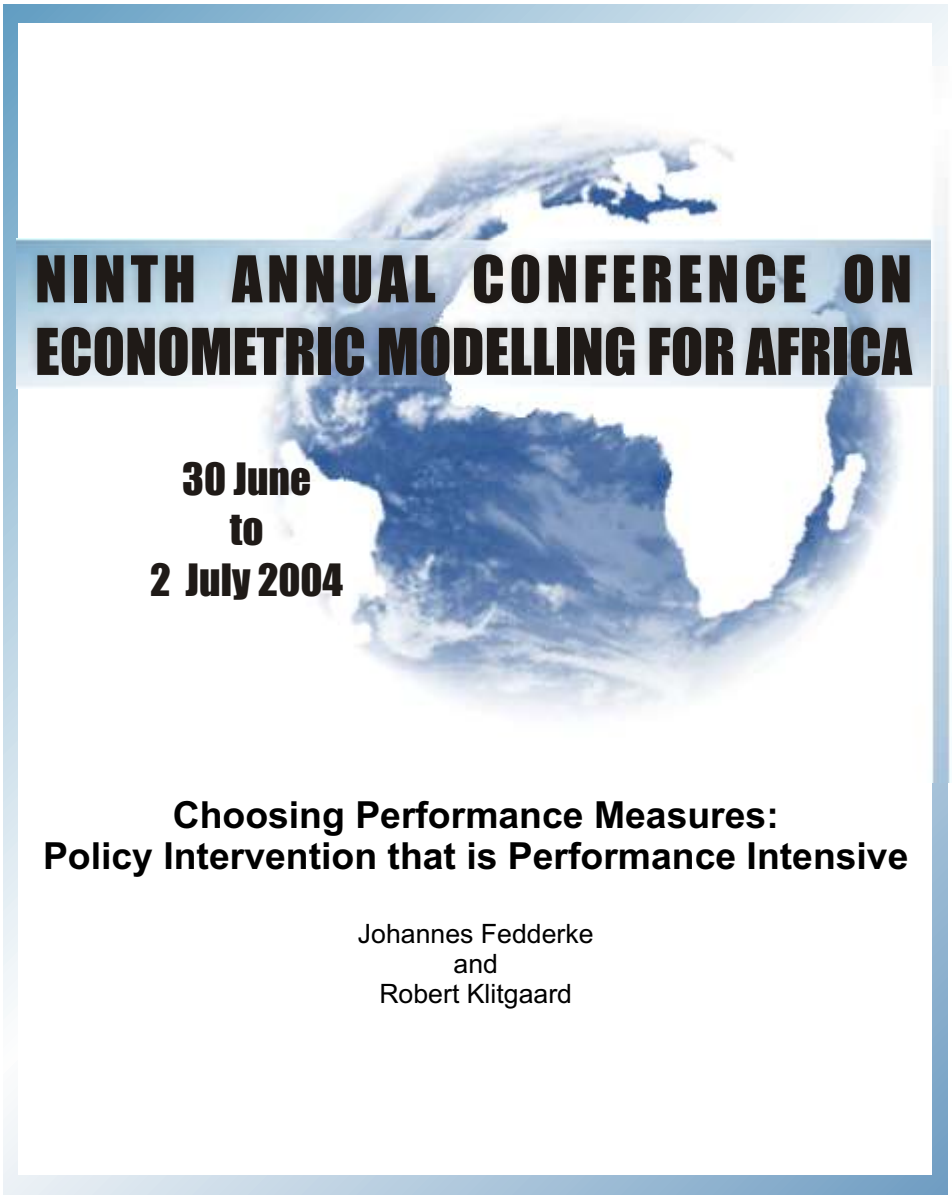

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Choosing Performance Measures: Policy Intervention that is Performance Intensive

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Abstract

We examine a two country aid model with performance intensive aid. The aid budget is determined by a donor country legislature, but allocated by a donor agency in terms of a performance criterion of its choice. Five sources of slippage in policy delivery are introduced. The donor agency observes the true performance of the aid recipient with error. The donor agency itself operates under stochastically variables efficiency. The aid recipient experiences rent-seeking behaviour. Effort in the aid recipient is subject to variable efficiency. Finally, adjustment of performance in the aid recipient is costly both in the level of effort, and in the time rate of change in the performance measure. The three core results to emerge from the model are that allocative efficiency improves under performance intensity of aid, in the sense that more aid comes to be allocated to aid recipients with good governance. Second, performance intensity of aid generates incentive effects, such that the optimal level of governance in the aid recipient will increase under strengthening performance intensity of aid. Thirdly, improving governance in the aid recipient in turn was shown to lead to increased budgetary allocations to aid in the legislature that allocates aid resources. Performance intensity of aid thus has fundraising effects. Policy slippage also carries impacts, however. The first of these is that the effectiveness of the performance intensity of aid appears to depend strongly on the degree of efficiency of own effort in the aid recipient country. At the same time, the aid budget provided by the legislature for allocation by the aid donor agency will grow only as long as the own effort of the aid recipient shows some positive return short of increasing returns. The maximum aid budget the legislature awards is under conditions of constant returns to the own effort of the aid recipient. Unfortunately, many of the world's poorest countries may suffer from low returns to own effort. These two findings in conjunction lead us to a first conjecture concerning the use of performance measures in policy: performance intensity of aid may work best under conditions where it is supplemented by technical assistance to improve the effectiveness of own effort by the aid recipient. A second feature of policy slippage is that A number of sources of policy slippage tend to have opposite impacts on the aid recipient and the donor agency. Increased rent-seeking lowers the optimal level of governance of the recipient country. It increases the optimal performance intensity of aid for the donor agency. Increased cost of effort in the aid recipient, lowers optimal governance levels in the recipient, but again raises the optimal performance intensity of aid for the donor agency. Losses in donor agency efficiency, lowers optimal governance in the aid recipient, but raises the optimal performance intensity of aid. Positive measurement shocks in governance raise the optimal level of governance in the aid recipient (with some ambiguity), and lowers the optimal performance intensity of aid. These results leads to a second conjecture concerning the use of performance measures in policy: since the benevolent donor agency responds to negative shocks to the net income of aid recipient countries by increasing the performance intensity of aid, it may face considerable populist pressures at home. Finally, a consideration of the dynamics of adjustment in governance, identified a further source for concern in implementing performance measures in policy. The presence of adjustment costs in governance for the aid recipient introduces the possibility of optimal time paths in governance that are non-monotone. The implication is that governance, on the optimal time path of adjustment to a new higher level of governance, may be such as to initially make things worse before they improve. A third and final conjecture is therefore that policy makers face risks in implementing performance intensive policy measures. In particular it may appear as if the policy is failing, immediately after implementation. Policy designed to improve governance does produce change - but in the wrong direction, even though things are bound to improve, and improve substantially This may be both difficult to sell, and perhaps even more importantly difficult to distinguish form cases where things really are going wrong.

Keywords: Aid, performance intense policy measures, growth, incentives.

JEL classification: D81, D82, D90, E61, O19, O29.

1. Introduction

Calls for performance driven public management have increased. Recent applications of the principle have emerged with respect to foreign aid tied to improved governance in aid recipient countries, state or federal funding tied to test score performance of schools, proxies for quality of health care or short run health indicators, and bonuses and incentive schemes in the public service provision of federal agencies.[1]

The suggestion sounds like sound economics. Tie rewards to (one of) the desired outcomes of the policy intervention - align the incentives of the agents engaged in policy delivery with intended outcomes. But which performance measures should one use? Are the desired incentive effects likely to emerge? What happens if desirable performance is difficult to observe? Do lurking rent-seekers threaten to derail the sound functioning of the incentive mechanism - and if so how severe is this effect? Can the donor agencies that dispense funds themselves come to distort the intended impact of performance intensity in policy intervention?

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[1]The Volcker Commision calls for performance-driven public management. Klitgaard, Fedderke and Akramov (2004) examines in greater detail issues that arise from the choice of performance criteria. Fedderke, Klitagaard and Akramov (2004) supplements with statistical evidence.

In this paper we consider these questions with reference to a relevant abstraction of the problem. The example we detail is the allocation of foreign aid, but the reach of the analysis is more general, including education policy, health policy, the provision of federal services. The point is the presentation of a simple model, in order to gain traction on the economic drivers of recipient country and donor agency responses.

In February 2003, President Bush sent Congress a bill to increase foreign aid by 50 percent over the next three years by creating a Millennium Challenge Account (MCA). The MCA provides an additional $5 billion per year to a select group of poor countries, allocated on the basis of sound policies and honest governments. In a March 2002 speech describing this initiative, President George W. Bush said the MCA will:

> reward nations that root out corruption, respect human rights, and adhere to the rule of law... invest in better health care, better schools and broader immunization... [and] have more open markets and sustainable budget policies, nations where people can start and operate a small business without running the gauntlets of bureaucracy and bribery.

By early 2004 the Bush administration had identified 63 countries eligible to compete for the first round of MCA funding because their per capita income (GDP p.c.) was below $1,415 and they were not deemed to be sponsors of terrorism.[2] To qualify for MCA funds, countries are rated on 16 indicators from a variety of sources. To qualify, a poor country would have to score above the median on the anti-corruption indicator and above the median in half of the indicators in each of the three policy areas.

In both scale and design, the MCA has been called the first major foreign aid initiative in more than 40 years (Radelet 2003a, 2003b). Its underlying logic is based on a growing recognition that aid can help countries with good governance, but will make little difference in countries with bad governance. This is a lesson of an influential book by David Dollar and Lance Pritchett (1998). Although more recent statistical studies question the robustness of the their findings—for example, William Easterly et al. forthcoming—it is now commonly observed that good governance is important for development. And regardless of which way the empirical evidence comes to settle, certainly USAID has accepted the lesson:

> No amount of resources transferred or infrastructure built can compensate for or survive bad governance. Predatory, corrupt, wasteful, abusive, tyrannical, incompetent governance is the bane of development. Where governance is endemically bad, rulers do not use public resources effectively to generate public goods and thus improve the productivity and well-being of their society. Instead, they appropriate these goods for themselves, their families, their parties, and their cronies. Unless we improve governance, we cannot foster development. (USAID 2002: 33)
>
> Only if governance becomes more democratic and accountable will development occur in the poorly performing countries. And only with a comprehensive, consistent, "tough love" from the international community is political will for governance reform likely to emerge and be sustained. (USAID 2002: 51)

An abstract version of the problem posits three stages. A legislature (funder, Congress say) specifies an aid budget. This provides money to an executive (donor agency), which decides on the allocation criteria according to measures of performance among recipients. Finally, the executive then allocates money across a variety of recipients (activities, agents, countries).

The process is taken to be sequential, with the executive taking the decision of the legislature (i.e. the budget) as given, while the aid recipient country accepts the performance criteria specified by the executive as

[2] The following 16 indicators (with sources), "chosen because of the relative quality and objectivity of their data, country coverage, public availability, and correlation with growth and poverty reduction, will be used to assess national performance relative to governing justly, investing in people, and encouraging economic freedom":

1. Governing Justly: Civil Liberties (Freedom House); Political Rights (Freedom House); Voice and Accountability (World Bank Institute); Government Effectiveness (World Bank Institute); Rule of Law (World Bank Institute); Control of Corruption (World Bank Institute).

2. Investing in People: Public Primary Education Spending as Percent of GDP (World Bank/national sources); Primary Education Completion Rate (World Bank/national sources); Public Expenditures on Health as Percent of GDP (World Bank/national sources); Immunization Rates: DPT and Measles (World Bank/UN/national sources).

3. Promoting Economic Freedom: Country Credit Rating (Institutional Investor Magazine); Inflation (IMF); 3-Year Budget Deficit (IMF/national sources); Trade Policy (Heritage Foundation); Regulatory Quality (World Bank Institute); Days to Start a Business (World Bank).

given. This reflects the assumption that the recipient cannot act strategically in order to alter the optimizing behaviour of the donor agency, nor can the donor agency strategically affect the decision of the legislature. While there may be some recipients that have the capacity to affect the donor agency (Russia?, Brazil?), in the general case this is unlikely (Rwanda). Similarly, in general the executive is taken to follow the lead of the executive.

The legislature maximizes a utility function that is a function of some results among the recipients (Y) and the size of the budget (k). However, the choice of the performance measure (g) by the executive for use in the allocation formula ($k = k(g)$), may itself feature in the utility function of the legislature. For instance, in our aid allocation example, g is effectively a measure of democracy, which might be valued as an objective in its own right, as an indicator that aid recipients will employ aid more effectively toward its intended goals, as well as an imperfect long-run facilitator of economic development in its own right.[3]

Recipients or agents by contrast are concerned solely with the maximization of their results (Y), while an institutional division of powers precludes the executive from pursuing its own objective function,[4] such that it too remains focussed on the maximization of results amongst recipients. Recipients have the means to alter behaviour so as to alter their score on the performance measure, thereby altering the amount of aid received, subject to some cost. Besides choice of the performance measure, the executive has the capacity to alter the strength of aid's performance intensity.

Description of the problem identifies three distinct analytical dimensions that require attention.

Allocative efficiency. Where performance measures are used to allocate resources across recipients, the choice of performance measure will affect the efficiency of allocation. By allocating resources to the agents with higher g, the productivity of k increases. The allocation of k that maximizes Y defines efficient static allocation.

Incentive effects. Performance measures create incentives, altering recipient behaviour. Agents have an incentive to increase g in order to capture more k. This has two positive implications. Y increases as a function of higher g, and the marginal impact of each dollar of investment dY/dk rises.

Fundraising effects. The funder may alter the budget k to the extent that allocation is conditioned on g. The funder may value g for its own sake. The funder may value our using the allocation formula as a sign that the investments made in the agents will not be wasted. Finally, the funder may respond to "inequities" that arise from those selected and excluded by the allocation formula.

What follows is an attempt to capture these three distinct effects simultaneously. The motivation arises from the fact that their coexistence and interaction appears to be ignored in the literature.

2. A Fuller Description of the Problem

Consider a two-country case with donor country and recipient country. The aid granting country has two agencies responsible for the provision of resources for aid (say Congress), and the allocation of aid respectively (say the State Department, or USAID). The two agencies have split power in order to prevent the pursuit of strategic interest on the part of the donor country. In this sense the donor country is effectively being assumed to act purely benevolently. We term the two agencies the donor agency and the granting agency respectively.

Suppose then that the division of power in the aid granting country is successful in keeping the objective of the donor agency "pure." We mean by this that the donor agency wishes only to maximize the recipient country future GDP (denoted Y),[5] subject to the cost of aid (denoted k). For the sake of simplicity assume further that the cost of aid is simply the magnitude of the aid granted.[6] Donor agency utility will thus load on both recipient country income Y (positively), as well as the quantity of aid granted, k (negatively).[7] The cost to the donor agency of granting the aid, C_D, is simply the magnitude of aid, k.

[3] In an educational example, the legislature, the executive, and the schools may all value academic learning for its own sake, as well as an imperfect contributor to longer-term economic advance, equity, and political development.

[4] Of course this is an abstraction - and indeed the model below allows for some relaxation of this assumption. Nevertheless, we are interested in the case where institutional design is sufficiently strict to preclude excessive policy slippage from the pursuit of the executive's own utility.

[5] In doing so we suppress the possibility that aid may be an instrument by means of which strategic interest dictated by *realpolitische* interests are pursued. Such motivation for aid is undoubtedly present in the cosideration of aid donors. But they belong to a different kettle of fish than we wish to investigate.

[6] Thus any fixed and variable cost of administration and transfer of aid is effectively borne out of the aid budget itself.

[7] Recall that the institutional stucture of the aid granting country is such as to render the donor and granting agency "pure." So the donor agency is peopled only by true altruists, that care not at all about maximizing budgets for their own sakes.

The aid donor agency must raise funds for foreign aid. For instance, for USAID aid is part of the State Department's budget, submitted by the President and approved by Congress, both in response to voters' preferences. How well USAID spends the money—the impact it has, the accountability USAID demonstrates— influence how much money USAID gets in the next budget. For our purposes, the insight is that the budget we have is a function of the performance criteria we use for allocation. The aid budget k is a function of the governance criteria we choose: $k = k(g)$. This is so for two reasons. The Administration, Congress, and the people may value good governance for its own sake, as an objective of aid apart from GDP growth. And they may believe that the leakage of aid to non-developmental uses will be lower if we give aid only to countries with good governance. Another way of putting this is that every dollar of development aid will have a higher impact if we condition it on good governance. The aid represents a cost to the legislature, $C_L(k)$.

Recipient country output depends on capital stock (denoted K), and its effort in pursuing growth-friendly policies, (denoted e). For the sake of tractability, suppose further that $Y_{ke} = 0$, such that the marginal impact of effort is unaffected by the amount of aid. Effort is not costless. The recipient country faces $C_R = C_R(e)$, presumed convex, $C_{R,e} > 0, C_{R,ee} > 0$. We normalize effort on the minimum feasible effort, which we might think of as a baseline or subsistence contribution.

Objective of the aid, k, is two-fold. First, the donor intends to stimulate output in the recipient country directly. Second the intention is the stimulation of growth enhancing efforts on the part of the aid recipient. Aid will have both a fixed component, F, and a component that is dependent on the effort made by the recipient in improving performance. The donor assigns a performance intensity, b, to the incentive mechanism on recipient effort, subject to the realization that effort is not directly observable, and that a proxy indicator has to be employed (see the discussion below).

Four forms of slippage in policy implementation are posited.

First, aid donors face information asymmetries. Effort of aid recipients cannot be observed directly. Instead, we have a proxy indicator, say governance, denoted g, which is an imperfect measure of effort subject to the error ε.[8] Performance intensity of aid is therefore tied to the observable dimension, rather than the unobservable underlying effort. Note that to the extent that the performance intensity of aid is tied to governance rather than the true underlying effort, this creates the incentive for aid recipients to generate a positive measurement error. One example is given by Costa Rica. throughout the 1970's, 1980's, and 1990's, Costa Rica has maintained uniformly sound levels of governance, yet growth in real GDP has remained low, averaging 1.62% per annum. Figure 1 illustrates by reporting Costa Rica's Freedom House political rights and civil liberties measure, as well as growth rates of output. What follows immediately is that the sound governance of Costa Rica has not been associated with spectacular productivity increases. At least potentially this may be due to the fact that the governance measures do not provide a sound indication of the quality of the underlying effort expended. An alternative explanation would relate to the productivity of the expended effort - of which more below. Employing data from the 1997 World Development Report Private Sector Survey, we compare the quality of government services and policy by comparison with Germany, given the latter's consistent reputation of having poor pro-growth policy, Switzerland (good governance) and Zambia (bad governance). Summaries are provided in Figure 2.[9] The performance of Switzerland relative to Germany confirms that the latter is indeed perceived to have growth-unfriendly policies. What is notable is that while the obstacles provided by the quality of government policy for Costa Rica is in general no more than "moderate" on the 6-point scale of the survey, note that in only one category (Severity of Red Tape) does the highly regulated and developed country score worse than Costa Rica, while in at least two cases (Obstacles in Government Business Interfaces, Inefficiency of Government Services), Costa Rica scores significantly worse than Germany, in the low end range of the moderate business environment quality. Worse, the performance of Costa Rica is in many instances worse even than Zambia, which has poor governance as measured by the Freedom House Rights indexes - with the single exception of the policy stability measure, where Zambia clearly does much worse than all its comparators. We conclude from the evidence that sound governance does not unambiguously translate into a sound policy environment for Costa Rica. Relative to countries with whom it shares governance ratings, the quality of its policy environment is considerably lower.

Second, aid recipients face a separate information asymmetry. The performance intensity of aid is itself

[8] In the current context, we concern ourselves only with the question of whether governance is a reliable measure of effort. A separate valid concern is whether governance itself is reliably measured across countries. Concern about the reliability and validity of measures is expressed in Bollen (1991) and Inkeles (1991). The work of Kaufman et al (1999a, 1999b, 2002) has concerned itself with redress. See also the discussion in Klitgaard and Fedderke (1995), and Fedderke, Klitgaard and Akramov (2004).

[9] We report averages across a range of questions in each category, which tends to suppress cross-country variation.

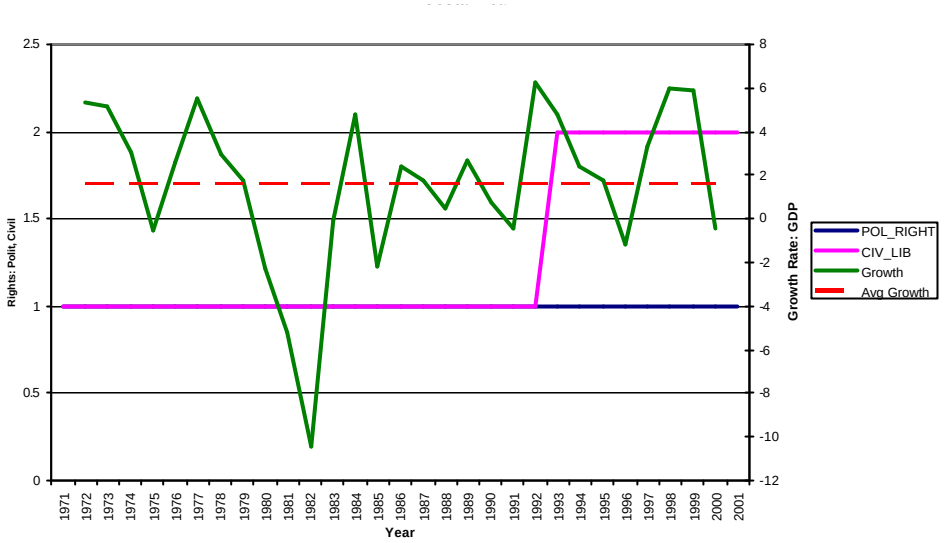

Figure 1: Costa Rica: Political Rights, Civil Liberties and Growth in Real Output.

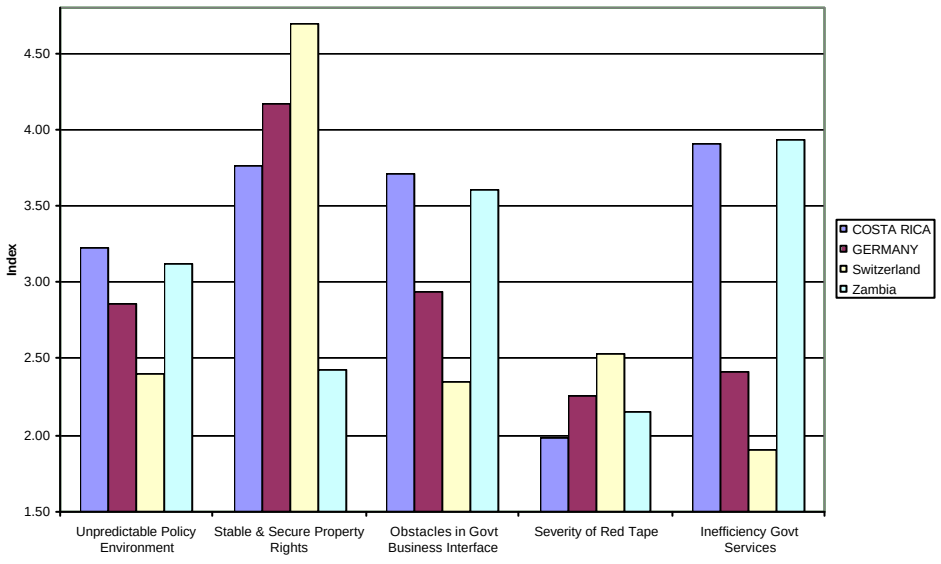

Figure 2: Comparison of the Effectiveness of Government Policy: Costa Rica, Germany, Switzerland and Zambia, Private Sector Survey, WDR 1997.

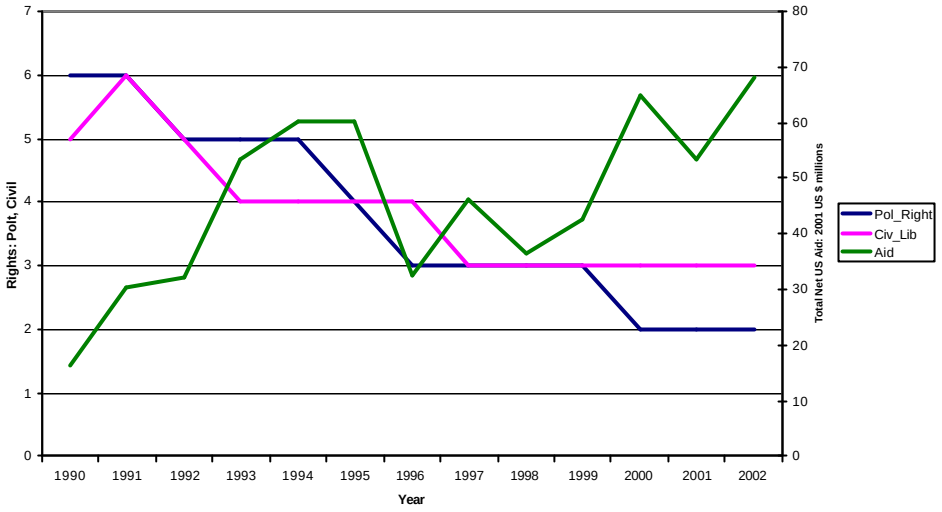

Figure 3: Ghana: Political Rights, Civil Liberties, and Total Net Aid Flows from the US, in constant 2001 US $ millions.

subject to some degree of uncertainty. This arises since bureaucratic inefficiency may prevent the adjustment of aid in response to governance changes. For present purposes we are not concerned with systematic inefficiency in policy delivery on the part of the donor. Rather, the focus is on policy slippage that is randomly distributed. Thus the b-parameter is subject to stochastic disturbance, such that $b = \beta + \epsilon$, where β denotes the true underlying performance intensity of aid and $\epsilon \backsim iid\left(0, \sigma_\epsilon^2\right)$ the stochastic disturbance to performance intensity of aid. By way of example of such mixed signals consider the experience of Ghana during the 1990's - Figure 3 illustrates. The Freedom House rights dimensions of Ghana improved from the second worst possible value of 6, to the second best possible value of 2 over the course of the 1990's. Yet US aid flows *increased* dramatically over the period in which rights remained poor (though there were signs of improvement), *decreased* by 33% in real terms over the period of the most dramatic improvements in rights, and only slowly recovered with significant lags thereafter. The case illustrates what we mean: there is conceivably *some* link between US aid and the quality of governance in the case of Ghana, but it is certainly not proximate, and postulating an error term in the association seems reasonable.

Third, the provision of aid resources may be diverted from the final income of the recipient country through rent seeking. Thus only some proportion, $0 \leq \phi \leq 1$, of the aid, k, granted may reach the final income of the target recipient country, with the rest being diverted into the coffers of rent-seekers in the distribution channels of the aid process.[10] Somali warlords raiding United Nations aid trucks, Mobuto Sese Seko diverting aid and national income flows to Swiss bank accounts, overblown aid administration in donor countries all constitute examples of the rent seeking we have in mind. For instance, India consistently had levels of governance at the second best level on the Freedom House scale (2) over the course of the 1990's. As Figure 4 demonstrates, the quality of the policy environment in 1997 was either the same or better than that of Costa Rica (though worse than Germany, and with less stable property rights and more government inefficiency). However, its ability to control corruption was significantly worse than Costa Rica, or Germany of course - see Figure 5. The implication is that in addition to less than perfect policy, graft may place an additional and separate constraint on delivery, including at least potentially that of aid. We propose to capture the effect by means of a separate dimension.

Fourth and finally, we have already noted that the income of the aid recipient depends on the effort it puts into the pursuit of growth friendly policy. But effort alone is not enough. Effort has to be productively deployed also, formally adopted good policy realized in practical implementation. The distinction from the first form of slippage above is that in the present case good governance *is* a reflection of sound effort, whereas in the first form of slippage good governance did not reflect sound effort. The problem in the present instance lies with the fact that sound effort/policy does not prove effective in stimulating growth. This may be due

[10]Note that the rent seekers could be located either in the recipient or in the donor country distribution channels. Reality is likely to be some combination of the two, and th model allows for this.

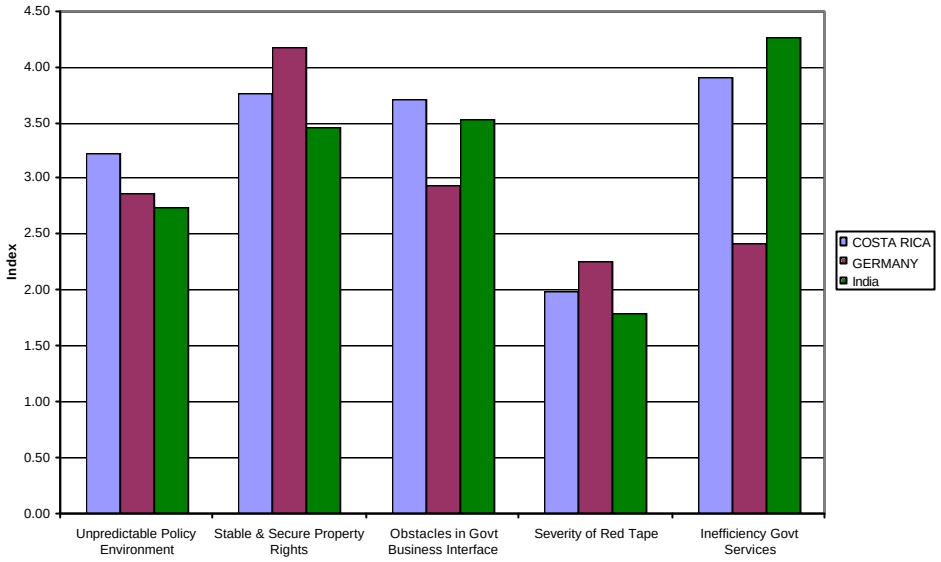

Figure 4: Comparison of the Effectiveness of Government Policy: Costa Rica, Germany and India, Private Sector Survey, WDR 1997.

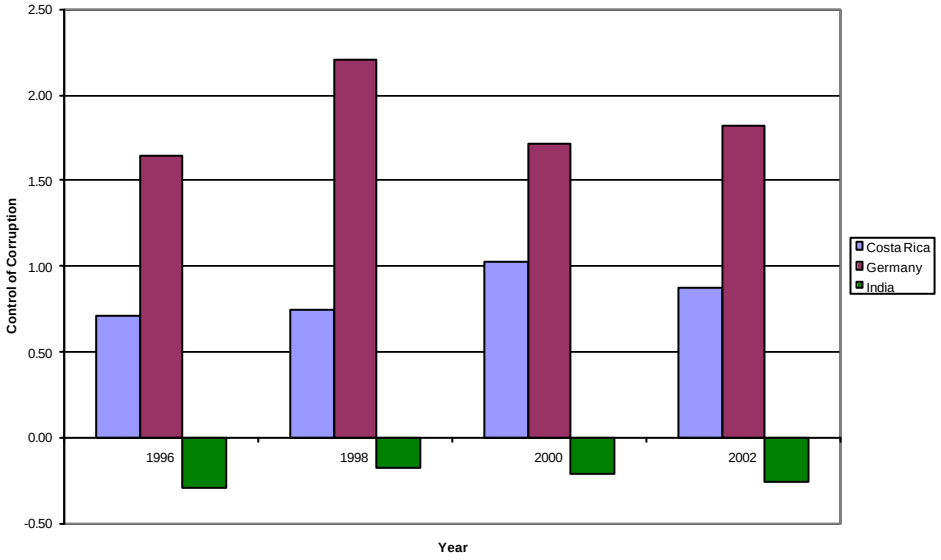

Figure 5: Ability to Control Corruption: costa Rica, Germany and India, World Bank Governance Indicators.

to the absence of sound institutions other than those related to governance or good policy - for instance, it might be due to the absence of sound financial market or commercial institutions, poor access to international capital markets, perhaps low levels of social capital, such that both sound governance and growth-friendly effort/policy is maintained, but to little effect. We capture this by means of an effort productivity parameter, δ.

To summarize our discussion thus far, we have:

$$\begin{aligned} Y &= Y(e,K,k),\ Y_e>0,\ Y_{ee}<0,\ Y_K>0,\ Y_{KK}<0,\ Y_k>0,\ Y_{kk}\leq 0 \\ C_R &= C_R(e),\ C_{R,e}>0,\ C_{R,ee}>0 \\ g &= g(e,\varepsilon),\ g_e>0,\ g_{ee}=0,\ g_\varepsilon>0,\ g_{\varepsilon\varepsilon}=0 \\ k &= k(F,g),\ k_F=\overline{F},\ k_{FF}=0,\ k_g>0,\ k_{gg}=0 \\ C_L &= C_L(k) \\ C_D &= \overline{C}_D \end{aligned} \tag{1}$$

such that the aid that is not performance intensive is taken to be fixed, $\overline{F}$, and the cost structure of the donor agency is taken to consist only of the fixed cost of running the donor agency. For the sake of analytical traction, and in the absence of compelling evidence to the contrary, we also impose $Y_{eK}=Y_{ek}=Y_{Kk}=g_{e\varepsilon}=k_{Fg}=0$.

2.1. Incentive Effects: The decision problem of the recipient country

The first question we are concerned with is the optimal response of the recipient country to the structure of aid proposed by the donor. Since aid is performance intensive, the recipient country stands to gain by increasing the measure that aid rewards. In this sense therefore, recipients now face an incentive to increase the indicator dimension to which the donor has tied aid, in order to increase the aid windfall, subject to the cost of doing so.

However, recall that the donor faces an informational disadvantage. The intention of the donor is to incentivize effort. Recourse to governance occurs only because effort is not directly observable, and is used as a proxy for the true target of the incentive scheme, subject to measurement error. The consequence of this is that the recipient country has an incentive not only to respond by increasing governance - but also by increasing measurement error, decreasing the reliability of the governance measure as a proxy for effort.

The incentive provided by the donor is therefore subject to some degree of slippage, generating a reaction not only in the intended underlying target dimension, but also perversely loosening the strength with which the target dimension is tied to the measurable dimension. We term this effect measurement slippage.

A further concern must attach to the objectives of the recipient country (or its governing elites). The concern of recipient countries may not be to maximize final income - merely to reap rents from the distribution of aid. One response to this danger by donor countries might be recourse to incentive compatible contracts, designed to ensure that the recipient country come to attempt to maximize final output. However since this merely raises the second order difficulties surrounding the enforcement (or lack thereof) of such contracts, we begin by considering the case of a recipient country that indeed has the objective of wishing to maximize its final output. If needs be, suppose that the incentive compatible contract has been written. In a subsequent section we turn to the case where rent seeking is not brought entirely under control.

This gives us the decision problem for the recipient country:

$$\max\ V[g] = \int_0^T [Y(e,K,k) - C_R(e)] \exp[-\rho t]\, dt \tag{2}$$

where ρ denotes the relevant time rate of discount, and subject to relevant boundaries. We allow only for governance as a state variable.[11] Use of a finite time horizon reflects the recognition of limited terms of office of administrations in leading donor countries, such that policy governing the provision of aid is subject to review and change after each term of office.[12]

[11] Capital stock may constitute an alternative state, subject to recipient country intervention. Our abstraction is motivated by our focus on the link between governance and aid. In addition, we point to the existence of capital and foreign direct investment constraints in developing nations, particularly those who are the intended targets of aid flows.

[12] Derivation proceeds under the assumption that the donor does not alter its behaviour (specifically the performance intensity of aid) in response to strategic behaviour on the part of the recipient. Stackleberg is not unreasonable in the current context. The USA is unlikely to alter β in response to Rwandan strategic initiatives.

The Euler equation first order condition for an extremal provides:

$$\underbrace{\frac{\partial e}{\partial g}\left(\frac{\partial Y}{\partial e}-\frac{\partial C_R}{\partial e}\right)}_{\substack{net\ direct\\ marginal\ return\\ on\ effort}}+\underbrace{\frac{\partial Y}{\partial k}\frac{\partial k}{\partial g}}_{\substack{marginal\ impact\\ of\ aid\\ on\ output}}=0 \tag{3}$$

such that $\frac{\partial e}{\partial g}\left(\frac{\partial Y}{\partial e}-\frac{\partial C_R}{\partial e}\right)$ denotes the net direct marginal return on effort, $\frac{\partial Y}{\partial k}$ the marginal impact of aid on output, $\frac{\partial k}{\partial g}$ the marginal impact of governance on aid, so that $\frac{\partial Y}{\partial k}\frac{\partial k}{\partial g}$ denotes the marginal impact of aid on output.

It follows from (3) that:

Proposition 1 (Incentives I) *The optimizing recipient country will exhaust all positive net returns available from effort - both as given by the direct impact of aid on output,* $\frac{\partial e}{\partial g}\left(\frac{\partial Y}{\partial e}-\frac{\partial C_R}{\partial e}\right)$*, and indirect as given by the aid channel* $\frac{\partial Y}{\partial k}\frac{\partial k}{\partial g}\frac{\partial g}{\partial e}$.

Proposition 2 (Incentives II) *The performance intensity of aid of necessity raises the level of effort in optimizing recipient countries provided only that the net marginal return on effort assumes a zero value before the marginal impact of aid.*

For the sake of illustration, suppose that (1) is satisfied under:

$$\begin{aligned}
Y(e,K,k) &= e^{\delta}K^{\alpha}+\phi k,\ 0\leq\phi\leq 1,\ 0\leq\delta\leq 1,\ e\geq 1, && (4)\\
C_R(e) &= \theta e+\lambda e^2,\ \theta,\lambda>0, && (5)\\
k &= F+bg,\ b>0, && (6)\\
&= F+(\beta+\epsilon)g,\ \beta+\epsilon\geq 0,\ \epsilon\backsim iid\left(0,\sigma_{\epsilon}^2\right) && (7)\\
g &= e\varepsilon,\ \varepsilon\sim iid\left(1,\sigma_{\varepsilon}^2\right) && (8)\\
C_D &= \overline{C}_D && (9)
\end{aligned}$$

satisfying the restrictions on functional form noted above. The δ-parameter measures the effectiveness of recipient effort in improving output. The direct effectiveness of aid in increasing recipient income, independently of the incentive effects of aid, is captured by the ϕ-parameter.[13] Convexity of the recipient cost function in effort is assured by the θ,λ-parameterization. This gives us the decision problem for the recipient country:[14]

$$\begin{aligned}
\max\ V[g] &= \int_0^T [Y(e,K,k)-C_R(e)]\exp[-\rho t]\,dt && (10)\\
&= \int_0^T \left[\phi F+\left(\phi(\beta+\epsilon)-\frac{\theta}{\varepsilon}\right)g-\frac{\lambda}{\varepsilon^2}g^2+\left(\frac{g}{\varepsilon}\right)^{\delta}K^{\alpha}\right]\exp[-\rho t]\,dt
\end{aligned}$$

The Euler equation first order condition for an extremal is then:

$$\left(\phi(\beta+\epsilon)-\frac{\theta}{\varepsilon}\right)-\frac{2\lambda}{\varepsilon^2}g+\frac{\delta K^{\alpha}}{\varepsilon^{\delta}}g^{\delta-1}=0 \tag{11}$$

Consider the special case in which $\delta=1$, and note that $\varepsilon^2=f\left(\sigma^2\right)$, such that $f_{\sigma^2}>0$.[15] This provides the *unique* optimal solution in governance for the developing country:

$$g^*=\frac{f\left(\sigma^2\right)}{2\lambda}\left(\phi(\beta+\epsilon)-\frac{\theta}{\varepsilon}+\frac{K^{\alpha}}{\varepsilon}\right) \tag{12}$$

A number of immediate implications follow.

[13] Linearity of Y in k in expression (4) may appear to violate our introductory reamrks. Since we have a single aid recipient, the need to exclude linearity is now absent, since all aid will of necessity be allocated to the single recipient.

[14] We suppress country subscripts given the presence of a single recipient.

[15] Since $\sigma^2=T^{-1}\sum[\varepsilon-E(\varepsilon)]^2=T^{-1}\sum[\varepsilon-1]^2$, the variance is monotonic in ε^2, and hence there exists the functional dependence $\varepsilon^2=f\left(\sigma^2\right)$, such that $\partial\varepsilon^2/\partial\sigma^2>0$.

Proposition 3 (Incentives III) *There is a positive governance response to increased performance intensity of aid (β). Thus strengthening the performance intensity of aid by tieing it to the governance performance of the recipient, does raise the optimal level of governance for the rational recipient. In this sense the performance intensity of aid creates an incentive to good governance.*

Proof. Given (12), $\frac{\partial g^*}{\partial \beta} > 0$. ■

It follows from Proposition 3 that attempts to provide incentives toward better governance in aid recipients are present under increased performance intensity of aid. The immediate question that follows is why performance intensity of aid is ever rendered bounded. We defer discussion of this point to the analysis of optimal donor agency behaviour.

Proposition 4 (Allocative efficiency) *Aid in the presence of performance intensity in allocation is more effective than in the absence of performance incentives.*

Proof. Propositions 1 through 3 demonstrate that the impact of aid operates not only through the direct channel that increases income in the recipient country. Governance responds positively also, raising output indirectly as well as directly. ■

Proposition 5 (Cost) *There is a negative governance response in optimizing recipient countries to increased effort costs (λ, θ).*

Proof. Given (12), $\frac{\partial g^*}{\partial \theta}, \frac{\partial g^*}{\partial \lambda} < 0$. ■

Proposition 5 is obvious from an economic perspective. But it does render explicit that the net effect of incentives to improve governance through performance intensity of aid, will depend crucially on how costly it is for the potential aid recipient to respond. Where substantial cost barriers are present, observed effects may be disappointing.

Proposition 6 (Slippage 3: rent seeking) *There is a positive governance response to a decrease in rent-seeking - or any other improvement in the direct effectiveness of aid (ϕ).*

Proof. Given (12), $\frac{\partial g^*}{\partial \phi} > 0$. ■

Aid is tied to governance and is transformed into final output by means of the ϕ-parameterization. The more effective aid is in increasing output, therefore, the greater the incentive on the part of the recipient to realize more aid by improved governance. Conversely, the presence of rent seeking in the aid recipient will limit the incentive effects of the performance intensity of aid. Therefore, to the extent that governance and rent seeking are separable (i.e. to the extent that good things do *not* go together), the effectiveness of performance intensity of aid will be limited by the existence of rent seeking.

Proposition 7 (Recipient internal consistency) *The greater the productive capacity of the recipient country, the greater the incentive for good governance (K), independently of the performance intensity of aid.*

Proof. Given (12), $\frac{\partial g^*}{\partial K} > 0$. ■

Again the intuition here is not difficult. The greater the productive capacity, the greater the opportunity cost of not ensuring the realization of the output potential through poor effort/governance. A significant corollary to follow is that the incentive effect that performance intensity of aid carries, wanes with rising productive capacity in the recipient country. The opportunity cost to poor effort renders the existence of poor governance less likely.

Proposition 8 (Slippage 2: recipient information asymmetry) *Gains in bureaucratic efficiency on the part of the donor agency (ϵ), generate a higher optimal level of governance in the aid recipient.*

Proof. Given (12), $\frac{\partial g^*}{\partial \epsilon} > 0$. ■

Since the aid recipient cannot distinguish between the true underlying performance intensity of aid (β), and the extent of the slippage that may result from bureaucratic inefficiency (ϵ), an increase in either will elicit a governance response. Crucially, bureaucratic inefficiency in the donor agency has the reverse impact on optimal governance in the recipient country.

Proposition 9 (Slippage 1: donor information asymmetry) *Positive governance shocks, ($\varepsilon > 0$), raise optimal governance where ($K^{\alpha} - \theta) > 0$, and lower optimal governance where ($K^{\alpha} - \theta) < 0$.*

Proof. Given (12), $\frac{\partial g^*}{\partial \varepsilon} = \frac{f(\sigma^2)(K^{\alpha}-\theta)}{2\lambda} \gtrless 0$ for $(K^{\alpha} - \theta) \gtrless 0$. ■

The intuition follows from the fact that $(K^{\alpha} - \theta)$ captures the marginal net social welfare impact of an increase in governance under $\delta = 1$. Hence a shock will raise the optimal level of governance only where the marginal effect generates a positive pay-off.

Measurement error on the part of the donor agency in establishing true underlying target effort thus has ambiguous impact on the optimal governance response on the part of the aid recipient. Since the donor cannot distinguish the true underlying effort (e) and measurement error (ε), thus responding only to the observed governance proxy (g), it is not surprising that the aid recipient has an incentive to increase its governance response as long as the marginal governance impact remains positive.

Perversely, note that the performance intensity of aid, tied to an imperfect measure of the true target of the performance intensity may have the unintended dynamic effect of decreasing the accuracy of the proxy measure for underlying effort. The aid recipient can increase aid flows either by increasing effort for a given measurement error, or it can loosen the link between effort and governance by increasing only the latter, increasing measurement error (variance).

Effectiveness of performance intensity of aid is therefore premised on the impossibility of a time-variant link between effort and governance, or on ready monitoring of the link in order to prevent the its exploitation by the aid recipient.

Proposition 10 (Variance) *Increased variance in measurement error (σ^2), raises recipient country optimal governance levels where the net incentive effect of performance related aid ($\phi\beta$) and the marginal net social welfare impact ($\frac{K^{\alpha}}{\varepsilon}$) outweighs negative cost component of effort ($\frac{\theta}{\varepsilon}$). Where they do not, increased variance lowers optimal governance.*

Proof. Given (12), $\frac{\partial g^*}{\partial \sigma^2} \gtrless 0$ *for* $\phi\beta + \frac{K^{\alpha}}{\varepsilon} \gtrless \frac{\theta}{\varepsilon}$. ■

For generality this leaves only the question of assessing the sensitivity of optimal governance choices to δ - that is the impact of the fourth policy slippage identified in the formulation of this paper's problem.[16] Table 1 reports the numeric solutions for g^* under the parameterization, $\theta = 1$, $\lambda = 0.001$, $\alpha = 1$, $\phi = 1$, $K = 1$.[17] Figure 6 provides a visual representation.

The crucial feature of the evidence are that Increasing effectiveness of recipient effort as measured by δ, is associated with increases in the optimal level of governance.

The impact of increasing effectiveness of recipient effort (δ) on the optimal governance level g^*, becomes proportionately stronger, the stronger the aid incentive effect on governance. Thus the ratio of g^* under $\delta = 1$ to g^* under $\delta = 0.001$ is nine times higher under $\beta = 0.9$ than under $\beta = 0.1$. Full performance intensity of the donor policy, $\beta = 1$, appears to constitute an anomaly. However, this arises due to the strong proportional increase in the optimal governance level even at the lowest level of effort effectiveness, $\delta = 0.001$, under full performance intensity of aid. See the ensuing discussion for fuller elaboration.

The impact of increasing the performance intensity of aid is differentiated across different levels of aid recipient effort effectiveness (δ). The most dramatic impacts are reserved for low levels of aid recipient effort effectiveness (note the $\frac{g^*_{\max}}{g^*_{\min}}$-ratio for $\delta = 0.1$). This is explained by the fact that at low δ, the impact of accumulating productive capacity is severely dissipated the effort effect on output. As a consequence, raising income through aid by means of governance compliance, is the most immediate means of improving income. While the incentive to focus on governance is weakened as the effectiveness of own effort improves (note the decline in $\frac{g^*_{\max}}{g^*_{\min}}$ with rising δ), continued improvement in the effectiveness of own effort serves to increase the incentive for good governance, both due to its direct output impact, as well as the performance intensity of aid. Under complete own effort effectiveness ($\delta = 1$), good governance is relatively desirable even in the absence of performance intensity of aid ($\beta = 0.1$).

Note that dramatic governance improvements occur under the combination of own effort effectiveness ($\delta \to 1$), *and* performance intensity of aid ($\beta \to 1$). One policy response that follows is that aid should

[16] We restict the analysis to the $0 < \delta \leq 1$ range, on the presumption that increasing returns in effort alone are not feasible. Empirical evidence corroborates.

[17] Strictly, the polynomial leading to the governance solution has a second equilibrium at zero governance. Since this implies an absence of all effort on the part of the recipient of aid, hence no production or income, we exclude this case as economically trivial.

δ	$\beta = 0.1$	$\beta = 0.3$	$\beta = 0.5$	$\beta = 0.7$	$\beta = 0.9$	$\beta = 1$	$\frac{g^*_{max}}{g^*_{min}}$
1	50	150	250	350	450	500	10
0.9	1.001	9.501	52.7	127.1	213.2	258.2	258
0.8	0.601	1.901	8.801	40.7	107.1	147.4	245
0.7	0.501	1.001	3.001	12.9	55.1	90.6	181
0.6	0.401	0.701	1.601	5.20	28.5	58.8	147
0.5	0.301	0.501	1.001	2.70	14.9	39.7	132
0.4	0.201	0.401	0.701	1.60	7.901	27.4	136
0.3	0.201	0.301	0.501	1.00	4.301	19.1	95
0.2	0.101	0.201	0.401	0.70	2.301	12.9	128
0.1	0.001	0.101	0.201	0.30	1.001	7.801	7801
0.001	0.001	0.001	0.001	0.10	0.001	0.901	901
$\frac{g^*_{max}}{g^*_{min}}$	50000	150000	250000	350000	450000	555	

Table 1: Optimal governance under alternative effort effectiveness (delta) and aid incentive (beta) parameterizations. Scaling is arbitrary.

incentivize good governance - but help in improving the impact of own effort would help to increase the desired pay-off. External incentives are insufficient, and aid that is decoupled from the internal effectiveness of effort on the part of the aid recipient, is likely to fail.

These implications can be summarized in one final proposition:

Proposition 11 (Slippage 4: effort effectiveness) *Desirable effects of performance intensity of aid emerge most effectively where the own effort of the recipient country is strong ($\delta \to 1$). Conversely, where the effectiveness of own effort are low, performance intensity of aid may have little or no impact.*

2.2. The decision problem of the donor agency

We continue under the assumption of a benevolent donor, interested only in increasing recipient country income. Recall that we postulated that the donor country had two organizations, the donor agency responsible for the disbursement of aid, and Congress responsible for determining the magnitude of the aid granted.

Thus far the formulation of the problem has been such as to render the aid budget potentially unbounded in improvements in governance, given the assumption that $k_g > 0$, $k_{gg} = 0$. In the concrete example we illustrated in greater detail, this assumed the form of linearity. The presumption of this formulation is that the donor agency in the donor country, would always be in a position to extract additional resources for the aid budget, provided only that it was able to demonstrate improvements in governance in aid recipients. We noted above that this might be due either to an intrinsic valuation of governance improvements by the budget setting instance in the donor (Congress), or because Congress may believe there to less wastage of aid under good governance. Greater realism might perhaps dictate that $k_g > 0$, $k_{gg} < 0$, though the existence of an upper bound to feasible governance improvements and the small proportions of the total budget made up of aid may also make this alternative assumption redundant.

Provided the benevolence assumption is satisfied, the donor decision problem is to:[18]

$$\max\ W[\beta] = \int_0^T \left[Y(e, K, k) - \overline{C}_D\right] \exp[-\rho t] dt \tag{13}$$

where ρ denotes the relevant time rate of discount, and subject to relevant boundaries. We allow only for the performance intensity of aid as a choice variable. Use of a finite time horizon reflects the recognition of limited terms of office of administrations in leading donor countries, such that policy governing the provision of aid is subject to review and change after each term in office.

[18] We introduce recipient country income directly into the objective functional of the problem. An extension would be to a von Neumann - Morgenstern utility formulation, though the core structure of the decision problem emerges also in our simpler formulation.

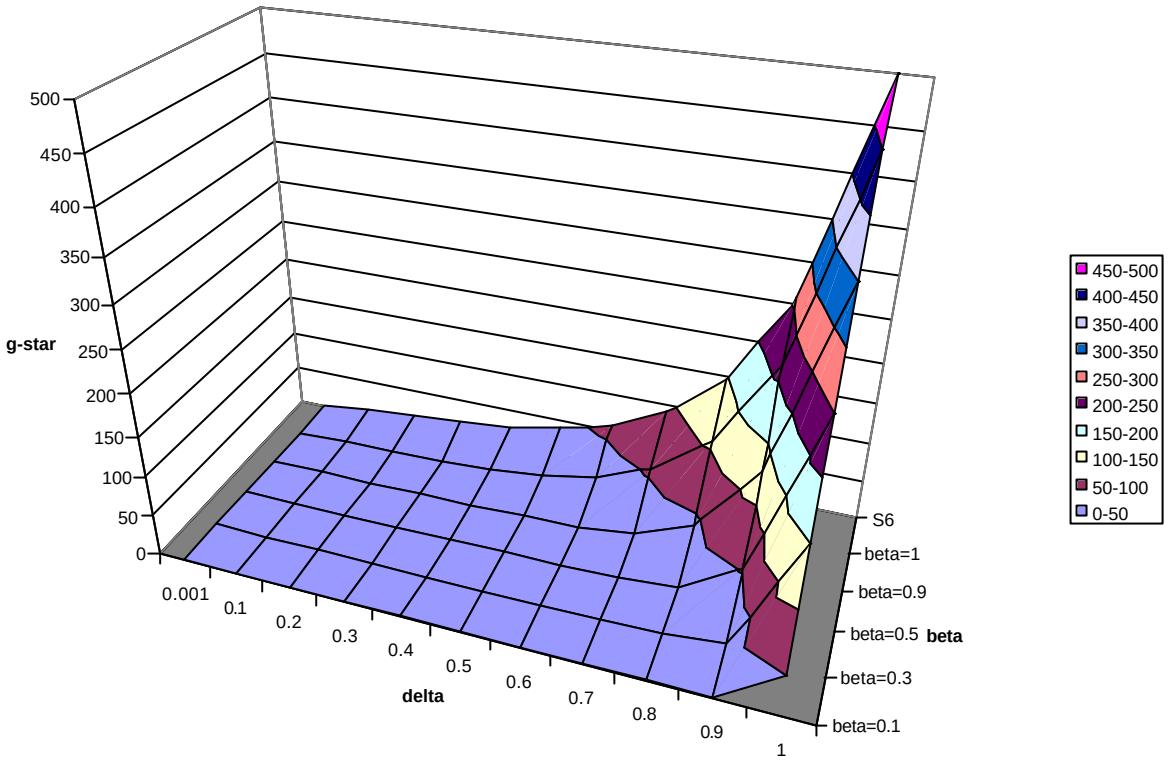

Figure 6: Variation of g^* in δ, over alternate β-parameterizations.

The Euler equation first order condition for an extremal in β provides:

$$\underbrace{\frac{\partial Y}{\partial e}\frac{\partial e}{\partial g}\frac{\partial g}{\partial \beta}}_{\substack{marginal\\ output-impact}} + \underbrace{\frac{\partial Y}{\partial k}\frac{\partial k}{\partial \beta}}_{\substack{marginal\\ fundraising\\ effect}} = 0 \tag{14}$$

such that $\frac{\partial Y}{\partial e}\frac{\partial e}{\partial g}\frac{\partial g}{\partial \beta}$ represents the marginal impact of increased recipient country output due to the incentive effect of the performance intensity of aid, and $\frac{\partial Y}{\partial k}\frac{\partial k}{\partial \beta}$ represents the marginal fundraising effect of increased recipient country governance in response to the performance intensity of aid.

Implication of (14) is that the optimal choice of performance intensity of aid by the benevolent donor agency will exhaust all means of raising recipient country income - both by exploiting the incentive effect that emanates from the performance intensity of aid, and by exploiting the fundraising effect that it can exert on the budget setting organization in the donor country.

Again for the sake of illustration, suppose that (1) is again satisfied under (4) through (9) satisfying the restrictions on functional form noted above. This then provides us with the specific decision problem for the donor agency of:

$$\max\ W[\beta] = \int_0^T \left[\left(\frac{g}{\varepsilon}\right)^{\delta} K^{\alpha} + \phi F + \phi(\beta+\epsilon)\, g - \overline{C}_D\right] \exp[-\rho t] dt \tag{15}$$

Provided the recipient country chooses the optimal level of governance given the aid incentives (see 12), and

for the case of $\delta = 1$,[19] this provides the donor with the decision:

$$\max\ W[\beta] = \int_0^T \left[\frac{f\left(\sigma^2\right)\left(\phi\left(\beta+\epsilon\right) - \frac{\theta}{\varepsilon} + \frac{K^\alpha}{\varepsilon}\right)}{2\lambda} \left\{ \phi\left(\beta+\epsilon\right) + \frac{K^\alpha}{\varepsilon} \right\} + \phi F - \overline{C}_D \right] \exp[-\rho t] dt \tag{16}$$

with ρ denoting the relevant donor time rate of discount, again subject to relevant boundaries, and with the finite time horizon reflecting the relevant planning horizon of the incumbent administration. The Euler equation first order condition for an extremal in β provides:

$$2\phi^2\left(\beta+\epsilon\right) - \frac{\theta\phi}{\varepsilon} + \frac{2\phi K^\alpha}{\varepsilon} = 0 \tag{17}$$

with the implied optimal performance intensity of aid:

$$\beta^* = \frac{\theta - 2K^\alpha}{2\phi\varepsilon} - \epsilon \tag{18}$$

A number of immediate implications follow.

Proposition 12 (Slippage 3: rent seeking) *Rising rent seeking in the recipient country ($d\phi < 0$), raises the optimal performance intensity of aid for the benevolent donor agency.*

Proof. Given (18), $\frac{\partial \beta^*}{\partial \phi} < 0$. ∎

While the result may appear counterintuitive, it is a direct consequence of assuming that the division of power in the donor country is successful in rendering the donor agency benevolent: interested purely in maximizing the recipient country output subject to its own fixed cost of operation. Thus in the presence of rent-seeking, which lowers the net realized income in the recipient country, given $Y_\phi > 0$, the benevolent donor agency interested in maximizing recipient country income will respond by raising aid, k, in order to counteract the declining effectiveness of the aid on income.

Proposition 13 (Cost) *An increasing cost structure of effort ($d\theta > 0$), raises the optimal performance intensity of aid for the benevolent donor agency.*

Proof. Given (18), $\frac{\partial \beta^*}{\partial \theta} > 0$. ∎

The intuition is similar to that for rent seeking. Increased cost of effort lowers productive activity in the aid recipient, and a benevolent donor agency intent of maximizing recipient country income responds by raising the performance intensity of aid, in order to off-set the rising cost structure.

Proposition 14 (Recipient capacity) *The greater the productive capacity of the aid recipient (K), the lower the optimal performance intensity of the benevolent donor agency.*

Proof. Given (18), $\frac{\partial \beta^*}{\partial K} < 0$. ∎

Since the recipient country with strong productive capacity has every incentive to ensure sound governance, and high effort levels of its own accord, the need for performance intensity of aid on the part of the benevolent donor agency is reduced.

Proposition 15 (Donor agency inefficiency) *The greater the inefficiency of the donor agency ($d\epsilon < 0$), the greater the optimal performance intensity of the benevolent donor agency.*

Proof. Given (18), $\frac{\partial \beta^*}{\partial \epsilon} < 0$. ∎

A perverse consequence of donor agency benevolence. Increased own inefficiency is compensated for by raising performance intensity of aid. In part this is a reflection of the fact that the model does not allow for self-correcting action on the part of the donor agency, leaving the only recourse for compensation by the donor agency increased reward for good governance so as to increase aid flows to the recipient country.

Proposition 16 (Measurement error) *The greater the measurement error of pure underlying effort (e) by means of the governance proxy (g) on the part of the donor agency, the lower the optimal performance intensity of the benevolent donor agency.*

[19] Since for $\delta < 1$ the effectiveness of aid is limited, there is diminished incentive for the aid donor to fine-tune β^*. The present case thus represents the limiting, but also the case of interest.

Proof. Given (18), $\frac{\partial \beta^*}{\partial \varepsilon} < 0$. ■

Positive governance shocks for the recipient country raises the optimal level of governance. For the benevolent donor agency, provided only that the agency can distinguish the shock, increased shocks lower the optimal performance intensity of aid. Straightforwardly since the donor agency wishes to reward the true correlate with effort, governance, not measurement error or dissimulation on the part of the aid recipient.

To the extent that systematic exploitation of measurement error by the aid recipient in order to increase aid flows (see Proposition 6) is subject to detection, the reaction of the benevolent donor agency of decreasing performance intensity represents a discipline on the aid recipient, limiting the strategic exploitation of measurement error.

The results of this section help demonstrate why the activities of donor agencies may often face considerable public disaffection in donor country voting constituencies. Attempts to increase aid flows to recipient countries through changed performance intensity of aid (since this is the only means at the disposal of the donor agency to change aid flows) are targeted to recipients with low productive capacity, where effort responses may be slow because costly, where rent seeking is rife, and to counter the inefficiency of the donor agency.

It is not difficult to understand that this may seem perverse to voters - the actions of government agencies hell-bent on maximizing budgets even where this appears custom made to be wasteful. In fact, in the current case we have demonstrated that such apparently perverse behaviour is precisely the result of benevolent action on the part of the donor agency. This in turn follows from an institutional structure that has separated powers between the donor agency and the budget setting instance, in order to ensure that the donor agency remain focussed on raising recipient country income.

2.3. The budget granting instance

It now remains to detail the decision faced by the final budget granting instance - the legislature (Congress say).

Again we proceed under the assumption that the legislature, through an appropriate division of powers pursues only altruistic and not strategic interests in granting aid. The objective is thus to maximize the income of the aid recipient, subject to the cost of granting aid, and recognizing that the performance measure, in this instance governance, may itself be a source of utility to the legislature. We have a utility function:

$$U = U(Y, g, k) \tag{19}$$

such that $U_Y > 0, U_{YY} < 0, U_g > 0, U_{gg} < 0, U_k < 0, U_{kk} < 0$. The decision variable for the legislature is the budget, k.

This gives the decision problem for the legislature:

$$\max\ U[k] = \int_0^T U(Y, g, k) \exp[-\rho t]\, dt \tag{20}$$

with ρ again representing the relevant time rate of discount, and with the fixed term of office of the legislature explaining the finite time horizon to the problem.

The first order condition given by the Euler equation is now:

$$\underbrace{\underbrace{\frac{\partial U}{\partial Y}\frac{\partial Y}{\partial e}\frac{\partial e}{\partial k}}_{\substack{marginal\ utility\\ of\ effort\\ impact\ of\ aid}} + \underbrace{\frac{\partial U}{\partial Y}\frac{\partial Y}{\partial k}}_{\substack{marginal\ utility\\ of\ directaid\\ impact}} + \underbrace{\frac{\partial U}{\partial g}}_{\substack{marginal\ utility\\ of\ improved\\ governance}}}_{source\ of\ fundraising\ effect} + \underbrace{\frac{\partial U}{\partial k}}_{\substack{marginal\ disutlity\\ of\ aid\ cost}} = 0 \tag{21}$$

with $\frac{\partial U}{\partial Y}\frac{\partial Y}{\partial e}\frac{\partial e}{\partial k}$ capturing the marginal utility of budgetary expenditure on aid through changes in effort on the part of the aid recipient, $\frac{\partial U}{\partial Y}\frac{\partial Y}{\partial k}$ identifies the marginal utility of the direct impact of aid on recipient country income, $\frac{\partial U}{\partial g}$ the marginal utility of improved recipient country governance on the donor legislature, and $\frac{\partial U}{\partial k}$ the marginal disutility of the aid cost. Jointly, $\frac{\partial U}{\partial Y}\frac{\partial Y}{\partial e}\frac{\partial e}{\partial k}$, $\frac{\partial U}{\partial Y}\frac{\partial Y}{\partial k}$, and $\frac{\partial U}{\partial g}$ are the source of the fundraising effect of aid.

Again for the sake of illustration, consider the case of utility that is Cobb-Douglas, such that:

$$U = MY^{\pi} g^{\mu} k^{\eta},\ \pi, \mu > 0,\ \eta < -1 \tag{22}$$

Recalling (4) through (9), the specific Euler is now:

$$\frac{\pi U \delta K^{\alpha} \left(\frac{g}{\varepsilon}\right)^{\delta-1}}{Y\varepsilon\left(\beta+\epsilon\right)} + \frac{\mu\phi U}{g} + \frac{\mu U}{g\left(\beta+\epsilon\right)} + \frac{\eta U}{k} = 0 \tag{23}$$

such that the optimal budget allocation is given by:

$$k^{*} = \frac{-\eta g Y \varepsilon \left(\beta+\epsilon\right)}{g\pi\delta K^{\alpha}\left(\frac{g}{\varepsilon}\right)^{\delta-1} + Y\varepsilon\left(\beta+\epsilon\right)\mu\phi + \mu Y\varepsilon} > 0 \tag{24}$$

A number of implications follow.

Proposition 17 *The optimal budget allocation will react directly to the governance level of the aid recipient, g, but not directly to the degree of performance intensity of aid, β, or to measurement error between aid recipient effort of governance, ε, or to variation in donor agency efficiency, ϵ.*

Proof. Since $\frac{\partial k^{*}}{\partial g} \neq 0$, $\frac{\partial k^{*}}{\partial \beta} = 0$, $\frac{\partial k^{*}}{\partial \varepsilon} = 0$, $\frac{\partial k^{*}}{\partial \epsilon} = 0$. ■

Proposition 18 *The optimal budget allocation will react indirectly to the degree of performance intensity of aid, β, or to measurement error between aid recipient effort of governance, ε, or to variation in donor agency efficiency, ϵ.*

Proof. Since $\frac{\partial g^{*}}{\partial \beta} \neq 0$, $\frac{\partial g^{*}}{\partial \varepsilon} \neq 0$, $\frac{\partial g^{*}}{\partial \epsilon} \neq 0$. ■

Proposition 19 *The optimal budget allocation, k^{*}, will rise in governance only if $0 < \delta < 1$.*

Proof. Since:

$$\frac{\partial k^{*}}{\partial g} = \frac{\eta g Y \left(\beta+\epsilon\right)\lambda K^{\alpha}\varepsilon^{2-\delta} g^{\delta}\delta\left(\delta-1\right)}{\left[g\pi\delta K^{\alpha}\left(\frac{g}{\varepsilon}\right)^{\delta-1} + Y\varepsilon\left(\beta+\epsilon\right)\mu\phi + \mu Y\varepsilon\right]^{2}}$$

and given $\eta < -1$,

$$\frac{\partial k^{*}}{\partial g} \gtrless 0 \; for \; 0 \lesseqgtr \delta \lesseqgtr 1$$

■

The illustration below demonstrates. The intuition of the result follows from the impact of δ on the own effort of the aid recipient. For $\delta > 1$, there are increasing returns to the own effort of the aid recipient - making the aid incentives toward improved governance redundant. Under these conditions, it would be rational for the legislature to decrease the aid budget, since it would serve no additional purpose, over an above the internal efforts of the aid recipient. The case of $\delta < 0$, is perhaps unlikely, since it implies that increased effort on the part of the aid recipient destroys output. Nevertheless, under such circumstances a legislature concerned to raise the income of the aid recipient would of course have little interest in lowering output in the aid recipient by stimulating destructive own effort.

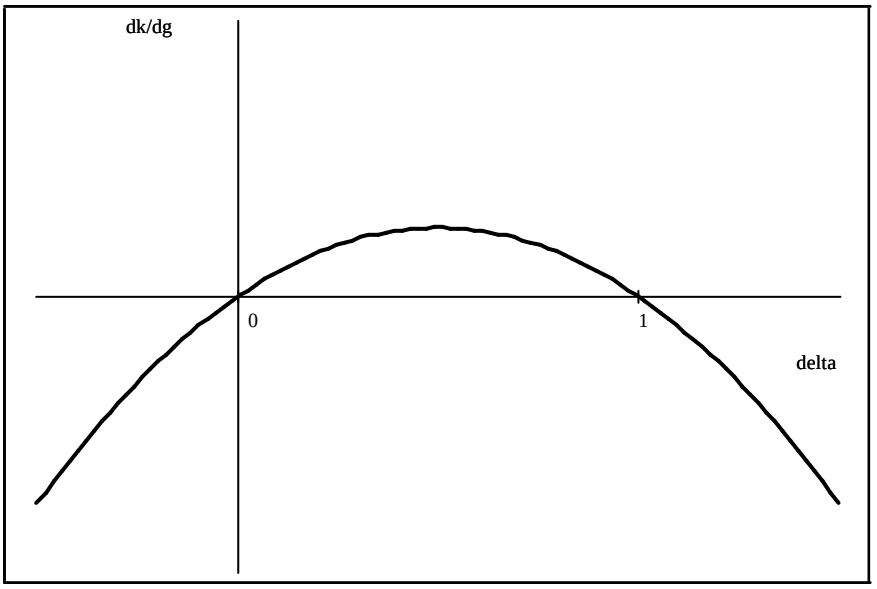

Illustration: $\frac{\partial k^{*}}{\partial g}$ in δ

Proposition 20 *The optimal aid allocation, k^*, reaches a maximum, where the own effort of the aid recipient is at a maximum without attaining increasing returns, i.e. where $\delta = 1$.*

Proof. Since $\frac{\partial k^*}{\partial g} > 0$ for $0 < \delta < 1$, $\frac{\partial k^*}{\partial g} < 0$ otherwise. ∎

The result is a counterpart to Proposition 11. The effectiveness of the performance intensity of aid reached a maximum where $\delta \to 1$. It is no surprise that the incentive of the legislature to allocate funds to aid should similarly peak where the impact of the aid recipients' own effort peaks, without realizing increasing returns. Under increasing returns the need to provide aid disappears.

3. Some additional dynamic concerns

Thus far the analysis has been essentially static. Thus far all decision problems have been effectively static. Linearity in the time rate of change of decision variables has ensured that the decision problems have been degenerate in the dynamic sense.

This is clearly an abstraction in the current context. Thus far the cost structure of the aid recipient has reflected the impact of effort, with $C_{R,e} > 0, C_{R,ee} > 0$. We noted in the preceding discussion that the adoption of performance intensity of aid had an impact on the level of governance that the optimizing aid recipient would adopt. To date we have dealt with this implication in terms that effectively invoke comparative statics. Yet *changing* the level of governance in the aid recipient country is unlikely to be costless - nor are changes in educational systems, health systems, or the provision of federal services costless. To reflect this, we now posit not only that $C_{R,e} > 0, C_{R,ee} > 0$, but also that $C_{R,\overset{\bullet}{g}} > 0, C_{R,\overset{\bullet\bullet}{g}} > 0$.

By contrast, for the donor agency to alter the degree of performance intensity of aid, $d\beta$, is essentially costless. Perhaps somewhat less plausibly, we also take the cost of altering the aid budget, dk, to be zero also. While budget debates are often notoriously vexed, relative to altering governance structures, so costs are negligible. This explains our choice of emphasizing the adjustment costs of the aid recipient.

The structure of the decision problems remains unaltered from (2). Given the additional argument in the cost function, however, the Euler equation now comes to reflect the time rate of change of the governance variable also. In general specification we have:

$$\underbrace{\frac{\partial e}{\partial g}\left(\frac{\partial Y}{\partial e} - \frac{\partial C_R}{\partial e}\right)}_{\substack{\text{net direct} \\ \text{marginal return} \\ \text{on effort}}} + \underbrace{\frac{\partial Y}{\partial k}\frac{\partial k}{\partial g}}_{\substack{\text{marginal impact} \\ \text{of aid} \\ \text{on output}}} - \underbrace{\frac{d}{dt}\left(\frac{\partial C_R}{\partial \overset{\bullet}{g}}\right)}_{\substack{\text{marginal cost} \\ \text{impact of} \\ \text{governance change}}} = 0 \tag{25}$$

The structure of the Euler remains symmetrical to that faced by the aid recipient in the absence of adjustment costs, except for appearance of the marginal cost impact of governance change $\frac{d}{dt}\left(\frac{\partial C_R}{\partial \overset{\bullet}{g}}\right)$. The optimal time path in governance, and intertemporal level of governance thus requires that the marginal cost of governance change must be compensated by the net direct marginal return on effort and the marginal impact of aid on effort.

Again, for purposes of illustration, suppose that in addition to (4) and (**??**) through (9), we have:

$$C_R(e) = \theta e + \lambda e^2 + \varphi \overset{\bullet}{g} + \psi \overset{\bullet}{g}^2,\ \theta, \lambda, \varphi, \psi > 0, \tag{26}$$

and let $g(0) = g_0$, with the fixed time horizon T, $g(T)$ free. The Euler equation first order condition is now:

$$\overset{\bullet\bullet}{g} - \rho \overset{\bullet}{g} - \frac{\lambda}{\psi} g = \frac{\varepsilon^2}{2\lambda}\left(\frac{\theta}{\varepsilon} + \frac{\rho\varphi}{\varepsilon} - \phi(\beta + \epsilon) - \frac{K^\alpha}{\varepsilon}\right) \tag{27}$$

giving the intertemporal equilibrium:

$$\overline{g} = \frac{f(\sigma^2)}{2\lambda}\left(\phi(\beta + \epsilon) + \frac{K^\alpha}{\varepsilon} - \frac{\theta}{\varepsilon} - \frac{\rho\varphi}{\varepsilon}\right) \tag{28}$$

and optimal time path:

$$\begin{aligned} g^*(t) &= A_1 \exp\left[\frac{1}{2}\left(\rho + \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] t + A_2 \exp\left[\frac{1}{2}\left(\rho - \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] t + \overline{g} \qquad (29) \\ s.t.\ g^*(0) &= g_0^* \\ 0 &= \left[\frac{\varphi}{\varepsilon} + \frac{2\psi}{\varepsilon^2}\dot{g}\right] \exp\left[-\rho T\right] \end{aligned}$$

with A_1, A_2, two arbitrary constants.

It follows that:

Proposition 21 *The general class of optimal time paths in governance, $g^*(t)$, is non-monotone in time.*

Proof. Since:

$$\begin{aligned} \frac{\partial g^*(t)}{\partial t} &= \left[\frac{1}{2}\left(\rho + \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] A_1 \exp\left[\frac{1}{2}\left(\rho + \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] t \\ &\quad + \left[\frac{1}{2}\left(\rho - \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] A_2 \exp\left[\frac{1}{2}\left(\rho - \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] t \\ \frac{\partial g^*(t)}{\partial t} &\gtreqless 0 \\ for\ t &\gtreqless \frac{\ln\left(-\left[\frac{1}{2}\left(\rho - \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right]\right) - \ln\left[\frac{1}{2}\left(\rho + \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] - \ln A_1 + \ln A_2}{\left[\frac{1}{2}\left(\rho + \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right] - \left[\frac{1}{2}\left(\rho - \sqrt[2]{\rho^2 + \frac{4\lambda}{\psi}}\right)\right]} \end{aligned}$$

■

This is not profound analytically.

But it is potentially of considerable practical policy importance. The implication is that the optimal time path in governance on the part of the aid recipient is not only non-linear, but non-monotonic. Thus it is feasible that the optimal time path of adjustment, on the part of an aid recipient that is attempting to increase the optimal intertemporal level of governance in responding to the performance intensity of aid, is such that governance initially gets worse, before it gets better. Figure 7 provides an illustration for our example - with governance falling before rising to the intertemporal equilibrium.

The difficulty for the donor agency, and the legislature, is that it may appear as if the policy is failing, immediately after implementation. Even though things are bound to improve, and improve substantially, it appears as if the policy not only brings about changes in governance, but in precisely the wrong direction. What is more, the case in which things gets worse before they improve is very difficult to differentiate from that in which things collapse. For those who are on the receiving end of the policy intervention risk aversion is easy to understand and sympathize with. The net result is easy pickings for critics - high risk for the policy proponent.

4. Conclusions and evaluation

Performance intensity of aid has three core features.

In this paper analysis proceeded under the abstraction of only three agents, a legislature that allocates resources to an aid budget, an aid donor agency that sets the performance intensity of aid, and an aid recipient (country) that chooses the optimal level of performance in the allocative measure chosen by the aid donor. Considerable slippage is introduced into the process of aid delivery.

Our simple model has demonstrated that allocative efficiency improves under performance intensity of aid, in the sense that more aid comes to be allocated to aid recipients with good governance.

Performance intensity of aid generates incentive effects, such that the optimal level of governance in the aid recipient will increase under strengthening performance intensity of aid.

Improving governance in the aid recipient in turn was shown to lead to increased budgetary allocations to aid in the legislature that allocates aid resources. Performance intensity of aid thus has fundraising effects.

Equally, however, it is useful to bear in mind the caveats that the model has identified. The model incorporated at least five distinct sources of slippage in policy delivery. First, the performance measure of

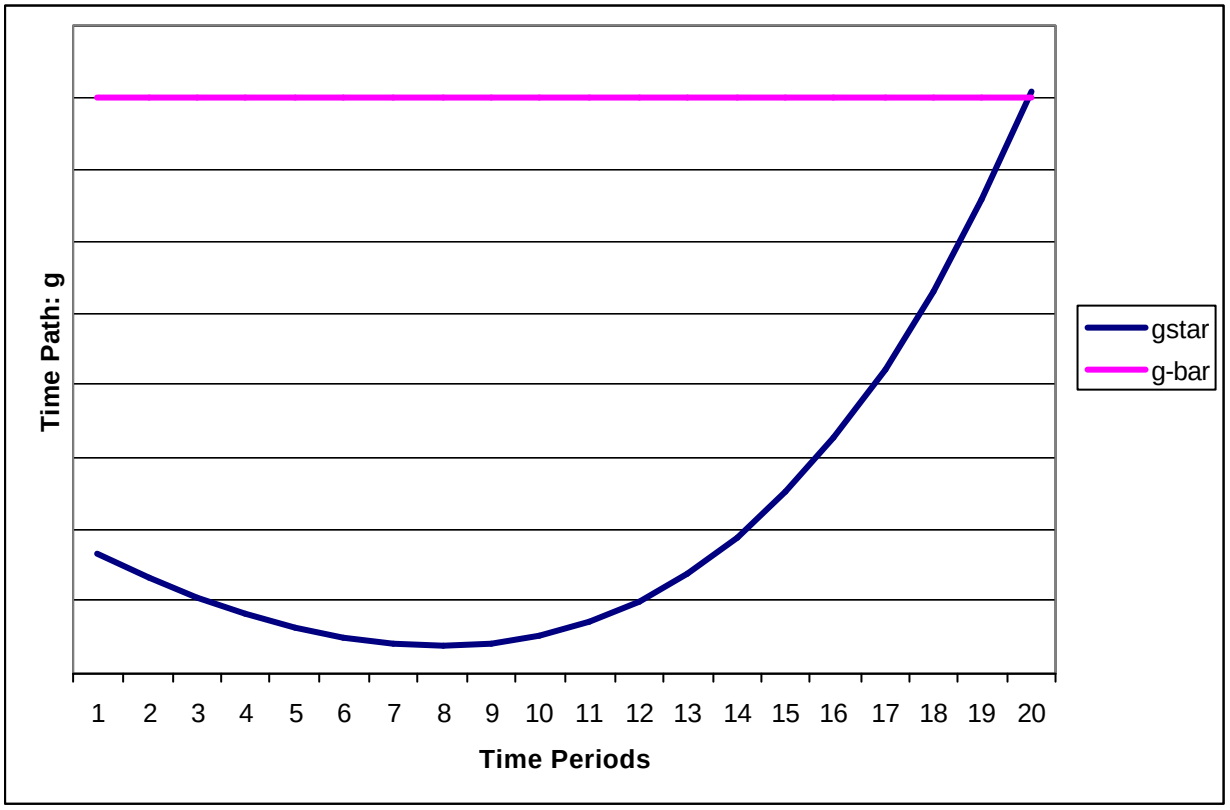

Figure 7: Illustration of optimal non-monotone adjustment in governance: $\alpha = 1$, $\beta = 1$, $\theta = 1.5$, $\epsilon = 0$, $\varepsilon = 1$, $\lambda = 0.001$, $\delta = 0.001$, $\phi = 1$, $\rho = 0.1$, $\varphi = 1$, $\psi = 0.9$.

interest to the aid donor is observed with measurement error. Second, the efficiency of the aid donor is also subject to both positive and negative shocks. Third, the recipient country may be subject to rent-seeking in the aid transmission process. Fourth own effort of the aid recipient may be more or less efficient. Finally, adjusting the optimal level of optimal governance in the aid recipient is subject to adjustment costs.

These sources of policy slippage lead to a number of important extensions to the three central results of the paper.

First, the effectiveness of the performance intensity of aid appears to depend strongly on the degree of efficiency of own effort in the aid recipient country. At the same time, the aid budget provided by the legislature for allocation by the aid donor agency will grow only as long as the own effort of the aid recipient shows some positive return short of increasing returns. The maximum aid budget the legislature awards is under conditions of constant returns to the own effort of the aid recipient. Unfortunately, many of the world's poorest countries may suffer from low returns to own effort.

These two findings in conjunction lead us to a first conjecture concerning the use of performance measures in policy: performance intensity of aid may work best under conditions where it is supplemented by technical assistance to improve the effectiveness of own effort by the aid recipient.

A number of sources of policy slippage tend to have opposite impacts on the aid recipient and the donor agency. Thus increased rent-seeking lowers the optimal level of governance of the recipient country. It increases the optimal performance intensity of aid for the donor agency. Increased cost of effort in the aid recipient, lowers optimal governance levels in the recipient, but again raises the optimal performance intensity of aid for the donor agency. Losses in donor agency efficiency, lowers optimal governance in the aid recipient, but raises the optimal performance intensity of aid. Positive measurement shocks in governance raise the optimal level of governance in the aid recipient (with some ambiguity), and lowers the optimal performance intensity of aid. In the paper we showed that these responses were optimal in the sense that they represented the response that maximized the returns to the relevant agent, either the aid recipient or the donor agency. In particular it reflected the benevolence of the donor agency.

Yet these results leads us to a second conjecture concerning the use of performance measures in policy:since the benevolent donor agency responds to negative shocks to the net income of aid recipient countries by increasing the performance intensity of aid, it may face considerable populist pressures at home. The left will abuse it for castigating the poor. The right for throwing good money at lost causes. Yet the intervention is simply a technically optimal attempt to improve the net welfare of the aid recipient. It neither punishment, nor waste.

Finally, a consideration of the dynamics of adjustment in governance, identified a further source for concern in implementing performance measures in policy. The presence of adjustment costs in governance for the aid recipient introduces the possibility of optimal time paths in governance that are non-monotone. The implication is that governance, on the optimal time path of adjustment to a new higher level of governance, may be such as to initially make things worse before they improve.

Our third and final conjecture concerning the use of performance measures in policy is therefore that policy makers face risks in their implementation. The problem for the policy maker is that it may appear as if the policy is failing, immediately after implementation. Policy designed to improve governance does produce change - but in the wrong direction. Even though things are bound to improve, and improve substantially, this may be both difficult to sell, and perhaps even more importantly difficult to distinguish form cases where things really *are* going wrong. The bottom line: easy pickings for critics - high risk for the policy proponent.

Yet what remains is that performance intensity of aid works. It simply is no panacea.

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