If the large farmer lobby wishes to bias the policy choice of party $k$ from $p^*$ to $p^k$, it would have to contribute at least $\tilde{C}^k(p^k)$ which makes the party indifferent between the two options, i.e., such that

$$W_I(p^k) + \chi \tilde{C}^k = W_I(p^*),$$

so this minimum contribution is given by

$$\tilde{C}^k(p^k) = \frac{1}{\chi}[W_I(p^*) - W_I(p^k)] \tag{61}$$

If the participation constraints bind, the lobby contributes only to influence policy choices of each party, but not the relative probabilities of either party winning. Then *party A continues to win with probability* $\phi^A \equiv \frac{1}{2} + a$, *independent of the precise policies chosen*, since the loss of informed voters is exactly compensated by gain of uninformed voters. In this case, the large farmer lobby effectively purchases the policy platform of each party at a price given by (61) above. Let $\phi^k$ denote the constant probability of winning for party $k$, which is $\frac{1}{2} + a$ for party $A$, and $\frac{1}{2} - a$ for party $B$. So in equilibrium, it will induce policy choice $p^k$ by party $k$ which maximizes the net expected utility of a representative large farmer $\phi^k U_r(p^k) - \frac{1}{\beta_r}\tilde{C}^k(p^k)$. This gives rise to the following result:

**Proposition 5** *Assume that participation constraints of both parties bind. Then the policy choice* $p^k$ *of party* $k = A, B$ *is selected to maximize*

$$\chi\phi^k U_r(p^k) + W_I(p^k) \equiv \alpha_p\beta_p U_p(p^k) + \alpha_m\beta_m U_m(p^k) + \beta_r\{\alpha_r + \chi\phi^k\}U_r(p^k) \tag{62}$$

Hence policy choices maximize a linear welfare function once again, where the effect of lobbying is to augment the welfare weight of the large farmers, by the term $\chi\phi^k$. The parameter $\chi$ reflects the importance of campaign contributions in determining electoral outcomes, and depends ultimately on the fraction of uninformed voters and how easily they can be swayed by vote canvassing expenditures incurred by parties. The term $\phi^k$ is the electoral prospect of party $k$. It follows that the party with an intrinsic advantage over the other (party $A$ here) will select policies that are be more biased in favor of the lobby, will receive larger contributions, and tend to win more often. Both parties are influenced

by the lobby, but party $A$ more so. Ultimately, the extent of 'capture' of the policy of the local government thus depends on a variety of parameters: it tends to be more extreme the fewer voters are informed on average ($\alpha_c$ is small), the greater the disparity in fractions of different classes that are informed, the more sensitive uninformed voters are to vote mobilization expenditures ($h$ is large), the more dispersed intrinsic preferences are in the voter population ($f$ is small), and the greater the *ex ante* bias in the competition between the two parties ($a$ is large).

In the preceding analysis, we assumed that the lobby would contribute no more than is necessary to induce the party in question to modify its policy. When is it in its interest to contribute even more, so the participation constraints do not bind? The benefit from additional contributions to a party is that it enables that party to win more votes. To the extent that the lobby prefers the policy stand of one party over another, it may then want to contribute additionally to its favored party (party $A$ here) to increase the chances that it wins. It is evident that the participation constraint may not bind for at most one party, the one that is favored to win (party $A$). Starting from the outcome depicted above, where the chosen policy of party $k$ is denoted $p^{k*}$, the lobby would not want to contribute more to the favored party $A$ if $\phi$ is concave above $\frac{1}{2}$ and

$$\phi'(\frac{1}{2}+a)h[1-\Sigma_c\beta_c\alpha_c][U_r(p^{A*})-U_r(p^{B*})]<1. \tag{63}$$

If electoral uncertainty is sufficiently low, i.e., party $A$ is favored sufficiently, the $\phi$ function will be sufficiently flat at $\frac{1}{2}+a$, and this condition will indeed hold, as it will not be worthwhile for the lobby to spend one additional dollar to achieve an infinitesimal increase in the likelihood of its favored party winning. In what follows, we shall assume that this condition is indeed met.[44]

The model identifies some of the parameters that determine the extent to which the local government is captured by the rich farmers. Of key importance is the extent to which

[44] If it is not met, then the asymmetry between the two parties is heightened further in all respects: party $A$ leans further in favor of the interests of the lobby group, receives larger campaign contributions, and wins more often. Indeed, party $A$'s induced welfare function will then entirely coincide (at least locally) with the preferences of the large farmers.

the democratic process is subjected to effective competition between the parties concerned. If one party has a significant incumbency advantage for instance, then the extent of capture will be far greater. An increase in the number of competing parties is easily checked to result in less capture, as long as it reduces the probability that the dominant party wins. Political competition is the mechanism that forces each party to give greater weight to the interests of general voters over special interest groups. For similar reasons, holding of regular elections that are fair, combined with rules requiring greater transparency in the working of local government, will reduce the extent of capture. Alternatively, the rise of a rival peasant lobby will enhance the welfare weight of the middle income group, at the expense of the other two groups. Finally, the degree of capture will depend also on the fraction of the three classes respectively that are informed: there will be less capture with more educated and politically aware voters, and the smaller the disparity in awareness levels between different classes.

This in turn explains why the degree of capture depends on economic inequality. First, an increase in incomes of the rich at the expense of the poor can cause levels of education and political participation of the latter to fall, causing a greater disparity in awareness levels. Moreover, a land reform, for instance that redistributes land from the large farmers to the landless, causes the fraction of middle income small farmers to grow at the expense of the demographic weight of the other two classes. If it is the case that the disparity in levels of 'awareness' (i.e., $\alpha_c$) between small farmers and the landless is much greater than between small and large farmers, the effect will be to increase the overall fraction of voters that are informed.[45] The land redistribution then has two effects on the induced welfare weights. One is the direct *demographic* effect of the redistribution: $\beta_m$ rises, while $\beta_r$ and $\beta_p$ fall. In addition, there is the indirect *political awareness* effect if $\alpha_m$ is substantially larger than $\alpha_p$, but not substantially smaller than $\alpha_r$: then the overall fraction of local voters that are informed rises, causing $\chi$ and hence the bias in favor of the large farmers to fall. The

[45]This assumption is reasonable insofar as the responsibilty for managing cultivation on own land necessitates investment in information concerning the delivery by the government of infrastructural and other agricultural inputs such as fertilizers and technical knowhow. In contrast, landless workers that work as wage labor on the land of others have little incentive to acquire such information.

weight on the interests of the small farmers will unambiguously rise, while the overall effect on the interests of the poor is ambiguous.

## A2. Relative Capture at Local and National Levels

Electoral competition at the level of the central government can also be modelled in a similar manner. However, there may be a number of differences between the level of capture at the national and local levels. It is interesting to speculate on possible sources of these differences, since the analysis of Part 1 identified this as a key determinant of the relative success of decentralization in the context of the poverty allevation scheme.

First, the number of seats contested in the national election is many times larger than the number contested in local elections. Then it is less difficult for a single party to win all (or most) of the seats at the national level. Policy making at the national level therefore represent greater compromise among the policy platforms of different parties. Extending the model of the preceding section to the national context, suppose to start with that there are many communities that are identical in all respects (in terms of composition and preferences of voters). Suppose there is one seat in the national legislature assigned to each community, while in local elections only one person is selected to form the local government. But as in the local context, suppose there are two parties, and the single lobby of rich farmers. Then given the national policy platforms of the two parties, and resulting vote share $s^A$ of party $A$ in each community, the law of large numbers implies that party $A$ will win approximately $\phi^A \equiv \phi(s^A)$ percent of the seats in the national legislature, while party $B$ wins the remaining $\phi^B \equiv 1 - \phi^A$ percent seats. On the other hand, local governments in $\phi^A$ communities are entirely governed by candidates from party $A$, while those in remaining communities are governed entirely by party $B$. Hence the composition of the legislature tends to be more predictable than that of any local government.

Suppose now that the policy actually selected by the government reflects a compromise between the policy platforms of the two parties, depending on the allocation of seats between them. This would indeed be the case if the government was formed on the basis of proportions of seats in the legislature, rather than on securing a majority. Even in the

latter case, the government may have to yield to the platform of the opposition in case a supermajority is required to pass spending bills, or if part of the policy formation process is delegated to specialist committees within the legislature, whose composition partly reflects the allocation of seats. Finally, in the case of more than two competing parties, no single party may secure an absolute majority; then parties winning a few seats can exert much influence within coalition governments. In all these situations the policy actually selected by the government at the national level will be a compromise between the platforms of contesting parties. In the two party context, the actual policy of the government will be a compromise between $p^A$ and $p^B$, and will tend to be closer to $p^A$ the greater the fraction of seats $\phi^A$ in the legislature won by party $A$.

To examine possible implications of this, assume that the policy space is Euclidean (e.g., policies concerning tax rates or spending programs), and that the resulting policy $p_N$ at the national level is a convex combination of $p^A$ and $p^B$, with weights given by the fraction of seats in the legislature:

$$p_n = \phi^A p^A + (1 - \phi^A) p^B \tag{64}$$

Typically the actual policy will take a more complicated nonlinear form, depending on the precise institutional rules concerning the formation of government, the nature of majority required to pass legislation, delegation of agenda setting to legislative committees, and norms of bargaining among legislative factions. The role of these is studied by a large literature in political science. For our purpose, however, the results below will qualitatively continue to hold with any such compromise formula.

It is plausible to suppose that each party will seek to maximize the fraction of seats it wins in the legislature. Hence party $i$'s objective continues to be described by (60), so the minimum campaign contributions necessary to induce a policy switch also continues to be described by (61). However, the expected utility of the large farmers is now given by

$$U_r(\phi^A p^A + (1 - \phi^A) p^B) - C^A(p^A) - C^B(p^B) \tag{65}$$

Under an assumption similar to (63), the contributions continue to be the minimum contributions necessary to induce the respective policy choices of the two parties, and allocation of seats ends up being independent of the policies chosen. Hence the equilibrium policies

$p^A, p^B$ must maximize (65), i.e., maximize

$$\chi\phi^A U_r(\phi^A p^A + (1-\phi^A)p^B) + W_I(p^A) + W_I(p^B) \tag{66}$$

Hence, if $U_r$ is linear in the policy choice, the same policies will be selected by the two parties at the national and local level elections. A majority (fraction $\phi^A$) of the local governments will select policy $p^A$, with the remaining local governments will select $p^B$. The policy of the central government will be predictable, and will equal the average of policies selected by different local governments. Hence policy at the national level will thus end up less biased in favor of large landlords, compared with the policies of a majority of local governments.

What are the consequences when $U_r$ is not linear? Then policy choices of the two parties will differ at the national and local levels. To illustrate the nature of discrepancy that arises, suppose that all citizens have utility functions that are strictly concave in their own incomes, and that policy preferences of voters are determined entirely by their consequences for their own incomes. Consider a policy over which the interests of the rich conflicts with that of the interests of the average informed voter (such as how low property tax rates should be set). Then $U_r$ is a strictly increasing concave function of $p^N$, while $W_I$ is a strictly decreasing convex function of $p^N$. Equilibrium policy choices of the two parties at the national level $p_n^A, p_n^B$ satisfy the first order conditions

$$\begin{aligned} \chi\phi^A U_r'(\phi^A p_n^A + (1-\phi_A)p_n^B) &= -W_I'(p_n^A) \\ \chi(1-\phi^A) U_r'(\phi^A p_n^A + (1-\phi_A)p_n^B) &= -W_I'(p_n^B) \end{aligned} \tag{67}$$

whereas policy choices at the local level $p_l^A, p_l^B$ satisfy

$$\begin{aligned} \chi\phi^A U_r'(p_l^A) &= -W_I'(p_l^A) \\ \chi(1-\phi^A) U_r'(p_l^B) &= -W_I'(p_l^B) \end{aligned} \tag{68}$$

These equations can be manipulated to imply that

$$p_n^B < p_l^B < p_n < p_l^A < p_n^A \tag{69}$$

so party policies become more divergent at the national level. But it is still the case that government policy at the center $p_n$ is less biased in favor of the rich, compared to policy of

the majority of local governments (where party $A$ wins). It would be interesting to compare the policy of the central government with the average policy of a local government, but we have not been able to obtain a definite result in this respect.[46]

A second source of difference between the nature of competition at national and local levels arises when communities are heterogenous. In general the demographic profile and levels of political involvement will differ across communities, as will the nature of policy preferences of any class owing to differences in local circumstances. Let us describe the special circumstances under which the implied welfare functions are qualitatively similar at national and local levels in this case: these will clarify possible sources of dissimilarities between the two levels. Suppose that (a) communities do not differ with respect to the dispersion of intrinsic political preferences (the parameter $f$), and (b) each party maximizes the aggregate number of votes $s^A = \sum_i s_i^A$ across all communities. Then the vote share of party $A$ in community $i$ is

$$s_i^A = \frac{1}{2} + a_i + fN_i[W_I(p^A;i) - W_I(p^B;i)] + h_i[1 - \sum_c \beta_{ic}\alpha_{ic}][C_i^A - C_i^B] \qquad (70)$$

where the subscript denotes variables specific to community $i$. Campaign funds will be allocated across communities to maximize $s_i^A$, i.e., will be allocated only to those communities with the highest value of $H_i \equiv h_i[1 - \sum_c \beta_{ic}\alpha_{ic}]$ (denoted by $H$, say). Also denoting $\sum_i a_i$ by $a$, and $\sum_i N_i W_I(p^k;i)$ by $W_I(p^k)$, it follows that party $A$'s objective, its aggregate vote share

$$s^A = \frac{1}{2} + a + f[W_I(p^A) - W_I(p^B)] + H[C^A - C^B] \qquad (71)$$

is similar to that in the context of a local election, and the rest of the analysis of the latter applies to the national context also. If either of the two assumptions (a) or (b) do not hold, then it is evident that this aggregation feature will cease to hold, and the outcome of national elections could differ from those of local elections. Of the two, assumption (b) is the less plausible: elections to seats in the national legislature is typically on the basis of contests in local constituencies, in which the probability of party $A$ winning in constituency

[46] Calculations with specific functional forms show that the policy at the center is less biased in favor of the rich than the the average policy at the local government level.

$i$ is $\phi(s_i^A)$. Since $\phi(.)$ is nonlinear, it is then not possible to aggregate vote shares in the way described in (71).

This brings us to another related difference between national and local elections: information. Candidates contesting local elections may be just as well informed as informed voters concerning the preferences of the latter, as well as other relevant characteristics of the local community. In a national election, political parties may be subject to greater uncertainty concerning voter preferences, given limits to the ability of central party leaders to process detailed information about local conditions in multiple jurisdictions. Moreover, lobbies perform a role in conveying information to political parties, at least regarding their own preferences (indeed this benefit is frequently discussed in arguments against bans on lobbying). Hence the effect may be to create greater uncertainty concerning voter preferences, compared to those of special interest groups. Risk aversion of political parties may then cause them to lean less in favor of the special interest groups at the national level.

Other differences between national and local elections with possible implications for relative capture at the two levels include the following. Stakes are higher for political parties in central elections than in local elections, resulting in contests that tend to be less skewed on average than are local elections. The number of contesting parties is also typically greater at the central level. National elections tend to held more frequently and less prone to 'booth-capturing' or other strong arm tactics, owing to greater media attention. Moreover, given fixed costs in the formation of lobby groups, there may be more lobbies operating at the central level, serving to diffuse the bias secured by any single group. All of these factors seem likely to imply that national governments are less prone to capture than local governments.

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