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## CAN FOREIGN AID ACCELERATE STABILISATION?\*

*Alessandra Casella and Barry Eichengreen*

This paper studies the effect of foreign aid on economic stabilisation. Following Alesina and Drazen (1991), we model the delay in stabilising as the result of a distributional struggle. Since the delay is used to signal each faction's strength, the effect of the transfer depends on the role it plays in the release of information. We show that this role depends on the timing of the transfer: foreign aid decided and transferred sufficiently early into the game leads to earlier stabilisation; but aid decided or transferred too late is destabilising and encourages further postponement of reforms.

Prominent among the problems afflicting the transition economies of Eastern Europe and the former Soviet Union are large budget deficits, rapid monetisation, and inflation. While there is no question about the need for stabilisation, observers disagree about the prerequisites for achieving it. Some have argued that Western aid can play a critical role by defusing distributional conflicts. By moderating the sacrifices required of those who bear the cost of stabilisation, aid can hasten adjustment. Others argue that aid will only delay necessary reforms. Financial assistance, they warn, reduces the pain of living with inflation. By providing additional resources to vested interests, aid encourages them to resist adjustment and delay the day of reckoning.<sup>1</sup>

The literature does not offer a systematic analysis of these views. Providing one is our goal in this paper.

Given the prominence of distributional considerations in the arguments of advocates and opponents of Western stabilisation alike, we employ a theoretical set-up in which distributional conflict is key. Alesina and Drazen (1991) have provided such a model. They analyse inflation persistence as the by-product of a distributional war of attrition between interest groups uncertain about the capacity of their rivals to bear the costs of inflation. Although all interest groups understand that restrictive policies will have to be adopted, and although all suffer while inflation persists, each has an incentive to resist the adoption of the relevant measures in the hope that another group will capitulate first and bear the burden of adjustment. Inflation persists until the weakest faction concedes.<sup>2</sup>

The set-up captures the essence, we believe, of the mechanism underlying many of the inflations that have prompted the extension of foreign aid. The

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<sup>1</sup> Allison and Yavlinski (1991) and Sachs (1994) are representative of the positive view, Eberstadt (1992) of the negative one. Rodrik (1994) discusses the different positions.

<sup>2</sup> In our knowledge, Alesina and Drazen are the first authors to have applied the war-of-attrition model to macroeconomic stabilisations. The model itself has been used profitably in numerous different applications; Alesina and Drazen build on the framework developed by Bliss and Nalebuff (1984).

1923 German hyperinflation, in response to which the Dawes Loan was offered, is widely interpreted in terms of a conflict between industrialists who demanded reductions in real wages and increases in hours of work to finance reparations payments, and workers who pressed for wealth taxation to raise the requisite funds.<sup>3</sup> Other post-World War I European inflations in response to which stabilisation loans were extended are similarly interpreted in distributional terms.<sup>4</sup> Delayed stabilisation in France and Italy after World War II has been attributed to distributional conflict between capital and labour, and US aid has been assigned a role in bringing about stabilisation.<sup>5</sup> Distributional conflict figures prominently in Latin American inflations where the IMF has extended stabilisation loans.<sup>6</sup> And the distributional interpretation of inflation in Russia and other post-Soviet republics has been encouraged by evidence of income inequality and tax avoidance.

Our innovation is to introduce foreign aid into the Alesina–Drazen model. The critical assumption is that aid is not extended instantaneously upon the advent of inflationary pressures. Whether to provide financial assistance to a foreign country is a contentious issue. The existence of an inflation problem must first be identified. The case for aid must be made. A coalition supporting its extensions must be formed. Finally, a mechanism for transferring the aid must be created. Each of these steps is a source of delay. In the case of post-World War I Germany, the Dawes Loan was only extended in 1924, after some five years of inflation. General George Marshall's speech at Harvard University in June 1947, making the case for US aid to Europe, followed an extended debate within the US government and preceded by six months' Congressional debate of the proposal. The merits of Western aid to Russia were discussed for more than a year before the G-7 countries assembled a \$24 billion package in 1992.

The effects of aid in our model turn out to hinge precisely on the issue of timing. We find that aid announced early and dispensed rapidly can hasten stabilisation, while aid offered late has the opposite effect. When stabilisation is delayed because information is incomplete and each group hopes to outlast its rivals, the effect of aid will depend on whether it accelerates or delays the release of information. The knowledge that aid will be forthcoming accelerates the transmission of information in the initial stages of the game, but hinders such transmission in the later stages.

This result obtains because aid reduces the fiscal burden on the group that concedes first and thus induces earlier concessions by groups that suffer greatly from inflation. If the transfer is announced early, these groups will not yet have

<sup>3</sup> See Maier (1975), Eichengreen (1992) and Feldman (1993).

<sup>4</sup> See Sargent (1986), Rothschild (1992) and Santaella (1993).

<sup>5</sup> This is our own view in Casella and Eichengreen (1993). The opinion that distributional struggles were responsible for delayed and contradictory policy measures is shared by other authors. See for example De Cecco (1968) and De Cecco and Giavazzi (1993). Eichengreen and Uzan (1992) argue that the Marshall Plan defused distributional conflict and facilitated stabilisation not just in France and Italy but elsewhere in Western Europe as well.

<sup>6</sup> Williamson (1983) provides a discussion of various country experiences.

released themselves. Thus, aid will either result in a concession, or, if none is observed, in the rapid recognition that all groups have relatively high endurance. The release of information is accelerated. On the other hand, the delay which ensues between the announcement and disbursal of aid provides an incentive to postpone concessions until assistance materialises. This second effect dominates in the case of groups which suffer low inflation costs. When aid is announced later in the game, the time that has already elapsed has made clear that all factions are capable of defending themselves from inflation. For each of them, the optimal time of concession is now postponed until the transfer arrives. The release of information is hampered, and stabilisation is delayed.

Section I of the paper lays out the basic model, while Section II introduces foreign aid. Section III interprets the results, while Section IV discusses their robustness. Section V is a brief conclusion. Formal proofs are in the Appendix.

#### I. STABILISATION IN A WAR OF ATTRITION MODEL

Alesina and Drazen describe an economy where government deficits are financed by distortionary taxes (a proxy for inflation) which impose welfare losses on consumers. These welfare losses differ across the consumers' types, are private information and could be avoided if consumers agreed to 'stabilise' the economy – that is, if agreement was achieved on higher (but not distortionary) taxes or lower government transfers. The authors assume that the costs of stabilisation are borne unevenly, with the group conceding first incurring the largest share. In equilibrium, each faction hesitates to concede, hoping to outlast its rivals. Although a fully informed social planner would stabilise immediately, delay is individually rational.

The model can be summarised as follows.

(1) Prior to stabilisation, government expenditure is financed by distortionary taxes  $\tau$ . For simplicity, government expenditure per period  $g$  is constant forever.<sup>7</sup> Therefore at time  $t$ :

$$\tau_t = g. \quad (1)$$

(2) There are two consumers, both earning the same constant income  $y$  and paying an equal share of taxes in each period. Besides reducing consumers' disposable incomes, taxes cause distortions which result in utility losses. These losses are assumed to be proportional to the amount of taxes but different across consumers; they are captured by a parameter  $\theta_i$ , which is private information.

In equilibrium, each player consumes his disposable income. Ignoring the

<sup>7</sup> In Alesina and Drazen's model, government spending before stabilisation is financed either by distortionary taxation or by new bond issues, in fixed proportions. Total government spending is then the sum of primary government expenditure and interest costs. Although primary expenditure is assumed to be constant, the rising stock of bonds outstanding causes an increase over time in interest costs and thus in total spending. Allowing for bond financing has no important effect on the game and may create the misleading impression that an increasing burden is required to induce stabilisation. To make clear that this is not so, and to present the game in its simplest form, we assume that all government expenditure is financed by taxation. In Casella and Eichengreen (1994) we allow for bond financing. The results are unchanged.

income term (which is constant), the two players' flow utilities each period (before stabilisation) are;

$$u_i = -(\theta_i + 1/2) \tau_i = -(\theta_i + 1/2) g \quad i = 1, 2. \quad (2)$$

$\theta_i$  lies between known extremes  $\underline{\theta}$  and  $\bar{\theta}$ . Both players estimate the opponent's cost  $\theta$  according to the density function  $f(\theta)$  and cumulative probability distribution function  $F(\theta)$ .

(3) At the date of stabilisation  $T$ , non-distortionary taxes become available and are raised so as to cover all fiscal expenditure. These taxes are divided unequally between players, with the player conceding first – the 'loser' – shouldering a larger tax burden forever. The tax shares of the 'loser' and the 'winner' are  $\alpha$  (larger than  $1/2$ ) and  $(1 - \alpha)$ , respectively.

Since taxes are non-distortionary, the only utility loss following stabilisation is that associated with the reduction in disposable income. Flow utilities at all times after stabilisation are:

$$U^L = -\alpha g \quad U^W = -(1 - \alpha) g, \quad (3)$$

where  $L$  denotes the 'loser',  $W$  the 'winner'; and discounted lifetime utilities evaluated at the date of stabilisation are:

$$V^L = -\alpha g/r \quad V^W = -(1 - \alpha) g/r, \quad (4)$$

where  $r$  is the constant interest rate.

(4) In each period, each player can concede and bring about stabilisation by agreeing to pay higher taxes forever. Alternatively, he can wait, hoping that his opponent will concede but enduring distortionary taxes in the interim. The solution of the game is a function  $T(\theta_i)$  mapping the idiosyncratic cost of living in the destabilised economy  $\theta_i$  into an optimal time of concession  $T$ . In equilibrium,  $T$  is such that the marginal benefit of conceding at  $T$  instead of at  $T + dt$  equals the marginal benefit of waiting:

$$(-u_i + U^L - dV^L/dT) = H(T, \theta_j) (V^W - V^L), \quad (5)$$

where  $H(T, \theta_j)$  is the probability that the opponent concedes between  $T$  and  $T + dt$ , given that he has not yet conceded, and is given by:

$$H(T, \theta_j) = -\frac{f(\theta_j)}{F(\theta_j)} \frac{1}{T'(\theta_j)} \quad (6)$$

where the prime sign indicates the first derivative.<sup>8</sup>

<sup>8</sup> Call  $G[T(\theta)]$  the cumulative distribution function of the time of concession  $T$  (and  $g[T(\theta)]$  the corresponding density function). Then:

$$H(T, \theta) = \frac{g[T(\theta)]}{1 - G[T(\theta)]}. \quad (\text{FN } 1)$$

But:

$$1 - G[T(\theta)] = F(\theta) \quad (\text{FN } 2)$$

and, differentiating this expression:

$$-g[T(\theta)] T'[\theta] = f(\theta). \quad (\text{FN } 3)$$

Substituting (FN 2) and (FN 3) in (FN 1), we obtain equation (6). Notice that the term  $dV^L/dT$  equals 0; it will be different from 0 when foreign aid is anticipated.

Substituting the functional forms assumed above and concentrating on the symmetrical equilibrium, equation (5) can be written as:

$$T'(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha - 1)}{r(\theta + 1/2 - \alpha)}. \quad (7)$$

The additional assumption  $\underline{\theta} > \alpha - 1/2$  guarantees that all types  $\theta > \underline{\theta}$  concede in finite time. As shown by (7), and as usual in wars of attrition, the optimal concession time  $T$  depends negatively on  $\theta$ : the higher is the idiosyncratic cost from distortionary taxation, the earlier a player concedes.

Moreover, the player with the highest possible cost,  $\bar{\theta}$ , concedes immediately, since he knows that any other type will wait. Therefore:

$$T(\bar{\theta}) = 0. \quad (8)$$

The differential equation (7) together with the boundary condition (8) completely characterises the symmetrical equilibrium. If, for example, the distribution of  $\theta$  is uniform between  $\underline{\theta}$  and  $\bar{\theta}$ , (7) and (8) imply:

$$T(\theta) = \frac{(2\alpha - 1)}{r(\underline{\theta} + 1/2 - \alpha)} \left( \ln \frac{\theta + 1/2 - \alpha}{\bar{\theta} + 1/2 - \alpha} - \ln \frac{\theta - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \right). \quad (9)$$

This function is shown in Fig. 1.

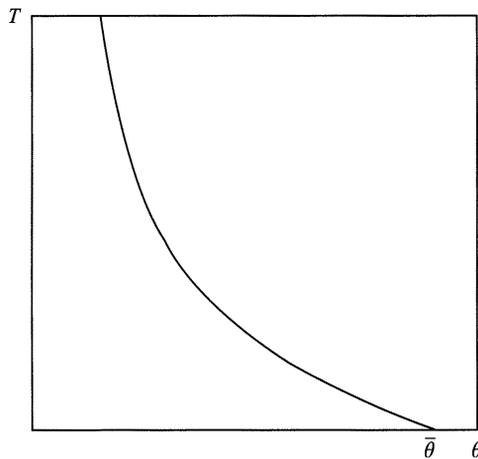


Fig. 1.

## II. STABILISATION AND FOREIGN AID

We now study the effect of a foreign transfer on the expected time of stabilisation. We model the transfer as accruing to the government, consistent with the historical episodes described in the introduction. Assume initially that foreign aid is unanticipated and arrives in the country at time  $v$ . The transfer is equal to a share  $(1 - \beta)$  of the present discounted value of the path of government spending. We can think of it as reducing internal financing of

government spending each period by a proportion  $(1 - \beta)$ , with  $\beta$  between 0 and 1.

It is simple to verify that conditions (7) and (8) remain unchanged: the optimal time of concession does not depend on the size of the budget and therefore is invariant to changes in fiscal policy. The assumption that the welfare costs of distortionary taxes are directly proportional to the tax bill implies that the level of public spending cancels out in equation (7): a cut in public spending has an identical effect on the marginal benefit of conceding and on the marginal benefit of waiting. Because in addition fiscal retrenchment does not affect the boundary condition, unanticipated foreign aid has no influence on the timing of stabilisation. The conclusion depends on the assumed linearity of the utility function, as we discuss further in Section III.

In point of fact, foreign aid hardly occurs as an unexpected event. It is demanded repeatedly by the prospective recipient and is the subject of bargaining and debate. We therefore turn next to the case of anticipated aid.

Suppose that at time  $s$  it is announced that aid will arrive at time  $v$ .<sup>9</sup> As before, aid will be used to reduce internal financing of public expenditure. If stabilisation has not taken place by time  $v$ , after the transfer has arrived the game continues along the path described by equation (7).

Consider the players' problem in the interval between  $s$  and  $v$ . Immediately following the announcement and before the transfer has arrived, the welfare loss from distortionary taxes and the one-period cost of conceding are unchanged, because the level of government spending to be financed remains the same. However, lifetime utilities after the stabilisation are affected by the knowledge that public spending will be reduced from  $v$  onward. If the date of stabilisation  $T$  falls in the interval between  $s$  and  $v$ :

$$V_T^L = \int_0^{v-T} -\alpha g e^{-rt} dt + \left( \int_{v-T}^{\infty} -\alpha \beta g e^{-rt} dt \right) \quad (10)$$

or:

$$V_T^L = -\alpha g [1 - (1 - \beta) e^{-r(v-T)}] / r \quad T \in [s, v] \quad (11a)$$

and similarly:

$$V_T^W = -(1 - \alpha) g [1 - (1 - \beta) e^{-r(v-T)}] / r \quad T \in [s, v]. \quad (11b)$$

Define:

$$\sigma(t) \equiv 1 - (1 - \beta) e^{-r(v-t)} \quad t \in [s, v]. \quad (12)$$

$\sigma(t)$  is always positive but smaller than 1, is decreasing in  $t$  and equals  $\beta$  when  $t$  equals  $v$ .

The anticipation of the transfer has two effects. Incoming foreign aid will reduce future fiscal burdens and therefore it diminishes the marginal cost of

<sup>9</sup> Throughout the paper, we assume that the disbursement of the transfer takes place at a given date with certainty. If the date of the transfer is uncertain, the analysis becomes more complex because estimates are updated with the passage of time. Note also that although in our analysis the transfer is certain to occur at date  $v$ , the receiving country is not allowed to borrow immediately against it. In the absence of this constraint, a future transfer would be identical to an immediate transfer of equal present discounted value. The historical experiences we have reviewed suggest that in reality countries are not able to borrow against future aid.

conceding. *Ceteris paribus*, this should hasten stabilisation. At the same time, however, since deficit reduction takes place only after the aid is transferred, there is an incentive to postpone conceding until closer to that moment. The overall influence on the time of concession is determined by the relative weight of these two considerations.<sup>10</sup>

Let  $\tilde{T}(\theta)$  denote the function describing the optimal time of concession in the interval between  $s$  and  $v$ . Using (2), (3), (11) and (12), the marginal condition (5) becomes:

$$\tilde{T}'(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha - 1) \sigma(\tilde{T})}{r(\theta + 1/2) - \alpha r[2 - \sigma(\tilde{T})]}. \quad (13)$$

Assume for the moment that the denominator is strictly positive. Comparing (13) to (7), the slope of the function  $\tilde{T}(\theta)$  is smaller than the slope of  $T(\theta)$ , in absolute value, if and only if:

$$\frac{\theta + 1/2 - 2\alpha}{\sigma(\tilde{T})} > \theta + 1/2 - 2\alpha. \quad (14)$$

Since  $\sigma(\tilde{T})$  is always smaller than 1, condition (14) is satisfied when:

$$\theta + 1/2 > 2\alpha \quad (15)$$

independently of the value of  $\beta$ . We have no *a priori* reason to believe that (15) should be true for all  $\theta$ .

The path of the game between  $s$  and  $v$  depends on the slope of the function  $\tilde{T}(\theta)$  (described by equation (13)), and on possible discontinuities in the optimal time of concessions following the announcement of the transfer. Independently of changes in the slope of the function, the expected time of concessions could change because of a 'jump' in the function, corresponding to the change in the optimal strategy brought about by the expectation of the transfer. We have assumed so far that the denominator of equation (13) is strictly positive, which occurs if:

$$\theta + 1/2 > \alpha[2 - \sigma(\tilde{T})]. \quad (16)$$

Condition (16) need not be satisfied. If it is violated, the marginal benefit from conceding is not positive: even if a player knows with certainty that his opponent will not concede, he still gains from delay. Since  $\sigma(\tilde{T})$  falls as  $\tilde{T}$  rises, if at a given moment in time (16) is violated for all  $\theta$  in the game it will continue to be so in the future. In usual wars of attrition, this would mean that the game has come to an end, with no possibility of further concessions. Here the situation is complicated by the knowledge that the game will change at time  $v$ , returning to the path defined by equation (7). Since  $\underline{\theta}$  is larger than  $(\alpha - 1/2)$ , all players will eventually find it optimal to concede after time  $v$ . Imagine a player knowing with certainty that he will concede exactly at  $v$ , before his opponent: if (16) is violated he will nonetheless have no incentive to

<sup>10</sup> In symbols, and referring to equation (5), the first effect causes a decline in the term  $(V^W - V^L)$ , the second an increase in  $dV^L/dT$ .

concede any earlier. The change in the game when the transfer is conveyed makes possible an expected discontinuity that is usually ruled out in wars of attrition.<sup>11</sup>

Organising these results, we can evaluate the effect of an expected transfer on the timing of stabilisation. Recall that at time  $s$  the marginal player who is just indifferent between conceding and waiting is of type  $\theta_s$ , where  $\theta_s$  is defined by:

$$T(\theta_s) = s. \quad (17)$$

Similarly,  $\theta_v$ , the player just indifferent between conceding and waiting at the moment the transfer is disbursed, is defined by:

$$\tilde{T}(\theta_v) = v. \quad (18)$$

Then we can state:

**PROPOSITION A.** *The announcement at time  $s$  of a foreign transfer that will arrive at time  $v$  may accelerate stabilisation only if  $\theta_s + 1/2 > 2\alpha$ , where  $\theta_s$  is defined by  $T(\theta_s) = s$ . The transfer accelerates stabilisation with certainty if  $\theta_v + 1/2 \geq 2\alpha$ , where  $\theta_v$  is defined by  $\tilde{T}(\theta_v) = v$ .*

Proposition A identifies a necessary condition and a sufficient condition for hastening stabilisation. The proposition is proved in the Appendix, but the intuition follows directly from our previous discussion. A transfer can change the expected time of stabilisation by changing the optimal path of concessions in the interval between announcement and delivery. Stabilisation will be hastened if, for any type conceding in the interval, the optimal time of concessions  $\tilde{T}$  is smaller than it would have been without the transfer. Thus, the slope of the function  $\tilde{T}(\theta)$  at the time of the announcement must be flatter than the slope of the original function. This is the necessary condition identified by the proposition. It is not sufficient to guarantee earlier stabilisation, however. For this we must ensure that the slope of the function is flatter over the entire interval, and that there are no discontinuities in the path. It is not difficult to show that both requirements are satisfied if the slope of the function  $\tilde{T}(\theta)$  is flatter than the slope of the original function at the time the transfer is delivered, the sufficient condition identified by the proposition.

At this level of detail, it is difficult to make empirical guesses about the support of the parameter  $\theta$  and evaluate the likelihood that either necessary or sufficient condition will be satisfied. But if the positive implications of the model remain ambiguous, the normative implications are clear. Since both  $T(\theta)$  and  $\tilde{T}(\theta)$  are monotonic in  $\theta$ , Proposition A can be rephrased as follows:

**PROPOSITION A'.** *If there is a delay between the time foreign aid is announced and the time it is disbursed, then there exist two dates  $s^*$  and  $v^*$  ( $s^* < v^*$ ) such that foreign aid*

<sup>11</sup> A second possible source of discontinuity is a change in the boundary condition at the time the transfer is announced, triggering a probability mass of concessions. Since the announcement is unexpected, there is no reason to exclude this possibility *a priori*. A change in the boundary condition can occur if new information about the opponent's type is revealed, or if a player's cost from staying in the game has changed sufficiently that he prefers to concede even with a positive probability of winning in the next instant. In our formulation, however, no new information about the opponent is revealed at the time of the announcement, and no player ever wants to abandon the game. Therefore this second source of discontinuity can be ruled out.

announced after  $s^*$  will delay stabilisation, while aid disbursed before  $v^*$  will hasten it.  $s^*$  is the solution to:  $T(\theta^*) = s^*$ , and  $v^*$  to:  $\tilde{T}(\theta^*) = v$ , where  $\theta^* + 1/2 = 2\alpha$ .

Proposition A' states that foreign aid can accelerate stabilisation but that proper timing is essential: aid announced or delivered too late is counter-productive.

The result is particularly simple because  $s^*$  does not depend on the size of the transfer. Whatever its amount, the announcement that aid is coming must be made before a critical date that depends on the structure of the economy, as captured by the parameters  $r$ ,  $\alpha$  and the support of  $\theta$ .<sup>12</sup>

Proper timing is essential not only in announcing aid but also in delivering it. A full characterisation of the critical delivery date  $v^*$  is complex since, unlike  $s^*$ ,  $v^*$  depends on the size of the transfer.<sup>13</sup> Regardless of the size of the transfer, however, the longer is the interval between announcement and disbursement, the higher is the probability that aid will delay stabilisation. But shorter intervals accelerate stabilisation only up to a point; as the interval grows short, the length of time during which the effects of the expected transfer are felt is also reduced, and the impact on the timing of stabilisation tends to disappear.

Although the size of the transfer is not of primary importance, it is not irrelevant. A very small transfer ( $\beta$  close to 1) implies that  $\sigma(t)$  will be close to 1, and therefore that the effect of the transfer will be very small, regardless of timing. Conversely, a large transfer accentuates the difference in the slope of the original path  $T(\theta)$  and the new path  $T^*(\theta)$  that is followed between  $s$  and  $v$ . Two implications follow. First, the larger the transfer the higher the return from getting the timing right. If the announcement of aid comes late, the expected date of stabilisation is delayed longer the larger is the size of the transfer. If the timing of both announcement and disbursement is chosen correctly, the date of stabilisation is hastened more the larger is the transfer. Second, the larger the transfer, the shorter must be the interval between announcement and disbursement for stabilisation to be hastened. Suppose the transfer has been announced early enough, so that  $T^*(\theta)$  is flatter than the original path at  $\theta_s$ . Then the critical moment when the marginal player is of type  $\theta^*$  is reached earlier, and from that moment onward  $T^*(\theta)$  is steeper than the original function. The larger the transfer, the larger the difference in slopes at time  $s$ , and the earlier the moment when  $T^*(\theta)$  becomes steeper than  $T(\theta)$ . Therefore, the larger is the transfer, the shorter must be the interval between announcement and disbursement.

<sup>12</sup> A simple example makes the point immediately. Suppose the distribution of  $\theta$  is uniform over the interval  $[1, 10]$ ,  $r = 0.20\%$ , and  $\alpha = 1$  (the loser shoulders the entire fiscal deficit). Then equation (9) and Proposition A imply that any foreign aid, of whatever size, must be announced before 6.4 periods have elapsed. The interest rate is the anchor implicitly defining the length of the period. It enters the expression in a simple multiplicative fashion: for example, if all other parameters are as in the text but the interest rate is halved to 0.10%, the maximum number of periods is doubled to 12.8. If we ignore compounding, the presence of the interest rate ensures that the arbitrary choice of the length of the period does not affect the result.

<sup>13</sup> Notice that  $\tilde{T}(\theta)$  depends on  $\beta$ .

## III. DISCUSSION

Why is timing so important? As mentioned above, a transfer has two effects: it lowers the lifetime cost of conceding by reducing the fiscal burden on the loser; at the same time it increases the marginal benefit of postponing concession until the transfer arrives. The relative importance of the two effects depends on the welfare costs of distortionary taxation. If these costs are high, the first effect dominates: the reduction in the cost of conceding is sufficient to accelerate a settlement. If, on the other hand, the costs of distortionary taxation are low, it makes sense to hold out longer in order to approach the time when the cost of losing is reduced by the arrival of aid.<sup>14</sup>

When aid is announced and disbursed early, high cost players could still be in the game. For them the first effect dominates: earlier concession is now optimal. If no concession is observed, each player can deduce immediately that his opponent is not a high-cost type. Thus the announcement of a transfer hastens the rate at which information about types is conveyed. Stabilisation will occur at an earlier date because the optimal time of concession is now earlier for all types: because  $\tilde{T}(\theta)$  is flatter than the original function, more types would find it optimal to concede before time  $v$ , and because potential concessions continue at the original rate after  $v$ , all remaining types would also concede earlier.

But if the announcement is late, both players have relatively low costs, and both now prefer to postpone concessions (equation (15) is violated). The optimal path of concessions is slowed, and with it the transmission of information. After the transfer has been delivered, potential concessions resume at the original rate, carrying over the delay until the conclusion of the game. Stabilisation is delayed.

To summarise, timing matters because an expected transfer creates different incentives for high and low cost players. As a result, the transfer affects the rate at which information is revealed, accelerating stabilisation if its timing is such as to accelerate release of information.

Notice an immediate implication: only a transfer that is decided and delivered with sufficient dispatch unambiguously increases welfare in the receiving country. Such a transfer reduces the fiscal burden of the stabilisation and shortens the time during which the economy suffers wasteful distortions. If instead aid is too late, the reduced sacrifice required by stabilisation must be weighted against the increased delay in bringing the stabilisation about, and thus the longer interval during which the distortions take their toll.<sup>15</sup>

<sup>14</sup> These effects are summarised in equation (15):  $\theta$  must be sufficiently high if the optimal time of concession after the transfer is announced is to be smaller.

<sup>15</sup> A few remarks on the role of the parameter  $\alpha$ , which we interpret, following Alesina and Drazen, as a measure of the polarisation of society. Proposition A makes clear that the value of  $\alpha$  influences the results, but in general its impact is ambiguous. The higher is  $\alpha$  – the more costly it is to concede – the higher  $\theta_s$  and  $\theta_v$  must be to satisfy the conditions spelled out in the proposition. At the same time, the higher is  $\alpha$  the slower is the rate of concession in the original game, and therefore the higher is the  $\theta$  characterising players still in the game at any point in time. Because these two effects work in opposite directions, the length of time after which foreign aid becomes counterproductive may become longer or shorter as the distributional struggle

## IV. EXTENSIONS

How sensitive are our results to the model's simplifying assumptions? As Alesina and Drazen note, a limitation of the framework is the absence of money. While it is natural to interpret the distortionary taxes financing the deficit prior to stabilisation in terms of inflation, no monetary mechanism is explicitly present. Hence, the specification of the welfare costs of inflation is arbitrary. The linear utility function assumed in the model posits a proportional link between distortionary taxation and welfare costs, and this proportionality drives the result that unexpected transfers have no impact on the date of stabilisation. One can think of specifications in which this strong result would not hold. Suppose for example that we wished to capture the idea that welfare costs rise less than proportionally with inflation when inflation is low, but more than proportionally when inflation is high. In addition, suppose that different agents have different abilities to protect themselves from inflation. Flow utility before stabilisation becomes (to a linear approximation):

$$u_i = -\max(0, \tau_t + \theta_i - c) - (1/2)\tau_t \quad \forall \tau_t > 0 \quad (2')$$

where  $c$  is constant. Here the cost of distortionary taxation is positive only when the distortionary tax rises beyond a threshold that depends on  $\theta_i$ . A necessary condition for an unanticipated transfer to accelerate stabilisation is that its impact on the deficit is larger than its impact on welfare costs for the marginal player prepared to concede at the time the transfer takes place. Here, this condition amounts to  $\theta_v > c$ , where  $\theta_v$  characterises the marginal player at the time the transfer is effected: players with sufficiently high welfare costs must still be in the game when the transfer occurs. Again, for aid to be stabilising it must be disbursed early.<sup>16</sup>

If the transfer is anticipated, abandoning the assumption of linear utility would complicate the analysis because the game would not revert to the original path once aid has been received. Nevertheless, it is likely that the effects studied in this paper would carry over: the incentive to postpone concession until aid materialises would still be present, and with it the differential effect of aid on players of different types and thus the role of the transfer in facilitating or hampering the transmission of information.

Another limitation of the model is that it does not capture the impact of expected future government spending on current inflation. A reduction in government spending leads to a commensurate fall in distortionary taxation at the moment it occurs and has no effect before that time even if it is anticipated. But inflation should depend not only on current money supply but on the whole expected path of monetary injections. Fortunately, our key results are

becomes more polarised. A little more can be said if we assume a specific distribution for  $\theta$ . For example, if the distribution is uniform, equation (9) implies that  $s^*$  must increase with  $\alpha$ . The lack of a closed form solution for  $\tilde{T}(\theta)$  prevents us from adding anything on the link between  $\alpha$  and  $v^*$ .

<sup>16</sup> Notice that  $\theta_v > c$  implies a negative threshold for distortions; i.e. distortionary taxation is costly for type  $\theta_v$  even if it is very small, as long as it is positive. For all  $\theta \geq \theta_v$  welfare costs have a discontinuity at  $\tau = 0$ . The restriction  $\theta > c - \tau_0(3/2 - \alpha)$ , implying that welfare costs are positive for all players already at time 0, is sufficient to guarantee that the game is well-behaved.

not affected if we allow each player's welfare costs to depend not only on the current level of distortionary taxation (our proxy for money creation) but also on his expectations of future distortionary taxes. Prior to stabilisation, flow utility for player  $i$ , whose optimal concession time is  $T_i$ , can now be written:

$$u_i = -(\theta_i + 1/2) \tau_t - \theta_i \{ [\text{Prob } T(\theta_j) \geq T_i] \int_t^{T_i} \tau_s e^{-r(s-t)} ds + \int_{\{\theta_j | T(\theta_j) < T_i\}} \int_t^{T(\theta_j)} \tau_s e^{-r(s-t)} ds f(\theta) d\theta \}, \quad (2'')$$

where the probability that the opponent is more patient,  $\text{Prob } T(\theta_j) \geq T_i$  is conditional on his not having conceded by  $t$ , and where the discount rate  $r$  is large enough to guarantee that  $u_i$  is falling in  $\theta_i$  for all  $t$ . The first term in (2'') is the cost of current taxation; the second term is the welfare cost of the discounted stream of expected future distortionary taxes. How far into the future distortionary taxation is expected to continue depends on the expected date of stabilisation. With some probability, the opponent is more patient, and stabilisation will occur when player  $i$  concedes at time  $T_i$  (the first of the two terms in the braces). But with some probability, the opponent is less patient, and stabilisation will occur when he concedes at time  $T(\theta_j)$  (the second of the two terms in the braces). Our results remain unchanged: at the margin each player considers the cost of postponing his concession by evaluating the welfare cost of staying in the game for another instant at time  $T$ . But at time  $T$  his expectation of future distortions is necessarily zero because the game is ending: only current distortion matters. The marginal condition is identical to the one derived earlier in the paper (assuming the problem is still well-behaved and the boundary condition is unchanged).<sup>17</sup>

Finally, our formulation assumes that aid is unconditional. It is easy to see that effective conditionality leads to earlier stabilisation. Assume a credible promise to deliver aid as soon as stabilisation occurs. Then only  $\beta g$  must be financed internally in all periods following stabilisation. Equation (7) becomes:

$$T'(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha - 1) \beta}{r(\theta + 1/2 - \alpha\beta)}. \quad (7')$$

Because  $\beta < 1$ , the slope of the function is now smaller in absolute value. Because the boundary condition is unchanged, for all  $\theta$  the optimal concession time  $T$  is smaller.

In reality, however, the effectiveness of conditionality is disputed, and the most accurate way of specifying it is unclear. After the first instalment of a transfer has been granted, both the donor countries and the international

<sup>17</sup> The counterintuitive conclusion that expectations do not matter depends on the assumption that welfare costs are a function of individual expectations of future distortions which can then be manipulated by individual action (concession). Notice that these expectations, although rational, differ between the two players since each one knows his own idiosyncratic cost  $\theta$ . An alternative specification would have the expectation of future distortions, which is the proxy for inflation, be formed by an outside observer. Expected future events would then appear in the marginal condition, but if an equilibrium strategy exists, the substance of our conclusion would not be modified.

institutions through which aid is channelled are under strong pressures to continue with the aid programme and disregard unfulfilled promises. Conditionality is far more complex than a credible contingent transfer, and its effectiveness depends on the institutions of the agencies and countries involved.<sup>18</sup>

#### V. CONCLUSIONS

This paper has analysed the conditions under which foreign aid can accelerate stabilisation. Inspired by the historical literature, we have modelled inflation persistence as the byproduct of a distributional war of attrition. The policies of adjustment needed to halt the inflation are delayed not because their need is unappreciated but because each distributional faction seeks to shift the cost of implementation onto its rivals. We show that aid announced and disbursed relatively early in the inflation process can accelerate stabilisation, while aid announced or delivered after a considerable delay can have the opposite effect.

Thus, it is most unfortunate that policy debate over the merits of foreign aid for countries grappling with high inflation is expressed in unqualified terms. Our analysis suggests that the effects of aid are contingent, and that timing is crucial.

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<sup>18</sup> As a first step towards understanding the effect of aid on the adoption of stabilising policies, we have chosen to neglect these complications. For a sceptical review of the effectiveness of conditionality, see for example Esposito's (1995) analysis of the Marshall Plan. For a negative view of conditionality stemming from theoretical consideration, see Rodrik (1989). The difficulties attached to conditionality are such that aid is often granted unconditionally. For example, most current US aid to Ukraine is unconditional (see the discussion in *The Economist*, 26 November 1994, p. 27).

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## APPENDIX

*Proof of proposition A.* We can distinguish three cases.

*Case 1*

Suppose  $\theta_v$  is such that:

$$\theta_v + 1/2 \geq 2\alpha. \quad (\text{A } 1)$$

Then, the marginal benefit from conceding is strictly positive for all  $\theta$  larger or equal to  $\theta_v$ , and  $\tilde{T}(\theta)$  is well-defined and decreasing in  $\theta$ . Since  $v$  is larger than  $s$ ,  $\theta_v$  must be smaller than  $\theta_s$ . Therefore:

$$\theta_s + 1/2 > 2\alpha. \quad (\text{A } 2)$$

Two results follow. First, (A 1) implies that equation (16) in the text is satisfied for all  $\theta$  larger or equal to  $\theta_v$ , and the path of concessions has no discontinuities. During the interval between  $s$  and  $v$ , this path is described by (13) and by the boundary condition:

$$\tilde{T}(\theta_s) = s. \quad (\text{A } 3)$$

After  $v$ , the relevant equations are (7) and

$$T(\theta_v) = v. \quad (\text{A } 4)$$

Second, condition (A 1) guarantees that  $\tilde{T}(\theta)$  is flatter than  $T(\theta)$  at all times between  $s$  and  $v$ . Therefore the delay before stabilisation is unambiguously shortened by the provision of aid. This case is depicted in Fig. 2 *a*. (Notice that, given  $s$ , the impact is largest if  $v$  is chosen so that (A 1) holds with equality.)

*Case 2*

Suppose instead that  $\theta_s$  is such that:

$$\theta_s + 1/2 \leq 2\alpha \quad (\text{A } 5)$$

(which implies that (A 1) is violated). There are two possibilities. First, it may be that:

$$\theta_s + 1/2 > \alpha[2 - \sigma(s)]. \quad (\text{A } 6)$$

In this case, the marginal benefit from conceding is strictly positive at  $\theta_s$ , and  $\tilde{T}(\theta)$  is well defined at the time the transfer is announced. Suppose there exists a  $\theta^*$ , smaller than  $\theta_s$ , for which the marginal benefit from conceding is 0 (i.e. for which (16) is violated). Then on the path defined by  $\tilde{T}(\theta)$  the optimal delay before concession for  $\theta^*$  is infinite. Since  $\tilde{T}(\theta)$  is continuous in  $\theta$ , the slope of the optimal path tends to infinity asymptotically as  $\theta$  approaches  $\theta^*$ . But then by construction  $\theta_v$  must be larger than  $\theta^*$ , and  $\tilde{T}(\theta)$  must be well defined for all  $\theta$  between  $\theta_s$  and  $\theta_v$ . In other words, if there is any jump it must occur at time  $s$  when the transfer is first announced.

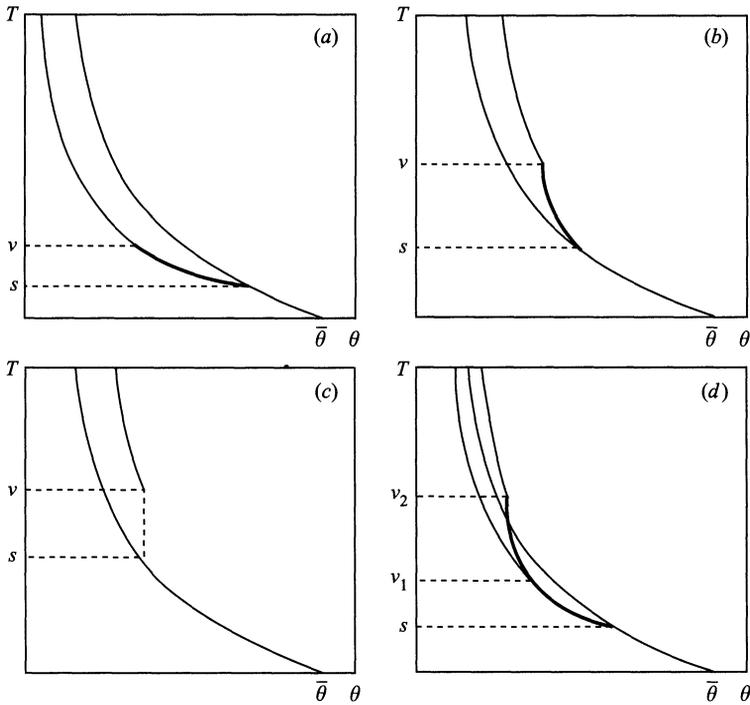


Fig. 2.

Therefore (A6) is sufficient to rule out discontinuities in the path of concessions: if (A6) is satisfied, the path of concessions is defined by (13), is continuous, and the boundary conditions at times  $s$  and  $v$  are (A3) and (A4), as before. However, (A5) implies that  $\tilde{T}(\theta)$  is steeper than the original function between  $s$  and  $v$ , and the conclusion must be that the transfer delays stabilisation. (See Fig. 2*b*).

On the other hand, if equation (A6) is violated, announcement of the transfer causes a discontinuity. Since all players still in the game must have costs lower than  $\theta_s$ , the marginal benefit of conceding is negative for all of them and continues to be negative as time passes and  $\sigma$  falls. It follows that no one concedes between  $s$  and  $v$ . At time  $v$ , when the transfer takes place, the path of concessions starts again, as described by (7) and the new boundary condition:

$$T(\theta_s) = v. \tag{A7}$$

Again, stabilisation is delayed by the transfer (see Fig. 2*c*).

Case 3

An intermediate case exists when (A2) is satisfied but (A1) is violated:

$$\theta_v + 1/2 < 2\alpha. \tag{A8}$$

In this case, discontinuities are ruled out (since (A2) implies (A6)), and the new path is flatter than the original one at  $s$  but steeper at  $v$ . The transfer may accelerate or postpone stabilisation. (See Fig. 2*d*.)

These conclusions can be summarised in the statement that equation (A2) is a necessary condition, and equation (A1) a sufficient condition for earlier stabilisation. This is the content of Proposition A.