

# The political economy of public savings and the role of capital mobility

Joshua Aizenman <sup>a,\*</sup>, Andrew Powell <sup>b,1</sup>

<sup>a</sup> *Economics Department, 6106 Rockefeller Hall, Dartmouth College, Hanover, NH 03755, USA*

<sup>b</sup> *Research Department, Banco Central de la República Argentina, Reconquista #266, Buenos Aires, Argentina*

---

## Abstract

This paper explains public saving and investment in economies where many groups compete for scarce public funds. We show that there is a collective action problem. If there is no strong center, then this problem manifests itself in a very low savings and investment rates. In the extreme, current spending may be determined simply by the current tax income and access to borrowing. This explains why in the face of a temporary boom, governments may not save but may even borrow more to finance even higher levels of expenditure. We deal also with several mitigating factors (repetition, insiders–outsiders interaction, elections). © 1998 Elsevier Science B.V. All rights reserved.

*Keywords:* Public saving; Public investment; Collective action problem

---

## 1. Introduction

The determinants of national savings have been a central theme throughout the history of development economics [see the work of Lewis (1955) for an early account]. However, much of the debate has centered on the determinants of private savings or of aggregate savings but with the rather dubious assumption that government savings may be regarded as exogenous. Nevertheless, government

---

\* Corresponding author. Fax: +1-603-6462122; E-mail: j.aizenman@dartmouth.edu

<sup>1</sup> Dartmouth College and the NBER; and Banco Central de la República Argentina, respectively. This paper is part of the NBER research program in International Trade and Investment. Opinions expressed are those of the authors' and not those of the NBER or the Banco Central de la República Argentina.

savings (or their low level in some countries) is an equally important subject within the development debate. Indeed, we would argue that the lack of government savings, in particular in countries where fiscal volatility is high, has had a severe cost in terms of government investment projects left unfulfilled and general fiscal policy volatility leading to more widespread and costly economic uncertainty in many countries.<sup>2, 3</sup>

More recently, a small but growing literature has developed which attempts to model government savings endogenously using a game theoretic framework to model political–economy interactions.<sup>4</sup> These papers have tended to focus on political parties that alternate in power and what might be referred to as ‘political uncertainty’ to explain low government savings rates. The main idea in these papers is that a political party in power may save less than the optimal saving if there is a positive probability that the rewards from future consumption or investment made from saved resources are captured by other political parties gaining power through a future election contest, or by other means.

This paper extends the literature related to public sector savings decisions within a political economy framework. Our first contribution is to model governments, not as a unified force, but as a set competing groups. Our second contribution is then to show that elections may be valuable as a monitoring device and potentially might shift the savings decision from a non-cooperative equilibrium to the cooperative one and so increase savings rates. In the basic model developed below (Section 2), we do not need political parties to explain low rates of public savings. Rather, our focus is on competing power groups within a single government. In all countries that lack an absolute dictator, fiscal budgeting decisions are not made by maximizing a specified government social welfare function but are the outcome of an internal political process which involves many groups competing for scarce funds. These groups may represent states in a federal system, ministries or other agents seeking access to governmental resources. We show that there is a strong bias towards non-cooperation between these groups, or in other words, that there is a collective action problem, akin to Olson (1965). If there is no strong center to impose the cooperative solution, then this problem manifests itself in a very low savings rate.

Indeed, things may be even worse than implied by the above. If governments also have access to credit markets and the center is truly weak, then current spending may be determined simply by access to capital rather than by the internal

---

<sup>2</sup> It may also be the case that although government investment appears high in some countries, in fact some of this is government consumption. In short, we argue that there are incentives for overstating investment figures and understating government consumption. We come back to this point in Section 4 below.

<sup>3</sup> See the works of Powell (1991), Hausmann et al. (1992), InterAmerican Development Bank (1995) and Gavin and Hausmann (1996) for related discussions.

<sup>4</sup> See the works of Edwards (1994, 1995) (Chapter 7) for a discussion, Persson and Tabellini (1990) and papers by Cukierman et al. (1992), Tornell and Velasco (1992) and Alesina and Perotti (1995).

solution of any intertemporal maximization problem. In this sense, our approach is closer to that of Alesina and Tebellini (1989) as this paper also admits international capital markets as we do below. Indeed, these authors also argue that governments may simply borrow as much as they can from international markets, although again their intuition is that a government may do this because there is a probability that the government may find itself replaced in which case the responsibility for repayment of the debt contracted may fall with a succeeding government of different political persuasion. Once again, different governments are not required in our basic model, only non-cooperation between competing groups within a government, and yet we also show that there is a strong bias towards excessive indebtedness.

However, there may be mitigating factors. First, in a repeated game, there may be good reasons to suppose that even with a weak center, the cooperative solution may be chosen. However, this raises the possibility of switches between the cooperative and non-cooperative regimes depending on the nature of the parameters. One possibility which we illustrate below is that as income rises, there may be a greater incentive for cooperative behavior. This result stems from the assumption of decreasing marginal utilities which reduces the value of opportunistic behavior at higher incomes. However, this is only one possibility and is dependent on the specification of the model. In general, it is difficult to predict whether a positive or negative shock will cause a shift to opportunistic behavior. Hence, we may see governments consuming more as income rises (indeed potentially much more such that debt actually rises) or the perverse result alluded to above that consumption actually falls as income rises due to a switch in regime towards cooperation.

A substantive difference in our approach with preceding work is that political parties, competing through the medium of elections, may act as a second mitigating factor rather than as a negative source of ‘political instability’ as contemplated in many of the papers discussed above. In a richer version of the model (Section 3), we consider the political process. We assume that society is made up of a number of groups and that at any one time, a set of groups is tagged as the ‘insiders’ and forms a government whilst the remaining groups are outsiders. Periodically, ‘insiders’ are judged in elections where the probability of election success is dependent on economic performance. This is in contrast to many of the papers cited above where election success is normally taken to be exogenous (e.g., Alesina and Tebellini, 1989). In our set-up, elections then provide a monitoring role. In short, the fear of future election outcomes provides an extra incentive for groups to behave cooperatively rather than non-cooperatively and hence elections (or ‘political uncertainty’) may raise saving rates rather than lower them.

However, we also investigate more subtle problems within a democratic environment. For example, the electorate may not have access to sufficient information or be sophisticated enough to fully realize the reasons behind economic performance. A positive shock may then increase the probability of

re-election and tilt the balance in favor of the cooperative result and so governments may actually save more out of current income than in the previous model. However, a negative shock may decrease the probability of re-election success and hence increase borrowing (if capital markets permit) and so give greater incentives towards opportunistic behavior. These effects tend to favor pro-cyclical borrowing behavior.

Our analysis suggests a trade-off, where a long electoral cycle may promote public investment but may also increase the risk of opportunistic behavior. This is the focus of Section 4 where we introduce investment explicitly. Frequent elections imply more monitoring and hence the cooperative outcome may be more likely. However, as in some of the papers discussed above, given ‘insiders’ face a probability of becoming ‘outsiders’ more frequently; thus, there is also a reduced incentive for public investment. Hence, we argue that elections may provide a useful economic role, somewhat in contrast to the role of elections in some of the literature to date, which has tended to focus more on the negative impacts of ‘political uncertainty’. We also argue that competing groups have an incentive to hide the extent of their consumption and record consumption as public investment to demonstrate that productive use is being made of scarce resources. In aggregate, this has the effect of understating government consumption and overstating government investment in the official statistics.

This paper is organized as follows. Section 2 outlines the basic model where the weakness of the center puts the pressure groups in a prisoner dilemma situation, where ‘beggar thy neighbor’ motives induce excessive spending, over-borrowing, and low saving. Section 3 considers the richer model, where a political process that ‘punishes’ excessive spending may elicit a constraining influence on the spending patterns of the pressure groups. Section 4 extends the model to deal with investment. Section 5 concludes.

## 2. The model

The purpose of this paper is to analyze the fiscal behavior of an economy characterized by powerful competing pressure groups and a weak center. The identity of pressure groups will differ across countries. They may represent powerful interests that attempt to promote their own agenda, like provincial governments in a weak federal system, or pressure groups engaging in rent-seeking activities to improve their income.

### 2.1. *Weak center and competing pressure groups*

Consider a two-period model of an administration which is composed of the treasury (the center) and  $n$  symmetric pressure groups.<sup>5</sup> The treasury has access

---

<sup>5</sup> The choice of two periods is done for exposition simplicity. As the second period is the end of the game, all the interesting decisions are done in period one.

to fiscal revenue ( $Y_t, t = 1,2$ ). At the beginning of period 1, the treasury allocates a planned budget ( $C_{p,1}$ ). The treasury has limited access to the international credit market: it can borrow up to a fraction  $\alpha$  of the net present value of the future revenue, at the risk-free interest rate.<sup>6</sup> Hence, the credit ceiling facing the treasury is  $B_1 \leq (\alpha Y_2)/(1 + r^*)$ , where  $r^*$  is the exogenously given real interest rate, and  $B_1$  is the first period borrowing. The resource constraint facing the treasury in the first period (denoted by  $R_1$ ) is  $R_1 = Y_1 + (\alpha Y_2)/(1 + r^*)$ . Period 2 is the end of the game: the second period revenue is realized. No borrowing is allowed, so the revenue minus of the debt repayment is divided equally among the  $n$  pressure groups.

There is limited monitoring in the short run—each insider can behave opportunistically, attempting to overspend the official allocation. The limited monitoring is manifested as a probability of detection: if the opportunistic expenditure of group  $i$  exceeds a threshold  $C_o$ , it is detected and prevented. Hence, opportunism is manifested as fiscal consumption that exceeds the planed allocation by  $C_o$ . The treasury is weak—it lacks a mechanism to penalize a group that behaves opportunistically, as long as its deviation from the planed allocation is below the threshold. Several interpretations for this weakness are possible. First, information problems may lead to the inability to identify the parties that abused the budget. Second, even if such identification is possible ex-post, the treasury may lack the power or the will to punish non-cooperative behavior in the following period by reducing the future allocation of the opportunistic group.<sup>7</sup> Hence, the intended first period expenditure of group  $i$  is:

$$C_1^i = \begin{cases} C_{p,1} + C_o & \text{if group } i \text{ behaves opportunistically} \\ C_{p,1} & \text{otherwise} \end{cases} \tag{1}$$

The aggregate resource constraint binds when the aggregate intended expenditure exceeds the available resources (as is the case if  $\sum_{i=1}^n C_1^i > R_1$ ). In these circumstances, each group’s realized expenditure is only a fraction  $R_1/\sum_{i=1}^n C_1^i$  of the intended one.<sup>8</sup> The resultant aggregate budget constraints are given by:

$$Y_1 + B_1 = \text{MIN} \left[ \sum_{i=1}^n C_1^i; Y_1 + \frac{\alpha Y_2}{1 + r^*} \right] \tag{2a}$$

$$Y_2 - (1 + r^*) B_1 = nC_2^v \tag{2b}$$

where  $v$  denotes the representative pressure group

---

<sup>6</sup> The value of  $\alpha$  is determined by factors like the openness of the economy, trade dependency, etc.  
<sup>7</sup> For further discussion of the economic environment leading to soft budget constraints, see the work of Maskin (1996).

<sup>8</sup> While we refrain from modeling the ‘rationing’ mechanism delivering this outcome, inflation is a natural candidate for it. For a model of inflation as the outcome of soft budget constraints, see the work of Aizenman (1993).

Let the utility of group  $i$  be given by:

$$V_i = U(C_{1,i}) + \rho U(C_{2,i}). \quad (3)$$

We proceed by studying the incentive of a representative pressure group, focusing on the property of a symmetric equilibrium where all the other pressure groups behave in the same manner. We adopt the following notation: index  $c$  corresponds to cooperation, index  $o$  corresponds to opportunistic behavior. Index  $i|c,o$  corresponds to the case where  $i$  cooperates, while all the others behave opportunistically. Similarly, index  $i|o,c$  denotes the case where  $i$  behaves opportunistically, while all the others cooperate, etc. It is easy to confirm that:

$$V_{i|c,c} = U(C_{p,1}) + \rho U\left(\frac{Y_2 + (1+r^*)[Y_1 - nC_{p,1}]}{n}\right); \quad (4a)$$

$$V_{i|o,c} = U(C_{p,1} + C_o) + \rho U\left(\frac{Y_2 + (1+r^*)[Y_1 - nC_{p,1} - C_o]}{n}\right) \quad (4b)$$

$$V_{i|o,o} = \begin{cases} U(C_{p,1} + C_o) + \rho U\left(\frac{Y_2 + (1+r^*)[Y_1 - n\{C_{p,1} + C_o\}]}{n}\right) & \text{if } n\{C_{p,1} + C_o\} < Y_1 + \frac{\alpha Y_2}{1+r^*} \\ U\left(\frac{Y_1 + \frac{\alpha Y_2}{1+r^*}}{n}\right) + \rho U\left(\frac{Y_2(1-\alpha)}{n}\right) & \text{if } n\{C_{p,1} + C_o\} \geq Y_1 + \frac{\alpha Y_2}{1+r^*} \end{cases} \quad (4c)$$

In the absence of coordination problems, the treasury would set  $C_{p,1}$  as to maximize Eq. (4a). The corresponding first-order condition (assuming an internal solution) is:

$$U'(C_{p,1}) = \rho(1+r^*)U'\left(\frac{Y_2 + (1+r^*)[Y_1 - nC_{p,1}]}{n}\right), \quad (5)$$

or alternatively  $U'_1 = \rho(1+r^*)U'_2$ , where  $U'_t$  is the marginal utility at time  $t$ . The optimal expenditure path is determined according to the permanent income hypothesis. In these circumstances, borrowing is used to smoothen consumption, equalizing the ratio of intertemporal marginal utilities with the real interest rate. Note that if  $\rho(1+r^*) = 1$ , consumption will be equalized across periods. The cooperative outcome, however, may not be supported in our economy. The condition ‘assuring’ that Eqs. (4a), (4b) and (4c) leads to a non-cooperative outcome is that  $V_{i|c,c} < V_{i|o,c}$ , which holds if:

$$U(C_{p,1} + C_o) - U(C_{p,1}) > \rho \left[ U\left(\frac{Y_2 + (1+r^*)[Y_1 - nC_{p,1}]}{n}\right) - U\left(\frac{Y_2 + (1+r^*)[Y_1 - nC_{p,1} - C_o]}{n}\right) \right],$$

or that (approximately)  $U'_1 > \rho(1+r^*) U'_2/n$  where the marginal utilities are evaluated at the proper points. For the case when  $\rho(1+r^*) = 1$  and for small  $C_o$ ,

this condition is equivalent around the cooperative outcome to  $1 > 1/n$ . Hence, in the economy described above, there is a strong bias to behave opportunistically. A party that deviates will pay only a fraction  $1/n$  of the extra cost induced by its opportunistic consumption. Consequently, as long as the credit ceiling does not bind (and  $n > 1$ ),

$$C_1^v = C_{p,1} + C_o; B_1 + Y_1 = nC_1^v. \tag{6}$$

This in turn induces a bias towards overspending relative to the cooperative solution. In the absence of any mitigating forces imposing a fiscal discipline, all groups will overspend. If the opportunistic overspending is large enough, it will push the economy to its credit ceiling, where:

$$C_1^v = \frac{Y_1 + \alpha Y_2 / (1 + r^*)}{n} \tag{6'}$$

Hence, in a weak federal system, there will be bias towards contemporaneous consumption. If this bias is powerful enough, it would imply that  $V_{i|o,o} < V_{i|c,c} < V_{i|o,c}$ . In these circumstances, the switch to the non-cooperative regime reduces welfare.

Further insight is gained by reviewing the simulations summarized in Fig. 1. We consider the case of a CRRA utility, where the RRA rate is 2, and  $n = 10$ ;  $\alpha = 0.05$ ;  $r = 0.1$ ;  $\rho = 1/1.1$ . Curves CC, OC and OO plot  $V_{i|c,c}$ ;  $V_{i|o,c}$ ;  $V_{i|o,o}$  for different levels of a planned budget. Curve H is the maximum feasible expenditure [per decision maker] in the cooperative regime—the expenditure level that leads to the credit ceiling [ $C_{p,1} = (Y_1 + \alpha Y_2 / (1 + r^*)) / (n)$ ]. Curve L is the maximum feasible planned expenditure in the opportunistic regime [ $C_{p,1} = (Y_1 + \alpha Y_2 / (1 + r^*)) / (n) - C_o$ ]. Fig. 1-I corresponds to an economy where the opportunistic expenditure is relatively small, so that it does not lead to welfare losses. Note that if the treasury sets the planned expenditure at the optimal level in the cooperative regime, all the decision makers will act non-cooperatively, leading to the welfare level depicted by point A', where the credit ceiling binds. Reaching the optimal expected utility in the non-cooperative regime requires a cut of the planned expenditure to the level associated with point A<sub>o</sub>. While the optimal cooperative outcome is not attainable (as curve OC is above curve CC at point A<sub>c</sub>), the cooperative utility level is reached in the non-cooperative regime by adjusting downwards the planned allocation (see point A<sub>o</sub>). As the future income is anticipated to be below the present income, the optimal allocation entails positive saving, which is used to smoothen expenditure overtime. In these circumstances, opportunism is fully internalized by the policy maker, and it does not lead to a lower welfare.<sup>9</sup>

---

<sup>9</sup> This result is the outcome of our assumption that the probability of detecting opportunism is zero below the threshold  $C_o$ . The next simulation (Fig. 2) will show that this result does not hold if the detecting probability is positive.

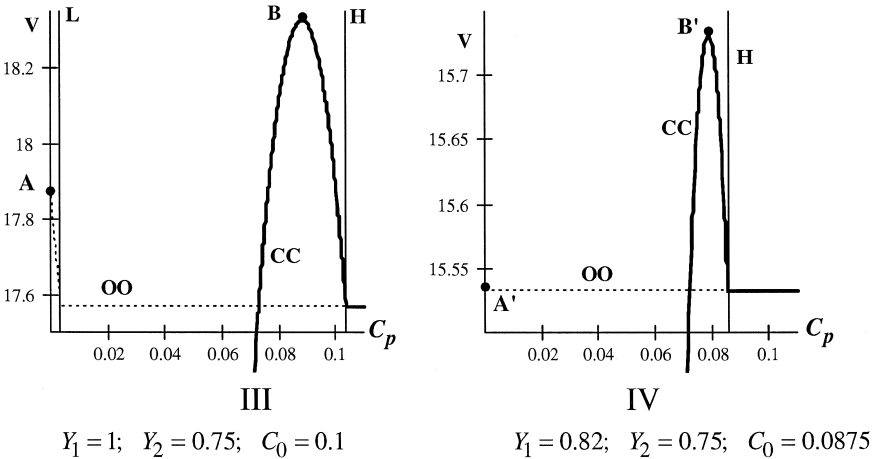
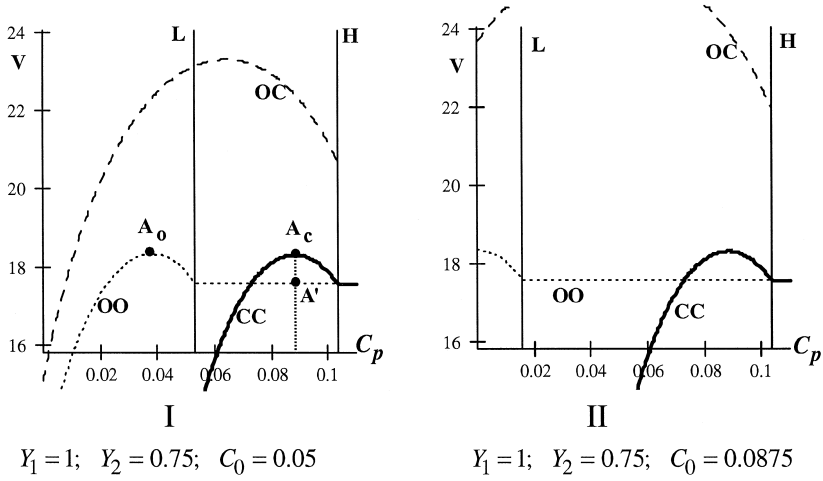


Fig. 1. Opportunistic expenditure, planned expenditure and welfare. Drawn for a CRRA utility,  $R = 2$ ,  $n = 10$ ;  $\alpha = 0.05$ ;  $r = 0.1$ ;  $\rho = 1/1.1$ . The bold curve (CC)— $V_{i|c,c}$ . The dotted curve (OO)— $V_{i|o,o}$ . The dashed curve (OC)— $V_{i|o,c}$ .

Fig. 1-II considers the impact of lax monitoring, in the form of increasing the opportunistic expenditure by 75% (relative to Fig. 1-I). It depicts the knife-edge economy, where the opportunistic expenditure is reaching a level that threatens to reduce welfare. While the cooperative outcome is not modified by the change, the higher opportunistic expenditure shifts OO leftwards, requiring a drop in the planned expenditure in order to prevent overspending. The downscaling of the planned allocation offsets the rise of the opportunistic expenditure, so that the total



spending in the non-cooperative regime remains at the optimal level. Once the limits to the downscaling of planned expenditure are reached, further increase in the opportunistic expenditure impacts welfare adversely.

This possibility is depicted in Fig. 1-III, which focuses on the consequences of doubling the opportunistic expenditure threshold  $C_o$  (relative to Fig. 1-I). The higher opportunistic expenditure shifts curve OO leftwards.<sup>10</sup> As the planned expenditure reaches its lowest threshold, the higher opportunistic expenditure leads now to higher aggregate spending. In these circumstances, the optimal planned allocation is zero, resulting in a realized first period spending of  $C_o$ , a spending level that exceeds the ‘first best’ expenditure in the cooperative regime.<sup>11</sup> The resultant utility level is depicted by point A, below the utility in the cooperative regime [point B]. The net effect of the rise in opportunistic expenditure is a drop in saving compared to the optimal saving at the cooperative regime, thus hampering intertemporal smoothing and thereby reducing welfare (the saving rates at points A and B are 0% and 9.5%, respectively).

Fig. 1-IV corresponds to the case where the first period GDP drops by 18% relative to the economy depicted in Fig. 1-II. The drop in the current GDP is not matched by a sufficient drop in spending. Instead, borrowing goes up, reaching the credit ceiling. In these circumstances, the realized spending is determined by Eq. (6'), and saving vanish. Note that Eq. (6') implies that the aggregate marginal propensity to spend out of first period income is 1. This is in contrast to the cooperative regime, where saving is still positive, and the marginal propensity to spend out of first period income is less than 1.<sup>12</sup> In the cooperative regime, saving is used to smoothen expenditure overtime, leading to a higher utility than in the opportunistic regime. The welfare level in the non-cooperative and the cooperative regimes are depicted by points A' and B' [Fig. 1-IV], respectively. Consequently, weak monitoring hampers the ability to smooth spending overtime, and this effect binds more in bad times. The deterioration of monitoring or an adverse income shock pushes the economy towards the credit ceiling, to an equilibrium where the ultimate spending is determined simply by access to the international credit market.

<sup>10</sup> In addition, curve OC shifts upwards. This curve is not plotted in Fig. 1-III and IV, as it exceeds the upper limit of vertical dimension in both figures.

<sup>11</sup> The zero planned spending is the outcome of our assumption that the probability of detecting opportunism is zero below the threshold  $C_o$ . The next simulation (Fig. 2) will show that this result does not hold if the detecting probability is positive. The above analysis suggests that with a heterogeneous fiscal expenditure, high opportunistic expenditure would lead to a positive planned spending for budgetary items that are easy to monitor and verify, and to a zero planned spending for budgetary items that are subject to the opportunistic expenditure.

<sup>12</sup> Applying Eq. (5), it follows that in the cooperative regime, the MPC is  $\pi[(dC_{p,1})/(dY_1)] = [(U_2'' \rho(1+r)^2)/(U_1'' + U_2'' \rho(1+r)^2)] < 1$ .

Note that for small opportunistic expenditure, opportunism is fully internalized by the policy maker, and it does not lead to a lower welfare, i.e., for small  $C_o$ ,

$$\text{MAX}_{C_{p,1}} [V_{i|o,o}] = \text{MAX}_{C_{p,1}} [V_{i|c,c}].$$

This ‘equivalence’ result is the outcome of our assumption that the probability of detecting opportunism is zero below the threshold  $C_o$ . This result does not hold if the detection probability is positive. For example, suppose that the probability of detection is  $p_o$  if the opportunistic expenditure is below the threshold  $C_o$ , with  $0 < p_o < 1$ , and one if the opportunistic expenditure is above the threshold  $C_o$ . Fig. 2 replicates the simulations reported in Fig. 1 (where  $p_o = 0$ ) for the case where  $p_o = 0.1$ . Note that, unlike the case where  $p_o = 0$ , the optimal planned consumption is positive even for a relatively large  $C_o$ . Furthermore, even for small  $C_o$ , the ‘equivalence’ result does not hold, and,<sup>13</sup>

$$\text{MAX}_{C_{p,1}} [V_{i|o,o}] < \text{MAX}_{C_{p,1}} [V_{i|c,c}].$$

This analysis has a number of interesting implications.

(i) The marginal propensity to consume out of income tends to be high when monitoring is lax. Relative large opportunistic expenditure implies that the credit ceiling binds, and expenditure is determined simply by access to the credit market, as is summarized by Eq. (6'). In these circumstances, the marginal propensity to consume out of transitory income is 1, and out of a permanent income is  $1 + \alpha/(1 + r^*)$ , exceeding the marginal propensity in the cooperative regime. Hence, for a commodity-exporting country, an improvement of its terms of trade that is viewed permanent will induce a spending spree. The spending spree will be magnified to the extent that the credit constraint is relaxed as income improves. Consequently, non-cooperative behavior may lead to pro-cyclical borrowing.<sup>14</sup>

(ii) Our analysis can be extended to cover the case where the country starts with a large debt overhang. In these circumstances, the country may be excluded completely from further borrowing ( $\alpha = 0$ ), and the periodic income  $Y$  will be reduced by debt service paid.

(iii) If the center is weak and the relative strength of the pressure groups high, the analysis suggests that explicit saving rules and/or stabilization funds will be

<sup>13</sup> This is also the case if the detection probability  $p_o$  is a continuous function of  $C_o$  for a given range [ $p_o = p_o(C_o)$ ,  $p'_o > 0$ ]. Solving this case is more involved, as both the size of  $C_o$  and  $C_{p,1}$  are endogenously determined.

<sup>14</sup> This point may be illustrated by the following example—suppose that there is uncertainty regarding the permanency of a given output increase of  $dY_1 > 0$  in period 1. With probability  $q(1 - q)$ , the shock is viewed as permanent (transitory). Assuming risk neutral creditors, the higher first period output increases the credit ceiling by  $dY_1(q\alpha)/(1 + r^*)$ . Consequently, in the non-cooperative regime where the credit ceiling binds, the observed marginal propensity to spend out of first period income is  $1 + (q\alpha)/(1 + r^*)$ . If the shock will turn out to be transitory, we will observe ex-post pro-cyclical borrowing.

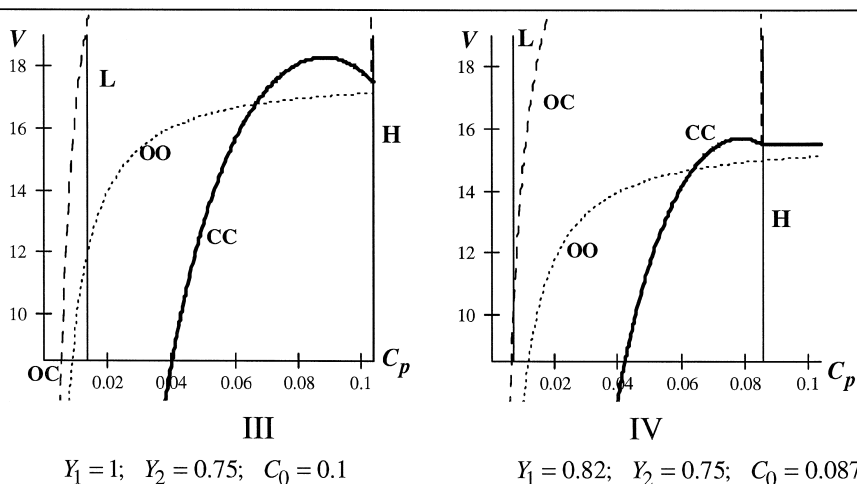
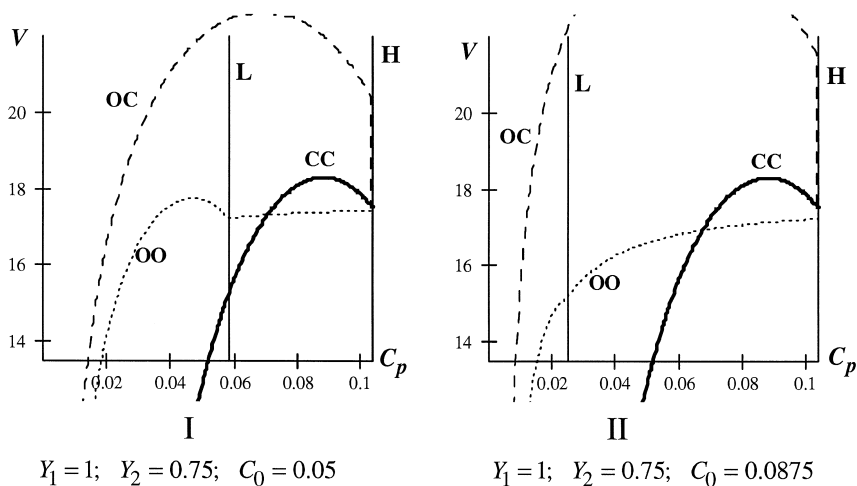


Fig. 2. Opportunistic and planned expenditure—positive detection probability. Drawn for a CRRA utility,  $R = 2, n = 10; \alpha = 0.05; r = 0.1; \rho = 1/1.1; p_o = 0.1$ . The bold curve (CC)— $V_{i|c,c}$ . The dotted curve (OO)— $V_{i|o,o}$ . The dashed curve (OC)— $V_{i|o,c}$ .

resisted and will in general be difficult to negotiate. Furthermore, unconditional foreign assistance will not be helpful as the competing groups may simply appropriate these funds as well. However, the model clearly demonstrates the role of an explicit rule to constrain future behavior. There may be a useful role here for the IMF or other international bodies if they have the capacity to offer foreign resources conditional on modifying the interaction among the center and the pressure groups. For example, international organizations may provide additional

commitment or monitoring capacity to a savings rule or stabilization fund. If the country starts with debt overhung, rescheduling and partial debt forgiveness may be made conditional on reducing the fiscal consumption and increasing the investment.

### 2.1.1. An infinite period extension of the simple model

The simple model considered above can be extended to an infinite number of periods. Appendix A describes an extension for the case where, for simplicity of exposition, a switch to opportunism implies that the non-cooperation will then last forever. This simple infinite period example illustrates three points.

(i) That cooperation may be more likely given a longer time horizon depending on parameter values and in particular on the discount factor.

(ii) That marginal propensities to consume are higher in the non-cooperative case relative to the cooperative case. Appendix A shows that the marginal propensities to consume out of temporary income are equal to  $r^*/(1+r^*)$  and 1 in the case of the cooperative and non-cooperative solutions, respectively. In the case of permanent income changes, the marginal propensity to consume is equal to 1 and  $(1+\alpha)$  in the cooperative and non-cooperative cases, respectively.

(iii) That switches may occur between the cooperative and non-cooperative solution depending on changes in parameter values. In the simple example above, we find that as income rises, there is a tendency for increased cooperation. However, we do not wish to suggest that this is a general result and believe that in particular, it reflects the linear nature of the budget constraints. If credit constraints were non-linear or the interest rate depended on the amount of borrowing, then these assumptions may overturn this finding. There is then no general presumption that an increase in income promotes cooperation or opportunism. Either result may hold in a particular situation.

## 3. Monitoring and insider–outsider interaction

The above analysis identified a bias towards a non-cooperative outcome. This bias may be attenuated if opportunism imposes direct costs on the deviating party. Such costs may come in several forms. For example, the political process may remove an administration that abuses its budget. We model this situation by invoking the notion of insiders and outsiders. The population is composed of  $n$  insiders and  $m$  outsiders,  $n < m$ . The insiders are forming an administration. The treasury has access to fiscal revenue ( $Y_t$ ,  $t = 1, 2$ ). The first period fiscal revenue is divided among the  $n + m$  agents so that an outsider gets only a fraction  $f$  of the allocation given to an insider,  $0 \leq f \leq 1$ . The coefficient  $f$  is exogenously given. It reflects the relative strength of outsiders—a lower  $f$  indicates weaker power of outsiders. Consequently, a fraction  $fm/(n+fm)$  of  $Y_1$  is allocated to outsiders, and the remaining fraction  $[n/(n+fm)]$  is left for insiders. As in Section 2, the

treasury has access to credit—it can borrow up to the credit ceiling [=  $\alpha Y_2 / (1 + r^*)$ ]. The planned borrowing,  $B_p$ , is divided equally among the insiders. Hence, the first period planned allocation to an insider is  $C_{p,1} = [1 / (n + fm)]Y_1 + [B_p / n]$ , whereas an outsider is allocated only  $[f / (n + fm)]Y_1$ .

There is limited monitoring in the short run—each insider can behave opportunistically, overspending the official allocation. The limited monitoring is manifested as a probability of detection: if the opportunistic expenditure of group  $i$  exceeds a threshold  $C_o$ , it is detected and removed from office immediately [losing the insider status]. Otherwise, the actual fiscal behavior will be revealed at the end of period  $t$  with probability one. Hence, opportunism is manifested as fiscal consumption that exceeds the planned allocation by  $C_o$ .

The realized debt ( $B_1$ ) is observed at the end of the first period. In between the periods, elections will take place. The reelection probability of an administration,  $\phi$ , depends positively on the ability of the administration to curb the overspending. The public view the outstanding public debt GDP ratio as an indicator regarding the competence of the administration, and a higher public debt would reduce the reelection probability.<sup>15</sup> If the administration loses the election, all insiders would become outsiders, and a new administration [composed of previous outsiders] takes office. If only one insider deviates, he will be ‘demoted’ to an outsider position in period 2. His opportunism implies that the reelection probability of all insiders goes down in proportion to his opportunistic spending. If all the insiders deviate, the overspending is magnified by a factor  $n$ , further reducing the reelection probability. Specifically, we assume that the second period output is exogenously given, and that the reelection probability in the cooperative regime is given by  $\phi_c = \phi(B_1)$ , where  $\phi' < 0$  for  $1 > \phi > 0$ . If only one insider behaves opportunistically, the reelection probability is  $\phi_{o,c} = \phi(B_p + C_o)$ , where  $B_p$  is the planned debt [i.e., the debt if all the pressure groups cooperate]. If all the insiders behave opportunistically, the reelection probability drops to  $\phi_o = \phi(B_p + nC_o)$ .

The sequence of events can be summarized in the following way: at the beginning of period 1, a new administration takes office. The treasury determines the planned expenditure,  $C_{p,1}$ . Next, insiders determine their expenditure,  $C_1^i$ . The aggregate public debt is revealed at the end of period 1, and election occurs between periods 1 and 2. Period 2 is the end of the game: second period revenue is realized. No borrowing is allowed, so output net of the debt repayment is divided rigidly between insiders (each getting  $[1 / (n + mf)][Y_2 - B(1 + r^*)]$ ) and outsiders (each getting  $[f / (n + mf)][Y_2 - B(1 + r^*)]$ ), where  $B$  stands for the realized first period debt.

As in Section 2, if the opportunistic expenditure pushes the economy to its credit ceiling, each insider would get only a fraction of his desired expenditure.

<sup>15</sup> We assume, for example, that high debt levels may lead to future instability. The May 1995 presidential election in Argentina provides a recent example of a vote for low debt.

Specifically, if  $\sum_{i=1}^n C_1^i > Y_1[n/(n+mf)] + [\alpha Y_2/(1+r^*)]$ , the realized expenditure of insider  $i$  is a fraction  $\{Y_1[n/(n+mf)] + [\alpha Y_2/(1+r^*)]\}/\{\sum_{i=1}^n C_1^i\}$  of his desired expenditure.

The budget constraints are given by:

$$(a) \quad Y_1 + B_1 = \text{MIN} \left[ \sum_{i=1}^n C_1^i + \frac{mf}{n+mf} Y_1; Y_1 + \frac{\alpha Y_2}{1+r^*} \right]$$

$$(c) \quad Y_2 - (1+r^*)B_1 = \psi C_{p,2} \text{ for } \psi = n+fm$$

where  $C_1^i$  (for  $1 \leq i \leq n$ ) is given by:

$$C_1^i = \begin{cases} C_{p,1} + C_o & \text{if group } i \text{ behaves opportunistically} \\ C_{p,1} & \text{otherwise} \end{cases}$$

The term  $\psi$  measures the ‘effective’ number of groups, weighting the number of competing groups by their respective share of  $C_{p,1}$  [1 and  $f$  for an insider and an outsider, respectively].

We focus now on the properties of an internal equilibrium, where the credit ceiling is not binding in the cooperative regime, and may bind only in the opportunistic one. Applying these assumptions, it follows that:

$$V_{i|c,c} = U(C_{p,1}) + \rho \left[ \phi_c U \left( \frac{Y_2 - (1+r^*)B_p}{\psi} \right) + (1-\phi_c) U \left( f \frac{Y_2 - (1+r^*)B_p}{\psi} \right) \right];$$

where  $B_p = nC_{p,1}$

$$+ \frac{fm}{\psi} Y_1 - Y_1 = nC_{p,1} - \frac{n}{\psi} Y_1 \text{ and } \phi_c = \phi(B_p) \quad (8a)$$

$$V_{i|c,o} = U(C_{p,1} + C_o) + \rho U \left( f \frac{Y_2 - (1+r^*)[B_p + C_o]}{\psi} \right); \quad (8b)$$

$$V_{i|o,o} = \begin{cases} U(C_{p,1} + C_o) + \rho \left[ \phi_o U \left( \frac{Y_2 - (1+r^*)(B_p + nC_o)}{\psi} \right) + (1-\phi_o) U \left( f \frac{Y_2 - (1+r^*)(B_p + nC_o)}{\psi} \right) \right] & \text{if } B_p + nC_o < \frac{\alpha Y_2}{1+r^*} \\ U \left( \frac{Y_1}{\psi} + \frac{\alpha Y_2}{(1+r^*)n} \right) + \rho \left[ \bar{\phi}_o U \left( \frac{Y_2[1-\alpha]}{\psi} \right) + (1+\bar{\phi}_o) U \left( f \frac{Y_2[1-\alpha]}{\psi} \right) \right] & \text{if } B_p + nC_o \geq \frac{\alpha Y_2}{1+r^*} \end{cases} \quad (8c)$$

where  $\phi_o = \phi(B_p + nC_o)$ ;  $C_{p,1} = (Y_1/\psi) + (B_p/n)$  and  $\bar{\phi}_o = \phi((\alpha Y_2)/(1+r^*))$ . Assuming that  $n$  is relatively large, we infer that a representative pressure

group will deviate from the cooperative outcome if:<sup>16</sup>

$$V_{i|c,c} < V_{i|o,c} \Leftrightarrow \rho\phi_c \left[ U \left( \frac{Y_2 - (1+r^*)B_p}{\psi} \right) - U \left( f \frac{Y_2 - (1+r^*)B_p}{\psi} \right) \right] < U(C_{p,1} + C_o) - U(C_{p,1}). \tag{9}$$

Eq. (9) is a stronger condition than that governing non-cooperative behavior in the simple model in Section 2.1. In the simpler model, non-cooperative behavior emerged for  $n > 1$  for  $\rho(1+r^*) = 1$ . Here, cooperative behavior may result even if  $n > 1$  so long as the reelection probability is large enough or the fraction of outsiders' expenditure is low.

A sufficient condition inducing the collapse of the cooperative regime is that opportunistic consumption is large enough, or that the reelection probability is small enough. Both conditions may be met if the administration is weak—a weaker center may be characterized by more limited monitoring capacity, increasing  $C_o$  and the public debt. In the absence of any monitoring capacity, the realized opportunistic expenditure would be determined by the access to the credit market, in the manner described in Section 2 [see the discussion leading to Eq. (6')]. In this case, the ultimate consumption pattern is driven not by the planned fiscal allocation, but by the access to the capital market. Otherwise, the treasury would set the planned fiscal allocation (and the corresponding external debt) as to maximize the expected utility of insiders. We turn now to an assessment of the factors determining the treasury's behavior.

Suppose that the competitive regime is viable, as is the case if  $V_{i|c,c} > V_{i|o,c}$ . Fig. 3-I describes the dependency of the cooperative expected utility on the debt, depicted by curve CC. The first-order condition characterizing optimal borrowing ( $B_p^*$ ) in an internal equilibrium is given by:

$$U' \left( \frac{Y_1}{\psi} + \frac{B_p}{n} \right) \frac{\psi}{n} = \rho(1+r^*) \left[ \phi_c U' \left( \frac{Y_2 - (1+r^*)B_p}{\psi} \right) + (1-\phi_c) f U' \left( f \frac{Y_2 - (1+r^*)B_p}{\psi} \right) \right] + \rho(-\phi_c) \psi \left[ U \left( \frac{Y_2 - (1+r^*)B_p}{\psi} \right) - U \left( f \frac{Y_2 - (1+r^*)B_p}{\psi} \right) \right]. \tag{10}$$

The optimal borrowing in the cooperative regime balances the marginal benefit (MB, the LHS of Eq. (10)) with the marginal cost (MC, the RHS of Eq. (10)), as

<sup>16</sup> Note that for a large  $n$ , if only one party deviates, the burden of the extra debt is divided among  $n + fm$ , and hence,  $[U(f[Y_2 - (1+r^*)B_p]/\psi)] \cong [U(f[Y_2 - (1+r^*)(B_p + C_o)]/\psi)]$ .

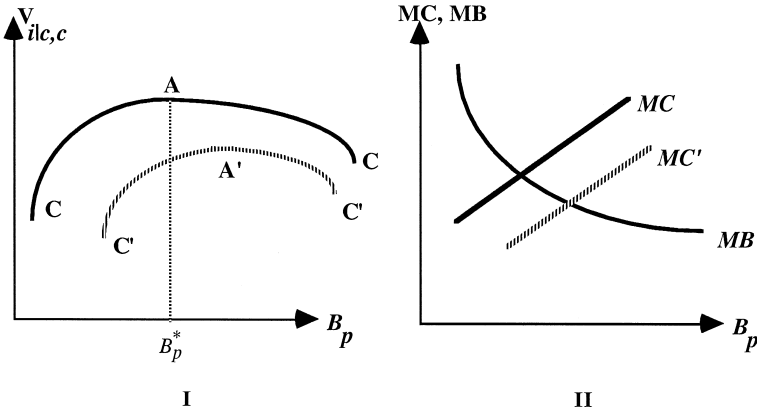


Fig. 3. The cooperative expected utility and planned debt.

is summarized in Fig. 3-II. Note that a drop in the political horizon of the administration (a reduction in reelection probability) would not change the marginal benefit of borrowing, but will reduce the marginal cost to  $MC'$ , encouraging thereby borrowing.<sup>17</sup>

We will observe the equilibrium at the bliss point ( $A$  in Fig. 3-I) if each power group does not have the incentive to deviate, as will be the case if  $V_{i|o,c} < V_{i|c,c}$ . Applying Eqs. (8a), (8b) and (8c), it follows that an adverse shock will shift curve  $CC$  downwards and to the right, to  $C'C'$ . Applying Eq. (10), it follows that at the bliss point:

$$-1 < \frac{\partial B_p^*}{\partial Y_1} < 0 \tag{11}$$

Hence, adverse supply shocks will increase borrowing, but at a rate that would lead to a drop in aggregate expenditure (hence  $0 < \partial[Y_1 + B_p^*]/\partial Y_1$ ). The induced drop in expenditure would increase the evaluation of the utility gain from opportunism, whereas the larger debt will reduce the reelection probability:

$$\frac{d[U(C_{p,1} + C_o) - U(C_{p,1})]}{d[Y_1]} < 0; \tag{12}$$

$$\frac{d[\phi_c]}{d[Y_1]} > 0. \tag{13}$$

Both effects imply that an adverse shock increases the likelihood that Eq. (9) would hold, inducing the collapse of cooperation. If the debt accumulation or if

<sup>17</sup> Let the new reelection probability be  $\tilde{\phi}$ , where  $\tilde{\phi} = \phi k$ . A drop in  $k$  would represent a drop in the reelection probability, shifting  $MC$  downwards.



the adverse shock is large enough, we may observe a switch from the cooperative to the non-cooperative regime.<sup>18</sup> The switch to the non-cooperative regime tends to increase expenditure, which in turn would shorten the horizon of policy makers, reducing the reelection probability from  $\phi_c$  to  $\phi_o$ . The regime switch from the cooperative to the non-cooperative equilibrium tends to increase the present consumption and indebtedness, thereby reducing future consumption. If this effect is large enough, the switch to the non-cooperative regime is welfare reducing— $V_{ij|o,o} < V_{ij|c,c} < V_{ij|o,c}$ .

Further insight is gained by reviewing the simulations summarized in Fig. 4. We consider the case of a CRRA utility, where the RRA rate is 0.75, and  $n = 15$ ;  $m = 30$ ,  $\alpha = 0.05$ ;  $r = 0.1$ ;  $\rho = 1/1.1$ .<sup>19</sup> Curves CC, OC and OO plot  $V_{ij|c,c}$ ;  $V_{ij|o,c}$ ;  $V_{ij|o,o}$  for different levels of planned budget. Fig. 4-I corresponds to the case of an economy where the opportunistic expenditure is relatively small and the first period output is relatively large. In these circumstances, the optimal cooperative outcome would lead to the utility level depicted by point K, Fig. 4-I. As the future income is anticipated to be below the present one, the optimal allocation entails positive saving, which is used to smooth expenditure overtime (it can be shown that at point K,  $B_p = -0.059$ ). Note that the cooperative outcome is stable, as curve OC is below curve CC at point K, and thus none of the groups has the incentive to behave opportunistically.

Fig. 4-II considers the impact of lax monitoring, in the form of increasing the opportunistic expenditure by about 20% (relative to Fig. 4-I). While the cooperative outcome is not modified by the change, the higher opportunistic expenditure shifts OO leftwards and OC upwards, implying that the cooperative bliss point K' is not attainable. At the cooperative equilibrium [point K', panel II], the incentive to behave opportunistically induces all insiders to abuse the planned allocation. The optimal response of the treasury is to internalize the opportunistic behavior by

<sup>18</sup> From Eqs. (8a), (8b) and (8c), it follows that  $\partial[V_{ij|c,c} - V_{ij|o,c}]/\partial[Y_1] = [1/\psi][U'(C_{p,1}) - U'(C_{p,1} + C_o)] > 0$ . Consequently, the adverse shock shifts curve CC in Fig. 3-I downward by more than the curve that corresponds to  $V_{ij|o,c}$  [the expected utility of a party that deviates while all the others cooperate]. The fact that the adverse shock increases the debt at the cooperative bliss point further increases the prospect that the cooperative regime would become non-viable. Formally, at the cooperative bliss point we get that:

$$\frac{\partial[V_{ij|c,c} - V_{ij|o,c}]}{\partial[Y_1]} \Big|_{B_p = B_p^*} = \frac{1}{\psi} \left[ U'(C_{p,1}) - \left\{ 1 + \frac{\partial B_p^*}{\partial Y_1} \right\} U'(C_{p,1} + C_o) - \frac{\partial B_p^*}{\partial Y_1} f \rho (1 + r^*) U' \left( f^{Y_2 - (1+r^*)} B_p^* \right) \right] > 0.$$

<sup>19</sup> The simulations were conducted for the case where:

$$\phi(B) = \begin{cases} \text{MAX}[0; 0.5(1 - 10B^{0.8})] & \text{for } B > 0 \\ \text{MIN}[1; 0.5(1 + 10\{-B\}^{0.8})] & \text{for } B < 0 \end{cases}$$

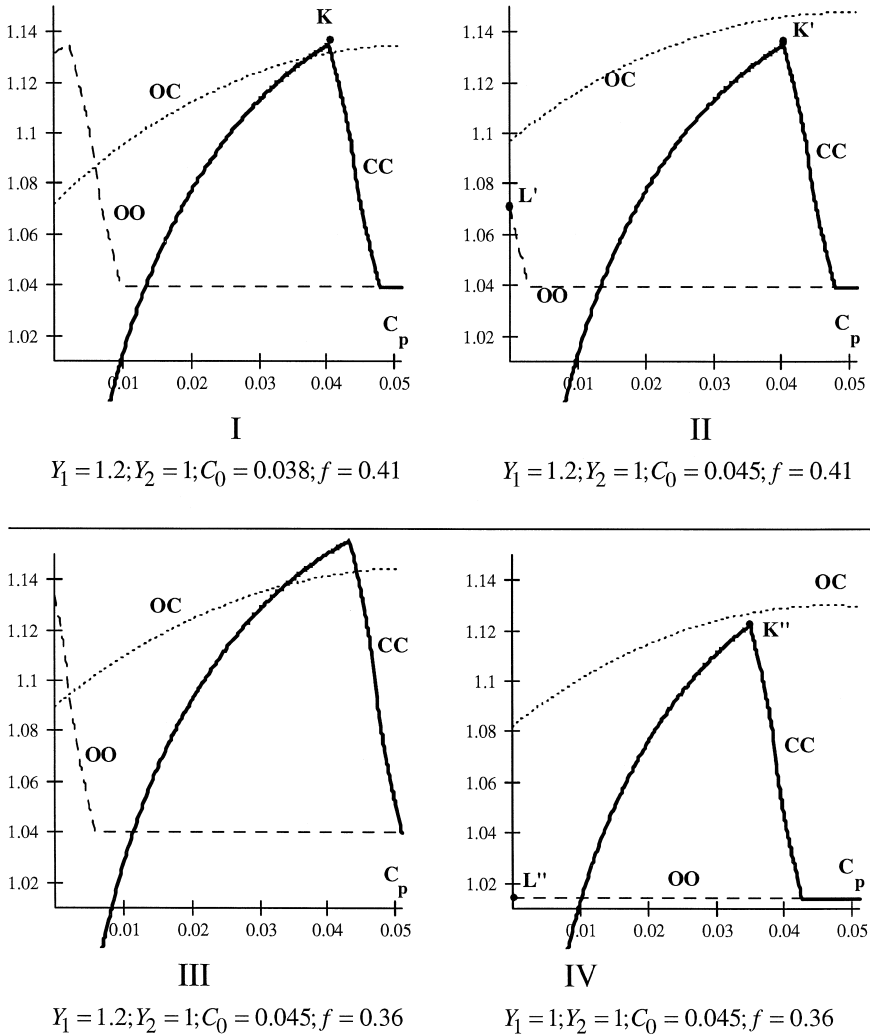


Fig. 4. Insiders opportunistic and planned expenditure and welfare. Drawn for a CRRA utility,  $R = 0.75$ ,  $n = 15$ ;  $m = 30$ ;  $\alpha = 0.05$ ;  $r = 0.1$ ;  $\rho = 1/1.1$ . The bold curve (CC)— $V_{i|c,c}$ . The dashed curve (OO)— $V_{i|o,o}$ . The dotted curve (OC)— $V_{i|o,c}$ .

cutting the planned expenditure. The net effect of the rise in opportunistic expenditure is a drop in saving, hampering intertemporal smoothing and thereby reducing welfare. In these circumstances, the optimal planned allocation is zero, resulting with a realized first period of spending of  $C_0$ , a spending level that exceeds the ‘first best’ expenditure in the cooperative regime. The resultant utility level is depicted by point  $L'$ , below the utility in the cooperative regime [point  $K'$ ].

While saving is positive in the cooperative regime [ $B = -0.059$  at  $K'$ ], the expenditure bias induced by non-cooperative behavior leads to borrowing [ $B = 0.0156$  at  $L'$ ]. Hence, in our simulation, the regime switch reduces the saving rate by about 7.5%.

Fig. 4-III focuses on the impact of weakening outsiders' position relative to Fig. 4-II [ $f$  drops from 0.41 to 0.35]. Weakening the outsiders' position increases the cost associated with losing the insider status, increasing the cost of opportunism. Indeed, while the cooperative outcome was not attainable in case II, it is attainable in case III. The drop in  $f$  magnifies the penalty associated with opportunism to a level that induces cooperation.

Fig. 4-IV corresponds to the case where the first period GDP drops by 20% relative to the economy depicted in Fig. 4-III. The adverse income effect induces a downward shift in all curves, but curve CC drops to a greater degree than curve OC. The adverse income shock increases the temptation to behave opportunistically, as it increases the marginal evaluation of the opportunistic expenditure gain, and it reduces the probability of reelection. If these effects are powerful enough, the cooperative outcome would become unstable. This situation is depicted by Fig. 4-IV, where point  $K''$  is unattainable. In these circumstances, all agents behave opportunistically, leading to a utility level depicted by point  $L''$ . The drop in the current GDP is not matched by a drop in spending, implying that the credit ceiling binds. The realized spending is determined by Eq. (6'), and saving vanishes. Note that Eq. (6') implies that the aggregate marginal propensity to spend out of first period income is 1. This is in contrast with the cooperative regime, where saving is still positive, and the marginal propensity to spend out of first period income is less than 1. In the cooperative regime, saving is used to smoothen expenditure overtime, leading to a higher expected utility than in the opportunistic regime. Consequently, weak monitoring hampers the ability to smoothen spending over time, and this effect binds more in bad times. The deterioration of monitoring or an adverse income shock pushes the economy towards the credit ceiling, to an equilibrium where the ultimate spending is determined simply by access to the international credit market.

#### 4. Public investment, public saving and the planning horizon

We turn now to the evaluation of the implications of coordination problems and election cycles on public investment behavior. We preserve all the assumptions of Section 3, modifying the specification of output and the reelection probability to reflect the endogenous determination of output: suppose that future output is given by:

$$Y_2 = Y_2[K_1 + I], \quad Y' > 0, Y'' < 0 \quad (14)$$

where  $I$  is the investment at time 1, and  $K_1$  is the initial stock of capital.

Investment  $I$  may refer to infrastructure investment, to be publicly financed. We assume first that the public investment is determined by the central administration. In the Section 4.1, we consider the case where the public investment is determined by the pressure groups. To simplify notation, let  $\rho(1 + r^*) = 1$ . Unlike the previous discussion, the policy of the administration would impact future output. We assume that the reelection probability depends negatively on the second period debt/GDP ratio:

$$\phi = \phi\left(\frac{(1 + r^*)B_1}{Y_2}\right), \tag{15}$$

where  $\phi' < 0$  for  $1 > \phi > 0$ . This is a natural extension of our previous specification, as it is equivalent to the previous specification if second period output is not affected by the administration.

A useful benchmark is the case of a cooperative outcome, where there is an internal solution where the credit ceiling is not binding and investment is positive. In these circumstances, the first-order conditions characterizing public borrowing and public investment are obtained by:

$$\begin{aligned} \text{MAX}_{I, B_p} \left[ U\left(\frac{Y_1}{\psi} + \frac{B_p - I}{n}\right) + \rho \left[ \phi_c U\left(\frac{Y_2 - (1 + r^*)B_p}{\psi}\right) \right. \right. \\ \left. \left. + (1 - \phi_c) U\left(f \frac{Y_2 - (1 + r^*)B_p}{\psi}\right) \right] \right], \end{aligned} \tag{16}$$

leading to:

$$\begin{aligned} U'\left(\frac{Y_1}{\psi} + \frac{B_p - I}{n}\right) \frac{\psi}{n} = \phi_c U'\left(\frac{Y_2 - (1 + r^*)B_p}{\psi}\right) \\ + (1 - \phi_c) f U'\left(f \frac{Y_2 - (1 + r^*)B_p}{\psi}\right) + (-\phi'_c) \frac{\psi \Gamma}{Y_2} \end{aligned} \tag{17a}$$

$$\begin{aligned} U'\left(\frac{Y_1}{\psi} + \frac{B_p - I}{n}\right) \frac{\psi}{n} = \left[ \phi_c U'\left(\frac{Y_2 - (1 + r^*)B_p}{\psi}\right) \right. \\ \left. + (1 - \phi_c) f U'\left(f \frac{Y_2 - (1 + r^*)B_p}{\psi}\right) \right. \\ \left. + (-\phi'_c) \frac{(1 + r^*)B_p \psi \Gamma}{[Y_2]^2} \right] \rho \frac{\partial Y_2}{\partial I} \end{aligned} \tag{17b}$$

where

$$\Gamma = U\left(\frac{Y_2 - (1 + r^*)B_p}{\psi}\right) - U\left(f\frac{Y_2 - (1 + r^*)B_p}{\psi}\right). \tag{18}$$

Applying Eqs. (17a) and (17b), and collecting terms, we infer that optimal investment is determined by:

$$\frac{\partial Y_2}{\partial I} = \frac{1 + r^*}{1 - n(-\phi'_c) \frac{Y_2 - (1 + r^*)B_p}{[Y_2]^2} \frac{\Gamma}{U'_1}}. \tag{19}$$

Applying Eqs. (17a) and (17b), it also follows that the condition for a positive investment in the cooperative regime is that for  $I = 0$ ,

$$\frac{\partial Y_2}{\partial I} > \frac{1}{[\phi_c \Omega_{c,e} + (1 - \phi_c)f\Omega_{c,n}] \frac{n}{\psi} + n(-\phi'_c) \frac{(1 + r^*)\hat{B}}{[Y_2]^2} \frac{\Gamma}{U'_1}}; \tag{20}$$

where

$$\Omega_{c,e} = \frac{\rho U'\left(\frac{Y_2 - (1 + r^*)\hat{B}}{\psi}\right)}{U'\left(\frac{Y_1}{\psi} + \frac{\hat{B}}{n}\right)}; \Omega_{c,n} = \frac{\rho U'\left(f\frac{Y_2 - (1 + r^*)\hat{B}}{\psi}\right)}{U'\left(\frac{Y_1}{\psi} + \frac{\hat{B}}{n}\right)}$$

are the intertemporal shadow prices if the administration is reelected and ousted from power, respectively, defined by the proper ratios of the marginal utility consumption, and  $\hat{B}$  is the debt level if investment is zero.

Suppose now that we operate in the non-cooperative regime, where the credit ceiling is not binding [a configuration like the one depicted by point  $L'$ , Fig. 4-II]. The condition for positive public investment is:

$$\frac{\partial Y_2}{\partial I} > \frac{1}{[\phi_o \Omega_{o,e} + (1 - \phi_o)f\Omega_{o,n}] \frac{n}{\psi} + n(-\phi'_o) \frac{(1 + r^*)B_1}{[Y_2]^2}}, \tag{21}$$

where

$$\Gamma_o = U\left(\frac{Y_2 - (1 + r^*)\left[nC_o - \frac{n}{\psi}Y_1\right]}{\psi}\right) - U\left(f\frac{Y_2 - (1 + r^*)\left[nC_o - \frac{n}{\psi}Y_1\right]}{\psi}\right)$$

and

$$\Omega_{c,e} = \frac{\rho U' \left( \frac{Y_2 - (1+r^*) \left( nC_o - \frac{n}{\psi} Y_1 \right)}{\psi} \right)}{U'(C_o)} ; \&$$

$$\Omega_{c,n} = \frac{\rho U' \left( f \frac{Y_2 - (1+r^*) \left( nC_o - \frac{n}{\psi} Y_1 \right)}{\psi} \right)}{U'(C_o)} .$$

A comparison of Eqs. (20) and (21) reveals that the switch from the cooperative to the non-cooperative regime tends to reduce investment, increases the likelihood that investment will collapse to zero. For example, if the income share  $f$  of outsiders is small enough, and if  $n$  is large, Eq. (21) would not hold— $[(\partial V_{i|o,o})/(\partial I)] < 0$ , and thus, investment will be zero in the non-cooperative regime.<sup>20</sup> A low income share of outsiders is consistent, however, with positive investment in the cooperative regime, as will be the case if the reelection probability or if the elasticity of the reelection probability with respect to future output are high enough. The economic intuition is that if the income share of outsiders is small, the expected marginal benefit of investment shrinks as the reelection probability drops, while the expected marginal cost remains the same. Consequently, a lower reelection probability tends to reduce investment, and to increase consumption.

This analysis suggests that more frequent election cycles will have two opposing effects on the efficiency of the economy: the ‘stick’ of being voted-out will provide a disciplining device against overspending and overborrowing. On the other hand, if uncertainty is large enough and the elections are approaching, the reelection probability may be low enough to discourage investment. Consequently, less frequent elections may encourage both more investment as well as opportunistic consumption.<sup>21</sup>

While our discussion focused on the case where the credit ceiling is not binding in the cooperative regime, the key results hold even if the credit ceiling is binding.

<sup>20</sup> A large  $n$  would imply that  $\phi_o = \phi'_o = 0$  in the opportunistic regime. In these circumstances, if,  $\lim_{f \rightarrow 0} \left[ f U' \left( f^{Y_2 - (1+r^*) B_p} / \psi \right) \rightarrow 0 \right]$ ,

investment would be zero in the opportunistic regime for  $f$  small enough. This in turn is a weak condition, which holds for both CRRA and for CARA utilities.

<sup>21</sup> A fuller treatment of these issues requires extending our model into an infinite horizon election game. The impact of changing the frequency of elections in our two-periods model may be approximated by an exogenous shift in the  $\phi$  function, leading to the results discussed in the text.

The switch from the cooperative to the non-cooperative regime tends to reduce investment. As in the previous discussion, a lower income share of outsider increases the prospect that the switch to the non-cooperative regime would lead to the collapse of investment.

#### 4.1. Opportunism and public investment

Public investment frequently involves funding local projects, in an attempt to improve the infrastructure of the economy. In economies where monitoring is lax, public investment may be used and abused as a mechanism for disguised transfers. For example, local officials may find it convenient to ‘over-invoice’ public investment, increasing thereby the effective transfer from the center.<sup>22</sup> In these circumstances, the marginal productivity of public investment will be low, as the net investment attributed to the reported investment is small. Our framework of the previous section may be extended to account for this possibility. Suppose that the future output is given by:

$$Y_2 = Y_2 \left[ K_1 + \sum_{i=1}^n I_i \right], \tag{22}$$

where  $I_i$  is the public investment undertaken by insider  $i$ . Suppose that the center allocates each insider its budget, expecting each group to use part of it to finance  $I_i$ . Lax monitoring will be manifested in the opportunistic behavior of group  $i$ , who may prefer to shirk on the investment project, using the allocated budget to finance current expenditure instead of investment. If none of the groups shirk, each investing  $I_r$ , the expected utility of each is:

$$V_{i|c,c} = U \left( \frac{Y_1}{\psi} + \frac{B_p}{n} - I_r \right) + \rho \left[ \phi_c U \left( \frac{Y_2 - (1+r^*)B_p}{\psi} \right) + (1 - \phi_c) U \left( f \frac{Y_2 - (1+r^*)B_p}{\psi} \right) \right], \tag{23}$$

where

$$Y_2 = Y_2 [K_1 + nI_r].$$

If group  $i$  is the only that shirks and behaves opportunistically, its expected utility will be:

$$V_{i|o,c} = U \left( \frac{Y_1}{\psi} + \frac{B_p}{n} + C_o \right) + \rho \left[ U \left( f \frac{\tilde{Y}_2 - (1+r^*)[B_p + C_o]}{\psi} \right) \right], \tag{24}$$

where  $\tilde{Y}_2$  denotes the second period output if only group  $i$  shirks [hence,

---

<sup>22</sup> The ‘over-invoicing’ takes place in many ways. For example, allocating construction contracts in a non-competitive manner would lead to the inclusion of a ‘political rent’ in the cost of public investment.

$\tilde{Y}_2 = Y_2[K_1 + (n - 1)I_r]$ . This situation leads to the free rider problem, where for a large-enough  $n$ , the temptation to shirk and behave opportunistically is overwhelming—the benefit is a boost of the first period expenditure by  $I_r + C_o$ , whereas the cost in the form of lower future output is shared by all.<sup>23</sup> If the shirking is masked by over-invoicing public investment, observable data will reveal low marginal productivity of public investment.

## 5. Conclusions

In this paper, we have suggested that public savings may be too low (or borrowing too high) due to a collective action problem between competing political groups. If the center is weak and cannot force the cooperative outcome, then there would appear to be a strong bias towards opportunistic behavior. Indeed in the extreme case, then due to non-cooperation, government borrowing may be determined by outside borrowing constraints (the government's access to funds) rather than the internal solution from maximizing a specified social welfare function.

However, we have also identified a number of potentially mitigating factors. First, in a repeated game, if discount rates are high enough, then cooperation may result, as the value of future benefits from saving outweigh the current benefits of opportunistic consumption. Second, we argue that elections may provide a monitoring device in democratic regimes.

This latter effect is in contrast to some of the recent literature which focuses on the negative effect on government saving rates from the probability of a current regime being ousted from power. In our approach, however, there is a trade-off. On the one hand, elections, by providing monitoring, increase the chances that competing groups will play cooperative, and in this sense electoral competition may increase savings rates. On the other hand, as there is also the probability that 'insiders' will become 'outsiders' then this implies that, as in the recent literature, political uncertainty will tend to depress the level of government savings. Our analysis suggests other trade-offs—a long electoral cycle may increase public investment as then it is more likely that 'insiders' will remain 'insiders' and hence will reap the rewards of public investment decisions made. However, if electoral cycles are long, then the monitoring effect of elections will be low and hence there

<sup>23</sup> For a large-enough  $n$ , opportunism is preferable if  $I_r + C_o > \rho \phi_c \left[ U \left( \frac{Y_2 - (1+r^*)B_p}{\psi} \right) - U' \left( \frac{f^{Y_2 - (1+r^*)B_p}}{\psi} \right) \right] / U'_1$ ,

a condition that will tend to hold for small  $\phi_c$  and for large-enough  $I_r + C_o$ .



may be a switch to the non-cooperative regime in which case public investment may drop considerably.

We do not wish to suggest here that the length of the electoral cycle should be considered an endogenous variable, but rather that countries with long electoral cycles and little ‘political uncertainty’ in the sense of different political parties competing for power may still suffer from problems of low government savings and low public investment. Moreover, we conjecture that even where government investment figures look respectably high, there may be a problem of statistical misrepresentation. There may be incentives for ‘insiders’ to record what is actually government consumption as investment in an attempt to hide non-cooperative strategies. In other words, there may be a systematic incentive to overstate government investment at the expense of government consumption.

A final mitigating factor, that we have not considered formally in this paper, is the role of international agencies, such as the World Bank or the IMF. At a general level, conditionality by such agencies may be rationalized as an attempt to provide the necessary coordination to move from non-cooperative to cooperative savings behavior. More specifically, policies such as the establishment of specific savings rules (e.g., commodity stabilization funds) may be seen as an explicit attempt to overcome the types of effects analyzed in this paper. Our model illustrates the value of such institutional developments to tie the hands of competing groups to attempt to reach the cooperative solution. Furthermore, our argument that a negative shock may reduce reelection probability and hence increase the probability of damaging non-cooperative behavior may provide an additional rationale for compensatory financing from the international agencies. However, this is a somewhat dangerous prescription as the international agency may be charged with bolstering a failing regime. A further role of the international agencies may be to attempt to ensure the quality of government investment. This monitoring role might be interpreted as an attempt to police the cooperative agreement to ensure that non-cooperative groups are prevented from hiding their opportunistic consumption behavior as government investment.

Finally, we have motivated this paper with reference to countries with low government savings rates and volatile fiscal revenues and clearly we have in mind here mainly developing countries and particularly those in Latin America and other more volatile regions. However, the model is more general and may apply as much to the US as to any set of developing nations. The US public debt in 1995 amounted to about US\$4.9 trillion dollars or US\$65,530 for every family in the US.<sup>24</sup> The size of the current level of borrowing and the inability of a number of recent administrations to reduce it may also reflect a non-cooperative equilibrium of political groups competing for resources from a weak center.

---

<sup>24</sup> See Borrowed time, *Economist*, 3 June 1995, p. 29.

## Acknowledgements

We would like to thank Sebastian Edwards, Juan Pablo Nicolini, Jorge Roldos, Pablo Sanguinetti and the IASE Buenos Aires Conference participants for useful comments. Any error, however, is ours.

## Appendix A

This appendix extends the model of Section 2 to an infinite horizon game. Suppose income in the first period is  $Y_1$  and then is constant and equal to  $Y$  for every subsequent period and suppose, for simplicity that  $\rho(1+r^*) = 1$ . We can now derive the utility for a group maintaining the cooperative solution or switching to the non-cooperative solution under the assumption that a switch to opportunism implies that the non-cooperation will then last forever.

### A.1. The cooperative solution

The cooperative solution is equivalent to the solution that a strong administration will adopt. Given the assumption on the rate of interest and on the discount factor, it follows that the administration would set consumption to be equalized in all periods.

Aggregate consumption in each period is then aggregate permanent income. The present value of the income stream is equal to  $Y_1 + Y/r^*$  and we assume that the constant consumption stream that can be supported is then shared equally between the  $n$  groups. This implies that,<sup>25</sup>

$$C = \frac{r^* Y_1 + Y}{1 + r^*} \quad (\text{A1})$$

in each period. The consumption is shared equally across the  $n$  groups. Hence welfare is given by:

$$U(C/n) + \rho U(C/n) + \rho^2 U(C/n) + \dots \quad (\text{A2})$$

and borrowing in the first period is given by:

$$B_1 = C - Y_1 = \frac{Y - Y_1}{1 + r^*} \quad (\text{A3})$$

Note that when income in the first period is high, borrowing will be negative and vice versa.

<sup>25</sup> Note that  $C \sum_{i=1}^{\infty} [1/(1+r^*)]^i = C[(1+r^*)/r^*]$ ; and  $Y_1 + Y \sum_{i=1}^{\infty} [1/(1+r^*)]^i = Y_1 + [Y/r^*]$ , thus  $C[(1+r)/r] = Y_1 + [Y/r]$ , from which we infer Eq. (A1).

*A.2. The non-cooperative solution: opportunistic behavior by group j*

Now suppose that group *j* is considering whether to play opportunistically. Group *j* knows that the borrowing constraint is  $\alpha Y$  and that current borrowing is given by  $B_1$  above. Hence, group *j* can borrow a further  $\alpha Y - B_1$  for opportunistic consumption purposes. This amount (denoted by  $C_o$ ) is equal to:

$$C_o = \frac{1}{1 + r^*} [Y_1 - Y(1 - \alpha(1 + r^*))]. \tag{A4}$$

After the first period, we assume that all groups share equally in the repayment of *j*'s opportunistic consumption and that then all groups punish group *j* by acting opportunistically. The consumption that can be supported given the borrowing constraints is then shared equally across the *n* groups. This means that *j*'s pay-off from the opportunistic strategy is as follows:<sup>26</sup>

$$U\left(\frac{C}{n} + C_o\right) + \rho U\left(Y \frac{1 - r^* \alpha}{n}\right) + \rho^2 U\left(Y \frac{1 - r^* \alpha}{n}\right) + \dots \tag{A5}$$

where  $C/n$  remains the consumption level for each group in the cooperative (treasury's) solution. This can be written (to make comparisons with the foregoing relatively easy) as:

$$U\left(\frac{C}{n} + C_o\right) + \rho U\left(\frac{C}{n} - \frac{C_L}{n}\right) + \rho^2 U\left(\frac{C}{n} - \frac{C_L}{n}\right) + \dots \text{ where } C_L = r^* C_o. \tag{A6}$$

We are now in a position to say when opportunistic behavior will occur as a function of the parameters of the model. Group *j* will deviate from cooperative play in the first period if Eq. (A6) > Eq. (A2). Or in other words, if:

$$\begin{aligned} U\left(\frac{C}{n} + C_o\right) - U\left(\frac{C}{n}\right) &> \frac{\rho}{1 - \rho} \left[ U\left(\frac{C}{n}\right) - U\left(\frac{C}{n} - r^* \frac{C_o}{n}\right) \right] \\ &= \frac{\rho}{1 - \rho} \left[ U\left(\frac{C}{n}\right) - U\left(\frac{C}{n} - \frac{C_L}{n}\right) \right]. \end{aligned} \tag{A7}$$

To investigate this condition, we take a Taylor expansion of  $U$  around  $U(C/n)$ . We assume here that  $(C_o)/n$  is small and so use a first-order approximation for

---

<sup>26</sup> Note that the opportunistic consumption of  $C_o$  by group *j* in the first period implies that future debt service increases indefinitely by  $r^* C_o$  [recall that  $\sum_{i=1}^{\infty} [r^* C_o / (1 + r^*)^i] = C_o$ ]. Opportunism in period 1 by group *j* implies that  $C_o$  is determined so that the credit ceiling binds— $B_o + C_o = \alpha Y$ . Hence, aggregate consumption in all future periods will decline to  $Y - r^* [B_o + C_o] = Y - r^* [\alpha Y] = Y[1 - r^* \alpha]$ .

the right-hand side of the expression, whereas we assume that  $C_o$  is not small and requires a second-order approximation. The condition thus becomes that opportunism will occur if:

$$C_o U' + 0.5[C_o]^2 U'' > \frac{\rho}{1-\rho} r * \frac{C_o}{n} U' \quad (\text{A8})$$

where  $U'$  and  $U''$  are evaluated at  $C/n$ . Dividing through by  $U'$  and by  $C_o$  and rearranging a little, we obtain the condition that opportunism will occur if:

$$\frac{\rho}{1-\rho} < \frac{n}{r * } \left[ 1 - 0.5R \frac{n}{r * } \frac{C_\ell}{C} \right], \quad (\text{A9})$$

where  $R$  is the coefficient of relative risk aversion for group  $j$ .

Note that marginal propensities to consume out of temporary income  $[(dC)/(dY_1)]$  are equal to  $r */ (1 + r *)$  and 1 in the case of the cooperative and non-cooperative solution, respectively. In the case of a permanent income change, the marginal propensities to consume  $(dC)/(dY_1)_{|dY_1=dY}$  are equal to 1 and  $(1 + \alpha)$  in the cooperative and non-cooperative cases, respectively.

Section 2 summarizes the main insights inferred from the above example. We should note that there may be other very important effects not captured in this simple approach. Opportunistic behavior implies a switch to the credit market access constraint forever. This means that there is no further possibility of smoothing through saving and borrowing. So if another boom or bust comes along, consumption must adjust accordingly. This is not captured above as income is set constant,  $Y$ , for all future periods.

## References

- Aizenman, J., 1993. Soft budget constraints, taxes and the incentive to cooperate. *International Economic Review*, November, 819–832.
- Alesina, A., Perotti, R., 1995. The political economy of budget deficits. *IMF Staff Papers*, March, 1–31.
- Alesina, A., Tebellini, G., 1989. External debt, capital flight and political risk. *Journal of International Economics* 27, 199–220.
- Cukierman, A., Edwards, S., Tabellini, G., 1992. Seignorage, political instability and inflation. *American Economic Review* 72.
- Edwards, S., 1994. Why are Latin America's Savings Rates So Low? Working Paper. Latin American and Caribbean Region, World Bank, Washington, DC.
- Edwards, S., 1995. Crisis and Reform in Latin America: From Despair to Hope. World Bank Book. Oxford Univ. Press, Oxford.
- Gavin, M., Hausmann, R., 1996. Securing stability and growth in a shock-prone region: the policy challenge for Latin America. In: Hausmann, R., Reisman, H. (Eds.), *Securing Stability and Growth in Latin America: Policy Issues and Prospects for Shock Prone Economies*.
- Hausmann et al., 1992.

- InterAmerican Development Bank, 1995. Overcoming volatility in Latin America. Report on Economic and Social Progress in Latin America. 1995 Johns Hopkins University Press for the InterAmerican Development Bank.
- Lewis, A., 1955. *The Theory of Economic Growth*. Allen and Unwin, London.
- Maskin, E.S., 1996. Theories of the soft budget-constraint. *Japan and the World Economy* 8 (2), 125–133.
- Olson, M., 1965. *The Logic of Collective Action*. Harvard University Press.
- Persson, T., Tabellini, G., 1990. *Macroeconomic Policy, Credibility and Politics*. Harwood Academic, New York.
- Powell, A., 1991. Options to alleviate the costs of commodity instability and uncertainty: the case of Zambia. In: Philips, L., (Ed.), *Commodity, Futures and Financial Markets*. Kluwer Academic, Amsterdam.
- Tornell, A., Velasco, A., 1992. The tragedy of the commons and economic growth: why does capital flow from poor to rich countries?. *Journal of Political Economy* 100 (6), 1208–1231.