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**INTERNATIONAL FISCAL POLICY  
AND FEDERALISM**

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## **International fiscal policy and federalism**

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## I SECTION

1. Traditionally in the quarters of the International Institutions assisting the countries asking for financial and economic aids, the idea of responsible fiscal policy has been associated with centralised Governments. Supposedly, they are more capable than the decentralised ones, of controlling public sector deficits and expenditures and the aggregate revenues of “general government”.<sup>1</sup>

International Institutions, as the International Monetary Fund and the World Bank, for their programs of adjustment, conditioning their financial assistance, normally dialogue with Central Governments and provide funds to them, even when their destination is in favour of peripheral regions. It is implicitly or explicitly assumed that central governments, institutionally, are the proper interlocutors of the International Agencies even when lower level Governments, because of their nature, could be involved in the distribution of the interventions. A similar attitude appears to be common also in the aids’ policies of the Governments of the developed countries for less developed countries. The former, as condition for debt relief policies, currently requires the central governments of the latter to show given performances of public services and investments in the sectors of health and education, thus implicitly considering these Governments as the right responsible for the accomplishment of tasks, where a fair distribution on the territory should be crucially important. One may argue that this explicit or implicit preference to the “elites” running centralised Governments, by part of the International Institutions and of the industrialised countries providing financial assistance and economic and social aid, is one of the most relevant explanation of the lack of regional autonomy and of grass roots democracy in the, now called, two-third countries.

2. Some recent policy changes by the International Institutions, however, signal a new attention to the instances of regional autonomy in the two-third countries. Thus, the International Monetary Fund in July 2000 has agreed to deliver a first share of 400,000 USD of a facility of 5,000,000 USD to Indonesia, in connection with a program of institutional changes that shall give considerable fiscal autonomy to the Provinces, to satisfy some of their requests of self government to which the highly centralised Indonesian regime so far, has resisted. It is assumed that these reforms shall have an important role in restoring peace and public order in the Indonesian islands, other than Java, increasingly unhappy of their lack of autonomy and tired of being exploited by their central governments and the interest groups surrounding it. The peripheral provinces claim that if their financial resources were not drawn in favour of Jakarta and absorbed by the central governments could have created widespread local growth and employment opportunities, while avoiding an uneconomical and unsound congestion in the area of the capital town.<sup>2</sup>

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<sup>1</sup> As it is known, this expression refers to the consolidated accounts of the public budgets and of budget entities at the various levels of Government.

<sup>2</sup> On the opposite, in the central governments and in the quarters of the Central Bank, fears have been expressed, that a great fiscal autonomy of the local governments might cause an unduly increase of public expenditure and of deficits, through a double source of causal factors. It is argued that the local governments, seeing new flows of revenues may be tempted to make new debts to finance initiatives that are impatient to be undertaken. And central governments’ may not downsize their spending in proportion to the reduction of their means. Obviously fiscal federalism may incur in these dangers. But there are institutional brakes taking care of them, as the Stability Pact, stipulated for the deficits and debts of both the central governments and local governments, to which the central governments of States member

3. Provided that these new fiscal institutions shall develop in practice, new opportunities shall arise for the International Organisations providing financial support to two-third countries as for the *decentralised policies* of financial aids. Decentralisation of development projects, together with privatisation, may be part of structural reforms to reduce the interference in the economy of the central governments, as well as to increase the democratic controls and to diminish the level of corruption.

However, according to recent studies (Paldam, 2000) there is a strong correlation between level of corruption and “transition” from poor countries to higher income-level countries, through economic development.<sup>3</sup> Indeed, in the economic literature, there is an increasing agreement that corruption is one of the most relevant hindrances to efficient public expenditure, to business investments and to economic growth (Paldam,2000<sup>4</sup>). It is also argued that public sector investments are inflated by corruption, at expense of other public expenditures that perhaps should have priority, as those in the area of health and education (Tanzi, 1999).

The image of misallocation of resources and wastes connected with the corruption of politicians and public officials projects a sort of negative multiplier effect on the foreign policies to support economic and human growth of two-third countries. Thus the public opinion in developed countries is reluctant to devote resources to financial assistance to the developing countries, in so far as they may be wasted by corruption. Federalism and decentralised international financial aid, we argue, may be a mean of reducing corruption.

This view is not always supported by empirical evidence on developed countries. Corruption, according to some findings related to US, appears greater at the regional level (Fisman, R. and Gatti, R., 1999). However, provided that the provincial dimension, with its narrowness, increases these collusive relations, it seems also true that the narrow circles of power of a provincial setting are more easily controllable than the ramified power connections of a big Government.

The empirical evidence that corruption is bigger at the States level, is drawn, for US, by showing that the rate of crimes of corruption, in recent years, appears greater for the State Governments than to the Federal Government. However, the number of crimes of corruption that emerge at a local level does not necessarily bear a uniform relation with the crimes committed and it may well be that at the local level the control of corruption is more efficient than at the federal level, for the very reasons given above. But even if these data were able to proof that corruption is greater for the regional Governments than for the central governments one, there is no evidence that corruption is greater under a federal system than in a centralised

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of the European Monetary Union are constrained. Moreover, the IMF appears to condition the trances of its financial facility to Indonesia to similar constraints. The application of this kind of Pact to the local governments implies some reduction of their *autonomy*. But this is only a limitation of the *new* fiscal federalism. Institutional constraints to deficits and debts of the local governments are normally set in the fiscal constitutions of a Federal State.

<sup>3</sup> The corruption of the Centralised Government under the 32 years of the political authoritarian regime of Suharto, now under trial, by the new Indonesian regime, following last year elections of a national assembly that democratically chose the new president of the Republic, does not appear to be an isolated case in the TT countries.

<sup>4</sup> See also Borner, Brunetti, Weder (1995), Mauro (1997); IBRD, (1997).

one. *Corruption, we argue, is less effective under the plurality of Governments of a Federal System than under the “monopoly- Government” of a centralist system*, even if in the first case may be lower for the central governments than for the local governments. And indeed, as it will be explained below, drawing from the theory of competition by information and from the theory of clubs, in a Federal State, there are reasons, regarding the different degree of competitiveness in the provision of their services, that tend to reduce corruption more at the local level than at central level (see below)

4. In a previous paper (Fedeli and Forte 2000), we have shown that as for the public co financing funds of private structural projects also financed with private investments, with a given location under budgetary constraints, the level of corruption tends to be higher when the allocation of funds is done at the central government level than when it is performed at a lower level by Regional Governments. The assumption of that model, meant to mimic the European Union system of allocation of public funds, was that the aggregate number of projects asking for co financing was the same, in the two hypotheses. Yet, given that the number of projects competing for the public cofinancing was smaller in each allocation-game under the decentralised choice system (because each Government considers only projects located in its territory), under the assumption that the bribes paid by the private sector to get public co-financing are function of the maximum amount of co-financing for each project entitled to public funds, the equilibrium level of corruption results higher when only one Governments allocates the resources among all the projects.

Let us now consider the incidence of corruption for international financing of projects of economic and social development with central or with central and regional governments of a two-third country

## II SECTION

1. We borrow from the already mentioned Fedeli and Forte (2000) model<sup>5</sup> and depict the basic framework of the public-financing game in both the centralised and decentralised contexts as follows.

We assume that either a central or two regional governments can allocate public resources amongst 4 private project’s proposals (two for each region), which have been previously selected. The projects’ realisation is assumed to be financed with resources *jointly* coming from the international institution and from internal funds (say, coming from taxation) of the country in question, both considered exogenous.

The players and the international institution co-financing the projects have the same evaluation of them,  $V(Q_i)$ , with  $Q_i$  denoting the units of project  $i$ . Yet in the absence of the international financial aids, the public and the private sector of the country considered could not realise the projects until the social optimum. For the sake of simplicity, we assume that each project lasts one period.

The total cost of project  $i$  is represented by

$$TC(Q_i) = c_i Q_i \quad i=1, \dots, 4 \tag{1}$$

where, the marginal cost  $c_i$  has been assumed constant and the fixed cost is zero<sup>6</sup>.

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<sup>5</sup> This is based on Nikaido and Isoda (1955) and further application to the economic analysis of public bureaucracies such as, for example, Miller (1977), in Fedeli (1999) and Fedeli and Santoni (2000).

The International Institution can choose two alternative types of “regimes” for allocating resources, one is a single “club” managed at the central government, CG, level; the other regime consists of two separate “clubs” constituted by the Regional governments, RG, (see below). In both cases, we assume that each private agent  $i$ , who gets the project selected, will choose the share of resources actually devoted to the project and, hence, his margin of profits: these shares shall be determined endogenously by the negotiation with the government in charge for the allocation of public funds. Therefore, they shall be affected by the amount of public funds available and – possibly – by the different (central or local) decision-making regime (see below).

2. Now we consider the two regimes of public financing:

(i) When politicians at the CG level allocate  $R$  (i.e., their own public resources<sup>7</sup> and those coming from the International Institution) to finance four private projects, they choose- from their objective function’s point of view (see below) - the optimal share of  $R$  to be given to each project. Thus the share of  $R$  for project  $i$ ,  $f_i^F$ , is endogenous<sup>8</sup> and determined so as to maximise CG’s payoff<sup>9</sup>. Under this regime, the amount of public funds potentially available for project  $i$  is  $R$  and  $f_i^F R$  is the amount of resources the CG devotes to project  $i$ . The private agent  $i$  replies to  $f_i^F$  by deciding the share  $s_i^F$  of  $f_i^F R$  to actually devote to project  $i$  to maximises  $i$ ’s objective function (see below).

We now express  $V(Q_i)$  in terms of the choice variables of the public and the private sectors. Recall that when the CG allocates the resources amongst the 4 projects, it decides on 4 choice’s variables  $f_i^F$  ( $i=1,..,4$ ), whereas each of the 4 private agents chooses his own  $s_i^F$  ( $i=1,..,4$ ). By using the cost function and knowing that the actual amount of public resources  $R$  devoted to  $i$  is given by  $(s_i^F f_i^F R)$ , we can write  $CT_i = (s_i^F f_i^F R)$ , for  $i=1,..,4$ , from which  $Q_i = \frac{s_i^F f_i^F R}{c_i}$ . In so doing each unit of project incorporates its own costs and is expressed in terms of the resources invested and the strategic variables.

We further assume that the evaluation of each project is represented by a logarithmic function as follows:<sup>10</sup>

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<sup>6</sup> The assumption of zero fixed costs does not alter the qualitative results of the model as well as the assumption of increasing marginal costs.

<sup>7</sup> Recall that the internal public resources, either central or local, are assumed to come from taxation and are exogenously given.

<sup>8</sup> We shall only look at the interior solutions under the constraint  $R \geq \sum_{i=1}^4 f_i^F R$ . In so doing, we exclude that the amount of the public resources allocated is higher than the public resources available.

<sup>9</sup> Notice that, in this paper, the use of the terms “government”, “ruling politicians”, “politicians in charge”, is interchangeable.

<sup>10</sup> In the absence of interdependencies amongst project, the results would not change with a different functional form.

$$FV_i(s_i^F, f_i^F) = \ln(\beta_i) + \alpha_i \ln Q_i = \ln(\beta_i) + \alpha_i \ln \left[ \frac{s_i^F f_i^F R}{c_i} \right] \quad i=1,..4 \quad (2)$$

where we have denoted the evaluation functions of each project  $i=1,..4$  incorporating the costs and expressed in terms of the strategic variables as  $FV_i(s_i^F, f_i^F)$  to indicate the game under the CG allocative choice. The arguments shall be omitted when no ambiguity arises.

(ii) An analogous formulation is done when the International institution decides that two RG are in charge for the choice of public financing. However, in this case we assume that the previously pooled resources  $R$  are split into 2 parts:  $(1-K)R$  is the budget of the RGA and  $KR$  is the budget of RGB, with  $0 < K < 1$ .<sup>11</sup> On this basis each RG allocates its own resources between the 2 project under its own jurisdiction. As mentioned the evaluation function of each project is the same. Now, however, the amount of  $R$  potentially available for project  $i$  under the jurisdiction A is  $f_i^A R(1-K)$ , whereas the amount of  $R$  potentially available for project  $j$  under the jurisdiction B is  $f_j^B RK$ . On this basis the private agents,  $i$  (under A) and  $j$  (under B), choose their strategic variables  $s_i^A$  and  $s_j^B$  respectively.

The public and private returns to each project  $i$  in jurisdiction A are the following:

$$R^A V_i(f_i^A, s_i^A) = \ln(\beta_i) + \alpha_i \ln Q_i = \ln(\beta_i) + \alpha_i \ln \left[ \frac{s_i^A f_i^A (1-K)R}{c_i} \right] \quad i=1,2 \quad (3)$$

since in A,  $Q_i = \frac{s_i^A f_i^A (1-K)R}{c_i}$ . An analogous representation can be done for B.

3. We now consider the objective function of each player.

### Private agents' objective function

The private agents are assumed to choose the share of resources to devote to the projects that maximises the sum of their evaluation of production at the minimum costs plus a margin of profit (negotiated with the government) defined by the share of public resources not devoted to the project. These shares are endogenous and determined by the negotiation between the private agent and the government allocating  $R$ . The criteria of selection of the projects are not modelled here. Given the different amounts of resources available to CG and to each RG, we need to formulate the payoff of each private agent under either regime. They are as follows:

(i) Under the CG regime

$$FP_i = FV + (1 - s_i^F) f_i^F R \quad i=1,..4 \quad (4)$$

(ii) Under the RG regime

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<sup>11</sup>  $K$  has not been thought of as a distributive parameter. It is used to ease comparisons between the RG and the CG regimes: This is done by leaving the total resources for A plus the resources for B sum up to  $R$ , with  $R$  taken as exogenous.

$$RP_i^A = R^A V + (1 - s_i^A) f_i^A (1 - K) R \quad i=1,2 \quad (5)$$

$$RP_i^B = R^B V + (1 - s_i^B) f_i^A K R \quad i=3,4 \quad (6)$$

where the amount  $(1 - s_i^F) f_i^F R$  represents the margin of profits for the private agent  $i$  (in this case, dealing with RG) from project  $i$ .

4. Because of two alternative regimes for deciding the extent of public co-financing of private project are considered here (the first is managed by the RG who chooses how to allocate the full amount of  $R$  amongst the 4 project; the second is managed by each RG, who chooses how to allocate its own share of  $R$  - that is  $(1-K)R$  and  $KR$ , respectively for RGA and RGB - between two project), we now specify the objective functions of the politicians in each regime in turn.

#### Central government payoff:

We represent the payoff for the politicians in charge at the CG<sup>12</sup> level as follows:

$$FG = w \sum_{i=1}^4 FV_i + (1 - w) R (1 - \sum_{i=1}^4 (1 - s_i^F) f_i^F) + E[bribe]^F \quad (7)$$

where  $\sum_{i=1}^4 FV_i$  is the aggregate evaluation of the 4 projects by the CG as defined in (2).

$R(1 - \sum_{i=1}^4 (1 - s_i^F) f_i^F)$  represents the difference between the full resources and the profits of the private agents.  $w$  and  $(1-w)$  are the weight given by the CG to the production and to private profits.  $(1-w)$  might also represent the central government's contracting power with the firms.

The term  $E[bribe]^F$  indicates the expected gains from corruption for the CG, that is

$$E[bribe]^F = pR \left[ \sum_{i=1}^4 Z_i (1 - \sum_{j \neq i} f_j^F) \right] + (1 - p)R \left[ \sum_{i=1}^4 Z_i (1 - \sum_{j \neq i} f_j^F) - H \sum_{i=1}^4 Z_i (1 - \sum_{j \neq i} f_j^F) \right] > 0, \quad (8)$$

where  $f_i^F$  is the share of the  $R$  which finances project  $i$ :  $p$  is the probability of not being discovered;  $0 < Z_i < 1$  is the exogenous parameter determining the amount of the bribe (or the politicians propensity to corruption (see below)) as a proportion of the maximum amount of  $R$  that can be devoted to project  $i$ , i.e.,  $[(1 - \sum_{j \neq i} f_j^F) R]$ ;

$(1-p)$  is the probability of being discovered having taken the bribes and

<sup>12</sup> Actually, the payoffs of the governments depicted here are intended to represent the payoff of the politicians belonging to the government in charge. The ruling politicians are assumed to be motivated by the pursue of their own interests, which might correspond to social welfare to the extent to which the social welfare guarantees the international aids. For this reason they positively evaluate the production (i.e., the constraint imposed by the international organisation).



$\left[ \sum_{i=1}^4 Z_i (1 - \sum_{j \neq i} f_j^F) R - H \sum_{i=1}^4 Z_i (1 - \sum_{j \neq i} f_j^F) R \right]$  is the total amount of the bribes obtainable by the ruling

politicians net of the monetary penalty (the penal rate H is proportional to the bribe) for having taken the bribe.

$E[bribe]^F = 0$  when the CG does not illegally divert R, otherwise it is assumed greater than zero (i.e., notwithstanding the penalty and the probability of being discovered, taking bribes is profitable for the government). Ruling politicians shall be assumed to be risk and ethically neutral to corruption.

### Regional governments payoff:

In a similar manner, we represent the payoff for the RGA, the politicians in charge in region A:

$$RG^A = w \sum_{i=1}^2 R^A V_i + (1-w)(1-K)R \left( 1 - \sum_{i=1}^2 (1-s_i^A) f_i^A \right) + E[bribe]^A \quad i,j=1,2 \quad (9)$$

whereas, the payoff for the ruling politicians of region B is

$$RG^B = w \sum_{i=3}^4 R^B V_i + (1-w)K R \left( 1 - \sum_{i=3}^4 (1-s_i^B) f_i^B \right) + E[bribe]^B \quad i,j=3,4 \quad (10)$$

where in (9) and (10), respectively, the terms indicating the expected gains from bribe for government A and government B are defined as follows:

$$E[bribe]^A = pR(1-K) \left[ \sum_{i=1}^2 Z_i (1 - f_j^A) \right] + (1-p)R(1-K) \left[ \sum_{i=1}^2 Z_i (1 - f_j^A) - H \sum_{i=1}^2 Z_i (1 - f_j^A) \right] > 0 \quad (11)$$

$j \neq i; i = 1,2$

$$E[bribe]^B = pR K \left[ \sum_{i=3}^4 Z_i (1 - f_j^B) \right] + (1-p)R K \left[ \sum_{i=3}^4 Z_i (1 - f_j^B) - H \sum_{i=3}^4 Z_i (1 - f_j^B) \right] \quad (12)$$

$j \neq i; i = 3,4$

Thus, the RG payoffs are formally similar to that of the CG. However, now each RG allocates only its own share of resources to financing the two projects under its jurisdiction. Thus, say RGA chooses  $f_1^A$  and  $f_2^A$  over a budget of  $(1-K)R$ . Whereas RGB chooses  $f_3^B$  and  $f_4^B$  over a budget of  $KR$ . We assume that  $w$  is the same at each level government: i.e., they give to the production the same relevance as the CG. For  $Z_i=Z$  and  $f_i^A = f^A$ , the term which would distinguish, say, the RGA payoff with corruption from RGA payoff in the absence of corruption is  $E[bribe]^A = 2Z(1-K)R [1 - H(1-p)][1 - f^A] > 0$ . Moreover,

notice that, with respect to the centralised regime, if it would be optimal for either government to allocate the full amount of R, then  $E[bribe]^F = E[bribe]^A + E[bribe]^B$ .

### 5. Invariance of the results under the central and the regional governments' regimes without corruption

In the absence of corruption, when, in the equations (7), (9) and (10), the terms defined, respectively, in equation (8), (11), and (12) are equal to zero, it can be shown that, notwithstanding that the public resources available under the CG regime, have been split into two parts by a parameter K, the aggregate regional results are invariant to the level of government deciding the resources allocation, because of the assumptions of independence between the projects (the proof is similar to Fedeli and Forte (2000) and it is not reported here).

The invariance of the results is not maintained with corruption

### 6. Central government regime with corruption

When CG chooses the amount of co-financing we have 5 players: the 4 private agents maximise their payoffs as from (4) with respect to  $s_i^F$ ,  $i=1, \dots, 4$  and CG maximises its payoff from (7), thus choosing  $f_i^F$ ,  $i=1, \dots, 4$ . Setting the first order conditions equal to zero and solving for the choice variables, the reaction functions are the following:

$$f_i^F(\mathcal{RC}) = \frac{w a_i}{R[(1-w)(1-s_i^F) + 3Z(1-H(1-p))]} \quad i=1, \dots, 4 \quad (13)$$

$$s_i^F(\mathcal{RC}) = \frac{a_i}{f_i^F R} \quad i=1, \dots, 4 \quad (14)$$

where  $\mathcal{RC}$  indicates the reaction functions of the players with corruption.

By solving the system given by the 8 reaction functions in equation (13) and (14) we get the interior equilibrium values of the public and private agents' strategic variables in the public financing game.<sup>13</sup> They are the following:

$$\tilde{f}_i^F = \frac{a_i}{R[1-w + 3Z(1-H(1-p))]} \quad (15)$$

$$\tilde{s}_i^F = [1-w + 3Z(1-H(1-p))] \quad (16)$$

thus,  $R\tilde{f}_i^F = \frac{a_i}{[1-w + 3Z(1-H(1-p))]}$  is the equilibrium amount of public funds financing project  $i$  in case of corruption and  $R\tilde{s}_i^F \tilde{f}_i^F = a_i$  is the equilibrium amount of public resources directly devoted to project  $i$  in case of corruption.

<sup>13</sup> The superscript  $\cup$  indicates the equilibrium values in the presence of corruption.

Notice that with respect to the absence of corruption (or  $Z=0$ ) the public-financing of project  $i$  is reduced because, under corruption, the denominator of (15) is higher of an amount equal to  $3Z(1-H(1-p))$ . The private agent's reaction to the reduced public financing, with respect to the absence of corruption, is in the direction of increasing the share of resources directly devoted to the project, for an amount equal to  $3Z(1-H(1-p))$ . This means that the reduction of  $R$  available to the projects, once absorbed by the bribes, is balanced by the reduction of private profits to keep the required level of production. Therefore, with respect to the CG regime in the absence of corruption, the realisation of each project is paid by the private sector as for the illegal amount of resources drained by CG.<sup>14</sup>

Notice that  $R \tilde{f}_i^F (1 - \tilde{s}_i^F) = \frac{a_i [w - 3Z(1-H(1-p))]}{[1-w + 3Z(1-H(1-p))]}$  are the equilibrium profits for firm  $i$ <sup>15</sup>.

With respect to the absence of corruption the private sector suffers always for reduction of profits. Moreover, since the reduction of profits under corruption is affected by both the contracting power of the government with the private sector and the share of resources it diverts as bribe, for some values of  $3Z(1-H(1-p))$  and of  $w$  the private sector might even end up with negative profits (see below).

By substituting back (15) and (16) for  $i=1, \dots, 4$  into equations (7) and (4) we get the equilibrium values for the players' payoffs

$$\tilde{FGC} = R[4Z(1-H(1-p)) + 1 - w] + w[4 \ln a_0 + \sum_{i=1}^4 a_i \ln(a_i / c_i) - \sum_{i=1}^4 a_i] \quad (17)$$

$$\tilde{FP}_i^C = \frac{(1-w)[\ln a_0 + a_i \ln(a_i / c_i)] + wa_i + 3Z(1-H(1-p))[\ln a_0 + a_i \ln(a_i / c_i) - a_i]}{[3Z(1-H(1-p)) + (1-w)]} \quad (18)$$

for  $i=1, \dots, 4$

Moreover, the equilibrium amount of bribe is equal to

$$E[bribe]^F = \frac{Z[1-H(1-p)] \left\{ 4R[3Z(1-H(1-p)) + (1-w)] - 3 \sum_{i=1}^4 a_i \right\}}{[3Z(1-H(1-p)) + (1-w)]} \quad (19)$$

## 7. Regional governments regime with corruption

Recall that now we have 6 players split into two separate games: two private agents in A and two in B, each maximising his own payoff as from (5) and (6) with respect to  $s_i^A$ ,  $i=1,2$  and to  $s_i^B$ ,  $i=3,4$ ; the RGA

<sup>14</sup> For  $n$  indistinguishable private agents, the term related to the bribe would be  $(n-1)Z[1-H(1-p)]$

<sup>15</sup> With  $Z=0$  they would be equal to  $R \frac{a_i w}{1-w}$ .

maximising its payoff from (9), thus choosing  $f_i^A$ ,  $i=1,2$ , and the RGB maximising its payoff from (10), thus choosing  $f_i^B$ ,  $i=3,4$ . The reaction functions for the players in region A are the following

$$f_i^A(\mathcal{RC}) = \frac{w a_i}{(1-K)R[(1-w)(1-s_i^F) + Z(1-H(1-p))]} \quad i=1,2 \quad (20)$$

$$s_i^A(\mathcal{RC}) = \frac{a_i}{f_i^F(1-K)R} \quad i=1,2 \quad (21)$$

where, as before,  $\mathcal{RC}$  indicates the reaction functions in the presence of corruption.

By solving the system given by the 4 reaction functions in equations (20) and (21) we get the interior equilibrium values of the public resources employed in co-financing game in region A.

$$\tilde{f}_i^A = \frac{a_i}{(1-K)R[1-w + Z(1-H(1-p))]} \quad (22)$$

$$\tilde{s}_i^A = [1-w + Z(1-H(1-p))] \quad (23)$$

from which,  $R(1-K)\tilde{f}_i^A = \frac{a_i}{[1-w + Z(1-H(1-p))]}$  is the equilibrium amount of public-financing for  $i$ ,

whereas  $R(1-K)\tilde{s}_i^A\tilde{f}_i^A = a_i$  is the equilibrium amount of resources devoted to project  $i$  in region A. The regional results go in the same direction of the CG's regime with respect to the absence of corruption (i.e.,  $Z=0$ ) given that corruption reduces the amount of public financing of project  $i$  by the RG at expenses of the private profits. However, the reduction of the public resources directly employed by the regional governments because of corruption is lower than under a corrupted CG, as well as lower is the social cost for taxpayers (see below).

By substituting back (22) and (23) for  $i=1,2$  into equations (9) and (5) we get the equilibrium values for the players' payoffs, which are

$$\tilde{RG}^A C = (1-K)R[2Z(1-H(1-p)) + (1-w)] + w[\sum_{i=1}^2 a_i \ln(a_i/c_i) + 2 \ln a_0 - \sum_{i=1}^2 a_i] \quad (24)$$

$$\tilde{RP}_i^A C = \frac{(1-w)[\ln a_0 + a_i \ln(a_i/c_i)] + w a_i + Z(1-H(1-p))[\ln a_0 + a_i \ln(a_i/c_i) - a_i]}{[Z(1-H(1-p)) + (1-w)]} \quad (25)$$

As before, other than the redistribution of funds and the players' payoff, we also evaluate the equilibrium bribe in regions A:

$$E[bribe]^A = \frac{Z[1-H(1-p)] \left\{ 2(1-K)R[Z(1-H(1-p))+(1-w)] - \sum_{i=1}^2 a_i \right\}}{[Z(1-H(1-p))+(1-w)]} \quad (26)$$

By substituting (1-K) with K, we get the corresponding results for the RGB, on which basis, we evaluate the equilibrium aggregate regional payoff and corruption.

$$\tilde{R}G^A C + \tilde{R}G^B C = R[2Z(1-H(1-p))+(1-w)] + w \left[ \sum_{i=1}^4 a_i \ln(a_i / c_i) + 4 \ln a_0 - \sum_{i=1}^4 a_i \right] \quad (27)$$

$$E[bribe]^A + E[bribe]^B = \frac{Z[1-H(1-p)] \left\{ 2R[Z(1-H(1-p))+(1-w)] - \sum_{i=1}^4 a_i \right\}}{[Z(1-H(1-p))+(1-w)]} \quad (28)$$

## 8. Comparisons of the two regimes of co-financing under corruption

We analyse how corruption affects the resources allocation of a centralised government as compared with a decentralised one. In the absence of corruption the aggregate results are invariant to the degree of (de) centralisation. With corruption the two games (centralised and decentralised) give different results. The differences do not depend on the amount of resources available to each regional government, but on the aggregate equilibrium level of the bribes, which is positively affected by the number of private competitors that can be exploited by each government, when deciding the allocation of public funds.

Consider first the private sector decisions under either (corrupted) regime. With respect to the cases of absence of corruption ( $Z=0$ ), the equilibrium share of resources chosen for each project is affected by the amount of bribe. The differences in the two values – cf. equations (16) and (23) – are mainly due to the number of projects of private competitors for public funds, which, in turn, affects the bribe kept by the governments. Increasing the number of project facing each government affects the private choice as follows: The higher the number projects (as it is at the central level) the higher the share of resources that each private agent directly employs into his own project, the lower the equilibrium margin of private sector projects.

$$\tilde{s}_i^F - \tilde{s}_i^A = 2Z[1-H(1-p)] > 0$$

On the other side, the differences in governments' decisions are partially affected by the parameter K, which distributes the public resources between the two regions. Thus comparing CG with RGA choices (equations (15) and (22)), in the extreme case of  $K=0$ , we get:

$$R(\tilde{f}_i^F - \tilde{f}_i^A) = - \frac{a_i 2Z(1-H(1-p))}{R[1-w+Z(1-H(1-p))][1-w+3Z(1-H(1-p))]} < 0 \quad (29)$$

i.e., if all the public resources go to region A, still choosing the allocation over only two projects, the difference would be negative since  $\tilde{f}_i^F - \tilde{f}_i^A < 0$  if  $Z(1-H(1-p)) > 0$  since the denominator of (15) is greater than that of (22). This means that RGA allocating the same amount of resources than the central government

between only two projects instead of four gives to each private agent a higher amount of public funds than the CG. Notice that this effect is only due to the bribe paid and neither to the evaluation of the projects nor to their costs.

Combining the above effects, we obtain the following results

**Proposition 1**

*In both the centralised and decentralised regimes, corrupted politicians determine, with respect to the absence of corruption, a reduction of the share of public funds invested in each private project, another part being captured by them. To counter balance the reduced share of public funds, the private resources directly invested in the same project shall increase, thus satisfying the production constraint imposed by the international organisation. In other words, what is kept by the politicians as bribe is paid by the reduction of profits of the private sector.*

*Moreover, in a centralised regime of public-financing, the size of corruption is higher than its counterpart in a decentralised regime. Thus the reduction of private profits suffered by the private sector is lower with decentralisation.*

Comparing the CG payoff and the aggregate RGs payoff, for any value of K, it turns out that

$$\check{FG} - (\check{RG}^A + \check{RG}^B) = 2RZ(1 - H(1 - p)) > 0$$

i.e., the difference is always positive when corruption is profitable and only determined by the amount of the bribe. Thus a corrupted CG gains from the bribe more than two local governments and, from the politicians’ point of view, a centralised mechanism for allocating resources is preferred.

The results of this section can be summarised as follows.

**Proposition 2**

*The effects of corruption in the two regimes are strictly dependent on the leverage effects of competition: The higher the number of projects in the game amongst the private agents aiming at getting the public co-financing, the higher the amount of the bribes.*

*Under our assumption about the central and local government (distinguished by the different amount of resources for a different amount of competitors, ceteris paribus), a corrupted central government diverts a higher amount of international and internal funds than two corrupted regional governments financing separately the same projects with the same (aggregate) amount of public funds.*

**9. The choice of institution by the international organisation**

If the private firms cannot recover their profits - for example, by deteriorating the quality of the projects or by inflating costs because the considered products are capital goods relating to their private firms- then, the whole (industrial, agricultural, services) development program may collapse in spite of the international financial efforts. Actually a relation has been found between increase of corruption and reduction of private initiative in developing countries(Shang-Jn Wey 2000)<sup>16</sup> For this reason it seems reasonable to assume that the International institution shall consider - as a likely “payoff” to evaluate the performance of the different regimes - the aggregate payoffs of the private agents. Therefore,

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<sup>16</sup> The research of Shang Jn Wei does not distinguish between investements that take advantage of particular financial benefits given to them as incentive from the others.

(i) under the CG regime the International organisation shall refer to the equilibrium value of

$$\sum_{i=1}^4 FP_i \quad (30)$$

as resulting from equation (4), whereas

(ii) under the RG regime, it shall refer to

$$\sum_{i=1}^2 RP_i^A + \sum_{i=3}^4 RP_i^B \quad (31)$$

as resulting from (5) and (6)

That is, other than the production level obtained (which result to be the same in either regime), it seems to us a reason for international aids can be found in the private profits considered as the incentive to economic development and growth.

Under this assumption, using (18) and (25) then comparing the results it is easy to show that

$$\sum_{i=1}^4 \check{FP}_i < \sum_{i=1}^2 \check{RP}_i^A + \sum_{i=3}^4 \check{RP}_i^B \quad 17$$

Thus the choice of the international organisation should be oriented towards a decentralised regime.

### **Firms' profits, competition and corruption in two-third countries with financial incentives**

10. To conclude this section, we need to confront our results about the relations between competition among the private firms and corruption with those in the literature. The relations between competition and corruption have been studied from different points of view. A quite standard argument is that bribes are more difficult where competition prevails either amongst public officials<sup>18</sup> or amongst private agents. As for the latter, on which we have focused until now, the standard approach to corruption has argued that increasing competition may be a way to reduce the returns from corrupt activities. The basic idea is that in a perfect competitive market (which implies no-profits from which to pay the bribe) no bribes can occur.<sup>19</sup> A slightly different approach develops a compensation theory<sup>20</sup> as in Ades and Di Tella (1999), who use an

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<sup>17</sup> Indeed, notice that the difference between the private agent payoffs, for all K, under the two regimes is the following:

$$\check{FP}_i C - \check{RP}_i C = \frac{a_i Z(1 - H(1 - p))}{[3Z(1 - H(1 - p)) + (1 - w)][Z(1 - H(1 - p)) + (1 - w)]}$$

That is exactly the difference in the size of profits.

<sup>18</sup> See Rose-Ackerman (1978).

<sup>19</sup> This theory is based on the assumption that no firm have rents unless monopolistic conditions; further that the bribe are paid with the rents and that public authorities cannot create rents unless creating monopolies.

<sup>20</sup> See, for example, Becker and Stigler (1974).

efficiency wage model of corruption to focus on the effects of rents on wage contracts and the equilibrium level of bribe.<sup>21</sup>

Finally Bliss and di Tella (1997).<sup>22</sup> show that increasing competition among the private agents might not lower corruption, but rather increase it: their result depends on the structure of uncertainty about costs faced by the corrupt officials, who act as single principal facing a different number of potential agents. Our reasoning is in a sense similar, because we consider a single principals dealing with a fewer or a greater number of competing agents, but our results are stronger: We show a unambiguous increase of the amount of graft depending on the leverage effect of competing projects on the (*ex-ante*) amount of resources actually available to politicians (which result to be different at local and central level). Possibly this results holds true because our model neither fits the definition of perfect competitive (only private) market nor we try to prove the *inherent virtue* of the competition itself, which makes corruption disappear.<sup>23</sup> Recall, in fact, that (i) the State intervention plus the international aid here have been justified because the scarcity of resources available in the market economy private sector. Moreover, (ii) when the “social optimum” requires the public financing, in the absence of corruption no-beneficial effects of exogenous competition<sup>24</sup> do appear (here the centralised and the (aggregate) decentralised results are invariant). On this basis, adding to the model the changes in public choices related to endogenously determined corruption, we have shown that exogenous change in the number of competing projects favours corrupt politicians as “consumers” of the bribes as well as in the standard market economy a shift to a more competitive situation on the supply side increases the consumer’s surplus.

11. In the case of competing private agents producing public goods as those in the area of public works or supply of current public services (of transportation, health-care and so on), whenever the private firms see their profits reduced by the bribe, they are likely to try to recover them by reducing the quality of the output or (and) by increasing ex post the costs, alleging unexpected factors. The corrupted Governments

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<sup>21</sup> The effect of competition on corruption is ambiguous in their model. They show that “less competition means bureaucrats can extract more rents from the firm they control” (p.991). Still, notwithstanding the result that low competition implies high rents for the firms: if public officials keep some control rights over them, they might have the incentive to increase the required bribe: e.g, rents might foster slack. Nevertheless, high rents might induce the public to rewrite bureaucrats’ contracts, which in turn determines the equilibrium amount of bribes. Thus it might well happen that less competition implies less corruption. In other words this result means that since it is also more valuable for the public to avoid corruption and, thus, it is more likely to try to control bureaucrats. This in turn, implies that “policies aimed at making markets more competitive could play a role in controlling corruption” (p.992)

<sup>22</sup> By considering how corruption affects the free-entry equilibrium by means of a model where both the equilibrium number of firms and the level of graft are endogenously determined by other *deeper* competition parameters (as affecting profits in any firm, as lowering overhead costs relative to profits and as less dispersing overhead costs), they state that, in spite of the expectations of the beneficial effects of competition on reducing corruption, “countries that have increases levels of competition in the economy have sometimes experienced upsurges in corruption.” (p.1001)

<sup>23</sup> Taking the extreme consequence of this view, one could even affirm that, in a perfect competitive corrupt market, the private agents pay the bribe to get nothing back.

<sup>24</sup> In our model the extent of competition is clearly exogenous, as it is given by the exogenously taken number of projects selected for the centralised and decentralised public co-financing.



may be aware of these attitude to lower qualities and/or to unjustified increases of costs, however they cannot but accept them because accomplices.

### SECTION III

1. Until now we have considered the perverse results of competition among the private agents, assuming no competition on the (public) principals' side, all of them having the same propensity to corruption (as given by the parameter  $Z$  in equation (8), (11) and (12)). However, with a multiplicity of government-clubs, it is likely that some have less (or no propensities to corruption) than others.

Considering this effects for the private sector operating in a decentralised regime, when each regional government shows its own attitude to corruption likely different from that of the other – as represented by  $Z^A$  and  $Z^B$  in region A and B, respectively – the equilibrium payoffs for the private agents operating in the 2 different regions became

$$\tilde{R}P_i^A C = \frac{(1-w)[\ln a_0 + a_i \ln(a_i / c_i)] + wa_i + Z^A(1-H(1-p))[\ln a_0 + a_i \ln(a_i / c_i) - a_i]}{[Z^A(1-H(1-p)) + (1-w)]} \quad (25A)$$

for  $i=1,2$

$$\tilde{R}P_i^B C = \frac{(1-w)[\ln a_0 + a_i \ln(a_i / c_i)] + wa_i + Z^B(1-H(1-p))[\ln a_0 + a_i \ln(a_i / c_i) - a_i]}{[Z^B(1-H(1-p)) + (1-w)]} \quad (25B)$$

for  $i=3,4$

Thus, assuming  $a_i = a$  for all  $i$  and comparing (25A) and (25B) it turns out that

$$\tilde{R}P_i^A C - \tilde{R}P_i^B C = \frac{a(Z^B - Z^A)(1-H(1-p))}{[Z^A(1-H(1-p)) + (1-w)][Z^B(1-H(1-p)) + (1-w)]} > 0 \text{ if } Z^A < Z^B$$

That is, as expected, a private agent dealing with a corrupted government gets a higher payoff (because of higher profits) the lower the government's propensity to corruption.

2. Therefore a multiplicity of Governments might act in the sense of inducing *actual competition* among the various Governments where the firms may become contractors. In the stylised model presented in Section II, where every Government has a definite propensity to corruption, the firms competing for a contract by a Government, have either to accept to “pay” a given bribe or “leave”. Now, with a multiplicity of Governments acting as competing clubs,<sup>25</sup> with different propensities to corruption, firms unwilling to pay a

<sup>25</sup> On the “clubs theory” the seminal paper is BUCHANAN 1965.. Assume a world in which it is possible to develop a multiplicity of Governments, which each person may become member of or sort out from, as in *clubs*.

Then any member of a given “club”, if his preferences are frustrated or has to undergo “excessive payments” to benefit others, may move to other clubs, to get better conditions. Presumably the clubs losing members shall try to improve their behaviour to avoid further defections. If they do not succeed, the average amount per head of frustrations and exploitations shall be reduced, because the better performing clubs have increased their membership while those badly performing have undergone an equivalent loss. Thus the *actual competition* among the Governments may improve the aggregate Governments' performances. If, in addition to the “regional clubs” there is a “central”

bribe may try to compete for contracts with other Governments. Thus, they shall likely produce the public goods at lower costs and with better qualities getting the same profits. And if one assumes that these different performances can be known, it seems reasonable to assume that some RG, having otherwise a pronounced preference for corruption, shall behave as “honest” principals because fear the negative consequences of being discovered: the comparison of the performance of each region, by part of the international organisation, should allow the disclosure of the illegal practice. The International Institutions, seeing the poor results in the supply of public goods in some region, may deny to them the financial aid that otherwise would have given, whereas competing Governments, showing higher performances might get more funds. On the other hand, firms that like to maximize their profits in a system with corruption, if dealing with Governments behaving honestly shall be able to compete for their contracts only if they are efficient enough. Thus only the “efficient” firms, behaving honestly (but not necessarily honest by inclination), shall compete for the contracts offered by the honestly behaving Governments. And, on the demand and supply side of the contracts, the most efficient should prevail, either because originally “honest” or because constrained by the competition to behave honestly.

3. Let us assume now that the projects financed by public funds are private projects of a market economy. As we have seen, in the model of section II, under corruption, profits of the private firms are reduced, the more the higher are the bribes. Under the current assumption of Governments as competing “clubs”, with some Government that behaves with a lower propensity to corruption, the private projects shall be allowed for higher rates of profits. Thus, private investments of firms interested in profit maximisation by ordinary market rules, shall flow to the areas where Governments act honestly. Firms who are prepared to maximise profits via corruption, if are efficient shall also prefer to address their investments to these areas. And their Governments shall have better results than those with higher propensity to corruption.

4. These considerations suggest a further argument in favour of competition among governments that consists of the possibility for the electorate of comparing the performances of different Governments<sup>26</sup>, to judge the one where they vote. This is actually a straightforward extension of the literature on federalism in terms of *informational competition theory* (see SALMON, 1993)

The relevance of this peculiar kind of competition by information has been stressed to overcome the objection that actual competition implies *mobility* and the “horizontal” competition for membership among RG clubs implies *mobility costs*. The “vertical” mobility between one of the RG clubs and the CG,

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club, whose services may increase or diminish, as a consequence of a diminution or increase of those exerted by the regional clubs, one may show that this competition shall particularly act to improve the central government behaviour. For a brief exposition of this model and the relevant literature see FORTE (2000)CH XXVII, Part II

<sup>26</sup> Note that, for several sectors of public activity, these comparison of governments’ performances may be done both among the various RG and between the CG and any of the RG. The related information costs may be lower for the comparison between any RG and the CG than for that among the various RG, because every person is *inside* the jurisdiction of the CG and that of a RG while is outside those of the other RG.

implying a shift of functions among them, on the same territory,<sup>27</sup> does not require that mobility. Thus one may argue that also the actual *competition* in addition to the informational *competition* must be stronger between the CG and all RG than that among these latter, where it is limited by mobility costs.

5. Thus the “clubs” model may be applied to the International Institutions (co)financing investment projects in a developing country with a decentralised system of Government. The CG and the RG governments may be viewed by the International Institution as alternative clubs in which it may enter to get the public service of delivering finance for initiatives in private or public goods. In the case that we are considering here of International institution financing development programs in a given country, with a multiplicity of Governments, the obstacle of mobility is a minimum, CG and the “clubs” of the different RG always are able to compete on each regional jurisdiction. Therefore in case of a project extended on the entire territory of the considered developing country, the choice of the international Institution may be done among:

- i) assigning the entire project to the CG
- ii) dividing the project in regional components assigning to each RG the part referring to its jurisdiction.
- iii) assigning to CG only the regional parts of the project that some RG do not seem apt to administer.
- iv) assigning to the CG the “national” component of the project while splitting the regional component among the various RG (except for those who are unable to perform satisfactorily)

The competition that may develop between the CG “club” and the RG “clubs”-playing with all these possibilities- may become substantial in reducing corruption and promoting efficient projects’ realisation. This “clubs” competition, as noted, is limited to the vertical relation between central and the regional Governments. A public work or an economic development project with a territorial dimension cannot be assigned to Regional authorities different from those of the RG having jurisdiction on that territory. However the International Institutions may have a multiplicity of projects of social and economic growth, in different areas of the country, that might be considered eligible, for their financing, in excess to the funds available. The decisive criterion of selection may be the capability of the clubs, i. e., the RG competing for the assignment of the projects to perform the task efficiently.

6. In essence a multiple Government structure, as that made possible through promoting fiscal federalism may perform, for “non market” activities as those of co financing growth projects in developing countries, as a “quasi-market”. The efficient cost of realisation of a contract of procurement of public goods of a given (observable) quality is likely to emerge, under a plurality of Governments with mobility of firms competing for the contracts, as if market operators were playing on the demand and on the supply side. A similar result is impossible if there is only a Government. It is true that a price competition may be generated here too through bidding. But corruption may blur the results of bidding. And if there is only “one club”, there is no way to know, by comparison, whether the prices resulting from bidding and their subsequent variations,

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<sup>27</sup> For instance the construction of regional highways or water infrastructures.

by the contractual clauses regarding new unforeseen events and cost adjustments justified by inflation, are similar to those that would emerge in a competitive market.

7. It must be noted however that the “club” model presented here implies some requisites, that one may trace back to that theory. In the first place, the RG must enjoy *a real autonomy* from the CG. Otherwise, while the appearance might be that of a multiplicity of clubs, the reality is that of many sections of the same club. Needless to say this “independence” requisite implies a widespread democratic setting. RG must be chosen (by the assembly elected) by their regional constituency, while the CG shall be democratically chosen directly or indirectly by all the electors of the Country.<sup>28</sup>

A second requisite it is that of *high transparency*. Clubs cannot compete under a non transparent situation. Obviously this requisite may appear too exacting if referred to common electors, because the contracts that we are considering are inherently complex. But the high transparency requisite here required is needed for two specialised information flows:

i) that with the firms, to enable them to compare and to choose the different clubs with whom to ask for contracting;

ii) and that with the International Institution providing the funds to enable it to play its “clubs” strategy with the various Governments, as for the administration and allocation of its funds.

A third requisite is that *there should not be artificial barrier to the movement* of the firms asking to be contractors, from the various clubs: RG should not discriminate in favour of local firms, nor the CG should discriminate against those of some regions or in favour of a close number of firms and the like.

A fourth requisite is that the “clubs” shall have an administrative structure and the technical capability adequate to the supply of the required services. Regions should be broad enough to internalise the most concentrated spillovers of the considered projects and should have the skills to properly organise the competitive offer and to manage the execution of the contracts relating to these projects, interfacing with skilled firms. International institutions, then, should assist and support Central Government institutions in a devolution that, respecting cultural and ethnical differences and political realities, aims at developing a system of broad-jurisdiction RG, with a transparent, non discriminatory setting. Providing them with technical assistance for their development policies, International Institutions shall also be able to assure uniformity of contracting rules and “competitive clubs” conditions.

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<sup>28</sup> It seems impossible to have an authoritarian Central Government while the Regions have a democratic setting. The case of Hong Kong with China is odd: only Hong Kong has a democratic system, based on election, inherited from its past situation. All the other Regions of China have an authoritarian system of Government, under the party control, as the Central Government.

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