Political Economy of Service Delivery: Monitoring versus Contestation

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Working Paper No. 172
May 2013

Office of the Chief Economist

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Abstract

Many communities suffer limited public goods provision due to civil servants (doctors, teachers, etc) supplementing their low income with moonlighting activities. Monitors of civil servants commonly also earn low salaries from monitoring and may prefer political contestation for power and prestige. We determine an internal equilibrium for how monitors strike a balance between monitoring and political contestation. We also determine a corner solution where an unresourceful monitor does not monitor. A variety of characteristics including the intensity of political contestation are accounted for. Survey data from Tanzania and Senegal are used to show the significance of poor service delivery within education and healthcare services.

JEL Codes: C72, D72, D74

Keywords: Monitoring, public good, production, risk, game, conflict
1 Introduction

Many communities experience low effort or inefficiency by public officials in delivering public services to the population at the local level. One reason is political contestation at the local authority levels which then results in more time being spent on fighting rather than in the provision of public goods. For example, at the individual level, doctors in Tanzania may spend ½ an hour per a day with patients because no one is monitoring them, and teachers in Senegal may teach only about 3 hours a day, which is less than ¾ of the required time.

Examples of professionals providing public goods to their communities are doctors and teachers. In most countries these are more commonly publicly employed than privately employed. In many countries governments provide too low salaries to such professions. Although individuals providing public goods are often idealistic, limits to idealism exist. When such limits are approached or exceeded, doctors and teachers earning too low salaries may be induced or forced to shirk on their responsibilities to make ends meet. They may increasingly "moonlight" elsewhere to supplement their income. They may even experience delays in receiving their salary payments, as evidence from Tanzania and Senegal reveals. They may do something not related to their profession, or something related to their profession through a private arrangement (e.g. private lessons for teachers or private medical services in case of doctors). The extent of such moonlighting depends on the extent to which authorities monitor such professionals adequately. In many communities monitoring by the authorities is lacking or absent.

At the level of doctors and teachers, they merely face an individual resource allocation problem in the face of poor monitoring. The challenging game is at the level of the monitors. At the local level (or indeed at the national level) monitors are involved in political contestation that absorbs their energies and focus, resulting in poor monitoring of civil servants such as teachers and doctors. Monitors commonly also earn low public salaries and may find it more rewarding to fight for power and position.

An example of a monitoring institution, with multiple individual monitors, in a local authority is a council, or a body that has a strong political character, for example in a rural district in South Africa. In this district, the ruling party members and opposition members in the council, operating as monitors, may commonly be involved in political contestation. These monitors are thus not focusing on monitoring but on power retention and fighting. Consequences are that professionals such as teachers and doctors go unmonitored and shift to other activities for extra income. This causes lack of public goods provision from which communities at large suffer.

The decentralization of government delivery channels creates local government structures and local bureaucracies that fail to deliver the required level of services to the local population. Such local government structures may involve various levels such as the municipal level, district level, council level, and province level. The objectives for decentralization are to transfer real power to the districts and improve accountability at the local level; to bring political power and administrative control over services at the local level; to establish a stronger link between payment of taxes by citizens and provision of services; and to capacitate the local governments in planning, financing and managing the delivery of services to their respective constituencies. Such services include primary health care, education, water and road infrastructure, agricultural extension services, and some elements of security and law and order.
In this paper we capture this phenomenon in a model of power contestation at the local level which results in low service delivery. Each monitor has an available resource that can be allocated to monitoring or political contestation. Monitoring gives a salary proportional to the amount of monitoring. Political contestation gives a fraction of power, expressed as a rent, determined by the relative amount of political contestation exerted by all monitors.

For the model we assume a one-to-one mapping from the monitors to the teachers or doctors. That is, if a monitor monitors x% of his time, the teacher or doctor being monitored spends x% of his time teaching or delivering medical services. To justify this, first consider the extremes. With 100% monitoring, assuming that the system of monitoring is set up such that it operates adequately if all monitors do what they are supposed to do, then we can reasonably assume that the teachers and doctors being monitored experience the monitoring regularly, and respond by doing what they are supposed to do, that is teach and practice medicine 100% of the time. Conversely, with 0% monitoring, teachers and doctors are left to do as they please. Additionally, they observe the dysfunctional situation where monitors don’t monitor, which is contagious, and we can expect 0% teaching and medical practising. For intermediate degrees of monitoring, between 0% and 100%, we assume proportionality so that the degree of monitoring maps directly over to the degree of teaching and the delivery of medical services.

Earlier research has been conducted by Collins and Green (1994), Kullenberg and Porter (1999), Prud’homme (1995). Golola (2001) presents empirical analysis on the impact of decentralization and local bureaucracies on service delivery. The theoretical frameworks for understanding the institutional dynamics at play that impact on service delivery are analyzed by Acemoglu and Robinson (2012). Hanushek (2003) provides some evidence on delivery of education services. Some literature has used randomized trials in analyzing the impact of various service delivery initiatives. Case and Deaton (1999) show, using a natural experiment in South Africa, that the impact of increasing school resources, as measured by the student-teacher ratio, has the effect of raising academic achievement among black students. Duflo (2001), in her study in Indonesia, finds that a school construction policy was effective in increasing the quantity of education. By using a randomized evaluation in India, Banerjee et al (2000) find that provision of additional teachers in non-formal education centers increases school participation of girls. However, a series of randomized evaluations in Kenya indicate that the only effect of textbooks on outcomes was among the better students (Glewwe and Kremer, 2006; Glewwe, Kremer and Moulin, 2002). More recent evidence from natural experiments and randomized evaluations also indicate some potential positive effect of school resources on outcomes, but not uniformly positive (Duflo 2001; Glewwe and Kremer 2006, Björkman, Martina, and Jakob Svensson 2009).

Section 2 presents the model. Section 3 analyzes the model. Section 4 tests the model empirically. Section 5 concludes.

2 The Model

In the quest to deliver quality services, the process of decentralization seeks to achieve certain goals. The goals include the desire to involve the local populations in the running of their affairs thereby democratizing the decision-making process; mobilizing resources at the local level, to achieve more efficiency and low costs in delivery of services, and improved accountability for service delivery to the target local population. Often these desired goals are not achieved due to political dynamics at the local
level. In the model we aim to capture the nature of such political dynamics and show how they impede service delivery objectives.

Consider n monitors. Each monitor i has a resource \( r_i \) which can be considered as the number of hours the monitor can work in a given time period, or work capacity combined with political power and other factors relevant for monitoring and political contestation for status. Each monitor allocates his resource into monitoring \( p_i \geq 0 \) at unit cost \( a_i > 0 \), and political contestation \( f_i \geq 0 \) at unit cost \( b_i > 0 \),

\[
r_i = a_i p_i + b_i f_i
\]

(1)

Monitoring \( p_i \) generates a public good, but it also generates a basic salary to the monitor which we assume is proportional to \( p_i \) with proportionality parameter \( v_i > 0 \), thus causing utility \( p_i v_i \). For political contestation \( f_i \) we apply the ratio form contest success function (Tullock 1980). Monitor i gets a fraction

\[
q_i = \begin{cases} 
\frac{f_i^m}{\sum_{j=1}^n f_j^m} & \text{if } f_i^m \geq 0 \text{ for all } i = 1, \ldots, n \\
1/n & \text{otherwise}
\end{cases}
\]

(2)

of the status, which can be perceived as a rent \( R > 0 \), where \( m \geq 0 \) is a contest parameter, \( \partial q_i / \partial f_i > 0 \), \( \partial q_i / \partial f_j < 0 \) when \( i \neq j \). If one monitor gets higher status, the other monitors get lower status. If one monitor captures the entire rent \( R \) through political contestation, he becomes a dictator with maximum status, and the other monitors get no status. Conversely, without contestation the monitors share the status equally each earning \( R/n \). When \( m=0 \), political contestation \( f_i \) has no impact on \( q_i \). No monitor can easily get an upper hand, for example due to culture, individual abilities, or technological factors. Examples are when chance or uncontrolled conditions impact status distribution, or in egalitarian societies. \( 0 < m < 1 \) gives a disproportional advantage of exerting less political contestation than the other monitors. When \( m=1 \), political contestation by each monitor has proportional impact on \( q_i \). \( m > 1 \) gives a disproportional advantage of exerting more political contestation than the other monitors (economies of scale). Finally, \( m=\infty \) gives a step function where “winner-takes-all”. Examples are highly competitive or volatile environments, cultures with insufficiently developed institutional arrangements and procedures, or non-egalitarian societies allowing dominant monitors or dictators to emerge.\(^2\)

Assuming that monitoring and political contestation impact utility additively, \( u_i = p_i v_i + q_i R \), each monitor’s utility is

\[
u_i = \frac{r_i - b_i f_i}{a_i} v_i + \sum_{j=1}^n \frac{f_j^m}{\sum_{j=1}^n f_j^m} R
\]

(3)

where we have inserted (1) and (2). No binding agreements between the agents are allowed, which means that the game is non-cooperative.

3 Solving the Model

3.1 Solving the model with \( n \) monitors and \( m=1 \)

Appendix A solves for Nash equilibrium to determine the efforts and utilities

\(^2\) Equation (2) is extensively used in the rent seeking literature. It expresses agents’ success in securing a rent dependent on efforts exerted. See Tullock (1980) for the use of \( m \), Skaperdas (1996) for an axiomatization where \( m \) plays a role, Nitzan (1994) for a review, Hirshleifer (1995) for an illustration of the usefulness of the function for a variety of application areas, and Hausken (1995) for recent literature.
f_i = \begin{cases} \frac{R(n-1)\left(1 - \frac{n-1}{a_i \sum_{j=1}^n b_j v_j / b_j v_j} \right)}{\sum_{j=1}^n a_j} \text{ when } \frac{r_i}{b_i} \geq \frac{R(n-1)}{a_i \sum_{j=1}^n b_j v_j / b_j v_j} \forall i, \\
\frac{r_i}{b_i} \text{ otherwise} \end{cases}

p_i = \begin{cases} \frac{r_i - b_i f_i}{a_i} \text{ when } \frac{r_i}{b_i} \geq \frac{R(n-1)}{a_i \sum_{j=1}^n b_j v_j / b_j v_j} \forall i, \\
0 \text{ otherwise} \end{cases}, u_i = p_i v_i + f_i R

The first lines for \( f_i \) and \( p_i \) are the interior solution. The logic of the ratio form contest success function is that each monitor always contests (Skaperdas 1996), i.e. exerts at least negligible effort on political contestation, and thus \( f_i > 0 \).

Proposition 1. (a) If \( \frac{r_i}{b_i} \geq \frac{R(n-1)}{a_i \sum_{j=1}^n b_j v_j / b_j v_j} \forall i \) and \( \frac{a_i}{b_i} = \frac{a_j}{b_j} \forall i, j, i\neq j \), then

\[ f_i = f_j = \frac{R(n-1)}{n \sum_{j=1}^n a_j}, \quad \frac{\partial f_i}{\partial v_i} < 0, \quad \frac{\partial f_i}{\partial R} > 0, \quad \frac{\partial f_i}{\partial a_i} > 0, \quad \frac{\partial f_i}{\partial b_i} < 0, \quad \frac{\partial f_i}{\partial v_i} < 0. \]

(b) If

\[ \frac{r_i}{b_i} \geq \frac{R(n-1)}{a_i \sum_{j=1}^n b_j v_j / b_j v_j} \forall i, \quad K - f_i = \frac{a_i b_i v_i}{a_i b_i v_i} \text{ where } K = \frac{R(n-1)}{a_i \sum_{j=1}^n b_j v_j / b_j v_j}. \]

(c) If \( \frac{r_i}{b_i} < \frac{R(n-1)}{a_i \sum_{j=1}^n b_j v_j / b_j v_j} \forall i \), \( p_i = 0 \) and \( f_i = r_i / b_i \).

Proof. Follows from (4) and (A2).

Proposition 1a assumes the interior solution and a specific sense in which the monitors are equivalent, i.e. \( \frac{a_i}{b_i v_i} = \frac{a_j}{b_j v_j} \Rightarrow \frac{a_i b_i v_i}{b_i v_i a_j b_j v_j} = 1 \) which implies equal political contestation by all monitors since \( \frac{K - f_i}{K - f_j} = 1 \).

Then political contestation decreases in the number of monitors. The reason is that competing with many monitors for a fixed amount \( R \) of status is costly and efforts are beneficially shifted towards monitoring instead. Intuitively, monitor \( i \)’s political contestation intuitively increases in the rent \( R \).
Further, political contestation increases in his unit cost \( a_i \) of monitoring, which makes political contestation relatively more profitable, decreases in his unit cost \( b_i \) of political contestation, which enables generating the same level of political contestation at a lower cost, and decreases in his proportionality parameter \( v_i \) for his salary from monitoring, which makes monitoring relatively more profitable.

For the interior solution in Proposition 1b, assume a low ratio \( \frac{K - f_i}{K - f_j} < 1 \), which means that monitor 1 engages more in political contestation than monitor 2, \( f_i > f_j \). This event occurs when \( a_i > a_j \), \( b_i < b_j \), or \( v_i < v_j \). That is, monitor 1 engages more in political contestation than monitor 2 when his unit cost \( a_i \) of monitoring is high, his unit cost \( b_i \) of political contestation is low, or his proportionality parameter \( v_i \) for his salary from monitoring is low. For the corner solution in Proposition 1c, where the monitor’s interior equilibrium resource expenditure \( b_i f_i \) from political contestation exceeds the monitor’s resource \( r_i \), the monitor does not monitor, \( p_i = 0 \), and transforms his entire resource into political contestation, \( f_i = r_i / b_i \). Interestingly, the monitor engages exclusively in political contestation when he is not resourceful, that is, when \( r_i \) is low. A large resource \( r_i \), and a low unit cost \( a_i \) of monitoring, induces the monitor to increase his monitoring \( p_i \).

3.2 Solving the model with \( n=2 \) monitors and general \( m \)

Appendix B solves for Nash equilibrium to determine the efforts and utilities

\[
f_i = \begin{cases} 
  \frac{a_i m R \left( \frac{a_i b_i v_2}{a_i b_1 v_1} \right)^m}{b_i v_i \left( 1 + \left( \frac{a_i b_i v_2}{a_i b_1 v_1} \right)^m \right)^{\frac{1}{m}}} & \text{when } \frac{r_i}{b_i} \geq \frac{a_i m R \left( \frac{a_i b_i v_2}{a_i b_1 v_1} \right)^m}{b_i v_i \left( 1 + \left( \frac{a_i b_i v_2}{a_i b_1 v_1} \right)^m \right)^{\frac{1}{m}}} \forall i \\
  \frac{r_i}{b_i} & \text{otherwise}
\end{cases}
\]

(5)

\[
p_i = \begin{cases} 
  \frac{r_i - b_i f_i}{a_i} & \text{when } \frac{r_i}{b_i} \geq \frac{a_i m R \left( \frac{a_i b_i v_2}{a_i b_1 v_1} \right)^m}{b_i v_i \left( 1 + \left( \frac{a_i b_i v_2}{a_i b_1 v_1} \right)^m \right)^{\frac{1}{m}}} \forall i \\
  0 & \text{otherwise}
\end{cases}
\]

The second order condition (Appendix B) is satisfied when

\[
\frac{a_i b_i v_2}{a_i b_1 v_1} > \left( \frac{m-1}{m+1} \right)^{1/m} \quad \text{and} \quad \left( m-1 \right)^{1/m} \frac{a_i b_i v_2}{a_i b_1 v_1} < \left( m+1 \right)^{1/m}
\]

(6)

which holds for a range of parameter values around a common benchmark such as \( \frac{a_i b_i v_2}{a_i b_1 v_1} = m=1 \).

Equation (6) always holds when \( m \leq 1 \).

In Proposition 2 we determine how monitor 1’s political contestation \( f_i \), without loss of generality, increases versus decreases as a function of the various parameters.
Proposition 2. Assume \( \frac{f_1}{b_1} \geq \frac{a_1 m R \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m}{b_2 v_1 \left( 1 + \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m \right)^2} \). (a) \( \frac{f_1}{f_2} = \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \), \( \partial f_1 / \partial R > 0 \). (b) Assume \( a b v \).

\[
(m - 1)^{1/m} \frac{a_1 b_2 v_2}{a_2 b_1 v_1} < (m + 1)^{1/m} \cdot \partial f_1 / \partial a_1 > 0, \ \partial f_1 / \partial b_1 < 0, \ \partial f_1 / \partial v_1 < 0. \]

(c) Assume \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} > 1 \). \( \partial f_1 / \partial a_2 > 0, \ \partial f_1 / \partial b_2 < 0, \ \partial f_1 / \partial v_2 < 0. \) \( \partial f_1 / \partial m > 0 \iff 1 + \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m + m \left( 1 - \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m \right) \ln \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right) > 0 \)

Proof. Follows from (B1) and from determining the sign of the first order derivative of \( f_1 \) in (5) with respect to the parameters \( a_1, a_2, b_1, b_2, v_1, v_2, R \).

The political contestation ratio \( f_1 / f_2 \) in Proposition 2a equals the ratio in Proposition 1b when \( n=2 \) and \( f_1 + f_1 = 1 \). Monitor 1’s political contestation increases in the rent \( R \). Proposition 2b assumes what is already assumed for the second order condition in (6) to hold. The results for the three derivatives are the same as in the last three derivatives in Proposition 1a. In Proposition 2c monitor 1 prefers higher political contestation than monitor 2 because he has a higher unit cost \( a_1 \) of monitoring, or a lower unit cost \( b_1 \) of political contestation, or a lower proportionality parameter \( v_1 \) for his salary from monitoring. This has three implications for monitor 1’s political contestation. First, it increases if monitor 2’s unit cost \( a_2 \) of monitoring increases, thus matching monitor 2’s increased political contestation. Second, it decreases if monitor 2’s unit cost \( b_2 \) of political contestation increases, thus matching monitor 2’s decreased political contestation. Third, it decreases if monitor 2’s proportionality parameter \( v_2 \) for his salary from monitoring increases, thus also matching monitor 2’s decreased political contestation.

The impact of the intensity parameter \( m \) is to amplify the role of \( \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m \), where \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} > 1 \) causes \( \lim_{m \to \infty} \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m = \infty \) and \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} < 1 \) causes \( \lim_{m \to \infty} \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m = 0 \). Proposition 2d implies \( \partial f_1 / \partial m > 0 \) for the benchmark \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} = m=1 \) which means that monitor 1 increases his political contestation when the intensity parameter \( m \) increases. This result also holds for a certain range outside the benchmark. But, when \( m \) is very large, the result may not hold for two opposite cases. First, when \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} < 1 \), the logarithmic function is negative multiplied with a positive term. Second, when \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} > 1 \), the logarithmic function is positive multiplied with a negative term. To illustrate, \( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} < 1 \) when \( a_1 = a_2 \) and \( v_1 = v_2 \) means that monitor 1 is disadvantaged with a high unit cost \( b_1 \) of political contestation, and
conversely when $\frac{a_i b_j v_i}{a_i b_j v_j} > 1$. That $\partial f_1 / \partial m > 0$ does not hold when monitor 1 is disadvantaged means that monitor 1 is too inferior to increase his political contestation when the intensity $m$ increases. That $\partial f_1 / \partial m > 0$ does not hold when monitor 1 is advantaged means that monitor 1 is so superior that increasing his political contestation when the intensity $m$ increases is not worthwhile.

3.3 Corner solution when $n=2$, $m=1$, and $f_1 = r_1 / b_1$

Assume without loss of generality that $\frac{r_i}{b_i} \geq \frac{a_i m R}{b_i} \left( \frac{a_i b_j v_i}{a_i b_j v_j} \right)^m \frac{a_i b_j v_i}{a_i b_j v_j} \left( 1 + \frac{a_i b_j v_i}{a_i b_j v_j} \right)^{-m}$ so that monitor 1 allocates his entire resource on political contestation, $f_1 = r_1 / b_1$, $p_1 = 0$. The Nash equilibrium (Appendix C) is

$$f_2 = \begin{cases} \frac{r_2}{b_2} & \text{when } \frac{a_2 R}{b_2 v_2} \geq \frac{r_1}{b_1} \text{ and } \sqrt{\frac{r_1}{b_1}} \left( \frac{a_2 R}{b_2 v_2} - \sqrt{\frac{r_1}{b_1}} \right) \leq \frac{r_2}{b_2} \\ 0 & \text{when } \frac{a_2 R}{b_2 v_2} < \frac{r_1}{b_1} \end{cases}$$

$$p_2 = \begin{cases} \frac{r_2 - b_2 f_2}{a_2} & \text{when } \frac{a_2 R}{b_2 v_2} \geq \frac{r_1}{b_1} \text{ and } \sqrt{\frac{r_1}{b_1}} \left( \frac{a_2 R}{b_2 v_2} - \sqrt{\frac{r_1}{b_1}} \right) \leq \frac{r_2}{b_2} \\ 0 & \text{when } \frac{a_2 R}{b_2 v_2} < \frac{r_1}{b_1} \end{cases}$$

Proposition 3. Assume $n=2$, $m=1$, and without loss of generality that $\frac{r_i}{b_i} \geq \frac{a_i R a_i b_j v_i}{b_i v_i \left( 1 + \frac{a_i b_j v_i}{a_i b_j v_j} \right)}$. Then $p_1 = r_1 / b_1$ and $p_2 = 0$. If $\frac{a_2 R}{b_2 v_2} \geq \frac{r_1}{b_1} \text{ and } \sqrt{\frac{r_1}{b_1}} \left( \frac{a_2 R}{b_2 v_2} - \sqrt{\frac{r_1}{b_1}} \right) \leq \frac{r_2}{b_2}$, monitor 2 strikes a balance between monitoring and political contestation. If $\frac{a_2 R}{b_2 v_2} \geq \frac{r_1}{b_1} \text{ and } \sqrt{\frac{r_1}{b_1}} \left( \frac{a_2 R}{b_2 v_2} - \sqrt{\frac{r_1}{b_1}} \right) > \frac{r_2}{b_2}$, monitor 2 is not resourceful and engages exclusively in political contestation. If $\frac{a_2 R}{b_2 v_2} < \frac{r_1}{b_1}$ monitor 2 focuses exclusively on monitoring.
Proof. Follows from (7).

The first solution in (7) expresses that monitor 2 jointly monitors and engages in political contestation. It presupposes that monitor 2 is sufficiently resourceful, and that the rent is high, or his unit cost of monitoring is high, or his unit cost of political contestation is low, or his proportionality parameter for his salary from monitoring is low, compared with monitor 1’s ratio of resource to unit cost of political contestation. In the second solution monitor 2 engages exclusively in political contestation. It presupposes the same as the first solution except that monitor 2 is sufficiently unresourceful. In the third solution, where the rent is low, or monitor 2’s unit cost of monitoring is low, or monitor 2’s unit cost of political contestation is high, or monitor 2’s proportionality parameter for his salary from monitoring is high, compared with monitor 1’s ratio of resource to unit cost of political contestation, then monitor 2 focuses exclusively on monitoring. If the rent is high, this third solution is unlikely.

4 Empirical Observations

In this section we present some findings from a survey on service delivery in education and healthcare in two African countries, namely Tanzania and Senegal, as reported in a study by the African Economic Research Consortium (AERC) and World Bank (2011). In Senegal 151 facilities each for healthcare and education were surveyed. In Tanzania, 175 facilities were surveyed in healthcare and 180 in education.

Table 1: Final sample of facilities by sector in the pilot countries

<table>
<thead>
<tr>
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<th>Senegal</th>
<th></th>
<th>Tanzania</th>
<th></th>
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<td>Rural</td>
<td>Urban</td>
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<td>Education</td>
<td>92</td>
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Source: AERC and World Bank (2001)

Poor service delivery behavior shows up in teacher-absenteeism, as measured by the Absence rate. The observations are in figure 1.

Figure 1: Absence rate: Tanzania and Senegal. Source: AERC and World Bank (2001)
From figure 1, about one in five teachers in Senegal, and one in four in Tanzania, are absent from school on any given school day. The absence rate in urban schools in Tanzania is significantly higher than in rural schools.

Next we focus on the time that children spend being taught in the classroom. Here we calculate the scheduled hours of teaching adjusted for the time teachers are absent from the classroom on average. Finally, from the classroom observation sessions we can measure to what extent the teacher is actually teaching when he/she is in the classroom. Here, we use information from the classroom observations done outside of the classroom. Specifically, the enumerator recorded every 5 minutes (for a total of 15 minutes) if the teacher remained in the classroom to teach, broadly defined, or if he/she left the classroom. The results are in figure 2.

![Figure 2: Time Children are in School being taught: Tanzania and Senegal. Source: AERC and World Bank (2011).](image)

Tanzanian students, on average, are taught 2 hours and four minutes a day, and half an hour less in urban areas compared to rural areas. In Senegal students are taught 3 and a quarter hours a day, which is higher than that for Tanzania, and this difference between the two countries persists for both urban and rural schools. The scheduled time for teaching in Tanzania is 5 hours and 12 minutes and that for Senegal is 4 hours and 36 minutes. Therefore the Tanzania results are too far below the scheduled teaching time!

One of the reasons for poor service delivery by teachers is the delays in their salaries. Such delays in salary-payments, may have an adverse effect on staff morale and therefore on the quality of service, is measured as the proportion of teachers whose salary has been overdue for more than two months. The data is collected directly from teachers at the school. This information captured in figure 3.
Significant (over two months) delays in salaries do not appear to be a common problem, especially in Senegal. In Tanzania, about 2% of the teaching staff report more than 2 months’ delay in salary, and this happens exclusively in rural schools.

We now present the results for healthcare services. We begin with the absence rate for healthcare staff not being in the clinic during one unannounced visit.

Figure 4: Absence rate for Healthcare Workers from Clinic: Tanzania and Senegal. Source: AERC and World Bank (2011).

Absenteeism among healthcare workers is widespread in both Tanzania and Senegal, as shown in figure 4. While one fifth of the healthcare workers are not in the clinic during the random spot check in both countries, the ratio reaches one third in urban areas in Tanzania and is significantly higher than in rural areas.

We now consider the time spent counseling patients per clinician. Clinicians were observed during a two-hour period. The results are in figure 5.
For Tanzania, the average time spent counseling patients is only 29 minutes a day! For Senegal the average time spent is 39 minutes, with more time spent in the urban areas of 1hr 35 minutes. Assuming that a normal working day for a doctor is 8 hours, in Tanzania the doctor spends 6% of the allocated time counseling patients, and 8% in Senegal.

Just like the case of the teachers, there are delays in the payment of salaries for clinicians. Such delays are likely to impact on their delivery of healthcare services. Figure 6 summaries the results.

The delay is measured as the proportion of healthcare workers whose salary is overdue for more than two months. From figure 6, we notice that 2 percent of healthcare workers in Tanzania reported delays in the payment of their salaries, while the figure for Senegal is higher at 5 percent. This is likely to impact on the quality of service provision in the healthcare sector.
5 Example(s) linking the empirics to the model

For teachers, Figure 2 gives the ratios 0.40 and 0.71 of scheduled teaching for Tanzania and Senegal, respectively. We assume the same ratios for the n monitors which, using (1), gives \((a_i p_i / r_i, b_i f_i / r_i) = (0.40, 0.60)\) and \((a_i p_i / r_i, b_i f_i / r_i) = (0.71, 0.29)\), for Tanzania and Senegal, respectively. Many different combinations of parameter values can give this equilibrium solution. To illustrate, we first consider the solution where the two unit costs \(a_i\) and \(b_i\) and the proportionality parameter \(v\) satisfy \(a_i / (b_i v_i) = a_j / (b_j v_j) \) \(\forall i, j, i \neq j\) for the n monitors, as in Proposition 1a, which implies \(b_i f_i = b_j R (n-1) / r_i \) \(\sum_{j=1}^{n} a_j b_j v_j / r_i \) for the n monitors, as in Proposition 1a, which implies \(b_i f_i = b_j R (n-1) / r_i \) \(\sum_{j=1}^{n} a_j b_j v_j / r_i \), which can equal 0.6 or 0.29, for Tanzania and Senegal, respectively. Assuming equivalent monitors across all parameters, i.e. \(r_i = r, a_i = a, b_i = b, v_i = v, f_i = f,\) and \(n=2\) monitors, give \(bf / r = aR / (4rv)\), and \(a=r\) gives \(bf / r = R / (4v)\). This expression equals 0.6 for Tanzania when the ratio \(R/v\) of status \(R\) to the proportionality parameter \(v\) for salary equals 2.4, and equals 0.29 for Senegal when \(R/v = 1.16\). The different results can thus as one hypothesis be explained by more than twice as high importance of status in Tanzania compared with Senegal.

The difference between the degrees 0.6 and 0.29 of fighting in Tanzania and Senegal, respectively, can be explained by the fact that in Tanzania the quality of monitoring teachers is ineffective. The difference may also be due to the fact in Tanzania parents are not involved as much as in Senegal in the schools where their children are pupils. The lower participation by parents reduces pressure on teachers to be held accountable for the quality of their services. Tanzania also shows a higher level of delays in the payment of salaries for teachers compared to Senegal (see figure 3) which would then impact on the quality of teaching.

For doctors Figure 5 gives the ratios 0.06 and 0.08, i.e. \((a_i p_i / r_i, b_i f_i / r_i) = (0.06, 0.94)\) and \((a_i p_i / r_i, b_i f_i / r_i) = (0.08, 0.92)\), for Tanzania and Senegal, respectively. Assuming as above, \(r_i = r, a_i = a, b_i = b, v_i = v, f_i = f,\) and \(n=2\), for doctors the ratios are \(R/v = 3.76\) for Tanzania and 3.68 for Senegal. These results are quite similar for Tanzania and Senegal, and can be interpreted such that monitors within medicine assign between three and four times as much value to status compared with the proportionality parameter \(v\) for salary. Other value choices for the parameters can also explain these results. For Tanzania and Senegal the situation is more dysfunctional for doctors than for teachers.

5 Conclusion

We develop a model where n monitors allocate their resources into monitoring versus political contestation for a rent. This applies for example for members of a council, with a strong political character, in various rural districts. Monitoring consists in supervising civil servants such as doctors and teachers such that they provide public goods. Political contestation consists in fighting with other monitors within a monitoring institution for power and position. Monitoring generates a public good for society at large and the recipients of monitoring, and generates a salary for the monitor which is commonly low. Lack of monitoring causes civil servants, who are commonly also underpaid, to go unmonitored, and they may seek income elsewhere. This causes communities to suffer decreased public goods provision. Political contestation enhances the power of the monitor which may potentially
be quite lucrative. We determine how monitors strike a balance between monitoring and political contestation.

We find that a monitor engages more in political contestation than other monitors when his unit cost of monitoring is high, his unit cost of political contestation is low, or his proportionality parameter for his salary from monitoring is low. We also determine a corner solution. An unresourceful monitor does not monitor. Detrimentally, the monitor does not monitor when his interior equilibrium resource expenditure from political contestation exceeds his resource capability. As the monitor becomes more resourceful, he monitors to some extent if his unit cost of monitoring is low. Intuitively, a monitor engages more in political contestation as the rent obtainable through political contestation becomes more valuable.

We next assume that monitor 1 prefers higher political contestation than monitor 2 because he has a higher unit cost of monitoring or a lower unit cost of political contestation, or a lower proportionality parameter for his salary from monitoring. This implies that monitor 1’s political contestation (1) increases if monitor 2’s unit cost of monitoring increases, (2) decreases if monitor 2’s unit cost of political contestation increases, and (3) decreases if monitor 2’s proportionality parameter for his salary from monitoring increases.

The intensity of political contestation amplifies the ratio between the monitors’ unit costs of monitoring and political contestation and the proportionality parameters for their monitoring salaries. For common benchmark parameter values, where the monitors are equally matched, increased intensity causes higher political contestation. When the monitors are unequally matched, increased intensity may cause lower political contestation due to strength or weakness.

We finally determine an additional corner solution. Assume that one monitor engages exclusively in political contestation due to being unresourceful. The second monitor chooses between three strategies. First, and unlikely, he engages exclusively in monitoring if the rent is low, or monitor 2’s unit cost of monitoring is low, or monitor 2’s unit cost of political contestation is high, or monitor 2’s proportionality parameter for his salary from monitoring is high, compared with monitor 1’s ratio of resource to unit cost of political contestation. Second and third, if these unlikely conditions are not satisfied, monitor 2 jointly monitors and engages in political contestation when resourceful, and focuses exclusively on political contestation when unresourceful.

One implication of the model is that political contestation cannot be eradicated, but its role can be reduced if one is aware of the logic of which factors impact how monitors allocate their resources between monitoring and political contestation.

We have used data for Tanzania and Senegal, both African countries, to show how serious poor service delivery is. The data are for the education and healthcare services sectors. In both sectors, and for both countries, teachers spend far less than the designated time teaching students, and clinicians spend very little time with patients, per day.
References
Kullenberg L. and D. Porter (1999) Decentralization and Accountability: Recent Experiences from Uganda, Agriculture and Development, 6, 1,
Appendix A Solving the model with n monitors and m=1

The first order condition for $f_i$ is

$$\frac{\partial u_i}{\partial f_i} = \frac{mRf_i^{m-1} \sum_{j=1}^{n} f_j^m}{\left( \sum_{j=1}^{n} f_j^m \right)^{\frac{3}{2}}} - \frac{b_i}{a_i} = 0$$  \hspace{1cm} (A1)$$

Inserting $\sum_{j=1}^{n} f_j = K - f_i$ and $\sum_{j=1}^{n} f_j = K$ for m=1 into (A1) gives

$$R = \frac{b_i}{K^2} \frac{b_i}{a_i(K-f_i)} \Rightarrow (K-f_i) = \frac{b_i}{b_j} \frac{a_j}{b_j a_j} (K-f_j)$$  \hspace{1cm} (A2)$$

Inserting (A2) into the sum

$$\sum_{j=1}^{n} (K-f_j) = Kn - \sum_{j=1}^{n} f_j = K(n-1)$$  \hspace{1cm} (A3)$$

gives

$$\sum_{j=1}^{n} \frac{b_j v_j}{b_i v_i} (K-f_j) = K(n-1)$$  \hspace{1cm} (A4)$$

which is solved to yield

$$f_i = K \left( 1 - \frac{n-1}{a_i \sum_{j=1}^{n} \frac{b_j v_j}{b_i v_i} a_j} \right)$$  \hspace{1cm} (A5)$$

which satisfies $\sum_{i=1}^{n} f_i = K$. Applying (A2) to determine K gives

$$K = R \sum_{j=1}^{n} \frac{(n-1)}{b_j v_j a_j}$$  \hspace{1cm} (A6)$$

which is inserted into (A5) to yield

$$f_i = \frac{R(n-1)}{\sum_{j=1}^{n} \frac{b_j v_j}{b_i v_i} a_j} \left( 1 - \frac{n-1}{a_i \sum_{j=1}^{n} \frac{b_j v_j}{b_i v_i} a_j} \right)$$  \hspace{1cm} (A7)$$

The second order condition for $f_i$ when m=1 is satisfied,

$$\frac{\partial^2 u_i}{\partial f_i^2} = -\frac{2R \sum_{j=1}^{n} f_j}{\left( \sum_{j=1}^{n} f_j \right)^3} < 0$$  \hspace{1cm} (A8)$$
Appendix B Solving the model with \( n=2 \) monitors and general \( m \)

Solving (A1) for \( n=2 \) gives

\[
\begin{align*}
    f_2 &= \frac{a_2 m R \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m}{b_2 v_2 \left( 1 + \left( \frac{a_1 b_2 v_2}{a_2 b_1 v_1} \right)^m \right)^2}, \\
    f_1 &= \frac{a_1 b_2 v_2}{a_2 b_1 v_1} f_2
\end{align*}
\]  

(B1)

The second order condition is

\[
\frac{\partial^2 u_i}{\partial f_i^2} = -\frac{m R f_i^{m-2} f_j^m \left( f_i^m (m+1) - f_j^m (m-1) \right)}{(f_i^m + f_j^m)^3} < 0
\]

(B2)

Appendix C Corner solution when \( n=2, m=1, \) and \( f_1 = r_1/b_1 \)

The first and second order conditions for \( f_2 \) are

\[
\begin{align*}
    \frac{\partial u_2}{\partial f_2} &= \frac{R r_1 / b_1}{(f_2 + r_1 / b_1)^2} - \frac{b_2 v_2}{a_2} = 0, \\
    \frac{\partial^2 u_2}{\partial f_2^2} &= -\frac{2 R r_1 / b_1}{(f_2 + r_1 / b_1)^3} < 0, \\
    \frac{\partial^2 u_2}{\partial f_2^2} &= -\frac{2 R r_1 / b_1}{(f_2 + r_1 / b_1)^3} < 0 \quad \text{(C1)}
\end{align*}
\]
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