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Reputation, Debt, and Policy Conditionality

Rodney Ramcharan

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Prepared by Rodney Ramcharan¹

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Abstract

<p>The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate.</p>
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In principle, international financial institutions (IFIs) can use their leverage as creditors to prompt governments to undertake policy reform. Yet such lending has been frequently linked to unsustainable debt levels and little reform. This paper illustrates how the dual roles of IFIs as purveyors of credit and monitors of reform may help explain these negative outcomes. When debt levels rise, the IFIs reforms goals may become subordinated to its creditor's interest, compromising the enforcement of conditionality. Attracted by this prospect, malevolent governments strategically reform, enhancing their reputation in order to maintain lending and build their debt stock. Once debt levels are sufficiently large, such governments can stop policy reforms, assured that lending will continue.

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Author's E-Mail Address: Rramcharan@imf.org

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I. INTRODUCTION

“Some twenty-five countries have been indebted to the Fund for more than thirty years out of the last fifty. Sixteen countries have been under Fund-supported programs for twelve years or more out of the last eighteen. Such prolonged use risks turning the Fund into a source of long term financing, in contradiction with the mandate set forth in its Articles of Agreement. Many of the countries have acute debt sustainability problems and most are now enrolled in the HIPC initiative,”—Independent Evaluation Office (IEO) of the International Monetary Fund (IMF), 2002

International financial institutions (IFIs) such as the IMF and the World Bank (WB) frequently function both as major creditors and as partners in policy reform—monitoring economic conditions and suggesting new economic policies. In principle, from the leverage it generates as a creditor, an IFI can enable governments to implement difficult economic reforms (Ramcharan (2002)). In practice, the effectiveness of this approach has been mixed.² Some countries have had success in using financial assistance to implement durable economic reforms. But as highlighted in the IEO quote above, in many other cases long-term lending has been accompanied by an increasingly unsustainable debt burden, with only modest economic reform (Easterly (2001a, b)).

Why has conditionality so often failed to achieve sustained policy reform? The economics literature has often relied on altruism to answer this question. Because the welfare of the domestic poor is assumed to enter directly in the utility function of IFIs and other lenders (the interdependent utility function approach), the ex ante threat of aid withdrawal is deemed incredible. The resulting weak level of conditionality then allows aid recipients to pursue more freely other objectives (Sevensen (2000), Federico (2001)). Another strand of literature attributes the failure of conditional aid to imperfect monitoring; the budgetary process can be quite complex, and resources are fungible. The confluence of these factors can again enable aid recipients to divert resources to their preferred use, minimizing the effectiveness of conditionality (Cordella and Dell’Ariccia (2001)).

This paper formalizes a novel and very different explanation for the observation that long term IFI lending is sometimes associated with an explosive debt burden and a lack of domestic policy reform. The argument rests on the idea that the multiple roles of IFIs as purveyors of credit and partners in policy reform can collide; stated simply, if enforcing conditionality puts the IFIs own debt repayments at risk, then the IFI has little incentive to

² In a recent study, the Independent Evaluation Office (2002) of the IMF provides several case studies highlighting the inability of conditional aid to generate sustained policy reform. While fraught with many econometric difficulties, the more formal approaches also find conditional lending to be only modestly effective. For example, see Barro and Lee (2001), Burnside and Dollar (2000), Boone (1996, 1995), Khan and Haque (1998), and Przeworski and Vreeland (2000).

enforce conditionality.³ To be concrete, consider the case where a country's stock of debt becomes large enough to threaten its ability to repay. Suppose a debt-restructuring mechanism promises a future bailout at a lower marginal cost to the creditor than is currently available. Then rather than cease lending today and incur a costlier default, it may become optimal for the creditor to continue lending, rolling over the debt until the lower-cost relief becomes available;⁴ in the interim, conditionality vanishes. But the prospect of unenforced conditionality can greatly influence the reform behavior of some governments. With sufficiently large debt stocks, malevolent governments—those that prefer rent extraction to reform—can now “holdup” an IFI, enjoying the benefits of both rent extraction and continued lending.

To analyze how the prospect of unconditional lending—holdup—affects the incentives for both reform and lending, the paper employs a simple framework that treats the interaction between the IFI and the government as a dynamic game.⁵ The argument assumes that while good governments always reform, malevolent governments prefer rent extraction.

It also makes the natural assumption that the IFI benefits from providing aid to reform-minded governments (reformers), but suffers disutility whenever aid is provided to malevolent governments (extractors). But crucially, a government's true preference for reform relative to rent extraction is hidden information. And this uncertainty, in conjunction with the possibility of a “holdup,” pave the way for reputation effects and strategic reform.

³ Many empirical studies have found that existing debt has a robust positive impact on new IFI lending, but there has been much less success in identifying a specific mechanism. See Sturm et al. (2002) for an overview of this literature. That said, although never formalized, several observers have explicitly noted this mechanism in many different contexts. For example, Easterly (2001) discusses this issue more broadly for IFIs, while Gordon (1992) focuses on Africa, and IFI as well as bilateral lending in 1980s. Recently, Birdsall et al. have offered some descriptive evidence in support of this hypothesis (2002).

⁴ Strictly speaking, the disutility from country default need not be pecuniary, for IFIs are preferred creditors and their eventual repayment is always a priority. However, because they are highly visible institutions, a borrower's inability to repay can be politically costly to an IFI. For instance, a recent article in the *Wall Street Journal* (9/23/02) regarding Argentina's repayment woes notes that, “The threat of embarrassing the IMF seems to be Argentina's biggest bargaining chip.” Moreover, although there are checks and balances, these forces may also operate at the level of the lending departments. After lending large sums, it may become quite costly for the lending officer or department to acknowledge repayment difficulties, thereby postponing the decision to do this.

⁵ Some of this early applied literature include Kydland and Prescott (1977), Barro and Gordon (1983), and Backus and Driffill (1985). See also recent work by Seibert (2002) and Faust and Svensson (2002).

In particular, a malevolent government's optimal reform or reputation-building strategy turns on the relationship between aid and policy reform. Suppose reforming with aid is better than extraction without aid; of course, extraction with aid always yields the highest payoff. Since aid complements reforms relatively well, a malevolent government tries to minimize the possibility of reform failure and the resulting cancellation in lending. In so doing, a malevolent government maximizes its chances of accumulating debt in order to enhance its leverage; and once the debt level is sufficiently large, a malevolent government can safely cease reforming, assured that aid flows will continue. But faced with the probability of a costly breakdown in conditionality as its loans to the government grow, the IFI, in turn, requires the government to undertake increasingly difficult reforms in order to solidify its reformist credentials. Specifically, if the government manages to successfully reform in a given period, then its reputation rises by just enough to assure lending in the next period. Come next period, because the required reputation for lending rises as the government's debt stock grows, the government must pursue an even more difficult reform to try to ensure lending in the subsequent period. This process continues until either reform failure is observed, as a result of which the government's reputation is lost and lending is withdrawn—events which become increasingly likely over time—or until the stock of debt becomes large enough so that the IFI's creditor interest supersedes its reform goals. If the latter occurs, then from that point onward, the government ceases to reform and instead extracts rents while continuing to receive concessional lending—the best of both worlds.

The optimal reform strategy differs if aid and reform are relatively weak complements—rent extraction without aid is better than reforming with aid. In this case, since rent extraction is so lucrative, pursuing the holdup strategy is costly, for a malevolent government must forgo rent extraction for some time to maintain lending. Thus, instead of a sequence of increasingly risky reforms intended to gradually build its reputation and just maintain lending, the government initially attempts a reform that is not likely to succeed. If the reform does succeed, the government's reputation as a reformer becomes high enough to assure lending for the entire life of the arrangement. To preserve its reputation, the government then undertakes “easy” reforms, those where success is certain. As in the previous case, when the stock of debt becomes large enough, the government stops reforming, while still continuing to receive aid. If the government fails in its attempt at reform initially, then it reveals itself as malevolent, the lending arrangement is cancelled, and it extracts without receiving aid.

Although the characteristics of the optimal strategies vary, in all cases both the government's and the IFI's equilibrium strategies are time consistent. Before the debt burden grows large, government rent extraction is met with the credible threat of program termination; after this date, lending is expected to continue despite the government's rent extraction. Moreover, an extension to the argument offers some practical, if tentative policy insights. The combination of ambiguity over the IFI's willingness to roll over debt and transparency over current actions—which creates informational linkages across lending arrangements—can mitigate the holdup problem, either completely screening malevolent borrowers from IFI programs, or deterring malevolent borrowers from extraction strategies.

Specifically, because actions are now transparent, an IFI may be unwilling to roll over debt in a current arrangement in order to protect its reputation, and deter future borrowers from the holdup strategy. And intuitively, an IFI's willingness or unwillingness to roll over debt depends on its beliefs about the subsequent borrower's reformist credentials. But anticipating that an IFI wants to protect its reputation, a malevolent borrower in the first arrangement will itself be deterred from the holdup strategy. This paper is organized as follows. Section II develops the interaction between the IFI and a malevolent borrower, while Section III considers a simple extension to the argument. Section IV concludes, discussing the argument's implications and limitations.

II. MODEL

Policy reforms are assumed to pose an inherent tradeoff for some governments. Reforms can increase economic growth, but by eliminating economic and other distortions, they can also reduce the level of political and economic rents that a government can extract for its private gain. Foreign aid is viewed as a complementary input in this process. Aid increases the marginal impact of reforms on growth and mutes the marginal decline in government economic rents. To formalize this idea, assume that a government can either attempt reform, \bar{R} , or not, 0; let $b > 0$ denote the level of foreign aid in each period and let γ denote the pace of economic growth. Intuitively, growth is assumed to be the fastest in the presence of both aid and reform, and the slowest without either.⁶

$$\gamma(\bar{R}, b) > \gamma(\bar{R}, 0) > \gamma(0, b) > \gamma(0, 0) \quad (1)$$

Similarly, the level of economic rent E accruing to the government is highest when the government is pursuing extraction with aid, and lowest when reforms occur without aid:

$$E(0, b) > E(0, 0) > E(\bar{R}, b) > E(\bar{R}, 0) \quad (2)$$

But all governments are not identical. Let θ denote the government's relative preference for extraction. Given aid disbursement, b , the government chooses whether to reform or not in order to maximize its net utility:

$$\max_{R \in \{0, \bar{R}\}} U^G(R; \theta, b) = \gamma(R, b) + \theta E(R, b) \quad (3)$$

⁶ Behind the formulation that reforms affect the growth rate is the idea that output takes the form: $y = A(R)K$, where $A'(R) > 0$ and capital, K , is not subject to diminishing marginal productivity.

Let $R^*(b, \theta)$ denote the government's optimal reform given the level of aid and its relative preference for extraction. To simplify the analysis, assume that there are only two types of governments, those that are purely reformist and those that prefer to extract: $\theta \in \{0, \theta^H\}$, where θ^H is implicitly defined by $R^*(b, \theta^H) = 0$, and of course, $R^*(b, 0) = \bar{R}$.

The IFI's action space consists of (L)end or (D)o not lend. It selects its action $a_t = \{L, D\}$ in period t before the government chooses its reform behavior, $\{0, \bar{R}\}$. The lending arrangement between the IFI and the government begins on date 0 and has a finite horizon, T . By not lending, the IFI can terminate the arrangement in any period $0 \leq t \leq T$; time is discretely indexed. Let R^e denote the expected reform effort. As a further simplification, assume that the magnitude of aid itself, b , in each period is fixed; both aid and reform enter as complements in the IFI's utility function: $U^t(R, b)$, where naturally: $U_R^t > 0, U_b^t > 0$, and $U_{Rb}^t > 0$. With little loss of generality, I assume that both the interest and discount rates are identical and set to zero, and that outstanding claims are due on the program end date, T ; hence, in an ongoing program the stock of claims in period t , B_t , evolves simply:

$$B_t = tb \quad (4)$$

A country is "naturally" insolvent when its stock of outstanding claims exceeds national income: $y_t - b < B_{t-1}$. It is assumed that while the level economic growth from the combination of aid and reform always assures solvency:

$$1 + \gamma(\bar{R}, b) > \left[\frac{tb}{y_0} \right]^{\frac{1}{t}} \quad (5)$$

aid withdrawal in period t produces immediate insolvency:

$$1 + \gamma[\cdot, 0] < \frac{tb}{y_0 \left[1 + \gamma(\bar{R}, b) \right]^{t-1}} \quad (6)$$

Since by construction only malevolent governments fail to reform, if a government extracts in period $t-1$, it reveals itself as malevolent. After observing the government's true type, if the IFI immediately discontinues lending from period t onwards, then from equation (6), the country becomes insolvent; consequently, the IFI must "write off" some fraction of its outstanding claims on the country incurred through periods $t-1$. Let α denote

the IFIs marginal cost of writing off the existing debt , where $0 < \alpha < 1$; then the IFIs payoff from stopping the lending arrangement in period t after learning the government's true type in period $t-1$ is:

$$D(t) = U^I(0,0)[T-t] - (t-1)\alpha b \quad (7)$$

Instead of immediately stopping lending and precipitating a country default, suppose a debt restructuring mechanism available only at the end of the lending arrangement, T , offers the IFI an opportunity to “write off” debt at lower marginal cost. For example, it may be politically less costly for an IFI to postpone country default until a framework such as the recent Heavily Indebted Poor Countries (HIPC) initiative becomes available. Moreover, it is not hard to imagine bureaucratic incentives making debt roll preferable to admitting country insolvency. To model these ideas, let λ denote the marginal cost of writing off the outstanding stock of debt under the mechanism available in period T , where:

$$0 < \lambda < \alpha \quad (8)$$

But to stave off country insolvency until period T , the IFI must continue to lend despite learning the government's true nature in period $t-1$; the IFIs payoff from continued lending is then:

$$L(t) = U^I(0,b)[T-t] - \lambda T b \quad (9)$$

It should be apparent that the IFIs decision to roll over debt critically depends on when during the lending arrangement the government fails to reform, thereby revealing its true type. First, the IFIs opportunity cost of continued lending—lending amid extraction—depends on the length of the debt roll over period: $[T-t][U^I(0,0) - U^I(0,b)]$. And second, while the IFI benefits from a lower marginal cost using the roll over approach, the resulting debt stock is invariably larger compared with immediately discontinuing lending. Thus, if a government fails to reform early enough in the lending arrangement, then stopping the program and “writing off” the existing debt can be cheaper than “writing off” the much larger end of program debt stock, even at the lower marginal cost λ . Therefore, debt roll over is optimal only if the relative marginal cost or “relative price” of the debt write off in period T is small enough:

$$\frac{\lambda}{\alpha} < \frac{T-1}{T} \quad (10)$$

If condition (10) holds, then there exists a date, $t^* < T$, in which the IFI is indifferent between stopping the program and rolling over the debt:

$$t^* = \frac{T[U^I(0,0) - U^I(0,b) + \lambda b] + \alpha b}{U^I(0,0) - U^I(0,b) + \alpha b} \quad (11)$$

It follows that if reform failure occurs strictly before t^* , then the IFI finds it optimal to stop lending, while failure to reform on or after t^* leads to continued lending:

$$a_t = \begin{cases} D & t < t^* \\ L & t \geq t^* \end{cases} \quad (12)$$

If there is no uncertainty about the government's relative preference for extraction, θ , then $R^e = R^*(b, \theta)$. In this case, it is a strictly dominant strategy for the IFI to always lend to the reformer, and never lend to an extractor. Put simply, program failure, or persistent lending despite the lack of reform will never be observed in equilibrium. But uncertainty over θ alters matters, paving the way for strategic reform and the failure of conditionality. Because IFI lending continues after t^* , it can be optimal for an extractor: θ^H to pursue risky reforms and try to abide by conditionality in order to build its reputation and maintain lending until date t^* . With the enforcement of conditionality no longer optimal after t^* , the government can reveal its true type, extracting rents all the while continuing to receive aid. The next section formalizes this argument.

A. Reputation Equilibrium

The central feature of the model is a malevolent government's use of policy reform to manipulate its reputation and induce lending over the life of the entire program $[0, T]$. This is called the holdup strategy. If successful, despite lending through period T , a lending arrangement culminates in bankruptcy and the need for debt relief; otherwise lending is terminated prematurely. In contrast, benevolent governments reform for the entire life of the arrangement. The government enters period t with a reputation p_t equal to the IFI's probability assessment that the government is reform minded and will implement policy reform. By assumption, p_t is common information. Both players then choose their best strategies, given the other's strategy and the impact of current behavior on the next period's reputation. The probability p_t is then revised in light of observed reform according to Bayes' rule.

Each player's strategy is characterized by a mixed strategy. Let m_t denote the probability that the IFI lends (L) in period t . Let n_t denote the probability that the government reforms (R) in period t . The government's reputation next period, p_{t+1} , is zero if it fails to reform in this period (or any previous period) since by construction, reform is

a strictly dominant strategy for the reform minded government. Given that reform was observed, the probability that the government is actually a reformer is updated using Bayes' rule:

$$\begin{aligned}
 p_{t+1} &= \text{prob}(\theta = 0 | a_t = \bar{R}) \\
 &= \text{prob}(\theta = 0 \text{ and } a_t = \bar{R}) / \text{prob}(a_t = \bar{R}) \\
 &= \frac{\text{prob}(a_t = \bar{R} | \theta = 0) \text{prob}(\theta = 0)}{\text{prob}(a_t = \bar{R} | \theta = 0) \text{prob}(\theta = 0) + \text{prob}(a_t = \bar{R} | \theta = \theta^H) \text{prob}(\theta = \theta^H)} \\
 &= \frac{p_t}{p_t + (1 - p_t)n_t}
 \end{aligned} \tag{13}$$

Thus, the probability p_t is a sufficient statistic for past play and contains all relevant information needed by the players to make optimal decisions in the current period. Moreover, if \bar{R} is broadly interpreted, then mixed strategies afford a very intuitive interpretation in this context. The political difficulty of reforms vary, and if a reform is observed that is known to be difficult for a malevolent government—one with a small probability of success for such a government—then the government enhances its reputation as reformer. Of course, because tackling such reforms carry a high probability of failure for malevolent governments, $(1 - n)$, building a reputation is inherently risky.

To analyze optimal behavior, consider first a [malevolent] government's expected payoff, $J^G(t, p_t)$, from an IFI lending program in period t given its existing reputation p_t . The IFI lends with probability m_t , and the government reforms with probability n_t , earning payoff $U^G(\bar{R}, b)$; alternatively, with probability $(1 - n_t)$, the government fails to reform, earning instead $U^G(0, b)$. Hence, with probability $n_t m_t$, the program continues into the next period. Otherwise, lending is cancelled with probability $1 - n_t m_t$ and the government extracts from the next period onwards, earning payoffs $U^G(0, 0)[T - t - 1]$. Therefore, given the evolution of its reputation, (13), the government selects its strategy, n_t in order to maximize it's expected payoffs $J^G(t, p_t)$:

$$J^G(t, p_t) = \max_{0 \leq n_t \leq 1} \left\{ \begin{aligned} & m_t \left[n_t U^G(\bar{R}, b) + (1 - n_t) U^G(0, b) \right] + \\ & (1 - m_t) \left[n_t U^G(\bar{R}, 0) + (1 - n_t) U^G(0, 0) \right] \\ & + n_t m_t J^G(t + 1, p_{t+1}) + (1 - n_t m_t) U^G(0, 0) [T - t - 1] \end{aligned} \right\} \tag{14}$$

In any period $t < t^*$, the IFIs expected payoff from a lending program can be similarly derived. With probability m_t lending occurs, while with probability p_t the government is reputed to be a reformer, and the IFI expects to earn $U^I(\bar{R}, b)$. Thus, with probability $m_t p_t$ the IFI expects the program to continue into the next period, and the IFIs expected payoff can be written as:

$$J^I(t, p_t) = \max \left\{ \begin{array}{l} m_t \left[p_t U^I(\bar{R}, b)[T-t] + (1-p_t) [U^I(0, b) + U^I(0, 0)[T-t-1]] + \right. \\ \left. (1-m_t) \left[p_t U^I(\bar{R}, 0)[T-t] + (1-p_t) U^I(0, 0)[T-t] \right] \right] \end{array} \right\} \quad (15)$$

To characterize the IFIs lending behavior, note that since an extractor type government's net benefit from delaying extraction by an extra period beyond t^* is negative:

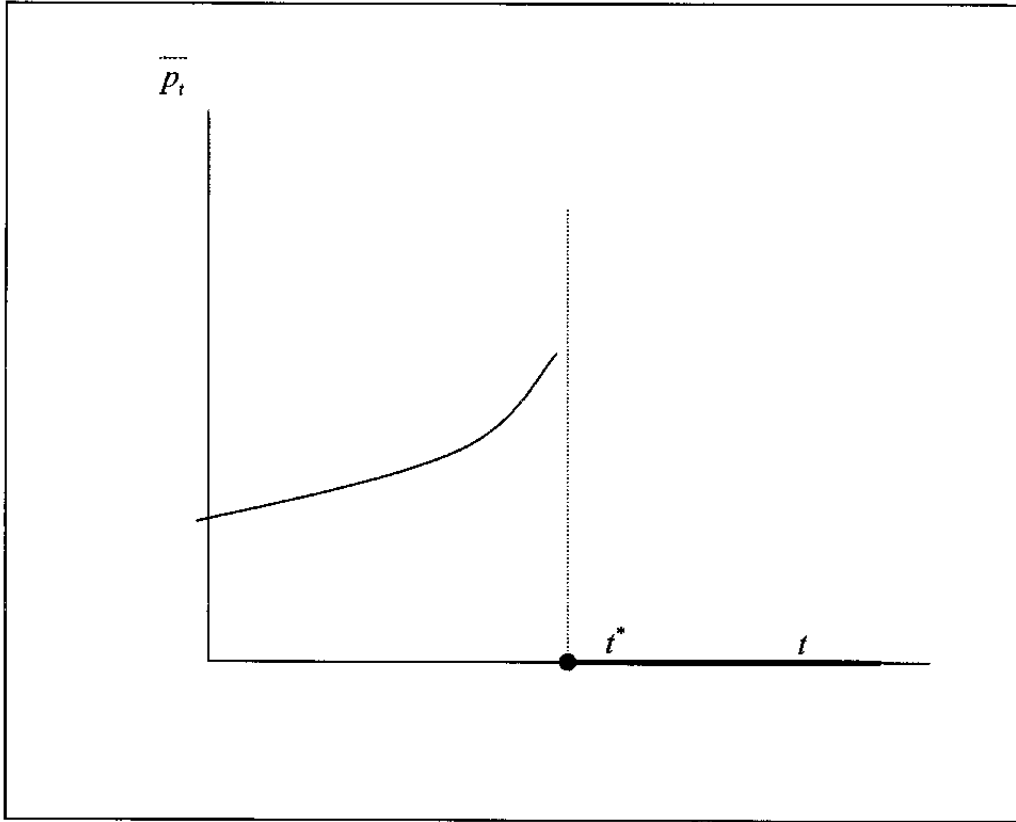
$$U^G(\bar{R}, b) - U^G(0, b) < 0 \quad (16)$$

extraction is an optimal strategy from t^* onwards. Therefore, since lending to the wrong type of government can be quite costly, the IFI lends only if a government's reputation as a reformer is sufficiently large. Moreover, as date t^* nears and the IFIs claims on the government rises, the IFIs net benefit from continued lending declines as the possibility of repeated government extraction draws closer. As a result, the reputation required in order to maintain a lending arrangement rises over time. More precisely, the threshold reputation level required for lending in any period, \bar{p}_t , can be written as:

$$\bar{p}_t = \frac{U^I(0, 0) - U^I(0, b)}{[T-t] [U^I(\bar{R}, b) - U^I(\bar{R}, 0)] + U^I(0, 0) - U^I(0, b)} \quad (17)$$

Figure 1 below depicts the behavior of the threshold reputation level as a function of time, where since conditionality is not enforced from t^* onwards, the required reputation for lending after this date is zero.

Figure 1. The Threshold Reputation



The nature of the relationship between aid and reform greatly influences the government's optimal strategy. And to exposit simply the intuition, it is first assumed that reforming with aid is superior to extraction without aid:

$$U^G(\bar{R}, b) > U^G(0, 0). \quad (18)$$

Condition (18) ensures that for all values of t^* a separating equilibrium does not exist. Both malevolent and benevolent governments strictly prefer IFI lending arrangements. In this context, reputation loss is costly, and in pursuing the holdup strategy a malevolent government prefers to maximize its expected payoffs by minimizing the risk of reform failure subject to maintaining the program. In particular, consider the optimal sequence of reforms for a malevolent government with a low initial reputation:

$$p_{-1} < \bar{p}_0 \quad (19)$$

In the period before the program the government selects a reform so that if successful, its reputation rises by just enough on date 0 to induce lending; and likewise, for each period $0 \leq t < t^*$, it chooses a reform that if successful, allows its reputation to rise by just enough to ensure lending in the subsequent period. If the government manages to succeed until t^* , then conditionality vanishes. Proposition 1 summarizes the behavior of a malevolent government.

Proposition 1: *If $U^G(\bar{R}, b) > U^G(0, 0)$, then the optimal strategy for a malevolent government with reputation $p_{-1} < \bar{p}_0$ is:*

$$n_t = \begin{cases} \frac{\bar{p}_t(1-\bar{p}_{t+1})}{\bar{p}_{t+1}(1-\bar{p}_t)} & t < t^* \\ 0 & t \geq t^* \end{cases} \quad (20)$$

and the government's value function can be written as:

$$V^G(t, p_t) = \frac{p_{-1}}{1-p_{-1}} \left\{ \begin{aligned} & \left(\frac{1-p_t}{p_t} \right) U^G(0, b) [T-t^*] \sum_{t=0}^{t^*-1} \frac{1-\bar{p}_t}{\bar{p}_t} U^G(\bar{R}, b) + \\ & \left(\frac{1-\bar{p}_{t-1}}{\bar{p}_{t-1}\bar{p}_t} \right) (\bar{p}_t - p_{-1}) [U^G(0, b) + U^G(0, 0)[T-t]] \end{aligned} \right\} \quad (21)$$

Suppose instead that aid and reform are weak complements, so that extraction without aid is superior to reform with aid:

$$U^G(\bar{R}, b) < U^G(0, 0) \quad (22)$$

In this case, pursuing a holdup strategy is costly. It requires a malevolent government to reform with aid, forgoing the higher payoffs available from rent extraction without aid.

And if the opportunity cost from pursuing the holdup strategy exceeds the net benefit of extraction with aid:

$$\left[U^G(0,0) - U^G(\bar{R},b) \right] [t^* - 1] > \left[U^G(0,b) - U^G(0,0) \right] [T - t^*] \quad (23)$$

then malevolent governments do not seek IFI lending arrangements. Otherwise, if condition (23) does not hold, then a pooling equilibrium exists: malevolent governments also seek lending arrangements. But the optimal strategy is quite different from the previous case. In the first period the government attempts a reform that if successful, embellishes its reputation as reformer by enough so that lending is assured for the life of the arrangement. Naturally, for a malevolent government, such a reform has a very small probability of success. If the government manages to reform, then until period t^* , the government preserves its reputation by implementing risk free reforms, those that even a malevolent government would be able to implement with a probability of one. From t^* onwards, the government extracts with aid. The proposition below summarizes this intuition.

Proposition 2: *If $U^G(0,0) > U^G(R,b)$ and $t^* < \hat{t}$ then the optimal strategy for a malevolent government with initial reputation $p_{-1} < \overline{p}_t$ is given by*

$$n_t = \begin{cases} \frac{p_{-1}(1-\overline{p}_t)}{\overline{p}_t(1-p_{-1})} & t=0 \\ 1 & 0 < t \leq t^* - 1 \\ 0 & t > t^* \end{cases} \quad (24)$$

The government's value can then be described by:

$$V^G(t_0, p_{-1}) = \frac{p_{-1}(1-\overline{p}_t)}{\overline{p}_t(1-p_{-1})} \left\{ U^G(R,b)[t^* - 1] + U^G(0,b)[T - t^*] \right\} + \left[1 - \frac{p_{-1}(1-\overline{p}_t)}{\overline{p}_t(1-p_{-1})} \right] U^G(0,0)T \quad (25)$$

If $U^G(0,0) > U^G(R,b)$ but $t^ < \hat{t}$, then a malevolent government is deterred from an IFI program.*

The preceding arguments illustrate conditionality's eventual demise as stemming not from incredible threats, but from time consistent equilibrium strategies derived from an IFI's claims on a borrower. Before t^* reform failure credibly leads to the denial of lending. But from t^* onwards, both agents realize that conditionality is no longer profitable to enforce. In this context, the analysis also demonstrates how a government's optimal sequence of reforms depends on the nature of aid. If aid strongly complements the reform process, then reform failure is less likely early on; but the probability of reform failure grows over time. In contrast, if extraction without aid is most profitable, then in an attempt to induce lending, reform failure is either observed before a program starts, or on date t^* onwards. That is, if successful in inducing lending, there is zero probability of observing reform failure before t^* .

III. EXTENSIONS

To gauge the robustness of the argument and introduce greater realism, this section modifies the information structure along two important dimensions. First, governments rarely know with complete certainty whether or when an IFI will not enforce conditionality and roll over debt. For example, there may be genuine doubt over the availability of a lower cost debt restructuring arrangement at the end of the program; and without such an arrangement, the IFI would simply stop lending in the face of nonreform. Likewise, even if such an arrangement were known to exist, the IFI's willingness to postpone a particular government's debt may be subject to international political considerations, introducing uncertainty over the IFI's behavior. A second key feature of reality is the repeated and increasingly transparent nature of IFI lending. An IFI expects to enter into lending arrangements with other governments, and these arrangements are often informationally linked: both the IFI's and the government's behavior in a particular lending arrangement have become quite observable to subsequent borrowers. For instance, in the case of the IMF, nearly all country documents are now published on the web, so that loan compliance can be publicly monitored. How then does uncertainty about an IFI's willingness to roll over debt, coupled with transparent repeated lending affect the previous section results?

The combination of these two factors can greatly mitigate the holdup problem. Suppose for example that the current lending arrangement "goes bad": a government attempts the holdup strategy. Unlike the previous analysis, even if it is "cheaper" for the IFI to roll over debt and continue with the lending arrangement, the IFI may have a strong incentive to pull the plug and prompt a costly default, in order to protect its reputation and deter the future borrower from playing the holdup strategy. Naturally, since canceling a lending arrangement in the face of nonreform is costly, deterrence is optimal only if the IFI's assessment of the next borrower's reform credentials is sufficiently low. Moreover, anticipating the IFI's need to deter the next borrower, the first borrower is itself deterred from the holdup strategy.

Since the essence of the argument is little affected, in developing these ideas it is assumed that at the end of the current arrangement, in period T , the IFI faces a single subsequent borrower. To facilitate the analysis, it assumed that both malevolent and benevolent governments seek IFI lending arrangements (condition (18) holds). To introduce uncertainty over the availability of future debt relief in the simplest manner possible, it is assumed that the IFIs marginal cost of providing this future debt relief, λ , takes on two values. With probability q_t , $\lambda = \bar{\lambda} > \frac{(T-1)\alpha}{T}$: rolling over debt is always too costly for an IFI, so that lending is immediately stopped once a government fails to reform. Otherwise, with probability $(1-q_t)$, $\lambda = \underline{\lambda} < \frac{(T-1)\alpha}{T}$; in this case, the IFI is willing to roll over debt if holdup occurs on $t^*(\underline{\lambda})$. To summarize,

$$t^*(\lambda) = \begin{cases} t^*(\bar{\lambda}) > T & q_t \\ t^*(\underline{\lambda}) < T & (1-q_t) \end{cases} \quad (26)$$

Lastly, let p_t^2 denote the common assessment of the second borrower's reputation for reform in period t . Since an IFI of type $\bar{\lambda}$ always cancels lending in the face of extraction, the analysis focuses on type $\underline{\lambda}$. In particular, when does an IFI of type $\underline{\lambda}$ refuse to roll over debt?

To analyze this question, note that a malevolent government will only play the holdup strategy if it believes with sufficient probability that the IFI is of type $\underline{\lambda}$. Let \tilde{q}^i denote this threshold probability for in arrangement i :

$$\tilde{q}^i = \frac{(T-t^*)[U^G(\bar{R}, b^i) - U^G(0,0)] + U^G(0,0) - U^G(0, b^i)}{(T-t^*-1)[U^G(0, b^i) - U^G(0,0)]} \quad (27)$$

where for convenience, arrangements are assumed to differ by the size of aid flows, b . Consider the case where: $q_t < \tilde{q}^2$, so that in the second arrangement an IFIs reputation can deter a malevolent government from attempting the holdup strategy. If in the first arrangement a malevolent government were to attempt the holdup strategy on date t^* , and an IFI rolled over the debt, beginning $t^*(\underline{\lambda}, b^1) + 1$, then the IFIs payoffs would be:

$$\begin{aligned}
 & U^I(0, b^1)[T - t^* - 1] + p^2 U^I(\bar{R}, b^2)T + \\
 & (1 - p^2) \{ U^I(\bar{R}, b^2)[t^* - 1] + U^I(0, b^2)[T - t^*] \}
 \end{aligned} \tag{28}$$

But since $q_t > \tilde{q}^2$, if the IFI were to cancel the first arrangement, with probability one, it expects compliance in the second arrangement:

$$U^I(0, 0)[T - t^* - 1] - abt^* + U^I(\bar{R}, b)T \tag{29}$$

Therefore, an IFI's willingness to roll over debt depends on both its current reputation and that of the subsequent borrower. If, $p^2 < \tilde{p}^2$ then since the probability of facing a malevolent borrower in the subsequent arrangement is high enough, it is optimal for the IFI to incur the cost of preserving its reputation in the first arrangement in order to deter the subsequent borrower. However, knowing that both types of IFIs will discontinue lending, a malevolent government in the first arrangement will not attempt the hold strategy.

Proposition 3: *If $q_t > \tilde{q}^2$ and, $p^2 < \tilde{p}^2$ then a pooling equilibrium is obtained: if extraction is observed in the first arrangement, then both types of IFIs cancel lending. As a result, in equilibrium the holdup strategy is never observed.*

Proposition 3 makes clear the benefit of transparency. The IFI knows that its actions in the current lending arrangement communicate information to the subsequent borrower. Thus, if with sufficient probability it expects to encounter a malevolent borrower in the future, then preserving its reputation in the current arrangement makes sense. As a result, even the current borrower is deterred from the holdup strategy, as it realizes that a pooling equilibrium exists: both types of IFIs will discontinue lending in the face of nonreform. In this way, transparency can ensure full compliance across lending arrangements.

IV. DISCUSSION

This paper has used a greatly simplified model to illustrate how an IFI's incentives to lend influences a government's optimal reform behavior. In so doing, it has depicted how the enforcement of conditionality can become compromised when debt levels rise. A key feature of the argument is an asymmetry in the marginal cost between future and present debt restructuring mechanisms. In this context, once the stock of claims becomes large enough, the IFI has an incentive to suspend the enforcement of conditionality and wait for the later debt restructuring mechanism, rather than immediately stopping lending. To exploit the prospect of concessional lending without conditionality, malevolent governments can strategically reform in order to manage their reputations and build up the stock of debt.

But as the simple extension to the argument shows, these results are quite sensitive to some key assumptions. The combination of a sufficient degree of ambiguity about the IFIs preferences for dealing with nonreform, with the possibility of lending to malevolent governments in the future can substantially change an IFIs optimal strategy. Instead of responding to nonreform by rolling over debt, an IFI may opt to cancel the current lending arrangement in order to protect its reputation and deter future malevolent borrowers from pursuing the hold strategy. Naturally, the worse the reputation of the subsequent borrower, the greater the attractiveness of deterrence in the current arrangement. In turn, this deters the current borrower from the holdup strategy.

The extension embodies some practical policy insights. Ambiguity over the willingness to roll over debt, as well as transparency over current actions—which creates informational linkages across lending arrangements—can greatly mitigate the holdup problem. Thus, while keeping the IFIs cost of dealing with nonrepayments vague, steps that improve transparency within existing lending arrangements, such as publicly and accurately reporting both government and IFI behavior, can reduce the likelihood of observing the holdup strategy.

That said, the analysis has ignored several important features of the problem. Instead of mechanically reforming, benevolent governments may actively try to differentiate themselves from their malevolent counterparts in order to achieve financing on better terms or other superior arrangements. Such signaling weakens the ability of malevolent governments to pursue a holdup strategy, and changes the policy implications of the analysis. For example, to encourage signaling, should IFIs redesign their various lending arrangements? The assumption of mechanical reform also conflicts with observation. Owing to underlying factors, and despite exerting maximal effort, even benevolent governments may fail to reform. Thus, what should the IFI conclude about the government's "type" if it observes reform failure? Clearly, a richer framework is needed to analyze these complexities.

Mathematical Appendix

Proposition 1: *If $U^G(\bar{R}, b) > U^G(0, 0)$, then the optimal strategy for a malevolent government with reputation $p_{-1} < \bar{p}_0$ is:*

$$n_t = \begin{cases} \frac{\bar{p}_t(1-\bar{p}_{t+1})}{\bar{p}_{t+1}(1-\bar{p}_t)} & t < t^* \\ 0 & t \geq t^* \end{cases} \quad (30)$$

and the government's value function can be written as:

$$V^G(t, p_t) = \frac{p_{-1}}{1-p_{-1}} \left\{ \left(\frac{1-p_t}{p_t} \right) U^G(0, b) [T-t^*] \sum_{i=0}^{t-1} \frac{1-\bar{p}_i}{\bar{p}_i} U^G(\bar{R}, b) + \frac{(1-\bar{p}_{t-1})(\bar{p}_t - p_{-1})}{\bar{p}_{t-1} \bar{p}_t (1-p_{-1})} [U^G(0, b) + U^G(0, 0)] [T-t] \right\} \quad (31)$$

Proof:

Standard arguments can be used to show that these strategies and beliefs constitute a sequential equilibrium. First, from Bayes rule, the beliefs of the IFI are consistent with the government's strategy. Second, to verify that the players' behavior are optimal note that if lending is ongoing and $t < t^*$, then the IFI cannot identify ex-ante the government's type. Given the optimal strategy of a benevolent government, the IFI earns $U^I(\bar{R}, b)[T-t]$ with probability p_t if it enters into a lending arrangement on date t . On the other hand, with probability $1-p_t$, the IFI earns $U^I(0, b) + U^I(0, 0)[T-t]$ when lending to a malevolent government. Therefore, the IFI agrees to a program if $p_t \geq \bar{p}_t$. Bayes' rule is inapplicable in some period $t > t^*$, the government reforms. It is then assumed that the IFI sets $p_t = 0 \forall t$. That is, because reform is a strictly dominant strategy for a reformer, after observing extraction, the IFI is unshaken in its belief that the government is malevolent.

Using the idea that reform is a dominant strategy for benevolent governments, it is then easy to derive a malevolent government's optimal strategy, given the IFIs strategy. If $\bar{p}_t \geq \bar{p}_t$, then given the IFIs willingness to lend, it is sufficient to show that by comparing payoff profiles, any single deviation from the most gradual approach to reputation building, given by the strategy defined in (30) is suboptimal. To simplify the notation, let l_t denote the government's payoffs if it fails to reform in period t ; for example: $l_t = U^G(0, b) + U^G(0, 0)[T - t]$. The expected payoff profile induced by strategy (30) in period, $J_A(t)$, can be written as:

$$J_A(t) = U^G(\bar{R}, b) \sum_{j=t}^{t-2} \prod_{i=t}^j n_i^A + \sum_{j=t}^{t-1} \prod_{i=t}^j n_{i-1}^A (1 - n_j^A) l_j + \prod_{i=t}^{t-1} n_i^A U(0, b) [T - t^*] \quad (32)$$

Suppose however, that there is a single deviation from strategy A . To take the more interesting case first, consider a government that plays strategy B , n_t^B , so that if successful, it raises its reputation by enough to ensure lending for the next two periods: $t+1$ and $t+2$. In particular:

$$n_t^B = n_t^A n_{t+1}^A \quad (33)$$

After this initial deviation, the government reverts to strategy A , which raises its reputation by just enough to ensure lending only in the next period. By comparing the payoff profiles:

$$U^G(\bar{R}, b) [n_t^A - n_t^B] + l_t [1 - n_t^B - 1 + n_t^B] + U^G(\bar{R}, b) [n_t^A n_{t+1}^A - n_t^B n_{t+1}^B] + l_{t+1} [n_t^A (1 - n_{t+1}^A) - n_t^B (1 - n_{t+1}^B)] \quad (34)$$

And using the fact that $n_{t+1}^B = 1$ (recall, from n_t^B , the government is assured lending in period $t+1$) if $U^G(\bar{R}, b) - U^G(0, 0) > 0$ then any deviation from strategy A is suboptimal. The focus has thus far been on deviations that are "riskier" than strategy A : $n_t^B < n_t^A$. It is trivial to show that any strategy less risky than A is also suboptimal. In this case, even if the reform succeeds, it will not be enough to enhance the government's reputation for continued lending next period. Suppose such a strategy is played in period t , leading to payoffs:

$$n_t^B U^G(\bar{R}, b) + (1 - n_t^B) U^G(0, b) + U^G(0, 0)(T - t - 1) \quad (35)$$

which is clearly dominated by strategy A .

Induction is then used to derive the government's value function (31).

Proposition 2: *If $U^G(0,0) > U^G(R,b)$ and $t^* \leq \hat{t}$ then the optimal strategy for a malevolent government with initial reputation $p_{-1} < \overline{p_t}$ is given by*

$$n_x = \begin{cases} \frac{p_{-1}(1-\overline{p_t})}{\overline{p_t}(1-p_{-1})} & t=0 \\ 1 & 0 < t \leq t^* - 1 \\ 0 & t > t^* \end{cases} \quad (36)$$

The government's value can then be described by:

$$V^G(t_0, p_{-1}) = \frac{p_{-1}(1-\overline{p_t})}{\overline{p_t}(1-p_{-1})} \{U^G(R,b)[t^* - 1] + U^G(0,b)[T - t^* + 1]\} + \left[1 - \frac{p_{-1}(1-\overline{p_t})}{\overline{p_t}(1-p_{-1})} \right] U^G(0,0)T \quad (37)$$

If $U^G(0,0) > U^G(R,b)$ but $t^* > \hat{t}$, then a malevolent government is deterred from an IFI program.

Proof:

If $U^G(0,0) > U^G(R,b)$ and $t^* \leq \hat{t}$, then an IFI program is attractive to a malevolent government:

$$\left[U^G(0,0) - U^G(\overline{R}, b) \right] [t^* - 1] < \left[U^G(0,b) - U^G(0,0) \right] [T - t^*] \quad (38)$$

And such a government tries to secure a lending arrangement. Using arguments very similar to Proposition 1, it can then be shown that both the government's and the IFIs optimal strategies constitute a sequential equilibrium. Moreover, because $U^G(0,0) > U^G(R,b)$, the government's optimal strategy is now given by (36); call this strategy C . To see this, let \tilde{U}_t denote the government's payoff profile in period t if, using strategy C , reform turns out be successful in period t :

$$\tilde{U}_t = U^G(\overline{R}, b)[t^* - 1 - t] + U^G(0,b)[T - t^*] \quad (39)$$

As before, l_t denotes the government's cost of reform failure in period t :

$l_t = U^G(0, b) + U^G(0, 0)[T - t]$. Now consider the following single deviation from strategy C .

In period t , the government undertakes a reform, that if successful, assures lending only into the next period; denote this strategy D . In period $t + 1$, the government reverts to strategy C , undertaking a reform, that if successful, assures lending through period t^* . The two strategies are related as follows:

$$n_{t+1}^C n_t^D = n_t^C \quad (40)$$

And by comparing payoff profiles:

$$n_t^C \tilde{U}_t + (1 - n_t^C) l_t > n_t^D U^G(\bar{R}, b) + n_t^D n_{t+1}^C \tilde{U}_{t+1} + (1 - n_t^B) l_t + n_t^B (1 - n_{t+1}^B) l_{t+1} \quad (41)$$

It can be shown that if $U^G(0, 0) > U^G(\bar{R}, b)$, then strategy C is optimal.

Proposition 3: If $q_t > \tilde{q}^2$ and $p^2 < \tilde{p}^2$ then a pooling equilibrium is obtained: if extraction is observed in the first arrangement, then both types of IFIs cancel lending. As a result, in equilibrium the holdup strategy is never observed.

Proof:

From equation (27) if $q_t > \tilde{q}^2$, then a malevolent government does not play the holdup strategy in the second arrangement. Let \tilde{p}^2 be defined by:

$$\tilde{p}^2 = \left[\frac{U^I(0, 0) - U^I}{U^I(\bar{R}, b) - U^I(0, b)} \right]$$

$$\tilde{p}^2 = \frac{[U^I(0, 0) - U^I(0, b)] - [[T - t^* - 1] + [U^I(\bar{R}, b) - U^I(0, b)]] [T - t^*] + U^I(\bar{R}, b) - \alpha b t^* + 2\lambda b T}{[U^I(\bar{R}, b) - U^I(0, b)] [T - t^*] + U^I(\bar{R}, b) + \lambda b T} \quad (42)$$

Then because a pooling equilibrium leaves beliefs about the IFIs type unchanged, if $p^2 < \tilde{p}^2$, and extraction is observed in the first arrangement, the IFI is strictly better off canceling lending rather than rolling over debt. And given a weak IFIs unwillingness to roll over debt in the first arrangement, since $U^G(\bar{R}, b) > U^G(0, 0)$, a malevolent government in the first arrangement does not pursue the holdup strategy.

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