LAREFI Working Paper

LABORATOIRE D'ANALYSE ET DE RECHERCHE EN ÉCONOMIE ET FINANCE INTERNATIONALES

Public Debt Accumulation and Institutional Quality: Can Corruption Improve Welfare?

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LAREFI Working Paper CR09-EFI/07

2009

http://lare-efi.u-bordeaux4.fr

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Abstract. *We explore the consequences of bad governance and corruption for public debt and welfare in a model of policymaking with time inconsistency. A decrease in institutional quality is supposed to adversely affect government revenue. The main point of this paper is that corruption can enhance welfare in two ways: first, by mitigating the inflationary bias of discretionary monetary policy; second, by reducing the loss due to the suboptimal distribution of distortions associated with debt accumulation. The paper thus invokes the lack of interest for explaining the prevalence of corruption in countries with low institutional quality that encounter a credibility problem in monetary management.*

JEL classification: *D*73, *E*63, *H*63.

Keywords: Corruption; fiscal and monetary policy; governance; public debt.

1. INTRODUCTION

Bad governance and corruption are regarded as an issue of major concern in many developing countries and now rank high on the agenda of both researchers and policymakers, as testified by the growing body of literature on the subject, and by the strong stance on the matter taken by the World Bank and other international organizations since the mid-1990s. The main reason for such an attention is that widespread corruption distorts the allocation of resources in the market system and disrupts competition, thereby acting as a deterrent to development and growth. Empirical studies provide support for the view that bad governance is likely to significantly harm economic performance through a wide range of channels. In particular, there is some evidence that corruption reduces growth by discouraging private investment (Mauro, 1995 and 1997), or by increasing public investment in unproductive projects (Davoodi and Tanzi, 1998), not to mention that public sector corruption also contributes to larger budget deficits when leading to tax evasion or improper tax exemptions (Tanzi, 1997).[1]

However, are countries suffering from bad governance always ready to strengthen their institutions? In a recent article that models weak public governance as an erosion of the ability to collect revenue through regular tax channels, Huang and Wei (2006) argue that most of the usually prescribed solutions to the credibility problem of monetary policy are likely to fail in developing or transition economies with poor institutions. This is because the optimal inflation rate in such countries is higher than that normally implied by a monetary arrangement such as a fixed exchange rate or a currency board. More importantly, Huang and Wei (2006) show in their model that some nations might fall into what they call a "poor-institution trap". That is, in countries facing a very severe governance problem, the authorities

[1] An interesting survey on the topic can be found in Jain (2001).

would no longer be willing to improve fiscal capacity and strengthen institutions from the moment that the cost of the reforms required to fight corruption exceeds a certain threshold.

The present paper adds insight about the lack of incentive to improve governance and curtail corruption, in line with the findings of Huang and Wei (2006). Like them, we deal with the role of institutional quality for the design of monetary and fiscal policies by means of a game-theoretic approach that features time inconsistency in decisionmaking and in which corruption is assumed to negatively impact the amount of tax revenue. These two authors explore the impact of corruption under both commitment and discretion, but here we only discuss the discretionary case, this latter being more realistic for modeling a country faced with institutional failure. The major difference with Huang and Wei (2006) lies in the two-period extension of their model for taking into account the consequences of corruption for public debt accumulation.

The main point in this dynamic version is that corruption can theoretically enhance welfare. This result, which looks somewhat surprising at first sight, actually derives from the basic principle that the aggravation of one distortion in an already distorted world may raise overall welfare because these distortions tend to offset each other. Intuitively, in this model, the distortion due to the absence of monetary commitment can be counterbalanced by the distortion associated with fiscal corruption, with the final outcome that a country can be made better off. Hence, our analysis, too, suggests that some developing nations could be stuck in a poor-institution trap. However, it is worth mentioning that such a trap here follows from a *positive* net effect of corruption on welfare, unlike Huang and Wei (2006) who endogenize the quality of institutions in their article and explain the phenomenon of the trap by the cost of the reforms aimed at strengthening governance (on account, among other things, of the resistance of pressure groups that have been benefiting from corruption).

In our paper, lower institutional quality affects welfare in two ways. The first source of welfare losses is *intratemporal* and arises from the well-known time-inconsistency problem, when the decisionmaker attempts to increase the output level through unanticipated inflation (Barro and Gordon, 1983). As the incentive to generate an unexpected monetary shock is perceived by the private sector, the equilibrium inflation rate is higher under discretion than under commitment. In the presence of tax distortions, more corruption has a positive impact provided that the government gives priority to its output objective. Indeed, if the cost of collecting revenue in terms of foregone output and employment rises because of a higher corruption level, the best thing to do is to reduce distortionary taxation, hence an increase in economic activity, but also a mitigation of the inflationary bias associated with discretionary monetary policy.

The second source of welfare losses stems from the *intertemporal* distribution of distortions across the two periods of the game. As already put forward by Beetsma and Bovenberg (1997) in a similar setup, the government is induced to employ debt policy strategically in the first period in order to influence second-period inflation expectations. Owing to that, the amount of public debt carried over from the first period into the second happens to be too low with respect to the optimum. However, we show in this model that the more serious the corruption problem, the greater will be the amount of public debt. Therefore, a weakening of governance can reduce the intertemporal loss by boosting public borrowing. The paper implies that the increasing relationship between the extent of corruption and the amount of indebtedness might be associated with a welfare-improving effect under some conditions, although it is regarded as a problem in most studies. More broadly, we think that the combination of these various effects could partly help to explain the governance problem that is observed in some developing or transition countries. Our study points to the fact that their authorities might essentially have little or no incentive to deal with the matter seriously.

The remainder of the paper is organized as follows. Section 2 presents the model. The equilibrium public debt level and the welfare loss under discretion are computed in Section 3. Section 4 explores the impact of a change in institutional quality on the intratemporal loss component. Section 5 then turns to the consequences of corruption for debt accumulation and intertemporal losses. Section 6 finally offers a few concluding remarks.

2. THE TWO-PERIOD MODELING FRAMEWORK

The model is based on Alesina and Tabellini (1987) but extended to two periods to allow for public debt. It describes a game between two players: a representative worker, who sets the nominal wage rate at the beginning of each period, and the policymaker, who controls the inflation and tax rates and chooses the amount of public debt in the first period. This model is intended to examine the welfare consequences of one particular feature, namely institutional failure, which is more prevalent in economies suffering from a lack of monetary credibility, so it will be assumed throughout the paper that the policymaking authority is never able to commit to its announcements.[2]

At any period t ($t = 1, 2$), the log of output, x_t, is given by a modified Lucas supply curve that allows the adverse impact of tax distortions to be taken into account:[3]

$$x_t = \pi_t - \pi_t^e - \tau_t \tag{1}$$

[2]. Owing to space limitations, the details of the calculations will be omitted here, but two separate technical appendices to this paper are available from the author upon request. Appendix A presents all details of the derivation of the discretionary equilibrium. For the purpose of comparison, the results for the benchmark case with commitment are given in Appendix B. Note that the commitment solution is second-best only because non-distortionary (lump-sum) taxes are supposed to be unavailable to the authorities in this model.

[3]. The derivation of Equation (1) is standard. See Alesina and Tabellini (1987) for details.

where π_t denotes the actual inflation rate and π_t^e the expected inflation rate, and where τ_t is the tax rate on total output. For the sake of simplicity, there is no shock and the natural level of output is normalized to zero. Monetary policy can stimulate activity only if the actual inflation rate exceeds the expected inflation rate, since real wages then go down. As in Alesina and Tabellini (1987), fiscal policy exerts distortionary effects: any increase in the tax rate leads to a fall in profitability of firms and results in lower output.

The budget constraint of the government creates a link both between fiscal and monetary policies within each period and between optimization decisions across both periods:

$$g_t + (1+R)d_{t-1} = \pi_t + \beta\tau_t + d_t \qquad (2)$$

where g_t denotes the level of public spending (as a share of output), d_{t-1} and d_t, respectively, are the amount of public debt carried over from the previous period and the amount of newly issued public debt, and R is the (constant) real interest rate. As will be seen below, β measures the revenue leakage due to corruption ($0 \le \beta \le 1$) and is the key parameter here.

The left-hand side of (2) represents the government's total outlay: public spending, g_t, and debt servicing costs, $(1+R)d_{t-1}$. The right-hand side of (2) indicates the various sources of finance available to the authorities: seigniorage revenues, π_t, output tax revenues, $\beta\tau_t$, and new debt issuance, d_t. Contrary to advanced economies featuring low holdings of base money on account of efficient financial systems, seigniorage remains an important source of government revenue for developing countries. Without loss of generality, there is no debt in $t = 0$ and all debt must be paid off at the end of the second period of the game (i.e. $d_2 = 0$), so $g_1 = \pi_1 + \beta\tau_1 + d_1$ and $g_2 + (1+R)d_1 = \pi_2 + \beta\tau_2$.

As in Huang and Wei (2006), institutional failure and corruption are supposed to lessen the government's ability to collect revenue through regular tax channels and are modeled as a decrease in the value of the parameter β in (2). This parameter can thus be thought of as a fiscal capacity or institution quality index intended to roughly capture the extent of corruption: the lower β, the greater will be the leakage of tax revenue. When $\beta = 1$, there is no corruption at all; in contrast, if $\beta = 0$, so serious is the public governance problem that the regular tax collection system collapses completely and the government can no longer collect tax.[4]

As usual in this type of model, the policymaker's quadratic loss function is increasing in the deviations of inflation, output and public spending from their targets:

$$V = \frac{1}{2}\sum_{t=1}^{2} \rho^{t-1}\left[s_\pi \pi_t^2 + s_x x_t^2 + s_g \left(g_t - g_t^* \right)^2 \right] \tag{3}$$

The targeted inflation rate is taken to be zero and corresponds to price stability. For convenience, the output target, too, is set equal to zero, without any consequence for our results: this is the natural output level reached in the absence of tax distortions (i.e. $\tau_t = 0$) whenever the price level is correctly anticipated by the private sector (i.e. $\pi_t = \pi_t^e$). Having an output target in excess of the natural level, as is usual in this class of models, would not affect our conclusions owing to the assumption $g_t^* > 0$: the need to provide public goods and the absence of lump-sum taxes are enough to generate the standard time-inconsistency problem and so an inflationary bias under discretion. s_π, s_x and s_g denote the weights placed on the

[4]. The corrupt practices undertaken by tax administration officials in return for bribes may significantly aggravate the leakage of tax revenues. Empirical evidence suggests that high corruption is associated with low tax revenues most of the time (Davoodi and Tanzi, 1998). The cases of Peru and Uganda quoted in Tanzi (1997) are particularly revealing in this respect: corruption became so pervasive in these countries that the existing administrations were dismantled and replaced by new ones. Another well-known example is the failure to undertake tax collection efficiently and equitably in Russia after the collapse of the Soviet bloc.

price stability, output and public spending objectives, respectively ($s_\pi + s_x + s_g = 1$), and ρ is the authorities' subjective discount factor ($0 < \rho \leq 1$).

As will be clear below, the weights the policymaking authority attaches to the various arguments in the loss function (3) play a crucial role. In what follows, we shall mainly retain the assumption of a "weight-liberal" government that cares more about output and employment than price stability (i.e. $s_x > s_\pi$). This assumption, indeed, is indispensable for highlighting the possibility of a welfare-improving impact of weak public governance (besides the fact that it permits us to explain why the policymaker comes up against a commitment problem and is unable to follow a monetary policy rule). Another possible justification lies in the fact that the authorities in countries where the institutional and political system is weak are likely to be more prone to populism in an attempt to increase their influence and reelection probability; within our very stylized framework, such a behavior could be captured, to some extent, by a small dislike for inflation (i.e. $s_\pi \to 0$).

3. PUBLIC DEBT AND WELFARE LOSSES UNDER DISCRETION

In this dynamic framework, the decision regarding how much to borrow is made in the first period while taking into account the consequences of public debt issuance for second-period outcomes. In this way, the first-period policymaker acts as a Stackelberg leader when determining the optimal debt stock, because debt policy can be used strategically with the aim of influencing future policy decisions (see the discussion by Beetsma and Bovenberg, 1997).

The first-period policymaker equates the marginal benefit from issuing more debt (i.e. smaller losses in period one owing to lower tax distortions) to the (discounted) marginal cost (i.e. larger losses in period two because of a higher debt service burden). Equation (4a) below illustrates this intertemporal trade-off (see Appendix A for the details of the calculations):

$$g_1^* - d_1 = \frac{\rho(1+R)\Xi\left[(1+R)d_1 + g_2^*\right]}{\Omega} \tag{4a}$$

where $\Xi \equiv s_\pi\left(s_x + \beta^2 s_g\right) + (1+\beta)^2 s_x s_g$ and $\Omega \equiv s_\pi\left(s_x + \beta^2 s_g\right) + (1+\beta) s_x s_g$.

The left-hand side of (4a) corresponds to the gain in the first period resulting from public debt issuance. A higher stock of debt in period one allows the authorities to lower both inflation and corporate taxes (i.e. $\partial\pi_1/\partial d_1 < 0$ and $\partial\tau_1/\partial d_1 < 0$), hence a rise in output (i.e. $\partial x_1/\partial d_1 > 0$). Furthermore, public borrowing does more than compensate for the decrease in seigniorage and regular tax revenues, so government expenditure in period one goes up with the debt stock (i.e. $\partial g_1/\partial d_1 > 0$).

The right-hand side of (4a) represents the cost of debt accumulation in period two. The term $\rho(1+R)\Xi/\Omega$ is referred as the authorities' *effective* discount factor, in the sense that it varies according to the nature of the policy game and the commitment technology. The effective discount factor under discretion depends both on the policymaker's preferences among the various economic objectives, as measured by s_π, s_x and s_g, and on the quality of institutions, as captured by β.[5] The higher the amount of public debt, the higher future inflation and tax rates (i.e. $\partial\pi_2/\partial d_1 > 0$ and $\partial\tau_2/\partial d_1 > 0$), since a larger financing requirement will compel the authorities to raise tax and seigniorage revenues, hence a decrease in the second-period activity level (i.e. $\partial x_2/\partial d_1 < 0$). The level of public expenditure in period two also is decreasing in the amount of debt (i.e. $\partial g_2/\partial d_1 < 0$).

It is straightforward to solve for the equilibrium debt stock under discretion from (4a):

[5]. The terms Ξ and Ω entering the expression for the effective discount factor are specific to the discretionary regime. It is shown in Appendix B that the effective discount factor under commitment is equal to $\rho(1+R)$.

$$d_1^D = \frac{g_1^* - \rho^D g_2^*}{1+\rho^D(1+R)} \tag{4b}$$

where $\rho^D \equiv \rho(1+R)\Xi/\Omega$ (the superscript "*D*" denoting discretion).

Equation (4b) reveals the determinants of debt accumulation. The higher the government spending target in period one, the higher will be the stock of public debt (i.e. $\partial d_1^D/\partial g_1^* > 0$). Conversely, the higher the second-period public spending target, the lower must be the equilibrium debt level (i.e. $\partial d_1^D/\partial g_2^* < 0$). It is also easy to check that a higher effective discount factor increases the marginal cost of public borrowing, thereby restraining debt accumulation (i.e. $\partial d_1^D/\partial \rho^D < 0$).

As in Beetsma and Bovenberg (1997), it is convenient to split the expression for society's welfare loss for both periods into two parts, so as to distinguish the *intratemporal* from the *intertemporal* component:

$$V^D = L_{\text{intra}}^D \times L_{\text{inter}}^D \times \Psi^2 \tag{5a}$$

where $\Psi \equiv (1+R)g_1^* + g_2^*$.

The intratemporal loss factor, L_{intra}^D, represents the distribution of distortions under discretion over the various available instruments within each period and therefore corresponds to the result that would be obtained in a simple one-shot game. The intertemporal loss factor, L_{inter}^D, stems from the distribution of distortions across both periods and thus depends on the rate of time preference, as measured by the effective discount factor ρ^D. These losses can be written as (see Appendix A for the details of the computations):

$$L_{\text{intra}}^D = \frac{s_\pi s_x s_g \Xi}{2\Omega^2} \tag{5b}$$

$$L_{\text{inter}}^{D} = \frac{\rho + \left(\rho^{D}\right)^{2}}{\left[1 + \rho^{D}\left(1 + R\right)\right]^{2}} \tag{5c}$$

It can be checked that both loss factors exceed the corresponding ones under commitment provided that $\beta > 0$ (see Appendix A and Appendix B). This results both from the well-known incentive facing decisionmakers to employ inflation surprises for alleviating distortions and from the suboptimal intertemporal distribution of losses, as will be shown below. It is worth noting, however, that the commitment problem does not arise any longer in the case of a totally inefficient tax collection system because of corruption (i.e. $\beta = 0$). As public spending could no longer be financed by regular taxes in such an extreme case, fiscal policy would be set only on the basis of the (natural) output target, thereby keeping the output gap at zero (i.e. $\tau_t = x_t = 0$). The incentive to resort to unanticipated inflation for stimulating economic activity would then be eliminated and monetary policy would be determined according to the tradeoff between the price stability objective and the benefits of inflation in terms of seigniorage revenues. Consequently, the commitment and discretionary solutions coincide at $\beta = 0$ in this model.

Also note that corruption unambiguously harms social welfare under commitment, in contrast with the discretionary regime on which we focus here. As pointed out by Huang and Wei (2006), lower institutional quality (i.e. a decrease in the value of β) leads to a higher equilibrium inflation rate under commitment to compensate for the lost revenue, and correspondingly to additional intratemporal losses, whereas the intertemporal loss factor remains unchanged in the dynamic version of the model (see Appendix B).

4. CAN WEAK PUBLIC GOVERNANCE BOOST ECONOMIC ACTIVITY?

This section explores the conditions under which weak public institutions and low fiscal capacity can boost employment and reduce the intratemporal welfare loss. For the moment we do not discuss the game dynamics created by debt accumulation. The consequences of corruption for the equilibrium amount of public debt and the intertemporal loss factor will be examined in the next section.

According to (5b), the impact of a change in β on intratemporal losses is given by:

$$\frac{\partial L^{D}_{\text{intra}}}{\partial \beta} = \frac{\beta s_{\pi}^{2} s_{x} s_{g}^{2}\left[\left(s_{x}-s_{\pi}\right)\left(s_{x}+\beta^{2} s_{g}\right)-\left(1+\beta\right)\left(1+2\beta\right) s_{x} s_{g}\right]}{\Omega^{3}} \tag{6}$$

Furthermore, as the intratemporal component (5b) corresponds to the loss value in a game without public debt (i.e. $d_1 = 0$), the effects of corruption on inflation and the output tax rate at any period t ($t = 1, 2$) are given by the following partial derivatives (see Appendix A):

$$\frac{\partial \pi_{t}}{\partial \beta} = \frac{s_{\pi} s_{x} s_{g} g_{t}^{*}\left[s_{x}-\beta\left(2+\beta\right) s_{g}\right]}{\Omega^{2}} \tag{7}$$

$$\frac{\partial \tau_{t}}{\partial \beta} = \frac{s_{\pi} s_{g} g_{t}^{*}\left[s_{x}\left(s_{\pi}+s_{g}\right)-\beta^{2} s_{\pi} s_{g}\right]}{\Omega^{2}} \tag{8}$$

The partial derivative of the intratemporal welfare loss component with respect to the fiscal capacity index (see (6)) allows us to formulate the first proposition below:

Proposition 1. If the policymaker puts a large weight on output but attaches little importance to the price stability and public expenditure objectives, more corruption leads to a decrease in intratemporal welfare losses.

Proof. $\partial L^{D}_{\text{intra}} / \partial \beta > 0$ when $s_x \to 1$ and $s_{\pi},\ s_{g} \to 0$. ■

This first result derives from the fact that corruption raises the cost of collecting revenue. All other things being equal, the corporate tax rate needed to supply a given amount of public goods goes up with the degree of leakage of public funds, hence a rise in the cost sustained by society in terms of foregone output and employment. Therefore, if the objective of stabilizing output around its natural level prevails over price stability and public goods provision, the optimal policy reaction to a worsening in institutional quality (i.e. a lower value of β) is to reduce distortionary taxation (see (8): $\partial \tau_t / \partial \beta > 0$ for $s_x \to 1$ and s_π, $s_g \to 0$). So the effect of an escalation of corruption on activity is positive in that case (i.e. $\partial x_t / \partial \beta < 0$). But this does not necessarily mean a shift of the revenue collection from regular tax to inflation tax. Actually, as can be seen from (7), when the policymaker primarily penalizes output deviations, the discretionary equilibrium inflation rate falls as well ($\partial \pi_t / \partial \beta > 0$ if $s_x \to 1$ and $s_g \to 0$), because the gain due to a higher output level lessens the temptation to generate unexpected monetary shocks. Thus, a rise in corruption, although always implying a fall in public expenditure (see Appendix A: $\partial g_t / \partial \beta > 0$), can eventually improve the intratemporal distribution of distortionary losses through its impact on both monetary and fiscal policy choices.

The alleviation of the credibility problem of monetary policy by the development of corruption is a noticeable and interesting feature. This stems from the fact that the worsening of some problems within an economic system already facing other inefficiencies can theoretically raise welfare because all these distortions tend to offset one another in the aggregate. In the present model, the "monetary distortion" due to excessive inflation originating in the lack of commitment turns out to be balanced by the "institutional distortion" created by the erosion of the government's ability to collect revenue through formal tax channels. From the standpoint of a government that is much more concerned with output

fluctuations than with price stability or public goods provision, an increment in the level of tax leakage can help to deal with commitment problems because the optimal response then consists in cutting the tax rate, which boosts employment and lessens the incentive to create surprise inflation, hence lower intratemporal losses.

The effect of corruption, however, appears to be very dependent on the values of the various weight parameters in (3). In a general way, the above result no longer holds with a government that does not heavily penalize output deviations. To see this, let us examine the polynomial of degree two in β in square brackets in the numerator of the partial derivative (6). Leaving aside the trivial case $\beta = 0$, the first-order condition $\partial L^D_{\text{intra}} / \partial \beta = 0$ is satisfied if:

$$-\left(s_\pi + s_x\right) s_g \beta^2 - 3 s_x s_g \beta + s_x \left(s_x - s_\pi - s_g\right) = 0 \tag{9}$$

The discriminant Δ of this polynomial in β equals $9 s_x^2 s_g^2 + 4 s_x s_g \left(s_\pi + s_x\right)\left(s_x - s_\pi - s_g\right)$. A sufficient condition to have $\Delta > 0$ is $s_x > s_\pi + s_g$, which holds only if the government attaches enough importance to its output objective. In that case, the two real roots are $\beta_1 = \frac{\left(\sqrt{\Delta} - 3 s_x s_g\right)}{2\left(s_\pi + s_x\right) s_g}$ and $\beta_2 = -\frac{\left(\sqrt{\Delta} + 3 s_x s_g\right)}{2\left(s_\pi + s_x\right) s_g}$. The latter must be ignored for $\sqrt{\Delta} > 0$ since $\beta \geq 0$ by assumption, whereas the former lies within the range $[0, 1]$ if $3 s_x s_g \leq \sqrt{\Delta} \leq 2 s_\pi s_g + 5 s_x s_g$. Accordingly, a rise in the corruption level exerts damaging effects (i.e. $\partial L^D_{\text{intra}} / \partial \beta < 0$) if $\frac{\left(\sqrt{\Delta} - 3 s_x s_g\right)}{2\left(s_\pi + s_x\right) s_g} < \beta \leq 1$ but is welfare-improving (i.e. $\partial L^D_{\text{intra}} / \partial \beta > 0$) if $0 \leq \beta < \frac{\left(\sqrt{\Delta} - 3 s_x s_g\right)}{2\left(s_\pi + s_x\right) s_g}$. The intratemporal loss, however, is continuously increasing in β over the entire interval $[0, 1]$ for sufficiently large values of s_x such that $\beta_1 > 1$, implying that more corruption is beneficial in that case.[6] As aforementioned, the welfare-improving impact of weak public governance as regards the

[6]. This is for instance the case when $s_x = 0.8$ and $s_\pi = s_g = 0.1$ in (3).

intratemporal component results from both lower inflation and higher output in equilibrium. But deterioration in institutional quality is likely to make a country worse off if the authorities do not place as large a weight on output, since a greater level of corruption then involves raising either the tax rate or the inflation rate to compensate for the lost revenue.[7]

In particular, it is worth considering the case $0 < \beta_1 < 1$, as it means that corruption, when starting from a low level (i.e. $\beta \approx 1$), initially harms welfare, but exerts a beneficial effect afterwards, once the leakage of tax revenue passes a certain threshold (i.e. $\beta < \beta_1$). Thus, from the policymaker's standpoint, the incentive to struggle against corruption and promote better governance might depend on the scale of the problem. According to the model, there is a reason to fight corruption as long as the perceived quality of institutions remains relatively high. On the other hand, if there already is a massive leakage of tax revenue owing to institutional failure, the authorities might no longer be inclined to devote effort to improving public governance.

As an illustration, consider the case with $s_\pi = 0.3$, $s_x = 0.6$ and $s_g = 0.1$: for this set of values, despite the higher weight on the output gap relative to the price stability and government spending objectives, the intratemporal loss function admits a maximum at $\beta \approx 0.53$. Therefore, for a very high initial quality of institutions (i.e. $\beta \approx 1$), a rise in corruption at first causes additional welfare losses on account of the drop in public spending. If the decline in β continues, corruption begins to exert a positive effect once the leakage of tax revenue roughly exceeds 50%, because the gain resulting from lower inflation and higher output then covers the cost caused by the fall in public expenditure. Thus, within this modeling framework, countries experiencing severe governance problems may no longer

[7]. As an example, corruption worsens welfare if the three objectives are weighted equally in the quadratic loss function (i.e. $s_\pi = s_x = s_g = \frac{1}{3}$).

have interest in seriously tackling the corruption issue beyond some point, which well corresponds to the poor-institution trap put forward by Huang and Wei (2006). However, whereas such a phenomenon is explained by the cost of anti-corruption measures in their analysis, the present paper emphasizes the potential positive role of weak public governance as an institutional failure likely to offset other distortions and to eventually reduce intratemporal losses.

5. DOES CORRUPTION YIELD EXCESSIVE DEBT ACCUMULATION?

This section investigates the consequences of malfunctioning institutions for the intertemporal distribution of distortions across the two periods of the game and the conditions under which corruption might again exert a positive effect on welfare. The first step consists in examining the impact of a change in the value of the fiscal capacity index on the equilibrium amount of debt, which is given by $\partial d_1^D/\partial\beta = \partial d_1^D/\partial\rho^D \times \partial\rho^D/\partial\beta$. It follows from the results of Section 3 that:

$$\frac{\partial d_1^D}{\partial \rho^D} = -\frac{\Psi}{\left[1+\rho^D(1+R)\right]^2} \tag{10}$$

$$\frac{\partial \rho^D}{\partial \beta} = \frac{\rho(1+R)s_x s_g\left[(1+2\beta)s_\pi\left(s_x+\beta^2 s_g\right)+(1+\beta)s_g\left[(1+\beta)s_x-2\beta^2 s_\pi\right]\right]}{\Omega^2} \tag{11}$$

These two partial derivatives allow us to formulate Proposition 2:

Proposition 2. Corruption boosts the accumulation of public debt when the policymaker assigns more importance to the output objective than to price stability.

Proof. $\partial d_1^D/\partial\rho^D < 0$ in any case and $\partial\rho^D/\partial\beta > 0$ when $s_x \to 1$ and $s_\pi \to 0$. In consequence, $\partial d_1^D/\partial\beta < 0$ if $s_x \to 1$ and $s_\pi \to 0$. ■

The explanation of the result stated in Proposition 2 is very simple. In this model, corruption raises the shadow price of collecting regular taxes relative to collecting seigniorage revenues, which leads the government to review the way of financing public expenditure (that is, the split between seigniorage, taxation and borrowing). As seen before, a rise in corruption involves lowering the tax and inflation rates if priority is given to output stabilization (i.e. if $s_x \to 1$ and $s_\pi,\ s_g \to 0$), so the first-period policymaker borrows more to compensate for the lost revenue.

The model implies that the amount of public debt is likely to be larger in nations where the problems of bad governance, poor economic management and corruption are more severe. This, indeed, is what is observed empirically. According to the Transparency International index measuring the level of corruption, many of the countries facing the greatest challenges as regards weak public governance and corruption are also ranked among the poorest and the most highly indebted in the world.[8]

Let us now consider the consequences of corruption for the intertemporal loss factor. It follows from (5c) that:

$$\frac{\partial L^D_{\text{inter}}}{\partial \rho^D} = \frac{2\rho(1+R)(\Xi-\Omega)}{\Omega\left[1+\rho^D(1+R)\right]^3} \tag{12}$$

By making use of (11) and (12), we can establish Proposition 3:

Proposition 3. More corruption leads to lower intertemporal welfare losses by boosting public debt accumulation when the government is "weight-liberal" and cares more about output deviations than it does about price stability.

[8]. By making use of the same index, Ciocchini, Durbin and Ng (2003) find that the emerging economies that are perceived as more corrupt must pay a higher risk premium when issuing bonds, and so that corruption significantly impacts borrowing costs for governments and firms in emerging markets.

Proof. Note that $\partial L^D_{\text{inter}}/\partial\beta = \partial L^D_{\text{inter}}/\partial\rho^D \times \partial\rho^D/\partial\beta$ and $\Xi > \Omega$ as long as $\beta > 0$. Hence, according to (12), $\partial L^D_{\text{inter}}/\partial\rho^D > 0 \ \forall \ \beta > 0$. Moreover, $\partial\rho^D/\partial\beta > 0$ if $s_x \to 1$ and $s_\pi \to 0$, as seen from (11). Therefore, $\partial L^D_{\text{inter}}/\partial\beta > 0 \ \forall \ \beta > 0$ when $s_x \to 1$ and $s_\pi \to 0$. ■

Proposition 3 seems counterintuitive at first sight, for it suggests that more debt should be issued for improving welfare, but it draws its theoretical rationale from the inflationary bias associated with discretionary monetary policy. Note that the positive sign of $\partial L^D_{\text{inter}}/\partial\rho^D$ as long as there is not a complete leakage of tax revenue (i.e. $\beta > 0$) means that the stock of public debt carried over from the first period into the second is inefficiently low in the discretionary equilibrium, since a smaller value of the effective discount factor, and thus a larger amount of debt (see (10)), would entail a decrease in the intertemporal loss component. As already shown by Beetsma and Bovenberg (1997), if inflation expectations in the first period are predetermined from the standpoint of the government when setting debt policy, expectations in the second period, in contrast, are endogenous and not yet determined. The government then is induced to employ debt policy strategically in order to influence second-period inflation expectations, and so future economic performance. The lack of commitment makes that long-term inflation expectations are too high from an *ex ante* perspective. Therefore, the policymaker can alleviate the long-run inflationary bias by issuing less debt: as the distortionary tax rate needed to meet future debt payment obligations will be lower, the incentive to engage in a surprise monetary expansion will be lessened as well, hence a lower equilibrium rate of inflation in the second period of the game. Such a strategic behavior is formally captured in the model by the ratio Ξ/Ω in the expression for the effective discount factor ρ^D. The presence of this ratio raises the second-period costs of additional debt and thereby constitutes a credibility effect: given that $\Xi > \Omega \ \forall \ \beta > 0$, the effective discount

factor is higher and, correspondingly, public debt is lower under discretion than under commitment (see Section 3, footnote 5).

Nonetheless, the problem here is that the trade-off between the cost of additional distortions in the first period and the gain in the credibility of monetary policy in the second period is suboptimal and leads to an equilibrium debt stock that is too low compared to the benchmark solution. This is because the government is induced to rely more heavily on first-period financing in the form of unanticipated inflation in order to build up public assets. As such an incentive is correctly anticipated by the private sector, the discretionary regime is characterized by an asset bias (Beetsma and Bovenberg, 1997). Accordingly, a rise in corruption (i.e. $\beta \to 0$) makes it possible to reduce the asset bias by pushing debt accumulation in the direction of its second best, and thereby exerts a welfare-improving effect once again.

It should nevertheless be stressed that this beneficial effect requires the policymaker's subjective rate of time preference and that of society not to differ too much from each other. In fact, in a slightly different model with a myopic government, in the sense that it focuses more on short-term performance because its discount factor is lower than that of society, possibly owing to political instability or a high probability of being voted out of office, one could have $\partial L^D_{\text{inter}} / \partial \rho^D < 0$. In that case, as a decrease in ρ^D would cause larger intertemporal losses, the equilibrium debt stock would turn out to be too large instead of too small. More corruption would then be damaging since a fall in β would exacerbate the initial debt bias.

6. CONCLUDING REMARKS

This paper has explored the impact of institutional quality on welfare in a simple two-period setup with time inconsistency. Our main finding is that corruption can, in theory, make a

country better off if its government is unable to make binding commitments and assigns a larger weight on output stabilization than on the other objectives.

Admittedly, the case for a positive effect of corruption as regards the intertemporal distribution of distortions looks quite implausible, given it presupposes an inefficiently low debt level that hardly fits empirical observation in less developed nations. Nevertheless, it is worth noting that the overall impact of corruption might still be positive in a country suffering from excessive debt because led by a short-termist decisionmaker whose preferences differ from those of society. In our study, this theoretically requires the gain resulting from lower intratemporal distortions to outweigh the higher intertemporal loss caused by the rise in public debt. Whether the net impact will be positive or not depends on the discount factor and the weight parameters in the policymaker's quadratic loss function.

More broadly, the paper supports the view that the degree of anti-inflationary credibility could be an important factor in the fight against corruption. A policymaker who is able to commit always has an interest in fighting corruption. On the other hand, the motivation to really tackle this challenge may be questioned under discretion. We think the uncertainty regarding the potential effect of reforms intended to strengthen institutions might partly explain why the issue of bad governance and its associated problems of corruption and political instability remain more prevalent in countries lacking credibility. Hence, the present analysis reinforces the possibility of a poor-institution trap highlighted by Huang and Wei (2006), but without modeling the disutility of the effort aimed at improving institutional quality.

A number of further extensions are possible to this model. One of these would be to introduce decentralized policymaking with an independent central bank to explicitly take into account the strategic interactions between players endowed with heterogeneous preferences.

This would make it possible to explore the consequences of corruption for debt accumulation and welfare according to the cooperative or non-cooperative nature of the policy game.

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