EXTERNALITIES, INCENTIVES AND FAILURE TO ACHIEVE
NATIONAL OBJECTIVES IN DECENTRALIZED ECONOMIES

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ABSTRACT

The purpose of this paper is to study why decentralized
economies often fail to achieve national objective in the
presence of externalities. The paper employs a two-period, open
economy framework in which the central government allocates its
tax revenues among a larger number of individual decision makers
(e.g., provincial authorities or managers of state enterprises).
The central government has only limited monitoring capacity,
which gives individual decision makers the opportunity to commit
to spend more than the incomes they are officially allocated.
Our analysis suggests that adverse macroeconomic shocks reduce
the likelihood that decentralized decision makers will behave in
a manner that limits spending and inflation to national
objectives. This is demonstrated for declines in the current or
expected future levels of domestic output, for a rise in foreign
interest rates, and for a reduction in the quantity of external
credit. We next demonstrate that debt relief can promote a shift
in the composition of spending toward the types of productive
investments that generate positive externalities. This is not
only because debt relief that expands the availability of current
resources has positive direct income effects, but also because
debt relief can promote a shift from opportunistic behavior to
cooperation among individual decision makers.

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I.   Introduction

In advanced and developing economies alike, failure to achieve national economic objectives can often be attributed to two common factors. Failure to hold down inflation rates usually reflects excessive aggregate spending and monetization, whereas failure to achieve adequate real economic growth rates frequently reflects an insufficient allocation of spending toward investment in productive assets. Although countries differ widely in their access to international credit markets, which affects their vulnerability to inflation and stagnation, the roots of their macroeconomic problems are similar.

One approach to controlling the level and composition of aggregate spending is to rely on central planning. The relatively slow economic development that centrally planned economies have experienced over the past several decades, however, suggests that decentralized decision making has clear advantages in exploiting available information to allocate resources toward activities that promote economic growth.

If central planning is rejected, the achievement of national objectives for inflation and economic growth depends on the ability of the authorities to find effective indirect methods for making the incentives of individual decision makers consistent with these objectives. In this regard, one deficiency of traditional macroeconomic analysis is its lack of microfoundations that pay adequate attention to the inflation and growth externalities associated with spending decisions in a decentralized economy. While decentralization and the introduction of market price systems can lead to substantial gains in the efficiency of resource allocation, a major risk is that central control may be lost at the macroeconomic level.   The

stabilization problems that emerged in China during the latter 1980s, for example, testify to the difficulties that can arise when provincial authorities, rather than the central government, have effective control over credit expansion and tax collection. 1/ Another important illustration of the risks associated with decentralization is provided by the experience that preceded the creation of the central banking system in the United States. 2/

These perspectives argue for a schizophrenic attitude toward decentralization--advocating it at the microeconomic level while opposing it at the macroeconomic level. 3/ This message happens to be particularly relevant to countries that are now undertaking the transformation from central planning systems to decentralized market economies.

To contribute to a better understanding of why decentralized economies often fail to achieve national objectives in the presence of externalities, this paper employs a framework in which the central government allocates its tax revenues among a large number of individual decision makers (e.g., provincial authorities or managers of state enterprises). The central government has only limited monitoring capacity, which gives individual decision makers the opportunity to commit to spend more than the incomes they are officially allocated. We assume that spending in excess of allocations fuels inflation. Cooperation to limit aggregate spending to the

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1/ See Blejer et al. (1991) and McKinnon (1990).
2/ See Friedman and Schwartz (1963).
3/ Such an attitude is exemplified by Milton Friedman (1948). While being the champion of the free market economy, he also advocated "reform of the monetary and banking system to eliminate both the private creation or destruction of money and discretionary control of the quantity of money by the central bank authority."

central government's tax revenues--and, thus, to keep inflation consistent with national objectives--only occurs when no decision maker can increase his expected utility by moving away from the cooperative solution.

We focus on a simple two-period framework that allows us to address the determinants of cooperation in a dynamic context (Section II). It is well recognized that cooperative behavior can be promoted by imposing direct penalties on decision makers who behave opportunistically. In addition, our analysis suggests that adverse macroeconomic shocks reduce the likelihood that decentralized decision makers will behave in a manner that limits spending and inflation to national objectives. This is demonstrated for declines in the current or expected future levels of domestic output, for a rise in foreign interest rates, and for a reduction in the quantity of external credit. We next introduce the objective of economic growth and demonstrate that debt relief can promote a shift in the composition of spending toward the types of productive investments that generate positive externalities (Section III). This is not only because debt relief that expands the availability of current resources has positive direct income effects, but also because debt relief can promote a shift from opportunistic behavior to cooperation. Concluding remarks, with a conjecture on the more general applicability of the analysis, are presented in Section IV.

III. Some Determinants of Cooperation

We focus on a two period example of a country composed of a central government and a large number of provinces or state enterprises, each having

a degree of fiscal autonomy. 1/ At the beginning of the first period the
central government allocates a budget to each province. The central
government has only limited monitoring capacity, and each province may
commit for spending that exceeds the official allocation. Spending in
excess of allocations fuels inflation and precludes the achievement of
national objectives. Thus, the achievement of cooperative behavior
consistent with national objectives in the presence of externalities is
inherently a problem of overcoming "coordination failure." 2/

Formulated in this way, the model focuses directly on the inflationary
consequences of "soft budget constraints," which have received considerable
attention in discussions of reforming previously centrally planned
economies, 3/ but which also exist in advanced economies. 4/ We will
demonstrate that adverse macroeconomic shocks increase the likelihood of

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1/ Examples in which the decision makers are regional authorities or
managers of state enterprises are particularly relevant for understanding
sources of inflationary pressures in the economies of Eastern Europe, the
U.S.S.R., and China. Problems of coordination failure among regional
governments are pervasive in those economies, as are problems associated
with the soft budget constraints of state enterprises.

2/ On coordination problems in the context of fiscal policies, see
Alesina and Tabellini (1987). On coordination and seignorage, see
Aizenman (1989a) and Aizenman and Isard (1990). On the role of the
political economy in stabilization and inflation, see Alesina and Drazen
(1989), Cukierman, Edwards, and Tabellini (1989) and Bruno (1989).

3/ See, for example, Kornai (1979, 1986), who coined the term "soft
budget constraint" in reference to situations where the financial losses of
enterprises are routinely covered by subsidies, tax concessions, or bail-out
credits from the state.

4/ Banks and other financial institutions whose deposits are insured by
the government, or other firms regarded as too large to be allowed to fail,
are examples of decision makers with some scope to spend more than they can
finance individually, and to pass the "bill" for their excess spending to
the government (or to society at large). By contrast, the credit lines of
most households and small firms are limited to amounts that normally can be
repaid by selling assets owned by the borrower.

spending in excess of budget allocations--and hence reduce the feasibility of cooperation--by raising the benefits associated with opportunistic behavior. We show this for domestic shocks, like a drop in the present or the anticipated future level of output, and for external shocks, like a higher foreign interest rate or a tighter external credit ceiling.

We assume that overspending during the first period is detected at the end of the period, when the central government infers the actual spending of all provinces and resorts to inflationary finance to cover any excessive spending. This case corresponds, for example, to a country where the central government lacks the capacity to adjust taxes in response to the deficit, and uses inflationary finance as the only means available at the margin to finance expenditure. 1/ The system of inflationary finance may involve various monetary schemes. For example, the exchange rate may be pegged in the first period, with the inflation generated by a devaluation that links the second period price level to the degree of overspending by the local governments.

One well known mechanism for promoting cooperative behavior is to impose future penalties on decision makers who choose to behave opportunistically. We incorporate this mechanism by hypothesizing that the decision maker faces uncertainty regarding his survival in the second

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1/ This example should be viewed as a reduced form, summarizing a complex political and institutional background. Implicitly we assume that the central government chooses to honor the commitments of the local government, funding them by using the inflation tax instead of by imposing fiscal austerity in the second period. These assumptions seem to fit well countries with weak central governments (for a study that exemplifies these considerations for Yugoslavia, see Borio (1990)). To some extent, as we discuss in the concluding section, they have general relevance for all countries.

period, which the central government has some leverage in determining.   In particular, we assume that the probability of survival is adversely affected by the amount of overspending in the first period.

The utility of the local decision maker, conditional on survival, is given by

(1) $U_{i;1} + \rho \, U_{i;2}$

where ρ is the rate of time preference and $U_{i;t}$ is the periodic utility.   We assume $U_{i;1} = U(G_{i;1})$, $U_{i;2} = U(G_{i;2}, \pi)$ where π is the rate of inflation between the two periods, $U_G' > 0$, $U_G'' < 0$, $U_\pi' < 0$, and $U_\pi'' < 0$.   Tax collections are a uniform fraction θ of the GNP, such that

(2) $T_t = \theta \sum_i Y_{i;t}$

where $Y_{i;t}$ is the GNP of province i in period t.   Due to restrictions on capital mobility, only the central government has access to the international capital market, with its borrowing limited to F at an interest rate i^*.   At the beginning of period t (t=1,2) the central government allocates revenues to the provinces in the amounts

(3) $G_{i;1}^p = (T_1 + F)/n, \; G_{i;2}^p = [T_2 - (1+i^*)F]/n$

The realized spending by province i in the first period is given by

(4) $G_{i;1} = G_{i;1}^p + \epsilon_{i;1}$

where $\epsilon_{i;1}$ measures its excess spending.   At the end of the period the excess spending is detected.   We assume that the survival probability of the policy maker in province i can be represented as $p_i = p(\epsilon_{i;1})$ with $p' < 0$

and p" < 0. The central government finances the aggregate overspending by resorting to the inflation tax, such that

(5) $\pi = \pi(\Sigma_i \epsilon_{i;1})$, with $\pi' > 0$.

We turn now to characterize the problem facing the local policy maker in province i, who maximizes his expected utility:

(6) $U_{i;1} + p_i \rho U_{i;2}$.

We proceed by identifying the properties of the equilibrium, assuming the number of provinces is sufficiently large that each decision maker takes the behavior of others as given. To simplify, we assume that all the provinces are alike. The cooperative equilibrium is characterized by the adherence of all policy makers to their budget constraint, yielding an expected utility for decision maker i of

(7) $V^C = U^C_{i;1} + p(0)\rho U^C_{i;2}$,

where $U^C_{i;1} = U(G^p_{i;1})$; $U^C_{i;2} = U(G^p_{i;2}, \pi^C)$ for $\pi^C = \pi(0)$. Here, π^C is the inflation rate that policy maker i expects to prevail, conditional on cooperation.

Starting from the cooperative equilibrium as a benchmark, if policy maker i behaves opportunistically, he will choose the value of $\epsilon_{i;1}$ that maximizes his expected utility (6). We denote this value by $\epsilon^o_{i;1}$. The condition characterizing his opportunistic behavior is thus:

$$(8) \quad \frac{\partial U_{i;1}}{\partial G_{i;1}} = \rho \left\{ U_{i;2}[- \frac{\partial p}{\partial \epsilon_{i;1}}] + p_i[-\frac{\partial U_{i;2}}{\partial \pi}] \pi' \right\}$$

The left hand side of (8) is the marginal benefit from higher fiscal
spending associated with non-cooperation. The right hand side is the
marginal cost, which reflects both the lower probability of survival and the
higher expected future inflation. The determination of $\epsilon^O_{1;1}$ is summarized
in Figure 1, where curves MB and MC characterize the marginal benefit and
marginal cost of first-period fiscal consumption--the left and right hand
sides of (8)--as functions of $\epsilon_{i;1}$. Opportunistic behavior is associated
with higher current fiscal expenditure (relative to the cooperative
equilibrium) and with a lower weight attached to the future, due to a lower
probability of survival. The expected utility associated with non-
cooperative behavior, denoted by V^N, is given by

(9) $V^N = U^N_{1;1} + p^N_1 \rho U^N_{1;2}$,

where $U^N_{1;1} = U(G_{i;1}); U^N_{1;2} = U(G_{i;2}, \pi^N)$ for $\pi^N = \pi(\epsilon^O_{1;1})$ and $p^N_1 = p(\epsilon^O_{1;1})$.

The feasibility of achieving the cooperative outcome in a decentralized
economy (where we take all decision makers to be alike) depends on the
relative magnitudes of V^C and V^N. If $V^N - V^C > 0$, the individual decision
maker has a temptation to behave opportunistically since, if he were the
only one to move away from the cooperative equilibrium, his expected utility
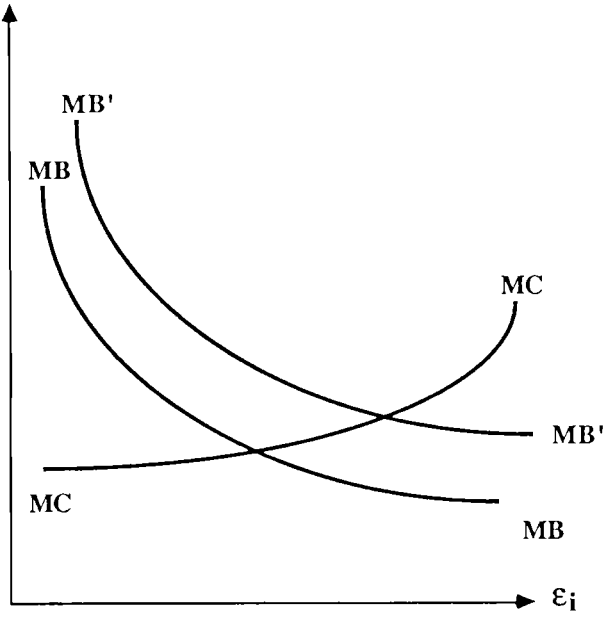would increase. Thus, cooperation will occur only if

(10) $V^C \geq V^N$.

FIGURE 1

To gain further insight, it is constructive to plot the dependency of V^C and V^N on the level of GNP in period 1, $Y_1 = \sum_i Y_{i;1}$. Note that $\underline{1}/$

$$(11) \quad \frac{\partial[V^C - V^N]}{\partial Y_1} = \frac{\theta}{n} \left[\frac{\partial U_{i;1}}{\partial G_{i;1}} \Big|C - \frac{\partial U_{i;1}}{\partial G_{i;1}} \Big|N \right] > 0$$

Higher first period output raises expected utility by the extra tax revenue times the marginal utility of first-period fiscal consumption. The inequality in (11) reflects the fact that the marginal utility is higher in the cooperative regime, since the level of first period fiscal spending is lower.

Figure 2 summarizes the dependency of the expected utility on first period output, drawn for the case where $V^C < V^N$ at $Y = 0$. Curves NN and CC depict the dependency of V^C and V^N on output, where V^N is based on the assumption that only one decision maker behaves opportunistically. Curve N'N' corresponds to the expected utility associated with a non-cooperative equilibrium in which all provinces behave non-cooperatively, such that the resultant inflation is $\pi(n\epsilon_{i;1}^o)$ instead of $\pi(\epsilon_{i;1}^o)$. For values of output below $\bar{Y}$ (denoted by the dashed line) the cooperative equilibrium is unattainable. For the individual decision maker, who takes the behavior of others as given, $\epsilon_{i;1}^o > 0$, so we will observe opportunistic behavior and a

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$\underline{1}/$ In deriving (11) we apply the envelope theorem:

$\frac{\partial V^N}{\partial Y_1} = \frac{\theta}{n} \frac{\partial U_{i;1}}{\partial G_{i;1}} \Big|N + \frac{\partial V^N}{\partial \epsilon_{i;1}} \frac{\partial \epsilon_{i;1}}{\partial Y_1} = \frac{\theta}{n} \frac{\partial U_{i;1}}{\partial G_{i;1}} \Big|N$, using the first-order

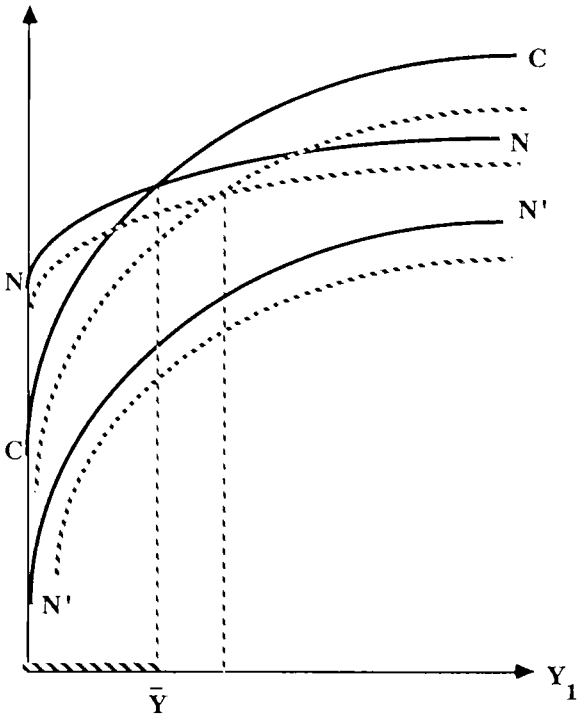condition that $\frac{\partial V^N}{\partial \epsilon_{i;1}} = 0$ at $\epsilon_{i;1}^o$.

FIGURE 2

resultant equilibrium along the N'N' schedule. As $Y_1 \rightarrow \bar{Y}$, however, $\epsilon^0_{i;1} \rightarrow 0$. High enough output $(Y > \bar{Y})$ will thus make a cooperative outcome feasible, whereas low output will induce non-cooperative behavior. The inflationary consequences of lower output can be seen by noting that lower output, which implies a higher marginal utility of fiscal spending, will shift curve MB in Figure 1 upward (to MB'), increasing $\epsilon_{i;1}$ and thereby increasing inflation.

The above analysis suggests that adverse shocks to domestic GNP and tax revenues weaken the incentive to cooperate by raising the marginal expected utility of the gains obtained from opportunistic behavior. Next consider another type of adverse macroeconomic shock in the form of an increase in the interest rate on external debt. Applying (3), (7), and (9), we can infer that

$$(12) \quad \frac{\partial [V^C - V^N]}{\partial (1+i^*)} = - [p(0) - p^N_i] \; \rho \; [\; \frac{\partial U_{i;2}}{\partial G_{i;2}} \;] \; F/n < 0$$

As depicted in Figure 2, the higher foreign interest rate will shift all the solid curves down to the corresponding dashed curves. Equation (12) implies that the downward shift of the CC curve exceeds that of NN. Thus, the higher interest rate reduces the region where cooperation will prevail.

A third type of adverse shock is a drop in the expected level of future output. The consequences of this type of shock are similar to the effects of an increase in the foreign interest rate. Formally,

$$(13) \quad \frac{\partial [V^C - V^N]}{\partial Y_2} = \theta \; [p(0) - p^N_i] \; \rho [\frac{\partial U_{i;1}}{\partial G_{i;2}}] > 0$$

Anticipation of lower future output will have greater consequences on expected utility in the cooperative regime, because in that regime the policy maker attaches higher weight to the utility of future spending. In terms of Figure 2, the various curves will again shift from the solid to the dashed positions, reducing the region where cooperation prevails.

A final type of adverse shock that we can consider is a reduction in the available amount of external credit ($\Delta F < 0$). In general, the direct effect of lower foreign borrowing is to reduce first period utility and to increase second period utility. To compare these effects across regimes, we impose further structure on the model, enriching the intertemporal linkages between the first and the second periods. Specifically, we assume the existence of a domestic bond market, where borrowing must be repaid in real terms. The policy maker in each province can borrow domestically in the first period from the private sector, at a real interest rate i, with repayments due in the second period. Consistent with treating the external credit ceiling as binding, we assume that $i > i^*$. With this modification, the levels of provincial spending can be written as:

$$(14) \quad G_{i;1} = G^p_{i;1} + \epsilon_{i;1} + B_i; \quad G_{i;2} = G^p_{i;2} - B_i(1+i)$$

where B_i is domestic borrowing and $\epsilon_{i;1}$ is zero in the cooperative regime. The optimal level of B_i is characterized by first order condition:

$$(15) \quad \frac{\partial U_{i;1}}{\partial G_{i;1}} = \rho \ P_i \ [\ \frac{\partial U_{i;2}}{\partial G_{i;2}} \ ] \ (1+i)$$

This condition applies to both the cooperative and the non-cooperative regimes, where the marginal utilities are evaluated at the corresponding spending levels, and where the probability p_i equals $p(0)$ and p_1^N, respectively, in the cooperative and the noncooperative regimes. Suppose now that the external credit ceiling is reduced so that $\Delta F < 0$. Applying (3), (7), (9), and (15) we infer that

$$(16) \ \frac{\partial V^C}{\partial F} = \frac{i \cdot i^\star}{1+i} \ \frac{\partial U_{i;1}}{\partial G_{i;1}} \ |_C > 0; \ \frac{\partial V^N}{\partial F} = \frac{i \cdot i^\star}{1+i} \ \frac{\partial U_{i;1}}{\partial G_{i;1}} \ |_N > 0;$$

Since $G_{i;1}^N > G_{i;1}^C$, we can also infer

$$(17) \ \frac{\partial [V^C \cdot V^N]}{\partial F} = \frac{i \cdot i^\star}{1+i} \left\{ \frac{\partial U_{i;1}}{\partial G_{i;1}} \ |_C - \frac{\partial U_{i;1}}{\partial G_{i;1}} \ |_N \right\} > 0$$

Tightening the external credit ceiling will reduce welfare in both regimes, but this effect is more pronounced in the cooperative regime. This implies that our analysis in Figure 2 continues to hold: tightening external credit will reduce the region where cooperation prevails.

III. Economic Growth and Some Consequences of Debt Relief

The previous section has emphasized that non-cooperative behavior leads to higher levels of aggregate spending and inflation than cooperative behavior insofar as opportunistic decision makers are not influenced by the disutility that others incur from the inflation generated by their spending. By a similar line of argument, in a model in which decision makers must divide their spending between consumption that provides current utility and investment that provides higher future output with positive externalities, non-cooperative behavior leads to lower levels of investment than

cooperative behavior insofar as opportunistic decision makers are not influenced by the utility that others derive from their investment spending.

In this section we provide a formal framework for comparing the levels of investment spending (and, hence, economic growth) that would emerge from cooperative and non-cooperative regimes. To extend our insights into factors influencing the choice of regimes, we also consider the implications of external debt relief on the prospects for cooperation and the resultant level of investment spending.

Assume that the country starts the first period with a high level of external debt, on which it simply pays its foreign creditors in each period a fraction δ of its GNP. 1/ Assume also that decision maker i invests $I_{i;1}$ during the first period in projects that provide positive externalities for others (infrastructure, communication, and the like). His consumption levels can thus be expressed as:

(18) $G_{i;1} = G^p_{i;1} + \epsilon_{i;1} - I_{i;1}$;

$G_{i;2} = G^p_{i;2}$

1/ We view this as a case of partial default, where the extraction capacity of foreign creditors is a fraction δ of the GNP, as would be the case if the creditors could impose a cost of δ GNP on the debtor country by invoking a trade embargo (or via alternative means). The threat of imposing the penalty supports an equilibrium where the borrower will service its debt up to the penalty. For further discussion regarding debt-bargaining equilibrium see Bulow and Rogoff (1989); for analysis regarding the determination of the default penalty δ see Aizenman (1991); on debt overhang see Krugman (1988).

where

$$(19) \quad G_{i;1}^{p} = (\theta - \delta) \frac{Y_1}{n} \; ; \; G_{i;2}^{p} = (\theta - \delta) \frac{Y_2}{n} \; ,$$

for $Y_t = \sum_i Y_{i;t}$, with $Y_{i;2}$ an increasing function of $I_{i;1}$.

The external debt is serviced by the central government, which divides the tax revenue (net of the debt service repayment) equally among the provinces. The level of public investment in province i will thus be guided by the following first order condition:

$$(20) \quad \frac{\partial U_{i;1}}{\partial G_{i;1}} = \rho \; p_i \; [\; \frac{\partial U_{i;2}}{\partial G_{i;2}} \;] \; \frac{\partial G_{i;2}}{\partial I_{i;1}}$$

where

$$(21) \quad \frac{\partial G_{i;2}}{\partial I_{i;1}} = \frac{\partial Y_{i;2}}{\partial I_{i;1}} \frac{\theta - \delta}{n}$$

This condition applies to both the cooperative and the non-cooperative regimes, where the marginal utilities are evaluated at the corresponding spending levels, and where the probability p_i equals $p(0)$ and p_i^N in the cooperative and the non-cooperative regimes, respectively.

Public investment adds a new dimension to the coordination problem, where the incentive mechanism designed by the central government has a crucial effect on the magnitudes of investment and growth. According to (21), each province gets only a fraction $(\theta - \delta)/n$ of the marginal product of the investment it makes. This reflects the centralized tax system and the equal budget appropriations to local provinces. Obviously, in such a

system, each province is appropriated only a fraction 1/n of the taxes yielded by the local investment.

There are several ways to deal with the coordination problem associated with public investment. One way is to centralize public investment, giving the center the authority to use a portion of tax revenues to finance the investment. The drawback of such a system is the likely loss of informational advantages associated with decentralized public investment. A second possible scheme is to tie the budget allocation of each province to the tax collection in that province. A third possibility is for the central government to coordinate investment by dictating that all provinces must invest a certain minimum amount to qualify for tax proceeds. This could induce all provinces to expand their investment to the proper level, increasing the effective yield on marginal investment from $(\theta - \delta)/n$ to $\theta - \delta$.

Figure 3 summarizes the behavior of public investment obtained by solving (20) and (21). Note that a higher Y_1 will raise investment in both the cooperative and the non-cooperative regimes, because it will reduce the marginal utility attached to present fiscal consumption, thereby encouraging future investment. The discontinuous jump of the investment function at output level $\bar{Y}$ corresponds to a discrete increase in the weight attached to the future. This jump is associated with the switch from a non-cooperative regime to the cooperative regime, thereby encouraging investment. Note that the lower probability of the policy maker's survival yields shortsightedness and an anti-investment bias in the non-cooperative regime.

Solving the coordination problems associated with local investment-- that is, inducing each province to invest the amount it would choose if the
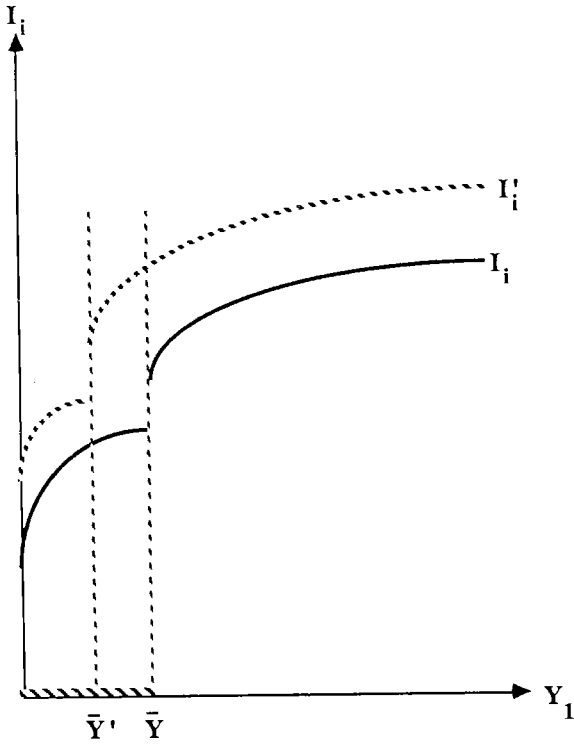
FIGURE 3

effective yield on marginal investment was $\theta - \delta$ rather than $(\theta - \delta)/n$--will shift the investment schedule upward. [1] At relatively low levels of Y_1, however, decision makers will still have incentives to behave opportunistically with respect to their total spending. Thus, an advantage of the third coordination scheme over the second is that, by dictating a minimum level of investment, the center may be able to force the provinces to raise public investment to a level that will overcome the shortsightedness of decentralized policy makers at relatively low levels of Y_1. [2]

We now turn to an analysis of the impact of debt relief implemented in period one. Suppose that creditors agree on a debt relief of R in period one, such that the first period repayment is $\delta Y_1 - R$. Applying the logic of our previous discussion it follows that

$$(22) \quad \frac{\partial [V^C - V^N]}{\partial R} = [\left. \frac{\partial U_{i;1}}{\partial G_{i;1}} \right| C - \left. \frac{\partial U_{i;1}}{\partial G_{i;1}} \right| N]/n > 0$$

$$(23) \quad \frac{\partial I_{i;1}}{\partial R} > 0.$$

In terms of Figure 2, the debt relief causes an upward shift of curve CC that exceeds the upward shift of NN, reducing thereby the region associated with non-cooperative behavior ($\bar{Y}$ drops to $\bar{Y}'$). It will shift the investment schedule upward in Figure 3, reflecting the income effect of the debt relief. The relief raises current fiscal spending, and depresses the

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1/ This can be inferred from equations (20) and (21).
2/ Needless to say, the behavioral relationships shown in Figure 3 would not be relevant under the third coordination scheme.

current marginal utility of fiscal consumption, encouraging future investment.

Current debt relief will thus increase investment both by reducing the incidence of non-cooperative behavior and through the direct income effect associated with the expansion of current resources. In drawing attention to the first effect and the importance of implementing a regime switch, our analysis extends the existing literature, which has focused simply on the role of debt relief in changing the incentive to invest within a given regime. In general, current debt relief leads unambiguously to an increase in the welfare of the borrower, and the creditor may also be better off if the resultant increase in future repayments due to the investment hike exceeds the cost of the current debt relief. Note that the likelihood of this case will be greater if the country is initially in the non-cooperative regime.

IV. Concluding Remarks

This paper has provided a framework for analyzing the types of factors that can enhance or obstruct the achievement of national economic objectives when decision making is decentralized in the presence of externalities. The analysis has focused primarily on factors influencing the level of aggregate demand (relative to available real resources), which bear on the achievement of national objectives for inflation, and also on factors influencing the level of investment in the presence of externalities, which bear on the achievement of national objectives for economic growth.

To simplify the treatment of income distribution, we have found it convenient to develop the analysis for a case in which the decision makers

receive predetermined shares of the tax revenues of the central government.
The government has limited monitoring capacity and cannot prevent decision
makers from committing to spend more than their incomes--a situation common
to all decentralized economies. Spending in excess of income levels causes
inflation to exceed the national objective, which makes it interesting to
investigate the determinants of cooperative behavior to avoid overspending.
We conjecture that the insights from our analysis are largely independent of
how decision makers receive their incomes--and thus apply to decentralized
economies in general--as long as there is a positive reduced form
relationship between inflation and the level of aggregate demand (relative
to income or the availability of real resources). In most OECD economies,
the majority of individual decision makers are unable to borrow without
collateral, and thus are constrained to spend no more than can be financed
through either income or sales of assets. However, some decision makers--
e.g., state and local governments, financial intermediaries whose deposits
are insured by the central authorities, or other firms regarded as too large
to be allowed to fail--face softer budget constraints that create
opportunities to spend more than the real resources available to them, and
to pass the "bill" for their excess spending to the central government (or
to society at large). 1/

Our analysis is based on the premise that cooperative outcomes,
consistent with the achievement of national objectives, are only feasible if

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1/ An important analogy in the international context is that countries
may have opportunities to borrow more than they can repay from the output
they produce, and to pass the bill for excess spending to creditor countries
or the international community at large.

no individual decision maker could raise his expected utility by behaving
opportunistically. In a framework in which decision makers maximize
expected utility over a multi-period horizon, it is well recognized that
cooperative behavior can be encouraged by implementing a system in which
opportunistic behavior is penalized in future periods. In addition, we have
demonstrated that the feasibility of cooperative outcomes is sensitive to
exogenous macroeconomic conditions. In particular, the likelihood that
decentralized decision makers will behave in a manner that limits aggregate
demand and inflation to national objectives will be adversely affected by
negative shocks to the current or expected future levels of GNP, by a rise
in foreign interest rates, or by a reduction in the quantity of external
credit.

It should be evident that, just as adverse macroeconomic shocks can
undermine cooperative behavior and lead to excessive aggregate spending and
inflation in the presence of negative inflation externalities, such shocks
can also lead to insufficient investment spending in the presence of
positive investment externalities. Our analysis has focused explicitly on
one particular manifestation of this insight--namely, the stimulus that
external debt relief can provide to investment and growth. While it is
clear that debt relief that expands the availability of current resources is
likely to have a positive direct income effect on investment, our analysis
emphasizes the additional positive effect on investment that can arise if
debt relief is sufficient to induce decision makers to shift from
opportunistic to cooperative behavior.

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