Starving Your Enemies and Your Friends: Career Incentives and Nonlinearity in Fiscal Transfers in Decentralized Countries

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Abstract

In decentralized countries, subnational governments are often heavily reliant upon transfers from the central government. Yet, not all subnational governments receive equal funding, even if they have equal responsibilities. In explaining those patterns, many have found a positive relationship between co-partisanship and funding: elected officials from the central government’s party receive more funding than others do (see, e.g., Arulampalam et al, 2009; Brollo and Nannicini, 2012). These explanations implicitly assume that decentralized service provision follows a straightforward principal-agent model, where the subnational government (agent) is responsible for carrying out the task with funds from the central government (principal). In many situations, however, non-government actors are actively involved in service provision, acting as either complements to or substitutes for the goods provided by governments. Foreign investors, in particular, often engage in service provision in the communities in which they operate (Krasner and Risse, 2014; Honke and Thauer, 2014). These investors can serve as an external source of resources when local governments struggle to provide services on their own, and this complicates the strategic dynamics of the principal-agent model. In this paper, I present an alternative model of decentralized service provision that predicts a nonlinear relationship between a subnational leader’s ‘upward accountability’ (how faithful an agent he is) and fiscal transfers, when a sufficient source of external resources, like foreign investors, are present. To test this theory, I first estimate upward accountability using a Bayesian IRT model to scale democratic and autocratic subnational governments from multiple countries on a single scale. I then use those estimates, along with other data, to test a holistic model of the theoretical data-generating process. For both the measurement and testing, I use a novel cross-national subnational data set covering several Asian countries.

Introduction

Principal-agent problems are pervasive in comparative politics. To get nearly anything done in domestic politics, some degree of authority or responsibility must be delegated. Decentralization of service provision is perhaps the most obvious example: in order to provide goods and services to citizens, fiscal resources are transferred from central to subnational levels of government, and

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then combined with some degree of own source revenue, in order to generate public goods and services.

In most discussions of decentralized service provision, scholars rightly conceive of this as a typical principal-agent problem. They reasonably predict that resources will be disproportionately allocated to the central government’s co-partisans. The logic behind this is straightforward and unassailable: if the principal wishes to assure his plans are carried out, he is best to channel resources to those likely to be faithful agents, and neglect those who are unlikely to carry out his plans.

The implicit assumption of these models is that the agent — the subnational government — provides the good or service by itself. Often, though, other actors are partially or wholly involved in this provision of goods. For evidence of this, we need look no further than toll roads and private schools in the United States, but contemporary and historical cases suggests that the role private industry has played in complementing or supplementing service provision should not be understated. In contrast with NGOs or charities, private firms often provide goods and services less because of altruism or adherence to a mission statement, but because private firms, especially in industries characterized by high fixed capital investment, have a vested interest in maintaining the quality of their local community. Also unlike NGOs or charities, firms can fund services either through taxation or direct provision, and a government who chooses to enlist their help often bears some cost, for instance in loss of control or in the potential to deter additional investment in their community.

In this paper, I present two versions of a principal-agent model of service provision. The first is the standard story, and predicts that co-partisans will be favored relative to non-co-partisans. The second model is a principal-agent model where private investment provides a costly external source of resources for service provision. The presence of this costly external source of resources — the private firms — alters the basic logic of the model. While highly imperfect agents still receive the fewest resources, highly upwardly accountable agents (those who are the closest to perfect agents) also receive few resources, as they can be incentivized to bear the costs of seeking out the external resources. Under these conditions, we instead expect a non-linear relationship between upward accountability and central-transfer funding, with the agents in the middle — those who are accountable enough to follow directions, but not accountable enough to bear the costs of partnership — receive the most funding.

In the sections that follow, I explain how this project builds on existing work in comparative political institutions and political economy. I then informally outline the two principal-agent
models, and explain the respective models’ predictions. After that, I explain the rationale behind, and method for, estimating upward accountability at the subnational level for a subset of Asian countries. With the measurement in hand, I move to demonstrating how I intend to test a theory of conditional functional form— specifically, that the complicated principal-agent problem predictions should occur only above a certain level of resources, with the standard story predominating below it, when that threshold of resources is a priori unknown. I run simulations on data with known parameters, and find that running either a linear model or a quadratic model on the data would produce very certain incorrect predictions. Because the data collection process at the subnational level is difficult, I also simulate how unmodeled confounding biases the results. After thoroughly surveying the method, I apply it to the Philippines and India.

**Literature**

Although decentralization can serve many purposes, like overcoming collective action problems (Olson) and protecting or allowing for the separation of ethnic, linguistic and cultural groups (?), one of its primary functions is transferring authority and responsibility to lower tiers of government to make governance more efficient. In particular, decentralization is thought by many to improve the efficiency of service provision by moving it closer to the recipients (?). Often, decentralized service provision entails local-level governments providing public services with money they receive from central governments, termed fiscal transfers or grants, supplemented with own-source revenue (?).

Unlike in some countries in the developed world – especially the United States, Switzerland, and Canada — in many developing countries, the ability to generate own-source tax revenue is limited. Central governments may limit subnational governments’ abilities to set the tax rate and base, stymie their ability to borrow, and require that all taxes be remitted to the central government (?). This effectively limits a local government’s fiscal autonomy, leaving them heavily reliant upon transfers from the central government to fund the services that have been entrusted to them (?).

These all-important fiscal transfers are seldom transferred back according to input or need. Initially scholars sought to explain patterns in fiscal transfers with a ‘benevolent planner’ approach—from each according to their ability, and to each according to their need— but it soon became clear that fiscal transfers are not necessarily distributed in an efficiency-increasing manner. More recently, the literature on fiscal transfers has emphasized that fiscal transfers are often allocated
for political purposes. Accordingly, analyses of different countries have shown that partisanship plays an important role in the allocation of fiscal transfers: central governments reward their co-partisans, especially in competitive races, and fiscally punish their competition with an eye toward improving their future election prospects (??).

Although central governments may wish to see their co-partisans (re-)elected because they can aid in garnering votes for the party in subsequent elections (?), central governments may also see their co-partisans as more likely to be faithful agents. The more closely aligned a local government is with the central government, the more likely the local government is to carry out the policies and agendas favored by the central government. Decentralization often creates competing incentives between central and local governments, and central governments struggle with trying to obtain policy compliance from their subnational entities, sometimes resulting in macroeconomic crises (?). Thus, subnational governments who are reliably faithful agents are valuable to a central government, which has a strong incentive to channel fiscal transfers their way to ensure their (re-)election. This logic is generalizable beyond partisanship—regardless of the institutional arrangement, subnational governments that are ‘upwardly accountable’ (that is, rely heavily on the central government for their continued career success, whether elected, appointed, or otherwise selected) are more likely to be faithful agents of the central government. We should reasonably expect these governments to receive more transfers than those who are less upwardly accountable.

Yet, the implicit assumption in these theoretical models is that governments are the sole or primary actors responsible for providing public services. That is not an unreasonable assumption, but often external actors are engaged in service provision at the local level as well (??). In the United States, one need think no further than churches operating parochial schools. Yet, throughout history and across the world, private firms have been among the most notable non-government providers of goods and services. This type of ‘welfare capitalism’ reached its peak in the United States in the early twentieth century, with employers like Sears Roebuck, Endicott-Johnson, and Ford Motor Company operating cradle-to-grave welfare systems (?). This is neither a pre-WWII nor a specifically American phenomenon. In the developing world, foreign corporations have been engaged with service provision at the local level since investing abroad became a viable business option. Although the most extreme and well-documented examples are entire company towns like Ford’s (failed) Fordlandia, Brazil and Firestone’s (still-operating) Harbel, Liberia (?), much more common are examples of private firms filling small gaps in the local service provision structure (?).
It may seem initially puzzling that private, for-profit firms may take on the types of activities we commonly associate with either governments or philanthropic organizations. Indeed, firms are not philanthropic organizations — firms provide services when they believe that doing so is good business (?). Yet, they have many incentives to do so. Many firms, especially those that originate in a foreign country, face risks of government interference in their work (??). Some types of firms face more risk than others (?), and often they are willing to pay to alleviate the risk or buy access (?). In that sense, providing public services can be a way investors can protect themselves against government intrusion, by making themselves more valuable to the community (e.g., if the firm operates a health clinic, the community may value that clinic and be unsupportive of government activity that angers the firm). Firms also sometimes face barriers to entry, and providing services may also be a way firms can buy an implicit license to operate from stakeholders (?). Firms may also provide services because, although attracted to the area by other location-specific assets (??), the provision of other services may be insufficient for their purposes. Much as there is also a benefit for producing in-house rather than contracting, it may also be more efficient for firms to internalize some service provision. Finally, firms may view service provision as a type of ‘corporate social responsibility’, and may do so either to further a business philosophy or to develop a particular image among consumers or in response to activists (??).

The presence of firms that have an incentive to provide social services is an intriguing resource for a subnational government. In effect, this means that subnational governments may be able to outsource some social services to private firms (??). Yet, outsourcing comes with costs. By entrusting someone else to provide a service, either alone or in partnership, they may get a different or lesser good than what they would ideally like. Additionally, since firms are not philanthropists, it is often necessary for the local government to seek them out and secure their help (?), which requires some time, effort, and manpower. Third, it is possible that entreatings firms to provide services may deter prospective investors, who may view this activity as a source of political risk, and a potential drain on their future income and choose instead to invest elsewhere (?).

Taken together, it is unclear what the option to outsource— the presence of a costly, external resource for service provision — should mean for our typical principal-agent model of decentralized service provision. We might expect that since non-co-partisans are known to receive less funding from the central government, that they might be those most likely to seek out firms to aid them in their assigned tasks. Yet, although they have the greatest financial incentive, their
career incentives mean they should be the least willing to pay the costs. The very upwardly accountable subnational governments, by contrast, should be the most willing to bear the costs if it meant pleasing the central government, but they receive the most funding and have the least fiscal incentive to do so. In the following section, I explain how this costly external source of services actually affects the central government’s strategic incentives to allocate its funds. Unlike previous models, which would predict that high upward accountability types should receive more funding than low upward accountability types, I argue that the most and least upwardly accountable now receive the least funding, and the moderates receive the most.

Theory

Baseline

In the standard principal-agent framework, decentralized service provision consists of a central government (principal) delegating resources to a subnational government (agent), who is then tasked with carrying out the provision of selected goods and services. We assume no ability on the part of the subnational government to raise a significant amount of own-source revenue, such that they are primarily reliant upon the central government’s transfers to carry out their tasks\(^1\). Rather, the subnational government is reliant solely upon the central government for its resources.

Without loss of generality, we can assume only one type of good is to be provided, that all subnational governments are expected to provided a roughly equal amount of the good, and that it is measured on a continuous scale. Within this framework, we assume the central government has a preference about how many of this good is provided. The subnational government also has a preference. How closely aligned the subnational government’s preferences are with the central government’s preferences is a function, in part, of that subnational government’s upward accountability. Highly upwardly accountable governments rely heavily upon the central government for their continued career success, and accordingly have preferences very close to those of the central government. Low upward accountability governments derive their power from other sources, and may have preferences that differ substantially from those of the central government.

\(^1\)Provided the ability to raise own-source revenue is independent of upward accountability, this should not influence the general patterns in funding choices, but should just add noise to the relationship. If increases in investment tax base are correlated with upward accountability— in that attracting these types of resources permits a subnational government to behave more independently of the central government, as implied by ?— this should only lead us to further expect that low upward accountability types should receive the least funding, as they require less, if at least part of the choice is not political. The endogeneity problem this presents is beyond the scope of this paper.
If we assume the central government wants to use its resources to assure that its own agenda is carried out\footnote{This is not orthogonal to having a preference for maximizing the general well-being of citizens; if this is something the central government values, we can assume its agenda largely reflects that.}, we should expect that the central government has an incentive to channel the resources at its disposal toward more upwardly accountable governments, as they are the better agents and more likely to spend the resources as the central government would like. The high upwardly accountability types should receive the most resources, which they can then spend providing goods for their district, which delivers electoral benefits to both the subnational and central government officials. The less upwardly accountable subnational officials, by contrast, should be expected to receive fewer resources, as they are less likely to be good and faithful agents. The prediction in this case, then, accords with the predictions and findings of the existing literature: high upward accountability types should receive more funding than low upward accountability types.

**H1:** When there are no external resources for subnational governments, central government allocations should be positively associated with upward accountability.

**Costly External Resources**

In the extension of the model, we consider the same case as before, but there is an external source of resources that the local government can tap to provide services, and using this source imposes some cost. This is the case in which private industry is available to help fund goods and social services, either by providing goods directly or by partnering with subnational governments.

As before, we assume that the central government has some preference about to the good being provided, and provides the good by giving funds to the subnational government. The subnational government then carries out the task. Before, the prediction was that higher upward accountability types should receive more funding than low upward accountability types, because they were more faithful agents. Now, the dynamics of the model change slightly, because the goods are not provided solely by the subnational government. We must consider two things: (a) the benefit to the subnational government of carrying out the central government’s instructions, and (b) the cost incurred by seeking out the firm’s help. If we assume for the sake of simplicity that the cost of partnering is the same across districts, our primary concern is determining for which districts the benefits of remaining in the central government’s good graces are likely to exceed those costs.

Under these conditions, the central government still has little incentive to provide funds to
the low upward accountability governments. The low upward accountability governments are still not good agents, and are not likely to carry out the central government’s preferred policies. Further, the low upward accountability governments have little incentive to bear the costs of partnering with a firm to fulfill their responsibilities, as they have no particular interest in doing what the central government wants.

The high upward accountability types, however, do have an incentive to bear those costs. High upward accountability types are very faithful agents. They are chiefly interested in remaining in the good graces of the central government. Even if they receive too little funding to fulfill their responsibilities, these types have a strong incentive to find a way to make ends meet. Similar to Stokes’ (?) logic about co-partisans and clientelism, or Kasara’s (?) reasoning about co-ethnics and taxation, the truly high upwardly accountability types cannot credibly commit not to carry out the central government’s policies: they are simply too dependent upon pleasing them to risk not doing so. Thus, the costs of seeking out and obtaining a private partner in goods provison are likely to be lower than the anticipated costs of not fulfilling the central government’s dictates. As a result, the central government has little incentive to provide them with sufficient funding, as long as there is a sufficient source of external resources present, such that the total amount of goods and services that is provided is still high.

Instead, it is those who are only moderately upwardly accountable that should receive the most funding. Moderately upward accountability officials have sufficient incentive to use the funding that is provided to them to carry out the tasks they are assigned. Yet, they are not so dependent upon pleasing the central government as to be willing to bear the costs of finding a private partner for service provision. That is simply a step too far. These governments can credibly commit not to please the central government if they are not given sufficient resources: they will do what they are told with what they are given, but they will not take the extra initiative to go above and beyond to please the central government.

From these three situations, we obtain the following predictions.

**H2:** When there exists a sufficient level of external resources for subnational governments, the relationship between fiscal transfers and upward accountability should be quadratic, with those on either end of the extreme receiving less than those in the middle.

**H3:** For each subnational unit, there exists a level of resources below which the linear relationship should hold, and above which the quadratic relationship should hold.
Empirical Testing of Complicated Implications

My argument suggests that the functional form connecting upward accountability and fiscal transfers is conditional upon the level of costly external resources. To test this, we need to accommodate a data-generating process in which the functional form is contingent upon some external variable, \( z \). Above some unknown threshold \( z^* \), the functional form is quadratic, and below that threshold it is linear.

\[
y = \begin{cases} 
  f(\cdot) & \text{if } z < z^* \\
  g(\cdot) & \text{if } z \geq z^* 
\end{cases}
\]  

(1)

The difficulty with this theoretical DGP is that it is unclear how to model it using conventional methods. Both a linear model and a quadratic linear model are only partially right, and although the relationship is a conditional one, it is the functional form rather than the marginal effect of a variable that is conditional upon \( z \). To demonstrate this, I generate data that follows this theoretical process. I create an independent variable, \( x \), by taking one thousand random draws from a normal distribution with mean ten and standard deviation 5. The conditional variable, \( z \), is generated by taking one thousand random draws from a uniform distribution bound by 0 and 100. The dependent variable, \( y \), is created using the process in Equation 1 with the addition of a noise parameter that is a single pull from a normal distribution centered at ten and with standard deviation of forty. The true values of the parameters are the same for each equation.

\[
y = \begin{cases} 
  b_4 + b_5 x & \text{if } z < z^* \\
  b_1 x^2 + b_2 x + b_3 & \text{if } z \geq z^* 
\end{cases}
\]  

(2)

Each time I generate a new data set, I run four different models: a linear regression \( (y \sim x) \), a linear regression with a quadratic term \( (y \sim x+x^2) \), a linear regression with an interaction term \( (y \sim x+z+xz) \), and a quadratic relationship with an interaction term \( (y \sim x+z+xz+x^2+x^2z) \). I record the coefficient and t-statistic for each regression. I repeat this process for each \( z^* \in [0,25,50,75,100] \).

In these simulations, the coefficients I estimated were almost always statistically significant at conventional levels (Table ??). In fact, regardless of the model specification, each of the one thousand estimations of \( b_1, b_2, \) and \( b_3 \) was statistically significant at the 95% confidence level. In the standard quadratic model, all of the \( b_1 \) coefficients were statistically significant when
$z^* \in [0, 25, 50]$, or when the majority of the data were generated from the quadratic process.

Yet, although nearly all of the coefficient estimates came out statistically significant, in very few of the simulations was the true value of the parameter recovered within the 25-75% bounds, or even in the range of estimated coefficients at all (Figure ??). The coefficients on the quadratic parameters are closest to correct when the majority of the data are generated by that process, and stray far from their true value as the proportion of the data generated that way.

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Table 1: Percent of coefficient estimates in each of 1000 simulations that is statistically significant at 95% confidence level.

What this reveals is telling: in short, given this data and any of these seemingly-reasonable model specifications, nearly everyone would conclude they were “right” when, in reality, nearly everyone would actually be “wrong”. Whether someone expected the relationship to be positive, or quadratic, conventional methods would lead the analyst to reject the null hypothesis, incorrectly, and conclude that there was evidence in support of their hypothesis. Unless all the data are generated using one process or the other ($z^* = 0$ or $z^* = 100$), the analyst would be, at best, 75% correct, in this example. A quarter of the data— a non-negligible amount— would be generated by an alternative process, that the analyst would not pick up on.

Instead, I estimate a Bayesian model that estimates the threshold along with all the coefficient. I program the theoretical data generating process into JAGS, and then estimate each coefficient, as well as $z^*$. I specify that the dependent variable is normally distributed, centered around a mean $\mu$ that follows the linear process if $z < z^*$ and the quadratic process if $z \geq z^*$. I put a uniform prior on $z^*$, bounded by the minimum and maximum of the known distribution of $z$, and I put a relatively flat prior centered at zero on each of the five parameters. I generate a

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3I estimate a Bayesian model here because the maximum likelihood estimator that would properly model this process would be unnecessarily difficult and tedious to derive, with little to no added benefit over the Bayesian approach.
new data set, and run the JAGS model for 10,000 iterations once for each $z^* \in [0, 25, 50, 75, 100]$. I record the mean and highest posterior density estimates for the distribution of each estimated parameter.

The one frustrating caveat to this process is that I must disallow $z^*$ from being either the minimum or the maximum of the scale of $z$. In practice, for the simulations, I bound the uniform prior on $z^*$ between 1 and 99. Without restricting the estimation of $z^*$ in this way, the MCMC sorts itself into two or three separate densities — a smaller, normally distributed posterior distribution centered at the true value of $z^*$ and the other two, larger, normally distributed posterior distribution centered at zero and 100. Colloquially, the chains get ‘stuck’ in the conditions for the data to all be generated linearly, or all generated quadratically, which biases the estimates of the other variables. For the simulations where $z^* = 0$, the model estimates all parameters as if all the data were generated by the quadratic process, as all $z > z^*$. The same is true for $z^* = 100$ and the linear DGP. For the others, it estimates the parameters as we would like, with the observations for which $z < z^*$ generated linearly and those with $z > z^*$ generated quadratically. This poses two problems. The first is that, while the three quadratic coefficients come close to converging, none of the other parameters achieve that sort of agreement. The second is that the $z^*$ estimate and the coefficient estimates for the linear DGP are incorrect if you use the mean of the distribution. The downside to restricting the prior on $z^*$ like this is that, in situations where the actual threshold is at the minimum of the distribution, the model will produce estimates that are technically wrong, but still very close. Still, bounding the prior like this allows for both DGPs to be estimated.

When we are able to estimate the theoretical data-generating process, the model results are right with much greater frequency (Figure ??). Although the model systematically misses b4 and b5 when $z^* = 0$ and all data are generated with the quadratic process, it actually gets b1, b2, and b3 mostly right on average, even when $z^* = 100$ and the data are all generated linearly. For the thresholds in between, in which part of the data is generated linearly and the other quadratic, the model does, on average, produce coefficients that are either correct or very close, and much closer than any of the OLS models. What is more, the model produces the correct estimates for $z^*$ for $z^* \in [25, 75, 100]$, and is only slightly off when $z^*$ is zero or one hundred. This means that we should not only be drawing reasonable inferences from the coefficients on the two DGPs, but that we should also get a fairly accurate idea of what threshold is necessary to produce the quadratic process.

In robustness checks (not pictured), when this model is run on data with $x, y$, and $z$ unrelated,
the posterior distributions of each coefficient include zero, except \( z^* \), \( b4 \) when \( z^* \in 0, 50 \). Many of the coefficients are actually estimated to be approximately zero.

**Data**

Data collection is among the most serious challenges of studying subnational governments. Unlike for many political science applications, there are few (if any) central repositories of subnational data\(^4\). Instead, the researcher must collect data from each individual country, which is a time-consuming and sometimes tedious process. Countries also vary tremendously in the amount of data they collect and make available, especially at the subnational level\(^5\). Data collection efforts are ongoing, but due to the lack of data, in the present incarnation on conduct my analysis on India\(^6\).

Data on intergovernmental fiscal transfers comes from the IndiaStat database. Transfers are measured in ten million Rupees (Rupees in crore) per capita\(^7\). Election data for the Indian state assemblies comes from the Election Commission of India. Data on the identity, party affiliation, and tenure of each chief minister is available from Elections.in, a private non-governmental website that aims to provide current and historical election information for voters. These data also allow me to code for years in which states were under President’s Rule, a constitutional feature in India that dictates that the central government can take over any state or union territory in the case of breakdown.

I operationalize private firms who can act as external sources of assets as the number of large firms (by the WES’ classification, greater than 100 employees at that location) operating within the territory. I look at large firms because medium- or small firms may have less incentive and less ability to engage in public service provision. I do not look at foreign direct investment, because it measures flows of assets rather than capital deployed on the ground, and additionally because it excludes domestic investment, while my theory does not. Lacking an actual count of firms in each state, I use the number of large firms surveyed in each state by the World Enterprise Survey in 2014. Unfortunately, 2014 is the closest year for which I have reliable data.

\(^4\)The World Bank maintains a database of cross-national subnational malnutrition data, but that is the only centralized source of cross-national subnational data of which I am aware.

\(^5\)It is possible that the availability of data at the subnational level could itself be correlated with either transfers or accountability, especially if the data are self-reported by the subnational governments. Although I cannot rule out this possibility yet, to address this concern, I do not include countries where data are not available for all subnational units.

\(^6\)I cannot rule out the possibility that countries that make their transfers data available online may be systematically different – e.g., more transparent, and perhaps less politically driven in their transfers processes – than those that do not. This should bias against finding any support for the hypotheses.

\(^7\)In 2010, they are measured in billions of Rupees and readjusted.
and I assign it as a static value for each year. While this does not capture the exact number of firms, the WES' claims that they survey a geographically and industrially represent sample of firms allows me to feel confident that the relative numbers, if not the actual magnitude, are correct. These values seem representative of what we would expect for India— the most large firms surveyed are in Karnataka, and so is Bangalore, a well-known tech hub. We have no data for the union territories, and the data lumps together some of the smaller states (Nagaland, Mizoram, etc.) such that we cannot assign values to those states, and so the model will estimate the number of large firms in each of those units. Data on votes for national legislatures is from the CLEA database and all lower-level constituency-level election data is aggregated additively up to the state or province level. All data is collected for all 35 states or union territories of India from 2005-2010.

Estimating Upward Accountability

Electoral data is standard in studies of fiscal transfers, but this use poses two problems. First, even within single countries, not all subnational governments are elected. In India, for instance, the administrators of the union territories are appointed, while the chief ministers of the states are elected. In other countries that may be of interest, like China, all provincial governors are appointed. Second, there are several reasonable electoral indicators one could use, and no individual indicator is obviously a better conceptual match than another. Is the percentage of the local legislature that belongs to the central government’s party a better indication of alignment than the percentage of the local delegation in the national legislature that belongs to that party? Are either better or worse than the party affiliation of the local executive, or the breakdown of the executive council? Conceptually, any of these are defensible, and none is obviously the best. Yet, they may not correlate well with one another, and thus the conclusions drawn from any analysis is heavily dependent upon the choice of indicator.

Since any individual indicator may contain valuable information, but not be a particularly good conceptual match, and also because any individual indicator may tell a slightly different story, the ideal measure would be one that incorporates different indicators of upward accountability in a systematic and thoughtful way. This raises the question: conceptually, what is upward accountability? If we cannot measure it with any single variable, how would we identify high or low upward accountability when we see it?

8 In future work, the model will take into account the multilevel structure of these data, allowing for within-state variation.

9
Theoretically, upward accountability captures the degree to which any subnational government relies heavily upon pleasing the central government in order to assure its continued career success. This ought to manifest itself in an alignment between the preferences of the different levels of government, but it is also not the only factor that might drive that observed alignment. The key, then, is to try to assemble data on a variety of indicators that capture not only alignment, but also information on the career trajectories of the subnational officials. In what follows, I aim to estimate upward accountability for the states and union territories of India for the years 2005-2010.

To try to capture both alignment and career trajectory, I include different indicators of upward accountability in a Bayesian item response theory (IRT) model. IRT models originate in the education literature, where a slate of questions are used to estimate a student’s latent ability. A step beyond attempting to proxy for this by simply adding up correct responses, IRT models also determine how difficult each question is, and how well each question discriminates between ability types. Much as a math teacher would construct a test of math questions to determine a student’s mathematical ability, by way of analogy, I estimate a state’s latent upward accountability by constructing an upward accountability test. There are five questions in the model, each of which should capture a facet of upward accountability.

I include five indicators in the model. Three are dichotomous. First, I include a dummy variable for whether the executive in the state is appointed. Appointees should be expected to be more accountable to the central government than elected officials. Second, I include a dummy variable for whether the state encountered President’s Rule in that year. President’s Rule occurs when the state assembly is unable to form or maintain a governing coalition. When a state is under President’s Rule, it is governed by a central government appointee. Third, I include whether the chief minister of the state is from the Indian National Congress, which was the party that controlled the central government for the duration of the time I cover. Each variable \( y_{itk} \), where \( i \) indexes state, \( t \) indexes year, and \( k \) indexes item, has a prior distribution, \( y_{itk} \sim Bern(p_{itk}) \), and success parameter \( p_{itk} \) is a function of the discrimination (\( \beta_k \)) and difficulty (\( \alpha_k \)) for each question \( k \in [1, 2, 3] \), as well as the latent upward accountability for that state-year, \( x_{it} \) (Equation ??).

\[
p_{itk} = \beta_{Dk}x_{it} - \alpha_{Dk}
\]

Two of the indicators in the model are proportions, rather than dummy variables. The first is the proportion of seats in the state assembly that are held by the INC in that year, and
the second is the proportion of the state’s seats in the lower house of the national legislature that was won by the INC. The analogy to test questions here is less straightforward, but each proportion is, in effect, simply the sum of many dummy variables. Whether a member of the INC won each seat is a coin flip. Because the difficulty and discrimination of each candidate are not important for our analysis, and because estimating so many additional parameters would impose computing hardships, I instead summarize them in a proportion. These variables, then, have a beta prior, where \( g_{itk} \sim \text{Beta}(\mu_{itk}, \nu_{itk}) \), where \( \mu_{itk} \) represents the number of INC victories and \( \nu_{itk} \) represents the number of INC defeats. The number of INC victories is equal to the number of flips, \( \phi_{itk} \), multiplied by the “success” parameter, \( \delta_{itk} \) (Equation ??). As before, the success parameter is determined by the question’s difficulty and discrimination parameters, and the state-year’s upward accountability (Equation ??). The \( \phi_{itk} \) parameter is supplied as data rather than estimated, with the total number of seats in the state assembly serving as \( \phi_{it} \) for the state assembly proportion\(^{10}\) and the number of seats in the national assembly allotted to that state serving as \( \phi_{it} \) for the national legislature proportion.

\[
\mu_{itk} = \delta_{itk}\phi_{itk} \quad \text{and} \quad \nu_{itk} = (1 - \delta_{itk})\phi_{itk}
\]

\[
\delta_{itk} = \beta_{Tk} - \alpha_{Tk}
\]

Each state’s upward accountability in year \( t \) is drawn from a normal prior centered at its upward accountability in year \( t - 1 \), with a fixed variance term, following ?. The state’s upward accountability in year \( t - 1 \) is centered on zero. All difficulty and discrimination parameters are drawn from a normal distribution centered on zero with a variance of one. For identification, all items are oriented such that higher answers (1 or higher proportions) are associated with greater levels of upward accountability, and both discrimination parameters are limited to positive numbers. I run the model in JAGS for R, with three chains exploring the posteriors for 100,000 iterations. After 100,000 iterations, 99.7% of parameters had an R-hat of 1.00, and 0.31% of parameters had an R-hat of 1.01, indicating complete mixing.

Although we are not explicitly modeling career trajectories, these results seem to correspond well with the career trajectories of the politicians. The highest upward accountability are all the union territories, who are appointed officials. The chief minister of Delhi during this period,

\(^{10}\) Most of the state assemblies in India are unicameral, but where they are bicameral, this is the number of seats in the lower house. I count seats reserved for scheduled castes and scheduled tributes as indistinguishable, statistically, from other seats.
an INC party member, was appointed governor of Kerala by the central government when her party lost its majority and she lost her position. A similar story plays out in Arunachal Pradesh, which also has among the highest upward accountability: the chief minister in the early 2000s, Mukut Mithi, was promoted administrator (governor) of Puducherry a couple of years after losing his position in an internal party struggle.

We see more moderate upward accountability in provinces like Himachal Pradesh, where both the Bharatiya Janata Party (BJP) and INC have strongholds, and the same two men, Virbhadra Singh (INC) and Prem Kumar Dhumal (BJP), have traded off power every few years since 1993, at least observationally very dedicated to serving their state. By contrast, Gujarat, a BJP stronghold and the state Narendra Modi led as chief minister for years, has fairly low upward accountability.

Results

To holistically test my three hypotheses, I run the same Bayesian model from the earlier simulations. In this case, the key dependent variable \( y \) is the log of fiscal transfers per capita for any given state-year, the key independent variable \( x \) is the upward accountability estimated in the previous section, and the level of external resources \( z \) is the number of surveys of large firms conducted by the World Enterprise Survey in 2014. The model estimates six parameters of interest: two coefficients \( y = b_4 + b_5 x \) from the linear data generating process, three coefficients from the quadratic data generating process \( y = b_1 x^2 + b_2 x + b_3 \), and a resource threshold, \( z^* \), below which the data are theoretically generated linearly and above which the relationship is quadratic. In lieu of additional control variables, I include both year and state random effects to account for unmodeled year- and state-specific variation. I alter the priors on the observed data to reflect the distributions of the observed data, e.g. the prior on \( z \) is now \( z \sim U(0, 208) \) rather than \( z \sim U(0, 100) \). The model runs for 100,000 iterations, with the first 75,000 discarded as a burn-in period. After completing all 100,000 iterations, 87.5% of R-hat parameters round to 1.00, and 12.2% round to 1.01, indicating that the chains have sufficiently mixed and the model can be said to have sufficiently converged.

The expectations of the model are that there are (a) some precisely-estimated and ex ante unknown \( z \) threshold, \( z^* \), that exists and separates the two data-generating processes, (b) the slope variable on the linear process (\( b_5 \)) is positive, indicating a positive linear relationship between the variables, and (c) the three coefficients from the quadratic process form a downward-facing parabola. Because this is a general theoretical model of fiscal transfers and private
provision, it is distinctly possible for any country-case (although there is just one here) that all of the units may fall above or below the line, and thus that only one data-generating process occurs. If \( z^* \) is at the lower bound, we can concluded that each unit has sufficient resources, by the central government’s standard, to provide supplemental or complementary goods and services. If \( z^* \) is at the absolute upper observed bound, the opposite is true.

Although India is a particularly hard test for this theory, we do see some preliminary evidence for the theory. The threshold \( z^* \) is high, but not at the upper bound, and the observed empirical maximum is not included in the posterior distribution of the parameter. This suggests that, for most of the states in the sample, there are not sufficient external resources for the central government to see them as a potential supplemental source of service provision. This is entirely consistent with Indian contemporary political history—believing that companies were not providing sufficient resources to their communities, the nation passed the Companies Act in 2013, requiring by law that each corporation in India spent 2% of its profits on “corporate social responsibility”.

Within the data, only one state actually has resources above that threshold for all of the years in the survey, indicating that its resources are sufficient for the central government to believe the private goods are effective substitutes. That state is Karnataka, home of Bengaluru (Bangalore), the hub of high-tech industry in India. Within Bangalore, there is a part of the city, called Electronics City, where all homes, schools, and health clinics are provided by companies like InfoSys and those like it. Yet, this is only a small portion of the city, and there remains a sense that the companies could do much more than they are. According to Forbes India, in 2012, right before the law as passed, InfoSys spent only 0.36% of its profits on corporate social responsibility.

However, although the threshold is high, we still see the patterns in the coefficients that the theory would predict (Table ??). We are fairly certain about the sign on each variable except for \( b5 \), the slope on the linear DGP, for which most of posterior distribution, but not all, is above zero. In the simulations, even when the threshold was near the maximum, the model still recovered the “true” coefficients on average, leading me to have sufficient confidence that it will do so here as well. After accounting for both state- and year-specific effects, the quadratic coefficients form a downward-facing parabola, and the linear coefficients form an upward-sloping line (Figure ??). The interpretation here is that, although each state has a certain baseline level

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11 This drives the necessity of cross-national testing, which will be included in future work.

12 In future work, I intend to estimate upward accountability for units within states, in addition to at the state level.
of transfers, as does each year, the upward accountability detracts from this, but those with moderately upward accountability have the least ‘penalty’ in the quadratic DGP, and those with higher upward accountability have the least ‘penalty’ in the linear DGP.

<table>
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<tr>
<th></th>
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Table 2: The mean, standard deviation, and 2.5% and 97.5% bounds of the posterior distributions of the quantities of interest.

Conclusion

In this paper, I presented a theoretical explanation for intergovernmental fiscal transfers. Fiscal transfers are an important developmental quantity, as they are often used to provide goods and services, especially in places where the ability to raise own-source revenue is limited. In my theory, I build on existing work of politically-motivated fiscal transfers that view them as a principal-agent problem. I also build on new work in foreign direct investment, historical welfare capitalism, and business, that suggests that private businesses may face incentives to engage in service provision in their communities. Connecting these literatures, I explain how the presence of that supplemental (or complementary) source of service provision complicates the existing principal-agent model, which implicitly assumes all service provision is carried out by the subnational government.

To further develop this theory, I introduce the concept of ‘upward accountability’, which captures the extent to which a subnational official is dependent upon the central government for his/her continued career success. I posit that it is these career considerations that lead a subnational official to be a good agent of the central government. The existing models would predict that, the higher the upward accountability (the better the agent), the more fiscal resources should be channeled their way. I argue that, when there is a sufficient external source of service provision, this bends that line into a curve—because highly upwardly accountable officials cannot credibly commit not to carry out the central government’s plans, because to do so would be harmful for their careers, central governments can provide them with fewer resources, knowing that a high level of goods will still be provided.
Because a holistic test of the theory involves two data-generating processes, separated by an ex ante unknown threshold, I show in simulations that running either a linear regression or a linear quadratic regression on the data would lead the analyst to (incorrectly) conclude that there was support for either a linear or quadratic regression almost one hundred percent of the time. Motivated by these overconfident incorrect results, and a desire to test the suite of predictions of the theory all together, I develop and test a Bayesian model that allows me to estimate the coefficients for each of the two data generating processes predicted by the theory, as well as to estimate the threshold that separates them.

I test this theory in India from 2005-2010 as a preliminary case due to the availability of data on the parameters of interest. First, I estimate upward accountability using five observable indicators and a Bayesian IRT model. Then, I apply my conditional DGP Bayesian model to those estimates and the rest of the data, and find primarily evidence in support of my theory. I find that the threshold is very high, such that only one state (Karnataka, home of India’s tech hub) has resources in excess of it. This suggests that the country of India considers the eternal service resources in most of the country to be insufficient to complement or supplement governmental provision. This seems borne out in the Companies Law, passed in 2013, which acknowledges that firms in the country are doing an insufficient job of providing for their communities, and dictates that companies must now designate 2% of their profits for “corporate social responsibility”-type community goods. Yet, even with such a high threshold, the coefficients for each of the two processes are precisely estimated and predict relationships that are consistent with my theoretical expectations.

Many in business and the media seem concerned with answering the question of whether “corporate social responsibility” is good. There is some anecdotal evidence that consumers do respond to a corporations’ behavior toward its employees. At an extreme negative end, we have seen consumers boycott and protest companies that make their goods in unsafe working conditions. We have also seen the rise of consumer goods corporations that trumpet their positive social actions abroad and socially responsible sourcing procedures, which suggests that companies at least believe that there is normative, sales value to this. Although I cannot weigh in on whether such behavior is ‘good’ or ‘bad’, what I do show is that it does seem to matter for the communities involved: my theory suggests, and my empirical evidence seems to support, that this type of behavior influences how central and subnational governments interact. At its logical extreme, this suggests that regions with a great deal of investment, with strong incentives to engage in social goods provision, may become largely starved of central government resources.
if these goods are seen as sufficient to replace what the subnational government would provide on its own. This, in itself, has implications for development, democracy, and representation, that all merits future research.

References


Kollman, Ken, Allen Hicken, Daniele Caramani and David Backer. 2012. *Constituency-Level Elections Archive (CLEA).* Ann Arbor, MI: University of Michigan Center for Political Studies.


Figure 1: Data generated, according to process in Equation ??, one thousand times. Each time, both an OLS regression and an OLS regression with a quadratic term were run and the coefficients on the variables recorded.
Figure 2: Results of five Bayesian models estimating coefficients and $z^*$ cutpoints for the data-generating process above. True values of parameters denoted by dotted lines. Model converges—one hundred percent of parameters have an R-hat of 1.01 or 1.00—after 25,000 iterations, and half of those iterations are discarded as a burn-in period when forming the posterior distributions. Thick lines are 25-75% bounds, and thin lines are 2.5-97.5% bounds.
Figure 3: India
Figure 4: Fitted values, based on the coefficient estimates, overlaid atop the observed data.