Agency and communication problems in IMF conditional lending

Silvia Marchesi and Laura Sabani
University of Milano Bicocca and University of Florence*

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Abstract

Given the imperfect observability of both actions and outcomes, we focus here on the role that the transmission of information between the IMF and the borrowing government has for the choice between ownership and conditionality. When agency problems are especially severe and/or IMF information is very valuable, a centralized control may be optimal. In this case we may expect full communication and no delegation (conditionality with policy actions monitoring). To the contrary, when local knowledge is more important than the agency bias we would expect delegation (ownership) to be the optimal incentive scheme.

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*Corresponding author: Silvia Marchesi, Dipartimento di Economia Politica, Piazza dell'Ateneo Nuovo 1, I-20126 Milano. Tel. +39 02 6448 3057; Fax. +39 02 6448 3085; E-mail: silvia.marchesi@unimib.it.

1 Introduction

The record of IMF conditional lending in promoting economic reforms is rather disappointing (e.g., see Dreher, 2004; Joyce, 2004). The success of any development assistance program depends, to a large extent, on recipients preferences and priorities: this implies that conditionality should take into account the domestic political realities in countries making use of its resources (Khan and Sharma, 2001; Mayer and Mourmouras, 2007). However, the expansion in scope and complexity of Fund conditionality in the 80's and in the 90's had some unintended consequences: domestic ownership for structural reforms was undermined and lack of ownership hindered policy implementation.[1] Starting in the spring of 2000, the IMF has initiated a wide-ranging review of conditionality which culminated in 2002 with a few principles to guide IMF conditionality, including national ownership of programs, parsimony in conditionality and tailoring of programs to borrowing countries' circumstances.[2]

In the debate on the reform of conditionality it has been often argued that both conditionality and ownership are central to assistance programs. However, as long as ownership of a program may be defined as the extent to which a country is interested in pursuing reforms independently of any incentives provided by the IMF, ownership seems to negate the need for conditionality (Drazen, 2001). Indeed, conditionality can be justified only by the existence of a conflict of interest between the lender and the borrower, where conditions are exactly meant to better align these interests.

[1] Until the '70s the conditions the IMF attached to its loans were primarily macroeconomic ones. In the '90s the IMF also used structural conditionality (especially in programs with a number of transition countries needing to adapt to the needs of a modern market economy). Finally, starting with Mexico in 1994-95, conditionality expanded to cover a wide range of financial and corporate governance issues.

[2] The 2004-05 conditionality review has examined initial experience with the implementation of the 2002 guidelines finding that structural conditionality has shifted to the Fund's core areas, has reduced in scope and that the clarity of conditionality has improved. However, results in program implementation are mixed: permanent program interruptions declined but the implementation of structural conditionality has not improved and, moreover, programs continue to contain many waivers.

Conflicts of interest over desired policy may reflect various causes. Political economy mechanisms, such as lobbying by special interest groups, may explain why some governments may choose to follow policies deviating form the first best (Svensson, 2000; Drazen, 2002; Mayer and Mourmouras, 2002), where this is especially true in programs with a structural orientation (Mussa and Savastano, 1999).[3] It is worth noting that the government can alternatively be seen as a unitary actor subject to some pressures by special interest groups or it must contend with domestic veto players (e.g., Drazen, 2001).[4]

This difference in objectives and the existence of informational asymmetries between the lender and the borrower justifies the use of a principal-agent model to represent the relationship that the Fund (the principal) establishes with the recipient government (the agent) (IMF, 2001). In this framework we aim to interpret the notion of ownership and the way in which conditionality and ownership can be made mutually consistent.

In this paper we try to reconcile these two terms by looking at ownership and conditionality as two distinct and alternative incentive schemes that should induce the recipient government to act optimally. In other words, we want to emphasize an incentive based rationale for ownership, however, in order to do this, we should adopt a narrower definition of "ownership".

The term "conditionality" has traditionally encompassed two categories: the policy actions a member country needs to take to continue the arrangement and the economic outcomes which the country is required to achieve (Mussa and Savastano, 1999).[5] The

[3]The empirical evidence indicates that the implementation of structural conditionality is inferior to macroeconomic conditionality, especially in countries with strong interests groups (e.g. Ivanova et al, 2005 and Nsouli et al 2005).

[4]The latter are constitutional and institutional actors influencing policy making from within government, the number and power of veto players depends on a country's political and constitutional organization (see Tsebelis, 2001a, 2001b).

[5]According to Dixit (2002), the distinction between structural benchmarks (SB) and performance criteria (PC) has some of the same feature. SB are quite detailed specifications of policy actions the country must undertake, while PC pertain to outcomes (Martin 2000, Mercer-Blackman and Unigovskaya, 2000).

concept of "ownership" and the recent debate about it, suggests to distinguish the case in which conditionality strictly specifies policy actions from the case in which ownership of a program by the borrowing country would leave the country considerable freedom to devise its own details of actions, to be ultimately judged by their outcomes. Ownership would represent a situation in which control rights over policies are allocated to the borrowing government (delegation). To the contrary, conventional conditionality, which specifies the action undertakings for program continuation, represents the case in which control rights are allocated to the IMF (centralization).

In the principal-agent literature, the choice between basing the incentives on the actions or the outcomes depends on the degrees of accuracy with which the different actions and outcomes can be monitored (Dixit, 2000). If outcomes are fully observable, it would be optimal to choose an incentive scheme based on outcomes, thus leaving the agent free to devise how to achieve the objectives (ownership or *target conditionality*). Conversely, if outcomes are not observable (or observable only with large errors), while actions can be monitored with more precision, agents have to be monitored for their actions.[6] This will be the case for conventional conditionality or *procedural conditionality*.

In the agency relationship established between the Fund and the recipient country there is poor observability of both actions and outcomes: governments' actions are imperfectly observable, outcomes are not fully determined by actions but are also affected by luck, and, moreover, governments' competence cannot be readily distinguished ex ante (Drazen and Fischer, 1997). Under these circumstances, whether action-based, outcome-based or mixed, all incentive schemes are imperfect in the sense that they cannot achieve a first-best.[7]

[6] For example, Wilson (1989) considers the choice of incentive schemes for government bureaucracies, providing a classification based on the observability or the non observability of outcomes and actions.

[7] Furthermore, in the context of IMF adjustment programs, even the distinction between policy actions and outcomes gets often blurred. Indeed, sometimes the IMF can be directly concerned about the means as well as the ends, then the actions logically fall into the outcomes category (Dixit, 2000). For example, a given improvement in the government budget balance can be achieved in various ways: by reducing

In this paper we enrich the traditional principal agent incentive scheme (aimed at reducing the impact of the agents' bias on the equilibrium actions) with an information transmission problem. More specifically, the incentive scheme should be designed by taking into account that the agent (the government) needs incentives to transmit its private information to the principal (the IMF). In fact, in order to be able to screen among a range of programs the one which is best tailored to the type of recipient government, the Fund needs to have some country specific information privately owned by the government (i.e., its local knowledge).

In preparing the loan arrangement, IMF officials must thus persuade the government to share some confidential data on both economic and sociopolitical issues and to enter into detailed negotiations on a wide range of areas. However, whenever the Fund and the recipient government's objectives differ, the IMF will expect the recipient country to transmit its information distorted by a "bias" and it will try to correct the information transmitted by the government for such a bias. If the country's authorities are not naive, they will anticipate this and they will use communication strategically. Thus, agency problems have indirect negative effects on communication (i.e., transmission of private information between the IMF and the borrowing country) and strategic behavior by the agent (the borrowing government) prevents full communication of private information to the decision maker (the Fund) (Crawford and Sobel, 1982).

The contribution of this paper is thus focussing on the effects of the two different incentive schemes (ownership versus conditionality) in fostering communication. The problem of enhancing communication between the IMF and recipient countries has been overlooked in the literature so far, while we believe that the issue of information transmission is crucial and, moreover, it can crucially help clarifying the importance of programs'

public expenditure (transfers, government consumption, public investment), by raising taxes or by asset sales. The IMF may not be able to monitor all these actions in sufficient detail, despite being concerned about them, since the country's medium and long term economic performance depends on the policies adopted to improve the budget balance (Drazen and Fischer, 1997).

ownership in the debate on the reform of conditionality.

In the literature on strategic information transmission it is claimed that an (uninformed) principal may rationally decide to grant formal decision rights to an agent who is better informed but has different objectives. Namely, it is shown that to the extent that a principal cannot verify the claims of a better informed agent, he is in general better off delegating decision rights to the agent, in order to avoid the noisy communication and hence the associated loss of information (Dessein, 2002).

In our model the issue of *delegation* (ownership) versus *centralization* (conventional conditionality) is enriched by the (new) circumstance that the principal (the IMF) owns some private information as well. Mutual communication is important because the IMF owns skills and information (i.e., analytical and cross-country knowledge) useful to process local information that the country has not.[8] Thus, the analytical setting of the agency relationship between the IMF and the borrowing governments is one of two-sided incomplete information.

The main result of our model is that whenever agency problems are especially severe, and/or IMF private information is relatively more valuable than local knowledge, a centralized control may be optimal. In this case we would expect no delegation (conventional conditionality with policy actions monitoring). To the contrary, when local knowledge is more important than the agency bias (which is especially true for more complex economies or in a fast changing environment, for example because of a financial crisis) we would expect delegation (ownership with monitoring of outcomes) to be the optimal incentive scheme.

The paper is organized as follows. The model is developed in Section 2. Section 3 discusses the equilibrium in the conditionality and the ownership case, while Section 4

[8]The mutual communication aspect has been so far overlooked in the literature. Spatt (2004) and Harris and Raviv (2005, 2008), who provide applications to corporate governance, constitute an exception.

analyses the optimal allocation of control rights by comparing the comparative statics of ownership and conditionality. Section 5 finally discusses some extensions and concludes the paper.

2 The model

The model presented is a three stage game between two agents: the IMF and a borrowing country's government. All agents are risk neutral. The IMF and a country's government must take a decision about an adjustment program denoted by s. In the model we do not question the borrowing country's ability to repay the IMF loan, this assumption is strong but it allows us to focus on the issue of information transmission and on its implications for conditionality and ownership.

The borrowing country's welfare is measured by Y (i.e., a country's national income) which is a function of an adjustment program s. The first best adjustment program (the one which maximizes Y) is determined by two stochastic factors $\widetilde{a}$ and $\widetilde{p}$. The Fund and the borrowing government privately observe $\widetilde{p}$ and $\widetilde{a}$, respectively. We assume that the borrowing country learns its informational advantage $\widetilde{a}$ in the course of its normal duties, while the Fund is presumed to have some cross-country expertise $\widetilde{p}$. We also assume that the first best decision about the adjustment program is given by:

$$s* = a + pa = (1 + p)a \tag{1}$$

thus (1) depends on the borrowing country's local knowledge a and on the interaction between a and p. In other words, in order to be "influential," the Fund's expertise needs to be combined with the country's local knowledge. We assume that the variables $\widetilde{a}$ and $\widetilde{p}$ are independent with $\widetilde{a}$ uniformly distributed on $[0, A]$ and $\widetilde{p}$ uniformly distributed on $[0, P]$. The larger A is, the larger the informational advantage of the borrowing government over the IMF with respect to $\widetilde{a}$. Likewise, the larger P is, the larger the informational

advantage of the IMF over the government with respect to $\widetilde{p}$.

Y is assumed to monotonically decrease with the distance between the adjustment program s, which is really implemented, and the first best program $s*$ More specifically, we assume: $Y = Yo - (s - s*)^2$, where Yo is potential output. Thus, any difference between s and $s*$, (positive or negative), is simply due to some structural distortions.

2.1 Objective functions

The IMF (the principal) is assumed to be a benevolent institution. It aims to reduce economic policy distortions in the recipient country (the agent) by offering economic assistance contingent on the adoption of distortion-lowering policies. Namely, in choosing the adjustment program s, it simply maximizes the recipient country's output, that is:

$$\underset{s}{Max} U^{IMF} = Yo - (s - s*)^2 \tag{2}$$

The borrowing government is concerned about its national income, but its choice is constrained by the influence of some interest groups, which benefit from structural distortions.[9] To formalize this argument, we assume that the government's ideal adjustment program is $s* + b$. This implies that, when the government keeps control rights on its policy choices, it simply maximizes the following:

$$\underset{s}{Max} U^{G} = Yo - (s - s* - b)^2 \tag{3}$$

where b represents the extent of the agency problem between the Fund and the borrowing country.[10] It is worth noting that biases often arise endogenously as the product of

[9] In a richer model b could also capture the conflict between the Fund and the government related to the existence of some externalities in the government's policy choices. For example, national governments do not always internalize the impact of their policy actions on their neighboring countries (like, for example, tariffs, subsidies, and other trade protection). Therefore, the traditional IMF mandate of being custodian of the world economic welfare and its inherent international orientation may generate some conflicts of interest with the recipient governments (Mayer and Mourmouras, 2005).

[10] For example a financial liberalization accompanied by an inadequate regulation of financial markets in order to favour interest groups.

inherently imperfect incentive schemes. In fact, while in principle the IMF might control for the government bias by threatening to interrupt the disbursements in case of non compliance with the pre-determined final outcomes (i.e. performance criteria), we are implicitly assuming that such incentive scheme does not manage to completely eliminate agency problems.[11]

2.2 Information

The stochastic variable $\widetilde{a}$, whose support is in $(0, A)$, is observed only by the government. The government superior information over $\widetilde{a}$ can be seen as deriving from its greater proximity to the "business environment," relatively to the IMF officials. More specifically, $\widetilde{a}$ represents the local knowledge, including both economic information about the state of the country's economy and sociopolitical information about the preferences and the agenda of the government and of the relevant national constituencies. Therefore, information on $\widetilde{a}$ is important to measure what Drazen calls a country's "institutional capacity" to perform reforms (Drazen and Isard, 2004). Such type of information is assumed to be soft, that is it cannot be certified or "proved." The Fund privately observes the random variable $\widetilde{p}$, whose support is in $(0, P)$. Its informational advantage relatively to the government derives from cross-country and analytical knowledge that allows it to better understand the links between policies and economic outcomes. The two pieces of information interact in designing the optimal adjustment program.

2.3 Timing

The sequence of events is assumed to be the following. First, the IMF decides whether or not to delegate to the government the control over the choice of the adjustment program. Next, the government learns $\widetilde{a}$ and the IMF learns $\widetilde{p}$. If authority has been delegated,

[11] There are many reasons why the IMF threat of programme interruption cannot be credible. For a discussion on this see Marchesi and Sabani (2007a, 2007b).

the government asks the IMF a technical advice and then chooses the program, while, if authority has not been delegated, the IMF asks the country's advice and then chooses the program. Finally, the government implements the program and outcomes realize.

3 Conditionality versus Ownership

In our model the IMF has two instruments to use the local knowledge of the recipient government: ownership (delegation) and conditionality (centralization).

By ownership, we refer to a situation in which the IMF delegates the recipient government the choice of the adjustment program, which implies that the government can choose autonomously the policies to be implemented, without the IMF's approval. We assume that in designing the program the government asks the IMF's advice (negotiation stage) but then it decides autonomously the structure of the program. In this case, the IMF does not engage in monitoring a country's policy undertakings, rather it subordinates the continuation of the disbursements to the achievement of some pre-determined outcomes (target conditionality). We will show that ownership will result in an under-utilization of the Fund's information and in a suboptimal adjustment program due to the government bias.

By conditionality, instead, we refer to a situation in which the IMF fully controls the design of the adjustment program and tries to exploit the government's private information by asking its advice (negotiation phase). Then, the Fund chooses the adjustment policies and the government implements them. The IMF monitors the economic reforms and it subordinates the continuation of the agreement to the country's compliance with the program (procedural conditionality). We will show that conditional lending avoids the government's bias but it will result in an under-utilization of the government's information. In this section, we will study both instruments separately. Specifically we start

by analyzing stage three of the game.

3.1 Conditionality

We start by examining the conditionality case. First, we introduce some notation. Let $r \in [0,1]$ denotes the message that the government sends to the IMF when asked to share its local knowledge. Let $q(r|\,a)$ denotes the density function that the government sends message r when it has observed a. This is the reporting rule which is chosen by the government. Further, let $g(a|\,r)$ denote the density function that the government's private information is a, when the IMF observes the message r. Finally, let $s(p,r)$ be the IMF's action rule depending on the country's message r and on its private information. A Perfect Bayesian Nash Equilibrium for this communication game is defined as follows:

Definition 1 *A Perfect Bayesian Nash Equilibrium of the communication game consists in a family of reporting rule $q(r|\,a)$ and an action rule for the IMF $s(p,r)$ such that: 1) for each $a \in [0,1]$, $\int_R q(r|\,a)\,dr = 1$, where the Borel set R is the set of all possible signals. If $r*$ is in the support of $q(r|\,a)$, $r*$ is such that:*

$$r* = \arg\min \int_0^P [(s(p,r) - (1+p)\,a - b)]^2 f(p)dp$$

2) for each r, $s(p,r)$ solves:

$$\min \int_0^A [s(p,r) - (1+p)a]^2\, g(a|\,r)da$$

where $g(r|\,a) = \frac{q(r|a)f(a)}{\int_0^A q(r|t)f(t)dt}$

Condition (1) says that the reporting rule $q(r|\,a)$ chosen by the government, yields an expected loss minimizing adjustment program s, given the IMF's choice rule $s(p,r)$. In other words, the equilibrium reporting rule $q(r|\,a)$ induces the IMF to choose an adjustment program $s(p,r)$, which minimizes the expected loss of the government. Condition

(2) says that the IMF responds optimally to each government's report r. The Fund uses Bayes' rule to update its prior on a, given the government's reporting strategy and the signal received. Namely, given the government's report r and the posterior density function of a given r $(g(r|a))$, $s(p,r)$ minimizes the Fund's expected loss.

The IMF's equilibrium reforms choice creates some endogenous signalling costs for the government, which allow for equilibria with partial sorting. Indeed, the model has multiple equilibria which are all "partition" equilibria, in which the government introduces some noise in the information transmitted by simply not discriminating as finely as possible in its signal among the different states of nature it is capable to distinguish.[12] More precisely, it is possible to show that there is a finite upper bound $N(\frac{b}{1+P/2})$ on the number of subintervals of the equilibrium partition and that there exists at least an equilibrium for each size from $N=1$ (uninformative equilibrium) to $N(\frac{b}{1+P/2})$ (most informative equilibrium).

Let $a(N) = a_0(N), a_1(N), ..., a_N(N)$ denote a partition of $[0,1]$ where $0 = a_0(N) < a_1(N) <, ... < a_N(N)$. The following proposition characterizes the relevant equilibrium for the communication game.

Proposition 2 *Suppose b is such that U^{IMF} is different from U^G for all a. Then there exists a positive integer $N(\frac{b}{1+P/2})$ such that for each N with $1 \leq N \leq N(\frac{b}{1+P/2})$, there exists at least one equilibrium $(q(r|a); s(p,r))$, where $q(r|a)$ is uniform, supported on $[a_i,\ a_{i+1}]$, and $s(p,r) = (1+p)(\frac{a_i+a_{i+1}}{2})$ if $a \in [a_i,\ a_{i+1}]$,*

(A) $\int_0^P \left[(1+p)(\frac{a_i+a_{i+1}}{2}) - [(1+p)a_i + b]\right]^2 f(p)dp = \int_0^P \left[(1+p)(\frac{a_{i-1}+a_i}{2}) - [(1+p)a_i + b]\right]^2 f(p)dp$

(B) $a_0 = 0;\ a_N = 1$

Proof. The proof follows directly from Theorem 1 in Crawford and Sobel (1982). ■

[12] See Lemma 1 in Crawford and Sobel (1982).

(A) is an arbitrage condition which says that for states of nature that fall on the boundaries of two intervals the government must be indifferent between the associated values of the adjustment program $s(p,r)$. (A) defines a second order linear differential equation on a_i, while (B) are its initial and terminal conditions. Since the government is not informed on the true value of P, when choosing r, it will take the expected value of P, that is $\frac{P}{2}$. The arbitrage condition (A) then specializes to:

$$\begin{aligned}(1+P/2)(\frac{a_{i+1}+a_i}{2})-[(1+P/2)a_i+b] &= [(1+P/2)a_i+b]-(1+P/2)(\frac{a_{i-1}+a_i}{2}),\\ (i &= 1,...,N-1),\end{aligned} \tag{4}$$

where, solving for a_{i+1}, we obtain:

$$a_{i+1}=\frac{4}{1+P/2}b+2a_i-a_{i-1}, \qquad (i=1,...,N-1). \tag{5}$$

This second order linear difference equation has a class of solutions parametrized by a_1 (given $a_0=0$):

$$a_i=ia_1+2i(i-1)b/(1+P/2), \qquad (i=1,...,N). \tag{6}$$

Since $a_N=A$ we have:

$$a_1=\frac{A-2N(N-1)b/(1+P/2)}{N} \tag{7}$$

$N(\frac{b}{1+P/2},A)$ is the largest positive integer N such that:

$$2N(N-1)b/(1+P/2)<A$$

which is easily shown to be:

$$\left\langle -\frac{1}{2}+\frac{1}{2}\left[1+\frac{2A(1+P/2)}{b}\right]^{\frac{1}{2}}\right\rangle$$

where $\langle v\rangle$ denotes the smallest integer greater or equal to v.[13] $N(\frac{b}{1+P/2},A)$ is determined by the bias b weighted by the relevance of the IMF private information and by the length of the support of a.

[13]Then v is the positive root of $[2N(N-1)b/(1+P/2)=A]$ minus one.

Crawford and Sobel show that both players' expected loss is decreasing with N. Therefore, they argue that the best Pareto equilibrium, corresponding to $N(\frac{b}{1+P/2}, A)$, is a focal equilibrium. Now, the following Lemma is established:

Lemma 3 *$N(\frac{b}{1+P/2}, A)$ is a continuous and decreasing function of b and it is a continuous and increasing function of A and P, that is:*

$$\frac{\partial N(\frac{b}{1+P/2}, A)}{\partial b} < 0, \ \frac{\partial N(\frac{b}{1+P/2}, A)}{\partial A} > 0, \ \frac{\partial N(\frac{b}{1+P/2}, A)}{\partial P} > 0.$$

Lemma 1 states that the precision of the government's information transmission in the focal equilibrium decreases with the bias, increases with the government's informational advantage and increases with the IMF's informational advantage. The intuition for these results basically depends on the government's incentive to avoid excessive distortions in the transmission of information. In fact, an excessively distorted report would lead to the choice of an adjustment program which is too distant from the first best, even taking into account the government's bias.[14]

Let denote by L^C the IMF's ex ante expected loss for an equilibrium of size N (where C stands for conditionality). Given the partition $0 = a_0(N) < a_1(N) <, ... < a_N(N) = A$, using (6) and substituting for the value of a_1 in (7) (determined by $a_N = A$) yields:

$$a_i = \frac{iA}{N} - 2i(N-i)b/(1+P/2), \qquad (i = 1, ..., N), \tag{8}$$

from which, it is easy to derive:

$$a_i - a_{i-1} = \frac{A}{N} + 2(2i - N - 1)b/(1+P/2).$$

Note that the width of the interval increases by $4b/(1+P/2)$ for each increase in i. Namely, the larger the observed value of a, less information is actually communicated

[14] In particular, the government's incentive in not distorting the information rises with the increase of both the government's and the IMF' informational advantage, where the influence of the latter depends on the multiplicative interaction between a and p in the design of the adjustment program.

by the government. Intuitively, anticipating that the government is biased towards larger values of s, the IMF considers the government more reliable when it reports small r. Then, we can write:

$$\begin{aligned} L^C &= \sum_{i=1}^{N} \int_{a_{i-1}}^{a_i} (1+p)^2 \left[a - \frac{a_{i-1}+a_i}{2} \right]^2 da = (1+p)^2 \sum_{i=1}^{N} \frac{(a_i - a_{i-1})^2}{12} \\ &= \frac{(1+p)^2}{12} \sum_{i=1}^{N} \left[\frac{A}{N} + 2(2i-N-1)b/(1+P/2) \right]^2 = (1+p)^2 \sigma_r^2 \end{aligned}$$

where σ_r^2 denotes the residual variance of r the IMF expects after being reported the equilibrium r by the government. Crawford and Sobel (1982) show that this is equal to:

$$L^C = L(N, \frac{b}{1+P/2}, A) = \frac{(1+p)^2 A^2}{12N^2} + \frac{\frac{b^2}{(1+P/2)^2}(N^2-1)}{3} \tag{9}$$

It is easy to verify that when $N = 1$ (uninformative partition) the residual variance is equal to the total variance ($\frac{(1+p)^2 A^2}{12}$). To the contrary, for a given N, the residual variance decreases with $\frac{b}{1+P/2}$. Indeed, when $b = 0$ the residual variance is equal to $\frac{(1+p)^2 A^2}{12N^2}$, which is smaller than total variance, for $N > 1$.

Now, the following Lemma is established:

Lemma 4 *$L^C = L(N(\frac{b}{1+P/2}, A), \frac{b}{1+P/2}, A)$ is continuous and increasing in A, and it is continuous and decreasing in $\frac{b}{1+P/2}$.*

Proof. The proof follows directly from Lemma 1in Harris and Raviv (2005). ■

Centralization certainly avoids the bias but it results in under-utilization of a country's government information. Indeed, Lemma 2 shows that the IMF's ex ante expected loss under conditionality is increasing in the informational advantage of the government A and decreasing in the bias b. However, it is worth noting that the expected loss deriving from the distortions in the information transmission decreases as P increases, for a given b.

4 Ownership

In the delegation game the situation is entirely symmetric to the centralization game. In the case of ownership, the government is supposed to choose the adjustment program s knowing a and after having asked the IMF for advice. As before, the IMF's report r is determined by a partition $\{p_i\}$ of $[0,\ P]$. Given the IMF's report t, it is possible to define a reporting rule $q\left(t|\,p\right)$ and a posterior belief $g\left(p|\,t\right)=\frac{q(t|p)f(p)}{\int_0^P q(t|r)f(r)d(r)}$ such that given the report $t\in[p_i,\ p_{i+1}]$, the government expected value of p is $\frac{p_i+p_{i+1}}{2}$ (posterior mean of the random variable $\widetilde{p}$, given t). The government will thus implements the following program:

$$(1+\frac{p_i+p_{i+1}}{2})a+b$$

The arbitrage condition specializes to:

$$p_{i+1}=-\frac{8}{A}b+2p_i-p_{i-1};\ p_i=ip_1-4i(i-1)b/A,\qquad (i=1,...,N).$$

Given that $p_N=P$ we have:

$$p_i=\frac{iP}{N}+4i(N-i)b/A,\qquad (i=1,...,N),$$

from which:

$$p_i-p_{i-1}=\frac{P}{N}+4(N+1)b/A-\frac{8ib}{A}.$$

It is easy to show that the width of the interval decreases by $8b/A$ for each increase in i. Intuitively, the more the IMF transmits its own information, the larger the value of p is. Anticipating that the government is biased towards larger values of s, the IMF considers the government more reliable when it reports large p.

As before we can compute the maximum size of the partition for the delegation game, which is given by:

$$N(\frac{b}{A},P)=\left\langle -\frac{1}{2}+\frac{1}{2}\left[1-\frac{PA)}{b}\right]^{\frac{1}{2}}\right\rangle$$

We consider the focal equilibrium, that is the one corresponding to the maximum size of the partition.

The IMF's ex ante expected loss for the ownership game is given by L^O:

$$\begin{aligned}\sum_{i=1}^{N}\int_{p_{i-1}}^{p_i}\left[(1+\frac{p_{i-1}+p_i}{2})a+b-(1+p)a\right]^2 dp &= b^2+a^2\sum_{i=1}^{N}\frac{(p_i-p_{i-1})^2}{12}=a^2\sigma_t^2\\ &= b^2+\frac{a^2}{12}\sum_{i=1}^{N}\left[\frac{P}{N}+4(2i-N-1)\frac{b}{A}\right]^2\\ &= b^2+L(N(\frac{b}{A},P),\frac{b}{A},P)\end{aligned}$$

Where σ_t^2 denotes the residual variance of t the government expects to have after being reported t by the Fund.

Lemma 5 *$L(N(\frac{b}{A},P),\frac{b}{A},P)$ is continuous and increasing in P and in b, while it is continuous and decreasing in A*

Proof. The proof follows directly from Lemma 1 in Harris and Raviv (2005). ■

Lemma 5 shows that the IMF ex ante expected loss under ownership is increasing in its informational advantage P and in the government bias b, while decreasing in the government's informational advantage A. Intuitively, as delegation does not avoid the bias, the IMF's expected loss increases with b. Moreover, under delegation, the IMF's information is under-utilized and so the Fund expected loss increases with P. However, delegation induces full utilization of country's government information which implies that the Fund expected loss is decreasing with A. However, it is worth noting that the expected loss deriving from the distortions in the information transmission decreases as P increases, for a given b.

5 Choice between ownership and conditionality: a comparative analysis

Proposition 6 *The IMF prefers conditional lending (no ownership) iff* $P \geq P(A, b)$, *where* $P(A, b)$ *is continuous and increasing in* A *and for any* b, $P(A, b) < A$

Proof. The proof follows directly from Theorem 1 in Harris and Raviv (2005). ■

Proposition 5 shows that the IMF will prefer conditional lending (no delegation) when its informational advantage is greater than a threshold level $P(A, b)$, which, for any b, is shown to be smaller than A. This means that the Fund will always choose not to delegate whenever its private information is more important that the agent's private information, that is $P > A$. Furthermore, the IMF will still opt for conditionality even when $P(A, b) \leq P < A$. This means that, due to the country's own bias, the Fund can optimally choose not to delegate even if its informational advantage is strictly smaller than A (see Figure 1). Finally, to choose ownership (delegation), IMF's private information P has to be smaller than $P(A, b)$. In fact, in this latter case, the loss related to an under-utilization of the government's information is more than compensated by the elimination of the bias and by the full utilization of the IMF's private information.

6 Conclusions and extensions

The approach to conditionality and ownership presented in this paper has focussed on the importance of the transmission of information between the IMF and the borrowing country in designing the most efficient "incentive contract." The combination of special interest politics (agency problems) and informational asymmetries presents serious problems as the implementation of Fund conditionality is concerned, especially in programs with a structural orientation. In fact, in order to be able to screen the most suitable con-

tract for the borrowing country, the Fund needs to have some country specific information that the government privately owns (its local knowledge). However, since the objectives of the Fund and the recipient government are different, the IMF will try to correct the information transmitted by the government for the recipient country's bias, and the country's authorities, anticipating this, will use communication strategically. Therefore, agency problems have indirect negative effects on the transmission of private information between the IMF and the borrowing country and a strategic behavior of the latter prevents full communication to the Fund.

Given the imperfect observability of both actions and outcomes, that would leave undetermined which, between delegation or centralization, would be the most efficient contract (in a traditional principal-agent framework) we have focussed on the specific role that the transmission of information between the IMF and the borrowing government has for the choice between delegation (ownership or target conditionality) and centralization (conventional conditionality or procedural conditionality). We find that when agency problems are especially severe, and/or IMF information is very valuable centralization is indeed optimal. To the contrary, when local knowledge is more important than the agency bias we would expect delegation to be the optimal incentive scheme.

What do we observe in reality? A natural extension of our paper would be to empirically investigate the "scope" of conditionality, namely the prevalence of monitoring of policy actions (Structural Benchmark or SBs) versus monitoring of the outcomes (Performance Criteria or PCs). These two types of monitoring clauses will be considered as proxy for the two types of incentive contracts, namely conventional conditionality vs. ownership. In fact, while SBs map out a series of steps toward a desired policy outcome (such as central bank independence or a broader tax base), PCs (such as a monetary or budgetary target) are a quantitative floor or ceiling, or a specified structural measure, clearly establish the circumstances under which the government's authorities can use the

Fund's resources.

Therefore, controlling for countries' characteristics, their economic performance and indeed for the IMF's political motivations,[15] we plan to investigate the role of strategic information transmission in the prevalence of PCs vs. SBs. More specifically, we expect to find a prevalence of SBs (centralization) when agency problems are especially severe (e.g., the country has a weak political structure or it is highly corrupted), and/or IMF information is very valuable. To the contrary, we expect PCs (delegation) to dominate when local knowledge (e.g., the country is economically relevant or with a particularly complex economic structure) is more important than the agency bias.

[15] Stone (2007) finds that being an important recipient of U.S. aid "positively" affects the scope of conditionality, which becomes narrower.

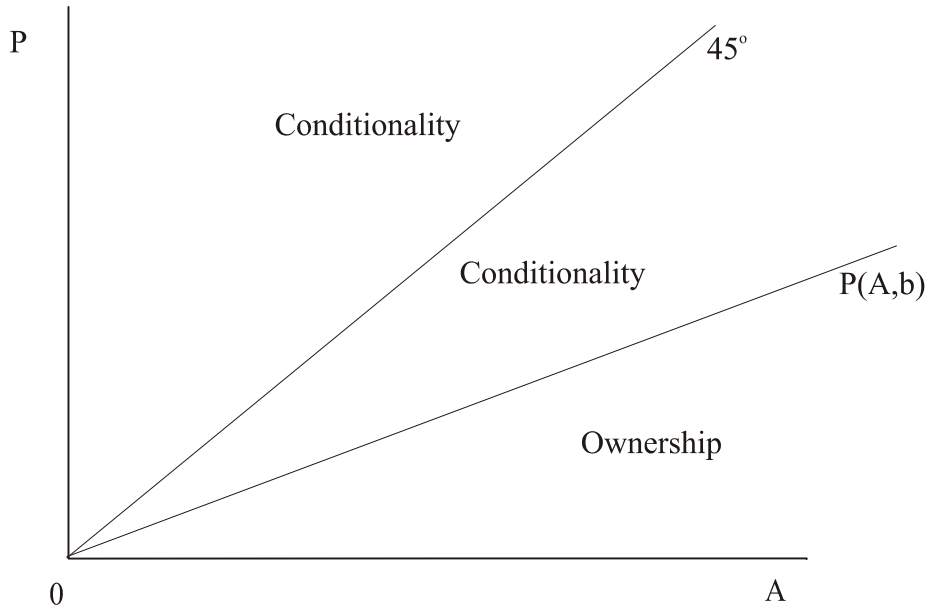

Figure 1:

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