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Does foreign aid delay stabilization

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Abstract

This paper addresses the question whether unconditional foreign aid accelerates or delays macroeconomic stabilizations. It first reviews models offering an explanation for delayed stabilization processes and analyzes whether the incorporation of unconditional foreign aid in these models implies an earlier or, as predicted by the so-called crisis hypothesis, a later date of stabilization. The last part of the paper builds on Casella and Eichengreen (1996) who first used Alesina and Drazen's (1991) war-of-attrition model to investigate the consequences of anticipated foreign aid on the expected date of stabilization. Casella and Eichengreen's main result, namely that foreign aid that is announced or disbursed after critical dates will delay stabilization, will be shown to be based on an invalidly modified equilibrium condition. A correct incorporation of anticipated foreign aid in the war-of-attrition model yields the result that foreign aid unambiguously accelerates stabilization.

I. Introduction

Starting after World War II, massive foreign aid programs have been launched to alleviate poverty and to stimulate growth in developing countries. Net official development assistance to all development countries accounted to 364.7 billion in current U.S. dollars between 1995 and 2001 alone.[1] After more than fifty years of transfers, a vivid discussion on the effectiveness of these programs is led both by economists and the public. Among economists, there seems to be an emerging consensus that the record of foreign aid programs is clearly disappointing with respect to results at the macro level. Boone (1996) shows that foreign aid does not significantly improve investment or benefit the poor as measured by improvements in human development indicators. Instead he finds that aid increases the size of government spending in all types of political regimes. Burnside and Dollar (1997) provide empirical evidence that in the presence of poor policies, aid has no positive impact on growth. In contrast, aid stimulates growth in developing countries with sound fiscal, monetary, and trade policies. While these findings underline that the goals of foreign aid have at best been achieved to a limited extent, some authors even postulate that foreign aid may be detrimental to the recipient country: A prominent German newspaper titled recently "Je mehr Hilfe, desto größer die Armut".[2]

To avoid remaining at the level of mere provocation as the quote above, this paper focuses on one specific effect of foreign aid when investigating the (potentially even adverse) consequences of foreign aid, namely on how foreign aid affects the date of macroeconomic stabilizations. For this purpose, the terms macroeconomic stabilization and socially beneficial reform will be used synonymously: both are defined by bringing welfare reducing distortions or deadweight losses to an end. Concentrating on those changes in a country's welfare level that are induced by reforms, only foreign aid that can be shown to accelerate the implementation of reforms will raise the recipient country's welfare. In contrast, the claim that foreign aid is detrimental to a recipient country seems to be justified whenever foreign aid induces a delayed adoption of a superior policy.

Obviously, foreign aid has numerous and diverse implications for the welfare level of respective recipient countries besides the one investigated here. Furthermore, explanations for the disappointing record of foreign aid should not only be sought in its effect on recipient countries' policies, but also in the donor countries' motives, the organization of international

[1] The figure includes both bilateral and multilateral net official development assistance flows and stems from Worldbank (2003), p.200.
[2] Süddeutsche Zeitung, 23.3.2004, p.21. A further classic reference is Erler (1985).

financial institutions, or in the design of foreign aid programs, to mention just a few determinants of the success of foreign aid programs. Nevertheless the approach chosen here captures a relevant as well as controversial aspect of foreign aid programs that politicians or bureaucrats often neglect when designing development cooperation programs. Foreign aid will be modeled as accruing directly to the government, which obviously is an inappropriate way of modeling traditional project aid but captures the idea of general budget support quite exactly. Thus, this paper might also offer valuable insights for the current controversy on providing aid in form of budget support instead of project aid.

To address the central question of this paper, namely "Does foreign aid delay stabilization?" the paper is organized as follows: chapter II reviews models offering explanations for non-adoption or delay of macroeconomic stabilizations. Chapter III builds on these models by investigating whether the incorporation of foreign aid implies an earlier or, as predicted by the so-called crisis hypothesis, a later date of stabilization. Chapter IV analyzes the addition of anticipated foreign aid to a war-of-attrition model of delayed stabilization to show that, in contrast to the results obtained by Casella and Eichengreen (1996), anticipated foreign aid can be shown to unambiguously accelerate stabilization. Chapter V concludes.

II. Models of delayed stabilization

Talking about reforms one important distinction should be kept in mind: while there are reforms for which there are clearly defined losers ex ante, as for example cutting back subsidies, the focus of this paper will be on those reforms that are expected to be of general benefit.[3] Macroeconomic stabilizations provide a good example for the latter case, as they are a means to leave behind an economic situation characterized by distortions affecting every agent of an economy to some, possibly differing degree. In this context, a very basic, minimal definition of reform underlying the models presented in this chapter is the adoption of a superior policy.

If reform corresponds to the adoption of a superior policy, there is a puzzling question that comes to mind immediately: why, in reality, are changes that a social planner would adopt since they are perceived as raising social welfare often delayed for long periods of time or not enacted at all? The following will offer an overview on models that address exactly this

[3] Cf. Drazen (2000), p.405.

puzzle. Section one focuses on models that make use of non-political, mainly economic arguments while section two reviews political economy models.[4]

1. Non-political, economic arguments

A broad variety of economic arguments has been used to explain non-adoption or delay of socially beneficial reform: Williamson (1994b) assigns a crucial role to lack of human capital or asymmetric information between experts and the constituency that cannot be convinced of the superiority of reform. Orphanides' (1996) main idea is that some situations are more favorable than others for implementing policy changes. Thus, the key tradeoff faced by politicians is between balancing the costs of continuing distortions that characterize the status quo against the benefit of a possibly less costly future stabilization. Drudi and Prati (2000) make the point that delay of debt stabilization may serve a strategic role, namely to signal fiscal sustainability.

1.1 Lack of human capital

As Drazen (2000: 407) points out a very simple explanation for failure to change policy is ignorance of how to do so or disagreement by social-welfare maximizing politicians which alternative policy should be adopted. While this explanation might not necessarily be empirically irrelevant, it cannot explain the interesting question of why clearly superior alternatives to current policy are not enacted.

Williamson (1994b) stresses the crucial role of economic experts who have knowledge and skills decisive for the processing of economic reforms. To implement their reform agenda these experts have to win political support. Thus, asymmetric information between experts and the constituency that cannot be convinced to adopt a superior policy can be a first reason for inaction. A second reason that could hinder a country from carrying out reforms, even if there is agreement on which policy can be considered socially superior to the status quo, is lack of human capital, or in Williamson's terminology, lack of "technopols", i.e. economic experts assuming positions of political responsibility. Obviously, different kind of reform programs hinge on knowledge and expertise to differing extents so that the argument offered

[4] A comprehensive introductory overview on the different strands of research on delayed reform is given in chapter 10 of Drazen (2000). Sturzenegger and Tommasi's (1998) book contains many published political economy papers on reform. After presenting the most important approaches to delayed reform, Rodrik (1993) discusses whether these models can be normatively used for policy analysis and policy design. Bruno's (1998) survey encompasses the empirical literature besides the theoretical one.

above can explain delay of some kind of reform programs but not of others. Reduction of excessive deficits, for example, does not seem to require elaborate economic expertise.

More generally, lack of any kind of capital or infrastructure may be a reason for non-adoption of reform. In this context, delay of reform can be explained by assuming that the accumulation of capital necessary for the implementation of reform takes time.

1.2 Stochastic economic environment for reform

According to Orphanides (1996), in a stochastic economic environment delay in the adoption of stabilization programs can be optimal, and does not necessarily imply irrational behavior of politicians. The basic idea underlying this "optimal waiting" model is that some situations are more favorable than others for implementing policy changes. Consequently, it may be beneficial to wait if there are expectations for an improved future climate in which to carry out a stabilization attempt. The key trade-off is between balancing the costs of continuing distortions against the benefit of a possibly less costly future stabilization, where the latter might stem from required adjustments being less painful or from smaller costs in case of a failed stabilization attempt.

This basic idea is applied to inflation stabilization via exchange rate management, which requires a sufficient stock of foreign exchange reserves. Initial conditions are characterized by the stochastic variable R_t with support $[\underline{R}, \overline{R}]$ that is determined completely by the level of reserves available to the government at the start of the stabilization program. Higher values of R_t denote more favorable initial conditions. A stabilization program is summarized by the adjustment effort $A \in [0, \overline{A}]$. The government is assumed to face a high inflation and a rapid depreciation of the currency. Before stabilization inflation induces a fix resource loss c per period. Orphanides' original model is multistage: it embeds an optimal stopping problem (namely, the decision to successfully complete or abandon a stabilization attempt) in an optimal starting problem (the decision of whether to initiate a stabilization).

Delaying stabilization imposes costs D equal to the sum of per period costs of inflation, c, and expected discounted costs of a new start decision state with uncertain reserves in the following period ("expected cost-to-go"). The latter are denoted by $\beta \cdot EV(R)$, where β is the discount factor, V(R) is the minimum cost-to-go conditional on the initial conditions R that will be specified more precisely below, and E is the expectation of V over the distribution of initial conditions R. This yields

(1) $D = c + \beta \cdot EV(R)$.

In contrast to that, initiating a stabilization induces costs of S given the choice of the optimal level of adjustment A, that is the level of adjustment effort that minimizes S:

(2) $S(R_t) = c + f + w(A) + \beta \cdot EW(X_{t+1}, R_t, A)$.

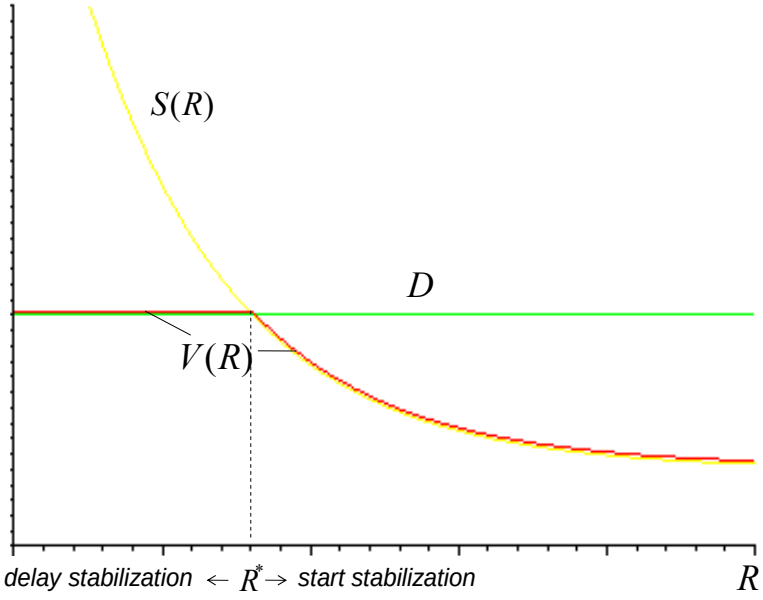
S(R_t) is the sum of the continuing inflation cost, c, fix costs of the adjustment program, f, variable costs of the program, w(A), that are convex in the level of adjustment made, and the expected discounted costs in period t+1 (a stop decision state) given the optimal adjustment level A and initial conditions R, $\beta \cdot EW(X_{t+1}, R_t, A)$. The expectation is taken with respect to X_{t+1}, the stochastic component of the demand for reserves in the next period that has to be met to successfully complete the stabilization attempt. While the cost of waiting and delaying stabilization, D, is constant with respect to the level of the initial conditions variable R_t, the costs of starting a stabilization attempt, S(R_t), are decreasing in R_t.

How does the solution to the government's decision problem look like? The government's objective is to minimize the expected present discounted costs that are incurred until a successful stabilization is completed. Thus, in a start decision state, for $S(\underline{R}) > D > S(\overline{R})$ the optimal stabilization initiation policy corresponds to

(3) $V(R) = \min\{S(R), D\}$

and can be characterized by a critical level of reserves in the current period t, R*, that is defined by the intersection of S(R_t) and D as depicted in Figure II.1.

Figure II.1



It is optimal to attempt a stabilization with an optimal level of initial adjustment A*(R) if R>R*, while to wait if R<R*. This yields the intuitive result that, if the government believes that the costs of implementing a stabilization program in the future may be lower than in the present due to better initial conditions, namely a higher level of initial reserves R, it will use the option of waiting for better circumstances before starting a costly stabilization attempt. In such a case delay of stabilization may be the best decision.

The support of the exchange rate is considered to be the determining factor of stabilization success. Thus, similarly to the start decision being summarized by a critical level of reserves R*, the decision whether to successfully complete a stabilization attempt or to abandon it can be characterized by a critical level X*(R) of the stochastic component of the demand for reserves, X. Whether a second adjustment effort is required in the stop decision state depends both on the realization of the stochastic component of demand for reserves, X, and the level of the first adjustment that is assumed to have generated γA additional reserves[5] which can be used in the stop decision state to support the exchange rate. This implies that a higher first period level of adjustment effort A increases the probability of a successfully completed stabilization.

To summarize, Orphanides' model is able to explain why delay may occur if policymakers believe that bad times are transitory and conditions will improve. For simplicity, the model works with reservation levels and assumes the crucial decision variable, R, to be stochastic. An interesting extension of the model might be to relax the assumption that the initial conditions facing the government during period t are independent of initial conditions faced in the past and government decisions made in previous periods. Relaxing this assumption would allow the government to improve initial conditions before attempting stabilization. Questionable is the assumption that the costs of inflation are totally independent of the level of inflation: even if the latter might approach infinity, the costs are still fixed at level c, an assumption with major implications when considering the stop decision state. Interestingly, the model suggests that reforms should be adopted mostly in good times, that is when the costs of stabilizing are low compared to the constant status quo utility. This contrasts most of the theoretical literature on delayed reform that relies on the so-called crisis hypothesis that states that reforms will only be adopted in perception of a crisis.

[5] Both in modeling adjustment efforts and the demand for reserves as including a random component Orphanides builds heavily on Dornbusch (1991) who deals with stabilization in a static set-up where a stabilization program will be implemented with probability one but has some ex ante probability of failure, so that credibility is always less than full. Dornbusch focuses on what factors raise or lower the probability of success of a stabilization program.

1.3 Delay of stabilization for signaling purposes

Focusing on delayed stabilization of government debt Drudi and Prati (2000) suggest that accumulation of government debt may serve a strategic role: dependable, but not fully credible governments have incentives to accumulate the critical amount of debt that, by stabilizing, allows them to signal their type to avoid being confused with weak governments that default on debt repayments. According to this line of reasoning stabilization of the debt-to-GDP ratio can be used to reassure markets of the sustainability of the fiscal regime to avoid otherwise increasing debt financing cost due to a high risk premium raising the interest rate.

The model's set-up is the following: With incomplete information concerning the type of government the public initially does not know whether a weak or a dependable government is in power. While dependable governments can precommit not to default on debt repayments, weak ones cannot. Consequently, without uncertainty a weak government would be unable to issue any debt at time zero since the public would anticipate its incentives to default. In the two-period model considered, a weak government defaults either in the first or second period depending on whether its strategy is to mimic the dependable type or not. Before the beginning of the first period the risk neutral public sets the first period gross interest rate, R_1, according the no-arbitrage condition: $R_t(1-\theta_t^e)=1$, where θ_t^e denotes the default rate expected by investors in period t. The public's belief on the probability that a dependable government is in charge can be interpreted as the "initial reputation" of the government in power. By the definition of incomplete information, the initial reputation is the same for both types of governments until beliefs are revised at the end of the first period based on observed policies.

Given the first period interest rate, R_1, and an initial stock of debt, D_1, in the first period the government repays either the whole ($\theta_1=0$) or a fraction ($1\geq\theta_1>0$) of the initial debt plus interest payments, $D_1R_1(1-\theta_1)$, depending on its type and strategy, it spends a certain amount of government expenditures, g, and levies distortionary period one taxes, τ_1. In period two, the government repays either all ($\theta_2=0$) or none ($\theta_2=1$) of the debt plus interest payments, $D_2R_2(1-\theta_2)$, which is financed by distortionary taxes, τ_2. This results in the following government budget constraints for period one and two respectively:

(4) $D_1R_1(1-\theta_1)+g=\tau_1+D_2$

(5) $D_2R_2(1-\theta_2)=\tau_2$

The government's objective is to minimize the costs of distortionary taxation minus the

benefit of government expenditure that is assumed to be linear in the level of government spending:

(6) $(h/2)\tau_1 + (h/2)\tau_2 - \alpha g$,

where h denotes the marginal cost of taxation and α corresponds to the marginal benefit of government spending.

Using this setup to investigate perfect Bayesian equilibria in pure strategies it is found that pooling or separating equilibria might prevail: In a separating equilibrium, a weak government will choose to fully default in period one ($\theta_1^W = 1$), and thus reveal itself by not repaying $D_1 R_1$, since the cost of imitating the dependable government's policies is larger than the benefit of issuing debt in period two. If this is not the case, a pooling equilibrium will prevail in which the weak government mimics the dependable government in period one and reveals its type only in period two by fully defaulting on debt and interest payments $D_2 R_2$ ($\theta_2^W = 1$). In contrast, a dependable government repays $D_1 R_1$ and $D_2 R_2$ in both separating and pooling equilibria so that the level of the debt-to-GDP ratio at the end of the second period will always be lower for a dependable government than for a weak one. The following parameter values affect the trade-off between the costs of imitating and the benefit of issuing debt in period two faced by a weak government:

- The higher the marginal benefit of government expenditure, α, the greater is the expenditure a weak government would like to finance in period one and the greater is the benefit of issuing debt between period one and two, D_2, since issuing debt is a means of avoiding high levels of distortionary taxation.
- The higher the costs of marginal taxation, h, the higher are the weak government's costs when imitating a dependable government's policy.
- The higher the initial stock of debt, D_1, the higher are the taxes levied by a dependable government in period one and the higher are the costs of imitating a dependable government.
- The higher the initial reputation, the smaller is the risk premium and the higher are the incentives for a weak government to mimic a dependable government's policies.

Whether the economy will end up in a pooling or a separating equilibrium depends on the specific initial realizations and dynamics of these four parameters. Imagine the debt stock at the beginning of period one to be small and associated with a high initial reputation of the government. This combination induces only small interest payments, so that a dependable government will run a budget deficit as it considers the marginal benefit of government

expenditure to be larger than the increase in interest cost induced by being confused with the weak type of government. Running a deficit, a weak government will mimic the dependable government – a pooling equilibrium will prevail. A budget deficit not only leads to a rising level of debt, but also to a worsening of reputation. Consequently, updating of beliefs on the type of government implies higher interest payments in period two. Defining stabilization as a stable debt-to-GDP ratio, a first situation that provides a rationale for delayed stabilization is characterized by risk premium and debt levels that are below a critical threshold in period one so that pooling equilibria prevail as no type of government has the incentive to tighten the fiscal regime in period one.

Only when risk premium or debt levels exceed this critical threshold, separating equilibria[6] will prevail as interest payments become so large that dependable governments want to signal their type in period one to profit from a higher credit rating and lower interest payments in period two. Since signaling requires primary surpluses or at least a balanced primary budget, stabilization results. Thinking of a horizon longer than two periods, even dependable governments find it optimal to delay the stabilization of the debt-to-GDP ratio. This is the case because dependable governments only have an incentive to tighten the fiscal regime when a sufficiently large stock of debt has been accumulated in past periods since it is under these circumstances that the signaling effect on credit ratings is larger.[7]

Given the specification of the government's objective function, a driving force of Drudi and Prati's signaling model of fiscal policy is that all types of government always have an incentive to run positive primary budget deficits as this is a way to avoid distortionary taxation. The signaling model presented above does give an explanation of why fiscal stabilization may be delayed, but it does not clarify whether fiscal stabilization can be considered welfare improving for the society as a whole. This contrasts the definition of stabilization used in this paper, namely that of stabilization being the adoption of a superior policy.

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[6] Two cases of separating equilibria exist: in the first case, debt plus interest maturing in period one is large enough to induce a dependable government to run a budget surplus. A weak government never mimics a budget surplus as it always prefers a higher level of expenditures. In the second case, parameter values are such that a dependable government would like to run a budget deficit due to a relatively low level of debt plus interest maturing (but not as small as in the pooling equilibrium). But not to be confused with a weak government, the dependable government has to cut its expenditures below the unconstrained optimal level by running a balanced primary budget. For this signaling strategy to be attractive for a dependable government the benefits of paying lower interest payments after signaling have to outweigh the cost of cutting expenditure in the previous period. Obviously, the incentives to signal are positively correlated with a poor initial reputation and with a high interest rate premium.

[7] Testing the theoretic predictions of their model econometrically, Drudi and Prati get affirmative results: the signaling power of primary surpluses seems to be largest when the debt stock is high and separating equilibria prevail.

2. Political economy models of delayed stabilization

In contrast to the models presented so far, the common feature of all political economy models explaining delayed stabilization is the crucial role they assign to conflict among heterogenous interest groups - an idea that was prominently laid down in Olson's (1982) stagnation hypothesis and formalized by Benhabib and Rustichini (1996). A first class of political economy models that aims at offering an explanation for delayed stabilization relies on the "tragedy of the commons": Assuming that interest groups have common access to the same pool of government resources Velasco (1998) models delayed stabilization as the result of a switch in interest groups' wealth-dependent strategies, namely from appropriative to cooperative behavior, after a sufficiently large level of debt has been accumulated.

A second category of models stresses that uncertainty regarding the distribution of individual gains and losses from reform can prevent socially beneficial reform from being implemented (Fernandez and Rodrik, 1991). Building on Fernandez and Rodrik's static model Labán and Sturzenegger (1994a) endogenize the change in relative bargaining positions for different groups over time and model delayed stabilization as the outcome of a distributional conflict between two risk averse groups in the presence of post-stabilization payoff uncertainty and costly policy reversion.

Conflict on how a cost imposed by reform is to be distributed among different social groups is the main element in a third class of models: Labán and Sturzenegger (1994b) modify the setup in Labán and Sturzenegger (1994a) by substituting the assumptions of risk aversion and post-stabilization payoff uncertainty for the existence of a cost of stabilization. Similarly, Alesina and Drazen's (1991) war-of-attrition model makes use of distributional conflict on how the cost of stabilization is to be shared, but adds the further assumption of incomplete information concerning how much the other interest group suffers from the status quo of no reform.

2.1 Blockade of policy change by interest groups

The idea that powerful interest groups block socially beneficial policy change because it is not in their individual interest is prominently laid down in Olson's (1982) stagnation hypothesis: some groups especially prospering economically in periods of economic success are also able to increase their political power. Having achieved positions of both economic and political power these groups clearly have an incentive to protect their gains by blocking (even socially beneficial) change that might be detrimental to them. A consequence of this

blockade will be economic stagnation or even decline. Although Olson's *The Rise and Decline of Nations* is not primarily a theory of non-adoption of reforms, many of the models explaining non-adoption or delay of reform that are presented in the following rely heavily on the role of interest groups.

Benhabib and Rustichini (1996) attempt to formalize Olson's stagnation hypothesis in a common property model in which the interest groups' optimal behavior (cooperation or appropriation) depends on the level of wealth that is taken to correspond to the economy's capital stock. They show that for utility being linear in consumption and Cobb Douglas production technology with positive, but decreasing returns to capital, cooperative behavior can be sustained only if the capital stock is low. Since the marginal product of capital is high for low levels of the capital stock, capital is too valuable to risk in a poor economy: appropriative behavior would imply high consumption today at the cost of a small capital stock in the next period. Due to the additional assumption of a linear utility function cooperative behavior can no longer be sustained at higher levels of wealth.

2.2 Common property model

As Benhabib and Rustichini, in his approach to explaining delay of socially beneficial policy changes Velasco (1998) makes use of the idea of the "tragedy of the commons": the fact that government resources are common property out of which interest groups can finance their preferred expenditures induces a level of government spending that exceeds revenues. As a consequence, government debt grows as time passes. Finally, delayed stabilization results nevertheless since interest groups' optimal strategies are wealth-dependent: appropriative behavior is only optimal when government debt is low, while cooperative behavior inducing stabilization becomes optimal at high levels of debt.

A major assumption of Velasco's infinite horizon, discrete time model is that of fragmented fiscal policy making: the central fiscal authority is weak so that each of the interest groups can influence fiscal authorities to set net transfers on the group's target item at some desired level. Consequently, economic policy reflects the sum of the interest groups' behavior with respect to the common property, namely government wealth b_t that is assumed to be negative. The government budget constraint is:

$$(7)\ b_{t+1} = Rb_t + y - z_t - \sum_{i=1}^{n} g_{it}\ ,$$

where y is exogenous non-tax revenue per period and g_{it} is interest group's i net transfer level

at time t, that is subsidies the groups receives minus the taxes it pays. z_t stands for a deadweight loss incurred every period as long as interest groups behave appropriative, that is demand total net transfers that exceed government revenues. Appropriative behavior has to be financed by issuing debt at gross real interest rate R. Only if all groups agree to cooperate total transfers imply a constant level of debt and the deadweight loss disappears (z_t=0). Such a situation is referred to as stabilization.

The n symmetric interest groups indexed by i determine their net transfer level g_{it} at time t subject to one constraint that results from the government budget constraint combined with a solvency condition guaranteeing that debt cannot grow without bound. An interest group's transfer demand will only be granted by the government if its desired net transfer does not exceed 1/nth of the income flow from maximum wealth the government can have given any starting point b_t, exogenous revenue y and an expected sequence of deadweight losses. If the desired net transfer violates this condition the interest group gets no net transfers at all. Every interest group maximizes its discounted utility that is logarithmically increasing in the received net transfer level subject to the evolution of b_t, the constraint mentioned above and the other groups' strategies.

To derive interest groups' demand for transfers, Velasco focuses on Markov strategies in which net transfers are restricted to be functions of the payoff-relevant state variable b_t only. Calculating transfer demand functions yields the result that fragmented fiscal policy-making leads to a deficit bias: Appropriative behavior implies a total demand for transfers that exceeds revenues.[8] Debt is accumulated and government wealth decreases over time. Calculating the interest groups' lifetime utilities under appropriative as well as cooperative behavior by substituting the corresponding transfer levels g_{it} into the utility function one finds that for all b_t all groups would be better off in a cooperative equilibrium.[9] But this does only mean that cooperation is preferred to appropriation if all interest groups cooperate. To investigate whether the cooperative equilibrium can ever be sustained Velasco analyzes a Markov switching equilibrium in which each group plays trigger strategies: starting from a situation with cooperative behavior each interest group acts in a cooperative way as long as all others do, but switches to appropriative behavior in the next period as soon as another group

[8] This is true for reasons parallel to the tragedy of the commons: since property rights are not defined over each group's share of overall government wealth, any portion of government wealth not spent by one group will be spent by another group. Consequently, there are incentives to raise transfers above the collectively efficient rate.
[9] A cooperative equilibrium corresponds to a situation with a balanced budget in which each group receives 1/nth of exogenous income plus interest payments on government wealth.

deviates from cooperation in the current period. Obviously, under these assumptions a cooperative equilibrium can only be sustained if utility from stabilizing weakly exceeds utility from defecting:

(8) $U^s(b_t) \geq U^d(b_t)$.

Given $U^d(b_t) > 0$ there exists a unique level of government wealth, b_t^*, at which the utility from stabilizing and the utility from defecting are just equal. For $b_t > b_t^*$, that is for low levels of government debt, utility is maximized from defecting and cooperation is not sustainable. Interest groups will play appropriative Markov strategies and debt will grow. After some time debt will be so high that $b_t < b_t^*$ and utility associated with defection falls below that associated with stabilizing. This is the case as the elimination of the deadweight loss after stabilization becomes more attractive as debt grows and the payoff from defecting falls because the government becomes poorer and poorer. As a switch in fiscal policy occurs only after a sufficiently high level of debt has been accumulated Velasco's model can convincingly explain delay of socially optimal policy changes.

2.3 Uncertainty about individual post-stabilization payoffs

2.3.1 Non-adoption of reform

Uncertainty regarding the distribution of individual gains and losses from reform can prevent reform from being implemented even if it is common knowledge that it is socially optimal - this is the main idea of Fernandez and Rodrik's (1991) model on non-adoption of reform.

Imagine, for example, the following situation in which a welfare enhancing reform is decided upon by majority voting: it is common knowledge that the reform would create a group of losers and a group of winners. Assume for example, that 60% of the population is known to be better off with reform ex post, while 40% would be worse off. To introduce uncertainty it is assumed that, ex ante, only some of the winners of reform know for sure that they would benefit from reform being enacted: e.g. only two thirds of the 60% who would gain from reform, that is 40% of the total population, know that they would be among the beneficiaries from reform and consequently, would vote in favor of it. The remaining 60% of the total population are equally likely to belong to the remaining 20% of the whole population that will be winners from reform ex post. Those 60% will calculate their expected benefit from reform before deciding whether to vote in favor of or against it. Obviously, it depends

on the magnitudes of gains and losses whether their expected benefit from reform is positive or negative. For a negative expected benefit from reform, the presence of individual-specific uncertainty would induce a reform that benefits a majority of 60% ex post to be rejected ex ante.

Fernandez and Rodrik formalize this argument using the example of trade liberalization in a two-sector model. Trade liberalization is assumed to lower wages in sector 1, while raising wages in sector 2. Workers who wish to move from the first to the second sector can do so, but only after incurring some cost that is not fully known ex ante. This cost of switching sectors is assumed to have two components: θ, a known general investment cost (e.g. in sector-specific human capital), and c_i, an individual-specific cost (e.g. representing differences in individual ability and productivity), incurred only upon actually switching sectors. Only after the general investment θ has been made the individual-specific value of c_i is revealed; before only the distribution of c_i, f(c_i), is known. As individuals in the second sector profit from higher wages, they unambiguously support reform. In contrast to that, individuals in the first sector will only vote in favor of reform if they expect their net utility to rise after the adoption of reform. Since reforms are decided on by majority voting, adoption of reform requires at least half of the voters to expect a net benefit.

Workers must make two decisions: first, whether to undertake the general investment θ and, only in case that this has been decided affirmatively, second, whether to actually switch sectors which requires incurring cost c_i. Starting with the second decision workers' optimal choice can be characterized as follows: A worker who has already invested θ will switch from sector 1 to sector 2 if the difference between wages in both sectors is larger than his individual c_i. This defines a cut-off level of c, $\tilde{c}$, such that all workers with $c_i \leq \tilde{c}$ will switch from the first to the second sector. $\tilde{c}$ is defined by

(9) $\tilde{c} = \tilde{w}_2 - \tilde{w}_1$

where $\tilde{w}_j$ is the equilibrium wage in sector j, j=1,2, after reform.

Since workers are assumed to be identical ex ante, a risk-neutral worker in the first sector will incur the general investment cost θ if his expected net benefit from doing so is nonnegative, that is, if

(10) $F(\tilde{c})[\tilde{w}_2 - \int_{\underline{c}}^{\tilde{c}} f(c)cdc[F(\tilde{c})]^{-1}] + [1 - F(\tilde{c})]\tilde{w}_1 - \theta \geq \tilde{w}_1$,

where $\underline{c}$ is the minimum value of all c_i s and F(c) is the cumulative distribution function. The right hand side corresponds to the certain status quo income, the left hand side to the expected

benefit from incurring cost θ.

What are the mechanisms used by Fernandez and Rodrik to make it possible that a reform with an expected benefit for society as a whole is not adopted? First, it is the assumption of majority voting that translates small differences in expected utility associated with adoption or non-adoption of reform into the binary decision whether to support or reject reform. Contrastingly, a mechanism that without causing any costs translates the intensity with which individuals favor or reject reform into policy outcomes (e.g. frictionless lobbying) would implement all socially optimal reforms. Second, the existence of a sector that benefits from reform with certainty is crucial.[10] With the existence of only one sector all individuals were identical, and a socially beneficial reform would be adopted under majority voting since the expected benefit from reform would be the same (and nonnegative) for all individuals. Third, ex post compensation of the losers has to be ruled out to get the result that socially beneficial reform might not be adopted. To summarize, the two crucial ingredients driving the result that, even in the absence of risk aversion, a majority of voters opposes a reform ex ante that benefits a majority ex post are (i) *heterogeneity* between individuals in sector 1 and sector 2 with respect to their expected benefit from reform and (ii) ex ante *individual (but no aggregate) uncertainty* of sector one individuals on whether they will be a gainer or loser from reform.

Extending their model to a two period version, Fernandez and Rodrik establish a result that they call "status quo bias": only if a reform is passed information is revealed on how individuals actually fare under reform.[11] If a reform has proved to be unpopular only after being adopted while the majority's ex ante beliefs were that reform would benefit them it could be reversed in a second vote. In contrast to that, if a reform is not passed no new information is revealed since the status quo is maintained. Thus, in a dynamic setting, a status quo bias arises since reforms that are initially rejected continue to be so while some reforms that have been implemented will be reversed.

A crucial, but questionable assumption of the model stipulates that even reforms with large net gains create some losers. Especially in the context of macroeconomic stabilizations it is hard to imagine a socio-economic group that does not gain from stabilizing. The war-of-

[10] Cf. Drazen (2000), p.416.

[11] This assumption might be too rigid since to some degree information concerning the distributional consequences of reform might be gained from experiences with similar reforms implemented abroad. An example is the German "Ökosteuer" that has been raised from 1999 on – a date at which 10 member states of the European Union had already established comparable taxes with similar distributional consequences. As the tax income is mainly used to reduce increases of pension insurance fees unemployed and retired people who do not pay the fee are the main losers. In contrast, employers in most branches of the economy are among the winners as higher energy costs are more than compensated by lower pension insurance fees (cf. Süddeutsche Zeitung, 21.4.2004, p.2).

attrition model presented in section 2.4.3 that focuses on distributional struggles arising from the possibility of an unevenly shared burden of reform offers an explanation why even reforms that virtually benefit everybody may be adopted only after some delay. Although the example presented in their model refers to trade reform Fernandez and Rodrik's central argument can be applied to any reform that creates a distribution of gains and losses that is partially uncertain ex ante. The model's focus on individual uncertainty certainly is an important and convincing contribution to the literature on why socially beneficial policy changes are not adopted, but it cannot explain why a policy change that has been rejected in the first place may still be enacted with delay. In order to address this point Labán and Sturzenegger (1994a) apply a dynamic version of the Fernandez-Rodrik model to inflation stabilization.

2.3.2 Delayed stabilization

Labán and Sturzenegger (1994a) model delayed stabilization as the result of a distributional conflict between two risk adverse groups in the presence of post-stabilization payoff uncertainty and costly policy reversion. Compared to the Fernandez-Rodrik model, they add time dependency by introducing learning in how to use a financial adaptation technology. This technology is only available to the rich and allows them to protect their assets against inflation taxation. Additionally, it increases the rate of inflation and concentrates the burden of inflation on the poor, which in turn induces the poor to accept conditions for stabilization that they were not willing to accept before.

In the model, per period endowment levels of the two types of agents, rich and poor ones (represented by the indices r and p), are e_r and e_p respectively. Before stabilization the poor receive a per period transfer g financed by distortionary taxation levied on both agents. As the rich have access to a tax shielding technology that allows them to optimally reduce the base over which a distortionary tax is collected a rich agent can decide which share f of his endowment he wants to protect against taxation. Agents' per period consumption equals their net endowment. The utility function is assumed to be a constant absolute risk aversion utility function, with risk aversion coefficient $\gamma>0$.

In the pre-stabilization economy, the government budget constraint is given by

$$(11)\quad g = \frac{\pi_t}{1+\pi_t}(e_r + e_p - F_t),$$

where F_t denotes the aggregate level of tax shielding chosen by the rich in period t and represents the share of their total endowment that is exempt from distortionary taxation. The

tax rate $\pi/(1+\pi)$ is endogenous and depends on the aggregate level of tax evasion, where π is the inflation tax. Using the financial adaptation technology for an amount f_t a rich agent faces a cost of $c(f_t, K_t)$, where $K_t = \sum_{z=0}^{t-1} F_z$ denotes the aggregate level of knowledge regarding financial adaptation accumulated until the beginning of period t. Due to a learning process an increase in the stock of experience on how to use financial adaptation technologies is assumed to reduce the marginal cost of engaging in tax evasion (c_K <0). Furthermore, $c_f > 0$, $c_{ff} > 0$ and $c_{fK} < 0$. Before stabilization the poor pay a proportion θ_t of distortionary taxation in period t and the rich bear a fraction (1- θ_t), where

$$(12)\ \theta_t = \frac{e_p}{e_p + e_r - F_t}.$$

Since inflation has distortionary effects, it generates welfare losses that are represented by an additive reduction in the endowment of each agent equal to $\phi(\pi)$, with $\phi'(\pi)$>0 and $\phi''(\pi)$>0. For simplicity, it is assumed that post-stabilization taxes fall completely on the rich.

At the beginning of each period agents decide whether to stabilize or not. Stabilization is defined as a fiscal reform that balances the budget via a combination of spending cuts and increased taxation and eliminates the distortions associated with inflation. Stabilization can only be enacted if both types of agents agree. The model's only source of uncertainty is instrument uncertainty in an environment otherwise characterized by perfect information, i.e. agents do not know a priori how effective the government will be in enforcing the agreed upon stabilization program. This uncertainty is only resolved after program implementation. Expected post-stabilization transfers are $E(\tilde{g}) = te_r$, where t denotes the tax rate after stabilization. Instrument uncertainty is conceptualized by assuming that the amount of post-stabilization transfers equals $\tilde{g}$, where $\tilde{g} = te_r - \alpha$ with α being a random variable with zero conditional mean and variance σ_α^2. Thus, certainty equivalent transfer levels after stabilization, $\bar{g}$, can be denoted by

$$(13)\ \bar{g}_p^s \cong te_r - \frac{\gamma\sigma_\alpha^2}{2} \qquad \text{and} \qquad \bar{g}_r^s \cong -(te_r + \frac{\gamma\sigma_\alpha^2}{2}),$$

where $\gamma\sigma_\alpha^2/2$ is the risk premium both agents are willing to pay to avoid uncertainty associated with the stabilization outcome, i.e. for a situation in which the poor receive $\bar{g}_p^s$ and the rich pay $\bar{g}_r^s$ with probability one.

The rich are assumed to maximize the discounted sum of their utility by choosing optimal

levels of financial adaptation f_1 and f_2. What can be learned by examining the maximization problem's first order condition for a situation in which stabilization is not achieved in either period? It reveals that the given economy is characterized by a positive and increasing equilibrium level of financial adaptation, an endogenously increasing level of inflation and a regressive impact of financial adaptation, $\theta_2 > \theta_1$. Since we are considering a two period economy, delay exists whenever stabilization is attempted in the second period but is not an equilibrium in the first period. When will this be the case? The poor and the rich will want to stabilize whenever their utility with stabilization is greater than that without stabilization. Thus, for stabilization in the second period to be feasible it must be the case that:

(14) $U(e_p + t_2 e_r - \gamma\sigma_\alpha^2/2) \geq U(e_p - \phi(\pi_2) + (1-\theta_2)g)$ and

(15) $U(e_r - t_2 e_r - \gamma\sigma_\alpha^2/2) \geq U(e_r - \phi(\pi_2) - (1-\theta_2)g - c(f_2^*, K_2))$.

Equations (14) and (15) implicitly define the minimum expected tax rate that the poor are willing to accept, t_{2p}, and the maximum expected tax rate that the rich are willing to pay, t_{2r}. Only when the latter is higher than the former, $t_{2r} > t_{2p}$, there is a non-empty set of tax rates in period 2 that both the rich and the poor are willing to accept and stabilization will be feasible. Evaluating this condition given that U(.) is a monotonic, strictly increasing function, the existence of such an agreement area requires

(16) $\gamma\sigma_\alpha^2 \leq 2\phi(\pi_2) + c(f_2^*, K_2)$.

Delayed stabilization not only requires t_{2r} being higher than t_{2p}, but also $t_{1r} < t_{1p}$ to guarantee that stabilization does not already take place in the first period. Similarly as above, the first period set of possible agreements to stabilize is empty if

(17) $\gamma\sigma_\alpha^2 > 2\phi(\pi_1) + c(f_1^*, K_1)$.

Equations (16) and (17) show that there will only be incentives to stabilize when the economy-wide gains from stabilization (end of overall distortions and money wasted by investments in the financial adaptation technology) at least compensate the risk premium of engaging in stabilization with uncertain outcome. It may be counterintuitive that stabilization is not achieved in the first period if everybody anticipates that it will be in the second, but in the given set-up with risky stabilization this result is reasonable: while inflation is low, its costs will not be large enough to justify engaging in a process with risky outcomes. But as inflation endogenously increases every period, the poor's relative position progressively deteriorates so that they are willing to agree to stabilize at a lower level of expected transfers

(formally, $t_{2p} < t_{1p}$). At some point further delays no longer constitute an equilibrium and stabilization is enacted.

To summarize, for delayed stabilization to be optimal under the conditions established in equations (16) and (17) the model makes use of two crucial assumptions: (i) the combination of risk aversion and uncertainty regarding post-stabilization payoffs and (ii) the existence of distributional conflict as this is the only reason for the use of the financial adaptation technology that only redistributes income from the poor to the rich without reducing the total amount of resources paid as inflation tax. Without the use of financial adaptation inflation would not increase over time and the optimal decision would be to either stabilize in period one or never, ruling out delay.

A comparison of Labán and Sturzenegger's model of uncertainty with deterioration with Orphanides' model of optimal waiting might be worthwhile[12]: in the optimal waiting model the status quo utility is constant and the decision whether to stabilize or not depends on the benefit of reform compared to its costs. In contrast to that, the uncertainty model compares the net benefit of stabilization to the status quo of no reform and the driving force is the deterioration of the status quo. In the uncertainty model stabilization results since utility associated with the status quo is falling even faster than relative costs of reform are rising. This results in the major difference that in the optimal waiting model stabilization occurs when its costs are low, while in the uncertainty model stabilization occurs when its costs are high compared to its benefits.

2.4 Distributional conflict

2.4.1 Distributional conflict and costly stabilization

A closely related approach to explaining delayed stabilization is presented in Labán and Sturzenegger (1994b). The major difference to the set-up described in section 2.3.2 is that the assumptions of risk aversion and post-stabilization payoff uncertainty are substituted for the existence of a cost of stabilization, Q, that has to be paid by both groups if stabilization is implemented. All other central features remain the same. The model described in section 2.3.2 already shared the ingredient of distributional conflict with Alesina and Drazen's war-of-attrition model outlined in section 2.4.3. Dropping the assumptions of risk aversion and post-stabilization payoff uncertainty in favor of a cost of stabilization is a further step towards the class of war-of-attrition models.

[12] Cf. Drazen (2000), p. 421f.

How does the slightly changed specification of the model influence its results? Since the set-up now incorporates an infinite horizon the date of stabilization can be specified by the smallest $t \geq T^*$, where T* solves

(18) $2\phi(\pi_{T^*}) + c(f^*_{T^*}, K_{T^*}) = (1-\delta)2Q$.

The left hand side of equation (18) can be shown to be increasing in t. Parallel to (16) in the first version of the model, stabilization will take place in the first period in which the agreement area for a transfer level both the poor and the rich are willing to accept becomes nonnegative. The date of stabilization depends only on aggregate costs and benefits of delaying stabilization (and not on the distributional parameter θ) where the benefits stem from the fact that discounting with factor δ reduces the relative costs of stabilizing tomorrow compared to the costs of stabilizing today. Consequently, the timing of stabilization is essentially a decision of when to pay the adjustment costs.

To summarize, in the second version of their model Labán and Sturzenegger show that, even in the presence of fully informed and rational agents, also the interplay between stabilization costs and distributional conflict may generate delay as well as change the conditions for stabilization through time as rising inflation worsens the relative bargaining power of the poor.

2.4.2 Cycles of inflation

An interesting extension of the model outlined above that points at further dynamics after stabilization is provided by Mondino, Sturzenegger and Tommasi (1996): if dealing with financial adaptation is expensive, stabilization will lead to remonetization. Remonetization will bring the economy back into the initial state so that groups demand transfers again and inflation resumes.

The set-up is very similar to that described above: there is distributional conflict due to the existence of a financial adaptation technology, but neither costs of stabilization nor post-stabilization payoff uncertainty exist. Instead both groups make use of the financial adaptation technology and may demand subsidies that have to be financed by an inflation tax. The crucial assumptions are the following: in general, there is a cost of operating with financial alternatives, namely

(19) $T(f_t) = \begin{cases} \tau f_t & for \quad f_t < e \\ \tau f_t + K & for \quad f_t = e \end{cases}$.

But f can be increased at no costs by steps of size J, mathematically

(20) $f_{t+1} \in \{0, J, 2J, ... f_t, \min[f_t + J, e]\}$,

and can be reduced for free. The cost of inflation π is $\alpha\pi$.

Different kinds of equilibria can be shown to exist depending on the marginal cost of inflation, α, and the marginal cost of using financial adaptation mechanisms, τ. Inflation cycle equilibria for example are the result of low marginal costs of inflation and low initial levels of financial adaptation since when faced with this situation groups demand subsidies. Being aware that subsidies have to be financed via inflation taxes groups make use of financial adaptation. As a consequence, the process of inflation and the use of financial adaptation deepen over time. At some point further subsidies entail inflation costs and financial adaptation costs that are higher than the subsidies' benefit so that groups will agree to stabilize and inflation will go down to zero. Next period, costs of inflation will be low due to remonetarization, groups will demand subsidies again and the whole cycle restarts. No inflation equilibria arise for sufficiently large costs of inflation. Equilibria with constant low inflation result when the costs of financial adaptation are so high that it is preferable for individuals to bear the full inflation tax rather than to operate in foreign currency etc.. Delayed (permanent) stabilization as in Alesina and Drazen's (1991) model is a further kind of equilibrium that exists given the assumption of full memory in the financial adaptation technology, i.e. the assumption that return to every level of financial adaptation previously attained is costless. Delayed stabilization results because, once stabilization has been achieved, there is never an incentive to demand subsidies again since this would automatically lead to the maximum amount of financial adaptation previously exercised.

The contribution of Mondino et al. to the existing literature clearly is integrating the possibility of policy inaction, delay and policy cycles in one single framework without relying on uncertainty or asymmetric information.

2.4.3 Distributional conflict and asymmetric information

In contrast to that, asymmetric information is one important ingredient of Alesina and Drazen's (1991) model that aims at explaining delayed stabilization as a war of attrition[13] between interest groups with conflicting distributional objectives. In their model, it is common knowledge that stabilization, basically eliminating budget deficits, benefits each

[13] Although not explicitly mentioned by the authors, the idea of a war of attrition is likely to be inspired by what Hirschman (1985) calls the tug-of-war thesis or social-conflict theory of inflation, that is "(t)he explanation of inflation in terms of social conflict between groups, each aspiring to a greater share of the social product" (p.57) in a situation in which "a social group holds enough power or influence to command additional wealth and income for itself (or to escape participation in some loss that is suffered by the economy), but not enough to do so in a permanent way through a definite transfer" (p.66).

group by putting an end to utility reducing distortions. Despite widespread agreement on the socially beneficial nature of stabilization there is disagreement on how the burden induced by the policy change is to be shared. Consequently, a war of attrition arises in which each group tries to wait the other groups out hoping to shift the burden of stabilization elsewhere. Delay ends and stabilization finally occurs when one group realizes that it is relatively weaker compared to the other group and agrees to bear a larger share of the burden of stabilization.[14] As Drazen (2000: 432) points out, this view of reform is based on the observation that reform is a public good: groups can benefit from it without bearing any costs.

Alesina and Drazen describe an economy in which the government is running a positive deficit (inclusive of debt service) due to the failure of two interest groups indexed by i, i=1,2, to agree upon a stabilization program. Without an agreement to stabilize only distortionary taxes are available for financing government expenditures *g* and revenue from those taxes is insufficient to fully cover government expenditures: a fraction γ of government expenditure is covered by distortionary taxation τ, and a fraction 1-γ is financed via debt. All payoffs are discounted with a constant interest r, r>0, and debt bears the same interest rate r. Thus, both the level of taxes and the level of debt are rising as time passes. The fact that taxes before stabilization are distortionary induces a per period utility loss that is assumed to differ across the two interest groups representing the whole population. This utility loss is captured by the interest group specific realization of the parameter $\theta_i : K_i(t) = \theta_i \tau(t)$, where θ_i is drawn from a distribution F(θ) with support $[\underline{\theta}, \overline{\theta}]$. θ_i is assumed to be private information: the exact value of θ_i is only known to an interest group itself whereas the other group only knows the distribution F(θ). Stabilization occurs as soon as one group concedes, i.e. agrees to pay a share α>1/2 of the cost of stabilization. Stabilization has two implications: first, stabilization implies a move away from distortionary means of taxation ($K_i(t) = 0$). In this respect, all groups clearly benefit from stabilization. Second, stabilization is defined as an increase in taxes sufficient to yield zero deficits and consequently, a constant level of debt and taxes. While before stabilization each interest group paid half of distortionary taxes non-distortionary taxes are shared unequally with the loser bearing a share of α>1/2, the winner 1-α. The fraction α is not bargained upon, but exogenous. It is assumed to represent the degree of polarization of a given society with a value of α close to one representing a highly polarized society. It is exactly this unequal sharing of the burden of reform or, put in other

[14] A very similar version of Alesina and Drazen's war-of-attrition model in which inflation appears explicitly, but there is no explicit evolution of debt is presented by Drazen and Grilli (1993) who find exactly the same type of equilibrium as in the original model.

words, the fact that interest groups benefit from stabilization to a differential extent (combined with the assumption of asymmetric information concerning the opponent's utility cost of distortionary taxation) that will provide the incentive to delay reform.

To underline that there is no need of an increasing level of debt (implying rising taxes and thus, an increase of disutility from distortions) to induce stabilization and to keep functional forms as simple as possible, the following more formal presentation of Alesina and Drazen's model deviates from the original one as γ is set equal to one and debt is assumed to be zero. This implies that both taxes before and after stabilization, $\tau(t)$ and $\tau(T)$ respectively, equal government expenditures g : $\tau(t) = \tau(T) = g$. Neglecting constant income, flow utility of group i before stabilization reflects both the effects of taxes paid and the utility loss due to distortionary taxation:

(21) $u_i(t) = -(1/2 + \theta_i)g$.

Discounted life time utilities of loser and winner from the date of stabilization onward, V^L and V^W , simply correspond to constant flow utilities after stabilization divided by r:

(22) $V^L = -\frac{\alpha g}{r}$ and $V^W = -\frac{(1-\alpha)g}{r}$.

Thus, if stabilization is implemented at date T, lifetime utilities of the winner and of the loser are given by

(23) $U^j(T) = \int_0^T u_i e^{-rx} dx + e^{-rT} V^j(T)$ with $j \in \{W, L\}$.

Each group maximizes expected present utility by the choice of a date to concede (where conceding brings about stabilization via the agreement that the conceding group bears a higher share α of taxes after stabilization). Expected utility as a function of one's chosen concession time T_i is the sum of the lifetime utility of the loser, $U^L(T_i)$, multiplied by the probability that the opponent has not yet given up at one's chosen time of concession, T_i , and the lifetime utility of the winner, $U^W(T_i)$, multiplied by the probability that the opponent concedes first at any date X for all $X \leq T_i$. Thus, if H(T) denotes the distribution of the opponent's optimal time of concession and h(t) the associated density function, the maximization problem can be put as follows:

(24)

$$\max_{T_i} EU(T_i) = (1 - H(T_i)) \left(\int_0^{T_i} u_i e^{-rx} dx + e^{-rT_i} V^L(T_i)\right) + \int_{x=0}^{x=T_i} \left(\int_0^x u_i e^{-rz} dz + e^{-rx} V^w(x)\right) h(x) dx .$$

As 1-H(T(θ))=F(θ), we can now use equation (24) to find a symmetric Nash equilibrium in

which each group's concession behavior is described by the same function T(θ). The following first order condition implicitly defines a group's optimal concession behavior T(θ):

$$(25)\ \theta + 1/2 - \alpha = -\frac{f(\theta)}{F(\theta)}\frac{(2\alpha - 1)}{T`(\theta)r}.$$

(A more comprehensive derivation of the equilibrium condition independent of functional assumptions is given in appendix A.) As in the basic war-of-attrition model from biology[15] the optimal time of concession is determined by the equilibrium condition that the cost of waiting another instant to concede just equals the expected benefit from waiting. The left hand side of equation (25) stands for the costs of waiting another instant to concede, while the right hand side represents the expected gain from waiting another instant to concede, namely the probability that the opponent concedes, $-\frac{f(\theta)}{F(\theta)}\frac{1}{T`(\theta)}$, multiplied by the gain if the opponent concedes, $(2\alpha - 1)/r$. At each given date, information is revealed and each agent revises his beliefs about the other player's type. However, this process is predictable[16] in the sense that the conditional probability that the other agent concedes given that he still resists in a specific moment can be computed before the start of the game. To guarantee that concession occurs in finite time with probability one it has to be assumed that $\underline{\theta} > \alpha - 1/2$, that is that the marginal costs of waiting are positive for all possible realizations of θ. Solving equation (25) for T`(θ), assuming θ to be uniformly distributed on $[\underline{\theta}, \overline{\theta}]$ and integration using the method of partial fractions and the initial boundary condition $T(\overline{\theta}) = 0$ yields the optimal time of concession function,

$$(26)\ T(\theta) = \frac{(2\alpha - 1)}{r(\underline{\theta} + 1/2 - \alpha)}\left(\ln\frac{\theta + 1/2 - \alpha)}{\overline{\theta} + 1/2 - \alpha} - \ln\frac{\theta - \underline{\theta}}{\overline{\theta} - \underline{\theta}}\right),^{17}$$

that is decreasing in θ. Given the optimal concession time as a function of θ, T(θ), the date of stabilization in a war of attrition with two interest groups corresponds to the minimum value of T, that is the optimal time of concession of the group with higher cost θ.

An extremely valuable and interesting aspect of Alesina and Drazen's war-of-attrition model is that it allows for comparative statics on how different values of observable parameters characterizing economies affect the expected date of stabilization. Ceteris paribus, stabilization is hastened

[15] See Riley (1980).
[16] See Bliss and Nalebuff (1984), p.5.
[17] For the derivation of equation (26) see appendix B.

(i) for a higher value of γ, that is, for the specified function of utility loss, if a greater fraction of the pre-stabilization deficit is financed via distortionary taxation,

(ii) if the costs of living in an unstabilized economy, K_i, increase for an unchanged distribution of θ_i,

(iii) in a politically less polarized society, i.e. for a smaller value of α.

Last, assume that the rich suffer less from pre-stabilization distortions: θ`(y)<0 and θ``(y)<0. A larger inequality of income due to a mean-preserving spread of income - to be able to maintain the assumption of unknown relative positions in the income distribution - that keeps the expected minimum income constant implies a later expected date of stabilization.

What are the crucial factors the war-of-attrition model makes use of to explain delay of a socially beneficial policy? First, as a single agent would decide to stabilize immediately being aware that he himself had to bear the costs of stabilization sooner or later, the existence of interest groups and their ex post heterogeneity (introduced by the parameter α that reflects the unequal sharing of the burden of reform) is a prerequisite for the distributional conflict that induces delay. Second, there is also a need for uncertainty about the other group's costs associated with the status quo: if a group would be sure that it would suffer most from the status quo, its best response would be to give up immediately. Third, as in the uncertainty model, the impossibility of ex post compensation from winners to losers is crucial to the results since full compensation would be equivalent to the burden of reform being shared equally (α=1/2). With α=1/2, both groups would pay the same amount of taxes before and after stabilization (as $\tau(t) = \tau(T)$) and the only change induced by stabilization would be the end of utility reducing distortions. Consequently, delaying stabilization would never be optimal.

Thus, both Alesina and Drazen's war-of-attrition model and Fernandez and Rodrik's uncertainty about benefits from reform model make use of the heterogeneity and uncertainty, though in different ways. While in the war-of-attrition model heterogeneity refers to heterogeneity after stabilization, namely the unequal distribution of the costs of reform, in the uncertainty model heterogeneity of agents before stabilization is decisive in that it is common knowledge that there exist some (and never all) agents that benefit from reform with probability one. In the war-of-attrition model, uncertainty enters as uncertainty concerning the

cost of waiting of the other group, while in Fernandez and Rodrik's model uncertainty refers to uncertainty about the individual-specific benefits from reform.[18] [19]

Alesina and Drazen's war-of-attrition model has been extended in various ways as will be presented below: by adding an exogenous deadline, beyond which all players suffer a penalty in case of no agreement (Carré, 2000), by endogenizing the distribution of stabilization costs through a bargaining game (Hsieh, 2000), and by adding foreign aid (Casella and Eichengreen, 1996, see chapter IV).[20]

2.4.3.1 Inclusion of an exogenous deadline

Carré's (2000) contribution to the literature on war-of-attrition models is the introduction of an exogenous deadline to study how such a deadline affects the date of stabilization.[21] The idea of a deadline is implemented as follows: at the beginning of the game it is decided that if no agent has conceded before time T_M, all agents will bear an extra per period cost β for the rest of the game. Furthermore, it is assumed that if both agents concede precisely at the same date, the cost of reform is evenly split, that is α=1/2.

What does taking a deadline into account imply for the equilibrium date of stabilization in the war-of-attrition model? Basically, a deadline induces a probability mass at point T_M in the distribution function H(.) of optimal conceding time: a player who, without the existence of any penalty, would have conceded right after T_M, at $T_M + \varepsilon$ with $\varepsilon \to 0$, now has an incentive to concede precisely at T_M if the cost of missing the deadline is larger than the gain from waiting in the hope that the other agent will give up first. Let θ_W denote the type who is

[18] A more comprehensive comparison of the war-of-attrition and the uncertainty model is presented in Drazen (2000), p.432.

[19] Drazen (1996) presents a simplified framework that encompasses both the war-of-attrition model and Labán and Sturzenegger's uncertainty about individual specific benefit approach to delayed reform by representing the decision whether to support or implement a reform program or not as a decision of whether to purchase a good or not. While the simplified set-up allows for comparison of the two complementary models with each other as well as with other models, it tends to oversimplify so that the models clearly loose a lot of their richness.

[20] Inspired by Alesina and Drazen's explanation of delayed stabilization, Spolaore (2003) emphasizes that delayed stabilization occurs specifically in consensus systems, but not in other types of government. Spolaore aims at predicting the patterns of adjustment policies in response to shocks in different systems of government based (i) on the degree of political fragmentation measured by the number of agents involved in decision making, and (ii) on agents' magnitude of conflict in choosing a policy instrument, a concept similar to the parameter α representing the polarization of society in Alesina and Drazen's model. The different government systems - consensus, cabinet and checks-and-balances systems - are characterized by the way control over adjustment policies is allocated across agents. All three government systems can be shown to suffer from inefficient reaction to adjustment requirements, but delayed policy response arises only in consensus systems in which each group is assumed to be able to veto policy change (as is the case in Alesina and Drazen's war-of-attrition model).

[21] One among many examples motivating such a deadline is the role of the Maastricht Treaty in the process of European integration: countries that had not reduced their budget deficit by the date specified in the treaty were not allowed to participate in the Monetary Union which can be considered costly for those countries.

just indifferent between conceding at time T_M and time T_M +ε. Thus, if θ_M is the type that optimally concedes at T_M without the threat of a penalty, with a penalty there are types i with costs $\theta_W \leq \theta_i < \theta_M$ who will concede earlier, at T_M. As a consequence the probability that stabilization occurs at date T_M is now a strictly positive. This in turn induces agents who would have conceded right before T_M in the game without any penalty to wait until date T_M in the hope to share the burden of reform equally as is the case in a split outcome. The type who is just indifferent between losing the game when conceding at $T(\tilde{\theta}) < T_M$ and waiting until T_M, which implies bearing distortion costs for this period in the hope to share the burden of reform equally, is characterized by costs of $\tilde{\theta}$.[22]

Figure II.2

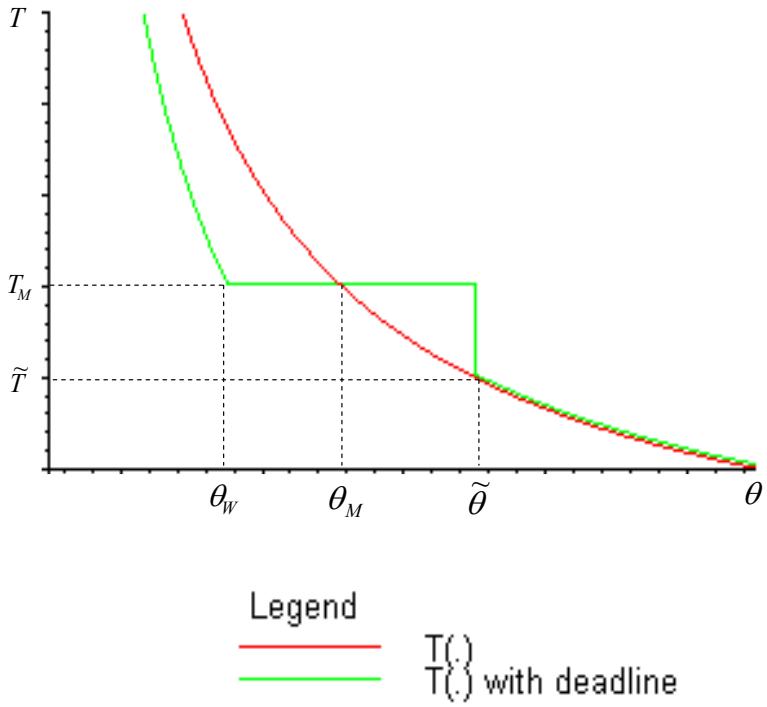

Figure II.2 describes the distribution function of equilibrium conceding times in both the game with and without a deadline, the green and the red line respectively. The graphs underline that the major difference between the model with a penalty and the basic war-of-attrition model is the existence of a mass point at T_M since all agents with parameter θ

[22] Along a similar line of reasoning, an increase in the costs of not having stabilized on time, β, induces a decrease of θ_W (due higher costs when not stabilizing on time) and an increase of $\tilde{\theta}$ (due to the higher probability to benefit from the split solution).

between θ_W and $\widetilde{\theta}$ choose the same date of conceding, T_M. On the one hand, the part of the green graph left from the red one shows that the release of information is accelerated by the existence of a penalty, on the other hand in equilibrium there exists a period of total inertia before the deadline, i.e. a period in which nobody (whatever type) wants to concede, namely $T \in]\widetilde{T}, T_M[$. In sum, the existence of a penalty induces some agents to advance and some agents to delay their decision to stabilize. Consequently, the implications of a credible announcement of an enforceable deadline for the exact date of stabilization (and for the welfare of a society) depend on the realization of types θ.

2.4.3.2 Endogenizing the distribution of stabilization costs

Hsieh's (2000) modification of Alesina and Drazen's war-of-attrition model allows the distribution of adjustment costs, the shares α, to be determined endogenously by a bargaining game rather than being exogenously fixed. It is assumed that groups with high income lose more from delay than groups with fewer resources and hence will agree to bear a larger share of stabilization costs. As the income of the group who accepts or rejects the offered share is private information, delay serves as a screening device in separating types: delay in the implementation of reform allows the party making offers to discriminate between groups that can bear a large burden of stabilization costs and groups that cannot. Although all groups lose from delayed stabilization, they bargain over how the stabilization costs are to be shared since there is no way other than delay how a group with small resources can credibly prove that it has small resources.

In Hsieh's two period model[23] of conflict, workers and capitalists bargain over the distribution of the tax burden after stabilization with the workers being agenda setter. While the workers' income is common knowledge, only the distribution of the capitalists' income is known, its exact value is private information of the capitalists. Thus, the capitalists' income corresponds to the type θ_i in Alesina and Drazen's model. In the first period, workers propose that capitalists pay a fraction α_1 of the higher non-distortionary taxes needed to close the budget deficit. If the capitalists accept, both groups receive their income, pay the agreed upon shares, stabilization takes place and the game ends. If the capitalists reject the offer, the economy slips into the second period in which hyperinflation prevails that devaluates both groups' incomes. As it is assumed that the lower is the capitalists' income the less they suffer from no stabilization, by rejecting the workers' first period offer capitalists can signal that

[23] Extending the bargaining game to an infinite horizon would allow determining the expected length of delay without changing the fundamental nature of the game.

their income is below some critical level so that the offer was not good enough to induce agreement. If the first period offer is rejected workers update their beliefs about the capitalists' income and offer a lower share α_2 in the second period since workers suffer from pre-stabilization distortions. It is the expectation of a better offer that induces delay in stabilizing the economy. If the capitalists accept the workers' second period offer, each group gets its income adjusted for the effects of hyperinflation minus the share of higher, non-distortionary taxes it pays. If capitalists reject the workers' second period offer, the game ends without stabilizing and payoffs are zero for both groups.

To conclude, Hsieh shows that the existence of delayed stabilization carries over to a war-of-attrition model in which the distribution of the burden of reform is endogenized. In a setup characterized by private information on how much a group suffers from the status quo, delay serves as a screening device and is the only way how a group can reduce the share of a reform's burden it has to bear.

III. Does foreign aid delay stabilization?

Building on the models explaining delayed stabilization processes that have been presented in the previous chapter, this chapter analyzes the implications of foreign aid in the context of these models: Is the provision of foreign aid predicted to have any effect on the expected date of stabilization? If this is the case, will the provision of foreign aid accelerate or, as postulated by the so-called crisis hypothesis, delay stabilization? Before turning to these questions it will be pointed out that the way foreign aid is typically modeled by economists is a more adequate formalization of the currently discussed instrument of budget support than of more traditional ways of development financing such as project aid.

1. Budget support

As has been pointed out in chapter I there is widespread agreement that the record of foreign aid programs launched after World War II to alleviate poverty and to stimulate growth is clearly disappointing.[24] One reaction to this finding is a discussion on the proper way to disseminate aid: a topic figuring prominently at the current international development agenda is the provision of aid in form of budget support instead of traditional project or sector aid.

[24] See for example Boone (1996) or Burnside and Dollar (1997).

The list of potential advantages of budget support is long[25]: as budget support induces a pooling of donor support and requires a better coordination instead of competition among donors external aid can be used more efficiently. Furthermore, sustainability can be increased as centralized information on the amount of available resources offers better possibilities to finance maintenance and to avoid a situation in which poor information on donor projects inflates sector budgets beyond the level that can be sustained in the long run. In contrast to project and sector approaches, budget support can save substantial amounts of transaction costs and is automatically embedded in the broader macroeconomic environment. Granting foreign aid in form of budget support also promotes a more transparent and predictable donor financing that leaves room for firmer budget and expenditure planning. A political advantage of budget support is that by increasing transparency it makes governments more accountable to their own people. Compared to a multiplicity of stand-alone projects staffed with overseas experts budget support can strengthen capacity and institution building. Last, but not least budget support stresses the idea of partnership as it promotes poverty reduction based on a country's own strategy and strengthens local ownership. In sum, the claim is that, for a variety of reasons, budget support is an extremely effective and favorable way to distribute aid. First studies evaluating the effects of budget support confirm that many of the promised advantages can be realized when budget support is designed carefully.[26]

Nevertheless the share of international development financing that is spent in form of budget support is still quite low, though rising. At EU level, in the years 2001 and 2002 an average of about 10% of gross bilateral Official Development Aid was spent in form of budget support, 70% on project aid.[27] One explanation of the relatively low share of budget support certainly is lack of donor's confidence in that external funds will be used as agreed upon and that priorities in poverty reduction strategies will be adhered to. In practice, this fear is addressed by making the provision of budget support conditional on the fact that the recipient country has worked out a poverty reduction strategy that has been accepted by the Worldbank or the IMF. Furthermore, governments must offer assurances that they will pursue sound fiscal management, which obviously requires an institutional capacity that cannot be taken for granted in many developing countries.

[25] Compare for example Development Cooperation Directorate / Development Assistance Committee / Task Force on Donor Practices (2001).
[26] See Oxford Policy Management and Overseas Development Institute (2002) and Institute of Development Studies (2002) on budget support programs launched by the United Kingdom and Switzerland, respectively.
[27] See http://www.oecd.org/dataoecd/61/24/1875307.gif.

The existing literature on budget support mainly deals with the prerequisites of successful budget support[28] or consists of evaluation studies. The focus of this paper differs as it investigates the impact of budget support on the timing of macroeconomic stabilizations. This is done by analyzing the incorporation of budget support in the models of delayed stabilization reviewed in chapter two – at the cost of related literature.[29] For this, budget support will be modeled as unconditional foreign aid accruing directly to the government budget[30]: Although budget support is, for good reasons, granted only if criteria like sound fiscal management and the existence of convincing and accepted poverty reduction strategies are met, budget support does not obey the rules of traditional conditionality, that is, making aid conditional on countries implementing a specific set of macroeconomic policies. The terms budget support and (unconditional) foreign aid will be used synonymously.

2. Theoretical literature

What are the consequences of the provision of budget support on the timing of macroeconomic stabilizations? Some of the models discussed in chapter two have already been extended by incorporating foreign aid modeled as a cash transfer to the recipient government. This trivial way of modeling foreign aid is certainly not appropriate for investigating the effects of traditional project aid that is typically organized in a decentralized way and often reflects the donor country's preferences on how to spend additional money in developing countries (as, for example, the large variety of environmental project underlines). In contrast to that, modeling the effect of foreign aid to be a higher level of government spending captures the idea of general budget support quite exactly.

In the following, models will be categorized according to whether they predict the impact of budget support on the date of stabilization to be delay, acceleration or to be not existent at

[28] For a comprehensive discussion of the circumstances under which provision of budget support seems to be the adequate choice of a financial aid instrument see Foster and Leavy (2001). Cordella and Dell'Ariccia (2003) present an economic model in which they compare the effectiveness of budget support and project aid based on the degree of alignment of the donor's and recipient's preferences.

[29] Svensson (2000), for example, addresses the question under which conditions the disbursement of foreign aid increases the level of costly reform effort chosen by the aid recipients. As the exertion of some positive level of reform effort is assumed to increase the expected welfare of society, Svensson's definition of reform is closely related to the definition used in this paper, namely that of reform being the adoption of a superior policy. The model's basic prediction is that if it is common knowledge that disbursements of foreign aid are partly guided by the needs of the poor, without effective conditionality the provision of foreign aid adversely affects the aid recipients' incentives to undertake structural reforms that would reduce poverty. Reform effort with the provision of foreign aid is lower than in a situation without foreign aid: if effort is not observable, the level of aid provided is a compromise between giving aid to those in most need and providing optimal incentives as there is moral hazard in that aid flows according to the need lower the incentive to exert effort ex ante.

[30] The analysis of conditional aid seems to be trivial anyway as the promise of foreign aid conditioned on the implementation of policy reform will always raise the incentives to enact a reform and thus, will weakly accelerate reform in those models in which the implementation of reform is decided upon by comparing a reform's (expected) benefits and costs.

all. Some of the models explaining non-adoption or delayed adoption of socially beneficial reform make use of concepts for which the incorporation of budget support does not seem to be meaningful: If it is lack of human capital or private information of politicians on the superiority of socially beneficial reform that hinders reform from being implemented, as suggested by Williamson (1994a), budget support does not seem to influence the timing of reform at all. In Drudi and Prati's (2000) signaling model of fiscal policy the arrival of budget support is counterproductive because it prolongs the time it takes to accumulate a level of debt sufficiently high to allow for signaling, but it has no welfare implications as pre-reform policies do not induce deadweight losses.[31] In Fernandez and Rodrik's (1991) two period, uncertainty about benefits from reform model, unconditional budget support cannot be integrated in a sensible way since the decision whether to implement a reform or not does only depend on those changes of expected utility that are induced by the reform.

2.1 Acceleration

In Orphanides' (1996) multistage model, budget support can affect the decision to start a stabilization attempt, its likelihood of success and the possibility of its abandonment. Orphanides' model predicts that unanticipated budget support weakly accelerates stabilizations independent of its arrival date: When a stabilization program has already been initiated, budget support unambiguously increases the probability of its success since it reduces the internal costs of further adjustments potentially necessary in the stop decision state. For budget support arriving before it has been decided whether to start a stabilization program, two cases have to be considered: If without the arrival of budget support postponement of stabilization would have been optimal as the level of initially available reserves is below the threshold value, $R<R^*$, budget support may improve conditions sufficiently to make starting a stabilization optimal. If the government would have attempted a stabilization even in the absence of budget support, budget support can be used to increase the stabilization program's probability of success by choosing a higher level of initial adjustment.[32]

2.2 Delay

[31] In the context of this paper, it would be interesting to extend Drudi and Prati's (2000) model to be able to analyze the welfare implications of a later date of stabilization.

[32] Alternatively, budget support could be used to reduce the adjustment costs for a given level of success. As Orphanides stresses, this option motivates conditionality if the aid-giving organization is primarily concerned with the success of a stabilization attempt while the recipient government might have a tendency to reduce the costs of the stabilization attempt.

While Orphanides' model predicts unanticipated foreign aid to accelerate stabilizations, results are different for anticipated foreign aid. As the government decides on whether to postpone or abandon a stabilization attempt by comparing its present and future costs, anticipation in a start decision state that foreign aid will arrive with a positive probability will raise the threshold R* at which stabilization is enacted in the absence of aid. Similarly, in a stop decision state, the anticipation of foreign aid will raise the probability that the current stabilization program is abandoned as the threshold value X* of the stochastic component of the demand for reserves, X, will be reduced, thus lowering the probability that the government is willing to undertake the adjustment necessary to successfully complete the stabilization attempt.

Many models of delayed stabilization presented in chapter two can be interpreted as formalizations of the so-called "crisis hypothesis"[33] that postulates that a deteriorating economic situation accelerates or even induces reform. If a crisis is assumed to be the result of a negative shock hitting the economy, while foreign aid can be modeled as a positive shock one could loosely conclude that foreign aid, by cushioning the effects of an economic crisis, will delay stabilizations. Before analyzing which of the models reviewed so far use this line of reasoning to argue that foreign aid delays stabilization, the following gives a brief overview on the discussion concerning the crisis hypothesis.

Focusing primarily on welfare implications of crises, Drazen and Grilli (1993) articulate most explicitly what they call the "benefit-of-crisis view": from a dynamic perspective, crises may be welfare-improving as they might enable societies to adopt welfare improving reforms that would be impossible to enact in less distortionary circumstances. Parallel to Alesina and Drazen's war-of-attrition model, the key to their benefit-of-crisis view is the assumption that in the absence of an agreement of all interest groups, some part of the budget must be financed via distortionary means. This results in a trade-off concerning the welfare level of a society: while higher distortions obviously lower welfare until an agreement is reached, distortions also induce an earlier time of agreement on the use of non-distortionary means of financing the government budget by raising the costs of living in an unstabilized economy.

Although broad support for the benefit-of-crisis hypothesis can be found in the economic literature on reform, the hypothesis is not unchallenged: Rodrik sharply criticizes the idea that crisis is the instigator of reform by pointing out "that there is a strong element of tautology in

[33] See Drazen (2000), p.446ff. For example, in Olson (1982) an economic crisis may weaken the power of some influential interest groups sufficiently to bring about reform. In Labán and Sturzenegger (1994a) a severe deterioration of the status quo can induce acceptance of an uncertain reform outcome.

the association of reform with crisis. Reform naturally becomes an issue only when current policies are perceived to be not working. A crisis is just an extreme instance of policy failure. That policy reform should follow crisis, then, is no more surprising than smoke following fire."[34] Drazen responds that the degree to which this argument is convincing clearly depends on the exact role crisis is assigned to in promoting reform and the definition of the term crisis: while it might be trivial to claim that reform is more likely to be adopted in bad times, this does not correspond to the major point made by Drazen and Grilli, namely that things need to get extremely bad (and not just bad) to induce reform.[35] In my opinion, this reply is not convincing: though the crisis hypothesis certainly has some intuitive appeal (as well as highly controversial implications for policy design), in contrast to Velasco's common property model the war-of-attrition model does not seem to be an adequate formalization of the crisis hypothesis since it predicts a stabilization to be enacted after some delay even in the absence of any deterioration.[36] As both parties suffer from deterioration proportionally, the degree of deterioration does not influence the date of stabilization. As will be shown in chapter four, in the context of the war-of-attrition model unconditional foreign aid does not necessarily imply a later date of stabilization.

The effect that a crisis will increase the probability of stabilization as it increases the cost of continued delay also exists in Hsieh's (2000) bargaining extension of the war-of-attrition model. Similarly, foreign aid that is used to reduce the costs of stabilization can be shown to decrease the probability of an agreement to stabilize. The probability of stabilization in the second period increases with the workers offering the capitalists a lower share α_2. This is the case if the workers expect the upper bound of the capitalists' income distribution to be smaller. Thus, the effects of foreign aid on the probability of stabilization can be examined by studying how foreign aid affects the distribution of stabilization costs, or, more specifically, by examining the effect of a lower cost of stabilization on the workers' equilibrium belief on the upper bound of the capitalists' income distribution. Foreign aid used to reduce the costs of stabilizing has three different effects: First and obviously, foreign aid directly reduces the burden of adjustment holding the cost of delay and the distribution of stabilization costs constant. Second, foreign aid indirectly affects the probability of a settlement by changing the share of stabilization costs the capitalists are asked to bear in the first period, α_1. In the specific bargaining model of Hsieh the first and the second effect just cancel. Third, a smaller budget gap due to foreign aid reduces the amount of distortionary taxation and by this, lowers

[34] Rodrik (1996), p.26.
[35] Cf. Drazen (2000), p. 444ff.
[36] Compare the argument laid down in section 2.4.3, p.21.

the welfare loss from continued delay. A smaller welfare loss in the absence of a stabilization agreement induces the workers to make the capitalists a less favorable offer. In sum, the last and net effect of foreign aid decreases the probability of an agreement to stabilize.

A model that provides a convincing formalization of the crisis hypothesis is Velasco's (1998) common property model: While Velasco does not make any statement on what the provision of unconditional foreign aid would imply for the date of stabilization, he briefly summarizes the effects of an economic crisis modeled as an exogenous shock that decreases non-tax government revenues y permanently. Similarly, modeling foreign aid (that starts at time zero and lasts at least until the date of stabilization) as an exogenous increase of y allows examining the effects of foreign aid. Comparative statics with respect to y using the two conditions that define the date of stabilization, T, and the level of government wealth, b, that induces a switch from appropriative to cooperative behavior yield the following results: First, an exogenous rise of y implies that a higher level of government debt is needed to induce cooperative behavior. The condition that utility from stabilizing just equals utility that can be obtained by defecting, $U^s(b_t) = U^d(b_t)$, that defines the level of b at which a switch from appropriative to cooperative behavior takes place requires a lower value of b, $b^{**} < b^*$, to be met. Second, as the date of stabilization is defined by the smallest T for which $b_T < b^{**}$ and government wealth is decreasing over time, provision of foreign aid implies a higher value of T, that is a later date of stabilization.[37]

2.3 No effect

In Labán and Sturzenegger (1994a) unconditional foreign aid arriving in the first or the second period implies the same extent of rise in utility on both sides of equations (14) and (15) if it is assumed that unconditional budget support implies additional consumption at the individual level. Consequently, unconditional budget support does not affect the agreement areas described by conditions (16) and (17) that exclusively consider benefits and costs induced by stabilization. Thus, Labán and Sturzenegger's model predicts budget support not to influence the date of stabilization.[38]

As will be shown in chapter IV, for the specific functional assumptions made Alesina and Drazen's (1991) war-of-attrition model also predicts that unanticipated foreign aid used to

[37] Taking these two effects together budget support would c.p. lower welfare as the deadweight loss is incurred for a higher number of periods. Budget support's overall effect on welfare is nevertheless ambiguous as higher government resources y also imply that there are more resources available for making net transfers.

[38] Due to the model's infinite horizon, the implications of unconditional budget support are less clear in Labán and Sturzenegger (1994b).

finance government expenditures g does not affect the timing of stabilization as the optimal time of concession does not depend on the size of the government budget.

2.4 Selectivity as a means to induce acceleration

Building on Boone (1996) who stresses the importance of the (exogenous) type of political regime for the effectiveness of aid programs[39], Drazen (1999) makes use of Velasco's (1998) common property approach to endogenize the type of regime that is characterized by the degree of appropriative behavior. As in Velasco (1998), interest groups find appropriative behavior optimal only if there are many resources to be appropriated. A further mutuality is the crucial role for economic deterioration and crisis: appropriation leads to a deterioration in the economy, a decrease in government wealth. While a crisis reflecting an extremely low level of government wealth may induce a switch to cooperative behavior (that corresponds to the adoption of a superior policy), unconditional foreign aid may delay such a switch in behavior by cushioning the effects of deterioration.

Drazen's additional point is that providing aid selectively[40], that is based on the perception of the nature of the political regime, can hasten stabilization since the selective provision of foreign aid can induce a switch away from appropriative behavior when economic deterioration is far less extreme than in a crisis. This result is established by investigating trigger strategy equilibria in which cooperation can only be sustained if utility from cooperation exceeds utility from defecting from cooperation:

(27) $U_{cooperation}(W_t, Z) - U_{defection}(W_t, Z) > 0$,

where utility can be written as an explicit function of current wealth W_t and current aid inflows Z. To model selectivity it is assumed that countries in which appropriation takes place in period t get no aid in t+1. Thus, another interpretation of Z adopted in the following is that it equals the amount of aid that is (potentially) cut off. Equation (27) can be shown to be negative for $W > W^*(Z)$ and positive for $W < W^*(Z)$, where the critical value $W^*(Z)$ is increasing in Z. It follows that the larger is the aid cut-off induced by appropriative behavior

[39] Boone (1996) characterizes regimes by whose citizens' utility they maximize, e.g. both elitist and egalitarian governments appropriate aid, but while the former transfer it to a high-income political elite, beneficiaries under the egalitarian regime are households with low initial income. In Boone's model, aid is only effective in non-appropriative Laissez-Faire regimes that use aid to lower distortionary taxes, which leads to higher investment and growth.

[40] Drazen (1999a) tries to draw a distinction between conditionality and selectivity. In Drazen's terminology, conditionality means withdrawing aid in response to the failure to pursue a specific set of economic policies previously agreed upon, while he defines selectivity as not giving aid based on the donor's perception of the nature of regime in the recipient country. Criticism of this model could refer to the fact that, in a context in which a political regime is defined by the policies it pursues, the distinction between selectivity and conditionality seems to be an artificial one.

(that is the larger is *Z*), the less an economy must deteriorate for cooperative behavior to become optimal. What Drazen adds to the result of Velasco's common property model that unconditional foreign aid delays stabilization is that providing and cutting-off foreign aid selectively based on the perception of the political regime is a means to accelerate stabilization. Obviously, the use of selectivity requires the appropriative nature of the regime to be known and, even if this prerequisite is met, is extremely controversial as it can be considered as a donor's indirect attempt to intervene in a country's domestic politics. From a theoretical perspective, modeling selectivity is one possible step towards investigating the conditions under which foreign aid is granted more carefully beyond the distinction of conditional and unconditional foreign aid.

3. Empirical evidence

3.1 Case studies

Discussing both the politics and the economics of achieving stabilization, Williamson (1994a) encompasses a comprehensive summary of papers, many of those analyzing the role of foreign aid on the date of macroeconomic stabilizations in a large variety of countries. In sum, they present very ambiguous historical evidence about whether foreign aid delays or accelerates the implementation of policy reform.

One of the most ardent proponents of the hypothesis that foreign aid is a crucial component of successful reform is Jeffrey Sachs: Sachs (1994) claims that successful reform requires both a government that is committed to reform and, equally important, foreign aid. He considers international help to be absolutely critical to allow reform-friendly governments to survive long enough to implement reforms that he considers to be inherently fragile at the outset. To support his view Sachs provides a great variety of examples including the transformation of Poland and Russia, the role of the Marshall Plan in post-war Germany, US assistance to post-war Japan, Bolivia's successful stabilization after hyperinflation in 1987, Chile's successful economic reforms in 1980s and the role of US foreign aid for Israel's successful stabilization in 1985.

Haggard (1994) challenges Sachs' hypothesis that the provision of external aid is crucial to support reformers by arguing that politicians have reduced incentives to undertake politically costly reforms when they know that the problems addressed by reform can be cushioned at lower costs by the use of foreign aid. He gives the examples of the Philippines at the end of the Marcos era and the current situation of aid-dependent African countries to

underscore his point of view.

Referring to Sachs' idea that aid can help "good governments to survive long enough to solve problems"[41], Rodrik (1996) claims that aid can also help bad governments to survive and cites the example of Korean and Taiwanese reforms in the 1960s that, in his opinion, only took place because plentiful US aid that had been provided during the 1950s was coming to an end.

Rodrik (1994) uses episodes of Turkish history to make the point that foreign aid can delay the implementation of policy reform: being hit severely by the first oil shock in 1974, Rodrik claims that it were only generous capital inflows from abroad (in form of external borrowing) that allowed Turkey to avoid necessary adjustments and to sustain its otherwise unsustainable expansionary fiscal policies culminating in a debt crisis. In 1980-81, generous foreign aid eroded the political perception under the new government that it was necessary to undertake painful economic measures to reduce the budget deficit.

3.2 Econometric cross-country analysis

Due to the problem of finding implementable measures of crisis and reform, econometric studies on the crisis hypothesis and the implications of the provision of foreign aid on the date of stabilization are rare and present mixed evidence. Bruno and Easterly (1996) define a crisis as extremely low macroeconomic performance. Their basic idea for testing the crisis hypothesis is to look at an indicator of macroeconomic performance at date t and at subsequent dates t+s, s>0. As policy indicators are persistent over time, one would expect indicators to be positively correlated across periods. In contrast to that, the crisis hypothesis predicts that extremely poor performance at t implies not simply good performance at t+s, but even better performance at t+s than if performance at t was just moderately bad.[42] Defining high inflation as inflation over 40% annually for two or more years, Bruno and Easterly's starting point is their finding that in countries with high-inflation crisis growth falls sharply during inflation crises, but growth after crises rises above the pre-crisis level although inflation is at about the pre-crisis level or even slightly higher. This finding can be considered to provide evidence for Drazen and Grilli's crisis hypothesis if it can be shown that only countries in a severe crisis reformed while those with moderate crisis did not reform. In fact, using pooled cross-country data for 1960-1994, Bruno and Easterly show that the relationship

[41] Sachs (1994), p.512

[42] This approach can be criticized for not measuring reform directly but taking it to be represented by a change in macroeconomic outcome, more precisely by a situation in which poor macroeconomic performance at date t is followed by significant improvement.

between inflation lagged five years and current inflation normally thought to be monotonically positive becomes downward sloping at sufficiently high inflation levels, that is at 150 to 200% per year.

Drazen and Easterly (1999) extend Bruno and Easterly's work in various ways: first, they consider alternative ways of how to define a reference level relative to which crisis is measured and show that results are robust to different ways of measurement. Second, they use a wider set of policy indicators and establish the result that only inflation and black market premium behave as predicted by the crisis hypothesis while growth rates of GDP per capita, current account deficit and public sector deficit do not. Trying to explain this finding they examine the relationship between each of these indicators and foreign aid (measured as Overseas Development Finance (ODF) in percentage of GDP) and find some evidence for the hypothesis that the provision of foreign aid delays reform. There is a high positive correlation between fiscal and current account deficits and foreign aid received – a result that Drazen and Easterly use to explain the failure of extreme levels of deficits to induce reform by suggesting that foreign aid cushions the perception of a crisis in case of huge deficits. In contrast to that, they show that there are negative correlations between received aid and very large levels of inflation or extremely high black market premium. The absence of large amounts of aid may explain why extremely high levels of inflation or black market premium were found to act as reform-inducing crises. In sum, these results can be interpreted to indicate that foreign aid delays macroeconomic reforms.

To further investigate the role of foreign aid, Bruno and Easterly (1996) compare two categories of developing countries with debt crises that lead to rescheduling of debt, namely debtors with inflation crisis (with inflation exceeding 40%) and inflation stabilization to those that had persistent low inflation (inflation of less than 20%).[43] Both groups started in 1980 with about the same amount of ODF, but while until 1993 ODF increased in the low-inflation group it decreased sharply in the high inflation group as the provision of aid seems to be conditioned upon the absence of very high inflation: explaining median ODF/GDP as a function of one year lagged inflation based on pooled cross-country data for 1960-1994, ODF turns down at about 150-200 percent inflation. Bruno and Easterly conclude that the cut-off of aid for high inflation might provide an extra-incentive to stabilize. Interestingly, their results contradict the prediction of Casella and Eichengreen's model (see chapter IV, section 2) as aid disbursed early, that is at low levels of inflation, does not seem to hasten stabilization, but to hinder it.

[43] Bruno and Easterly's results should be treated very carefully as they may be partially driven by the fact that they exclude countries with moderate or high inflation and no stabilization from their analysis.

IV. Inclusion of foreign aid in the war-of-attrition model

1. Unanticipated foreign aid

As Casella and Eichengreen (1996) point out, in Alesina and Drazen's war-of-attrition model, unanticipated foreign aid used to reduce present discounted government spending by a share (1-β), with $0 < \beta < 1$, does not affect the timing of stabilization, as the date of stabilization does not depend on the size of the government budget g. This can be seen by examining the expression for T`(θ):

$$(28)\ T`(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{V^W - V^L}{-u + rV^L - dV^L/dT}$$

$$= -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha - 1)g/r}{(\theta + 1/2)g - \alpha g}$$

$$= -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha - 1)}{r[\theta + 1/2 - \alpha]}.$$

As both the gain if the other player concedes first, $(2\alpha - 1)g/r$, and the cost of waiting another instant to concede, $(\theta + 1/2)g - \alpha g$, are proportional to the size of the government budget g, g cancels in equation (28). The result that the optimal time of concession does not depend on the size of the budget is due to the assumptions made, namely (i) that the utility loss of distortionary taxation is linear in the level of pre-stabilization taxes and (ii) that without an agreement to stabilize, a fixed fraction of the government budget is financed by distortionary taxes.[44] If these assumptions were removed, the size of the budget, and thus the provision of foreign aid used to reduce the internally financed amount of government spending would affect the timing of stabilizations.

Assume for example that pre-stabilization distortions rise more than proportional in the level of government spending g, as e.g. in $u = -(\theta g + 1/2)g$, while lifetime utilities after stabilization remain unchanged. This yields

$$(29)\ T`(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha - 1)}{r[\theta g + 1/2 - \alpha]}$$

which, as $T`(\theta)$ is negative, is increasing in g, $\partial T`(\theta)/\partial g > 0$. As the provision of unanticipated foreign aid reduces internally financed government spending g, the slope of the optimal time of concession function after the provision of foreign aid will be steeper than before for every value of θ. Furthermore, the boundary condition that an agent with the

[44] In the version of the model presented here, the fraction of government expenditures financed by taxes, γ, is set equal to one, which is the reason why γ does not show up in equation (28).

highest possible cost parameter, $\bar{\theta}$, will give up immediately, $T(\bar{\theta}) = 0$, is valid both with and without unanticipated foreign aid. This implies that unanticipated foreign aid will delay stabilization for the specific assumptions made. Intuitively, this result stems from the fact that the dominant effect of the provision of foreign aid is to reduce the utility loss due to distortions more than proportionally and thus, to weaken incentives to stabilize.

Similarly, if the utility loss from distortions is assumed to be concave in the level of government spending, e.g. $u = -(\theta/\sqrt{g} + 1/2)g$, which implies

$$(30)\ T`(\theta) = -\frac{f(\theta)}{F(\theta)}\frac{(2\alpha - 1)}{r[\theta/\sqrt{g} + 1/2 - \alpha]}$$

so that $\partial T`(\theta)/\partial g < 0$, the war-of-attrition model predicts that foreign aid will accelerate stabilization.

2. Casella and Eichengreen's model of anticipated foreign aid

Casella and Eichengreen's (1996) approach to incorporating foreign aid in the war-of-attrition model is motivated by the observation that the disbursal of foreign aid is rarely unexpected. Assuming that foreign aid is announced at date s to arrive at date v, Casella and Eichengreen obtain the result that whether the provision of anticipated foreign aid accelerates or delays stabilization is a matter of timing: stabilization is accelerated only by anticipated foreign aid that is announced and disbursed early in the game, while it is delayed otherwise.

For the same reason why unanticipated foreign aid does not influence the date of stabilization for the functional assumptions made, it is true that if stabilization has not yet taken place by the date foreign aid is disbursed, formally $T \geq v$, the fact that foreign aid has arrived and government spending is reduced will not influence the path of the game after date v. Thus, the path of the game after date v is described by equation (28). The announcement of foreign aid at date s to arrive at date v will only change the game's incentives in the interval between s and v. For $T \in [s, v[$, flow utilities before and after stabilization, $u_i(t) = -(1/2 + \theta_i)g$ and $U^L = -\alpha g$ for the loser and $U^W = -(1-\alpha)g$ for the winner respectively, remain unchanged, but flow utilities after the disbursal of foreign aid, $t \geq v$, are $U^L = -\alpha\beta g$ and $U^W = -(1-\alpha)\beta g$. Consequently, lifetime utilities after stabilization are modified if it is common knowledge that government spending will be reduced from v onward. It is only for those periods after stabilization in which aid has not yet been disbursed that government spending equals g while it is reduced to level βg afterwards:

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

or, after evaluating the integrals

(32) $V_T^L = -\alpha g[1-(1-\beta)e^{-r(v-T)}]/r$ and similarly, $V_T^W = -(1-\alpha)g[1-(1-\beta)e^{-r(v-T)}]/r$.

Casella and Eichengreen derive the slope of the optimal time of concession between s and v, $\widetilde{T}`(\theta)$, by plugging functional forms into the equilibrium condition of Alesina and Drazen's war-of-attrition model, equation (A3) in appendix A, except for one modification: they modify equation (A3) by substituting rV^L by U^L based on the insight that in the original model without foreign aid $rV^L = -r\alpha g/r = -\alpha g = U^L$, which yields:

(A3') $\widetilde{T}`(\theta) = -\dfrac{f(\theta)}{F(\theta)} \dfrac{V^W - V^L}{-u + U^L - dV^L/dT}$.

Substituting functional assumptions specified above, they get

(33) $\widetilde{T}`(\theta) = -\dfrac{f(\theta)}{F(\theta)} \dfrac{(2\alpha-1)\sigma(\widetilde{T})}{r[\theta + 1/2 - \alpha(2-\sigma(\widetilde{T}))]}$,

where $\sigma(t) \equiv 1-(1-\beta)e^{-r(v-t)}$ with $0 < \sigma(t) < 1 \ \ \forall t \in [s,v]$. Comparing $T`(\theta)$ in equation (A4) and $\widetilde{T}`(\theta)$, the anticipation of foreign aid can be shown to have two effects: First, anticipated foreign aid provides an incentive for stabilizing earlier. As foreign aid reduces the future fiscal burden it decreases the marginal cost of conceding. Formally, the difference in lifetime utilities after stabilization, $V^W - V^L$, decreases from level $(2\alpha-1)g/r$ without foreign aid being anticipated to $(2\alpha-1)\sigma(\widetilde{T})g/r$ after the arrival of foreign aid has been announced. Second, there is an incentive to postpone conceding closer to the date at which the reduction of the fiscal burden materializes, that is to the moment when foreign aid is actually disbursed. A later date of concession implies that both loser and winner have to bear the full fiscal burden after stabilization, αg and $(1-\alpha)g$ respectively, instead of the reduced one after the arrival of foreign aid, $\alpha\beta g$ and $(1-\alpha)\beta g$, for a smaller number of periods. This is the reason why the lifetime utility of the loser after stabilization is increasing in T when foreign aid is anticipated, $dV^L/dT > 0$ in equation (A3'), while it does not change over time in the basic war-of-attrition model, $dV^L/dT = 0$ in equation (28).

While these two contradicting effects provide a first intuition of why anticipated foreign aid may either result in delayed or accelerated stabilization, Casella and Eichengreen also offer a line of reasoning based on the slope of the optimal time of concession function. The basic idea of Casella and Eichengreen's proof is that, in expectation, stabilization will take

place earlier if, for any type conceding in the interval between s and v, the optimal time of concession is smaller with than it would have been without foreign aid. Thus, a necessary condition for stabilization to be accelerated is that the slope of the function $\tilde{T}(\theta)$ at the time of the announcement must be flatter than the slope of the original function.[45] As slopes are negative (except for a negative denominator of $\tilde{T}(\theta)$, a scenario that will be discussed below), this condition corresponds to $\tilde{T}`(\theta_s) > T`(\theta_s)$. θ_s characterizes the player who is just indifferent between conceding and waiting at time s and is defined by $T(\theta_s) = s$. Simplifying and making use of the fact that $0 < \sigma(t) < 1$, the necessary condition for an earlier stabilization reduces to

(34) $\theta_s + 1/2 > 2\alpha$.

For an earlier expected date of stabilization to be realized with probability one, (i) the slope of $\tilde{T}$ needs to be flatter than the slope of T over the entire interval [s,v] and (ii) the expectation of foreign aid may not bring about any discontinuities in the optimal concession behavior. The latter is true if the marginal benefit of conceding depicted by the second part of the denominator of equation (33) is positive so that players can never gain from delay:

(35) $\theta + 1/2 > \alpha[2 - \sigma(\tilde{T})] \quad \forall \theta \in [\theta_v, \theta_s]$.[46]

In the absence of any discontinuities, the optimal time of concession function with anticipated foreign aid is given by

T(θ) defined by equation (A4) and the boundary condition $T(\bar{\theta}) = 0$ for $0 \leq T <$ s

(36) $\tilde{T}(\theta)$ defined by equation (33) and the boundary condition $\tilde{T}(\theta_s) = s$ for $s \leq T < v$

T(θ) defined by equation (A4) and the boundary condition $T(\theta_v) = v$ for $T \geq v$.

Equation (36) underlines that, as stressed in section 1, it is the anticipation of foreign aid that modifies equilibrium concession behavior. Consequently, it is only in the interval between announcement and disbursal of foreign aid, $s \leq T < v$, that $\tilde{T}(\theta)$ describes the optimal concession behavior, while it is given by T(θ) and the respective boundary conditions otherwise.

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[45] Casella and Eichengreen miss to point out that this is only a necessary requirement for stabilization to be hastened if $\tilde{T}(\theta)$ is a strictly convex function – which it is given the specific assumptions made, but not necessarily for a broader set of functional assumptions. Otherwise one could think of a function $\tilde{T}(\theta)$ that is steeper than T(θ) in s, but crosses T(θ) at some $\theta < \theta_v$.

[46] In the basic war-of-attrition model, Alesina and Drazen simply assume $\underline{\theta} > \alpha - 1/2$ to avoid a situation with a negative marginal benefit from conceding.

The slope of $\widetilde{T}$ is flatter than the slope of the original function at the date at which foreign aid is disbursed if $\widetilde{T}`(\theta_v) \geq T`(\theta_v)$, where θ_v is defined by $\widetilde{T}(\theta_v) = v$. The condition $\widetilde{T}`(\theta_v) \geq T`(\theta_v)$ can be shown to be equivalent to

(37) $\theta_v + 1/2 \geq 2\alpha$.

From s<v it follows that $\theta_s > \theta_v$ which has two important implications: first, as the condition $\theta + 1/2 > 2\alpha$ is met for all θ larger or equal to θ_v and as $0 < \sigma(t) < 1$, the necessary condition and the condition for no discontinuities will always be met if equation (37) is true. Second, as T is monotonic in θ, it implies that equation (37) is a sufficient condition for stabilization to be hastened as it guarantees that $\widetilde{T}(\theta)$ is flatter than T(θ) on the whole interval [s,v]. As there are no a priori restrictions on parameters that justify to assume that equation (37) is always met, these considerations make Casella and Eichengreen claim that it is the timing of foreign aid that is decisive for whether foreign aid delays or accelerates stabilization as they summarize in their main proposition:

> "If there is 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 announced after s* will delay stabilization, while aid disbursed before v* will hasten it. s* is the solution to: T(θ*)=s*, and v* to: $\widetilde{T}$ (θ*)=v, where θ*+1/2=2α."[47]

3. Modified version of Casella and Eichengreen's model

Deriving the slope of the optimal time of concession between s and v, $\widetilde{T}`(\theta)$, by plugging functional forms into the equilibrium condition of Alesina and Drazen's war-of-attrition model as Casella and Eichengreen do, is, in general, correct as the maximization problem stated in terms of non-specified functional forms as in equation (A1) in appendix A stays the same for the addition of foreign aid. But, as has been pointed out above, Casella and Eichengreen use a slightly changed equilibrium condition of the basic war-of-attrition model in which rV^L, the fraction of the loser's lifetime utility after stabilization that is associated with one out of an infinite number of periods after stabilization, has been substituted by the loser's flow utility after stabilization, U^L. While this is a valid modification in the original war-of-attrition model in which $U^L = -\alpha g$ and $V^L = -\alpha g / r$, it is not a correct modification in the model that has been extended to include the effects of anticipated foreign aid: Adding

[47] Casella and Eichengreen (1996), p.613.

anticipated foreign aid, $U^L = -\alpha g$ remains unchanged for T$\in [s, v[$, but V^L now corresponds to $V^L = -\alpha g / r[1-(1-\beta)e^{-r(v-T)}]$. The new expression for V^L reflects the fact that with anticipated foreign aid flow utility after stabilization differs across periods: for the loser, it corresponds to αg in the periods before foreign aid has been disbursed and to $\alpha\beta g$ afterwards. Consequently, the relation $rV^L = U^L$ that Casella and Eichengreen make use of to derive their results is no more true[48] and the correct slope of the equilibrium concession function is given by

$$\text{(A3)}\quad \widetilde{T}`(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{V^W - V^L}{-u + rV^L - dV^L / dT}$$

instead of (A3'). For the functional assumptions made, equation (A3) yields

$$\text{(38)}\quad \widetilde{T}`(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{[-(1-\alpha)g\sigma(\widetilde{T}) + \alpha g\sigma(\widetilde{T})]/r}{(\theta+1/2)g - \alpha g\sigma(\widetilde{T}) - \alpha g(1-\sigma(\widetilde{T}))} = -\frac{f(\theta)}{F(\theta)} \frac{(2\alpha-1)\sigma(\widetilde{T})}{r[\theta+1/2-\alpha]}.$$ [49]

The most striking feature of the slope of the correct equilibrium concession function is that, while the numerator corresponds to the one derived by Casella and Eichengreen, the denominator equals the one in absence of anticipated foreign aid. The second part of the denominator of equation (A3), $-u + rV^L - dV^L / dT$, can be interpreted to represent the marginal "net" benefit from conceding: in case of concession, a player's next period payoff is rV^L , the fraction of the loser's lifetime utility after stabilization that is associated with one out of an infinite number of periods after stabilization. When a player decides to wait his marginal utility corresponds to u, the player's flow utility before stabilization, plus dV^L / dT , the increase in the loser's lifetime utility after stabilization induced by postponing stabilization one more period. The reason why the denominator remains unchanged after adding anticipated foreign aid is that the inclusion of foreign aid modifies rV^L and dV^L / dT in exactly the same way: without foreign aid $rV^L = -r\alpha g / r = -\alpha g$ and dV^L / dT =0, while when foreign aid is anticipated $rV^L = -\alpha g[1-(1-\beta)e^{-r(v-T)}] = -\alpha g + \alpha g(1-\beta)e^{-r(v-T)}$ and $dV^L / dT = \alpha g(1-\beta)e^{-r(v-T)}$. Obviously, $rV^L - dV^L / dT = -\alpha g$ both with and without the anticipation of foreign aid.

[48] An exception is the specific case in which the date of stabilization and the arrival date of foreign aid coincide, v=T, so that $U^L = -\alpha\beta g$ is equivalent to $rV^L = -\alpha g[1-(1-\beta)e^{-r(v-T)}] = -\alpha g[1-(1-\beta)e^0] = -\alpha\beta g$.

[49] Unfortunately, I could not find a closed form solution $\widetilde{T}(\theta)$ to the differential equation given by equation (38) without assigning specific values to the parameters.

Casella and Eichengreen correctly stress that the fact that $dV^L/dT>0$ provides an incentive to delay stabilization. A point that their model misses because they specify $\widetilde{T}`(\theta)$ as depicted in equation (A3') instead of (A3) is that, besides the decrease in $V^W - V^L$, there exists a further incentive to hasten stabilization, namely the rise in rV^L induced by the anticipation of foreign aid. Since, as shown above, the changes in rV^L and dV^L/dT are the same in absolute level, but have different signs, the two effects just cancel. The only remaining net effect of anticipated foreign aid on equilibrium behavior is that foreign aid reduces the future fiscal burden and thus, diminishes the marginal cost of conceding. This provides a first intuition of why the corrected solution of Casella and Eichengreen's model yields the result that anticipated foreign aid unambiguously accelerates stabilization. Obviously, this result sharply contrasts Casella and Eichengreen's claim that foreign aid announced and delivered after critical dates for announcement, s*, and disbursement, v*, will delay stabilization.

To manifest the result that anticipated foreign aid will always accelerate stabilization, two additional lines of reasoning will be offered in the following. The first is simply based on a comparison of the slopes of the functions describing optimal concession behavior with and without foreign aid,

$$\widetilde{T}`(\theta) = -\frac{f(\theta)}{F(\theta)}\frac{(2\alpha-1)\sigma(\widetilde{T})}{r[\theta+1/2-\alpha]} \text{ and } T`(\theta) = -\frac{f(\theta)}{F(\theta)}\frac{(2\alpha-1)}{r[\theta+1/2-\alpha]},$$

keeping equation (36) in mind. If stabilization has not yet taken place at the date at which foreign aid is announced, it is straightforward to show that the graph of $\widetilde{T}(\theta)$ is always below that of T(θ) for t>s, which implies a strictly earlier date of stabilization: from $0<\sigma(t)<1 \ \forall t$ and $\underline{\theta} > \alpha - 1/2$ it follows $\widetilde{T}`(\theta) > T`(\theta) \ \forall \theta$. Thus, anticipated foreign aid implies an earlier optimal date of concession for all combinations of s and v and all realizations of $\theta < \theta_s$.

Another approach is to follow Casella and Eichengreen's proof that is based on establishing a necessary and a sufficient condition for stabilization to be hastened: The necessary condition states that at date s, at which foreign aid is announced, the slope of the optimal time of concession function with foreign aid being announced has to be smaller in absolute value than the slope of the original function:

$$\widetilde{T}`(\theta_s) > T`(\theta_s)$$

$$-\frac{f(\theta_s)}{F(\theta_s)}\frac{(2\alpha-1)\sigma(\widetilde{T})}{r[\theta_s+1/2-\alpha]}>-\frac{f(\theta_s)}{F(\theta_s)}\frac{(2\alpha-1)}{r[\theta_s+1/2-\alpha]}$$

$$\frac{\sigma(\widetilde{T})}{\theta_s+1/2-\alpha}<\frac{1}{\theta_s+1/2-\alpha},$$

which, as $0<\sigma(t)<1$, will be true if

(39) $\theta_s > \alpha - 1/2$.

To be able to rule out any discontinuities in the optimal concession behavior the marginal benefit from conceding, that is the denominator of $\widetilde{T}`(\theta)$, needs to be positive for all θ which requires

(40) $\theta > \alpha - 1/2 \ \ \forall\theta$.

If the optimal time of concession can be described by a continuous function, a sufficient condition for stabilization to be hastened is given by $\widetilde{T}`(\theta_v) \geq T`(\theta_v)$ which reduces to

(41) $\theta_v \geq \alpha - 1/2$.

To be able to abstract from a situation in which there are incentives to never give up so that T(θ) would go towards infinity, the lower bound of θ has been restricted to exceed α-1/2, $\underline{\theta} > \alpha - 1/2$, in the basic war-of-attrition model. Since the announcement date of foreign aid s is defined by $T(\theta_s) = s$, the arrival date v by $\widetilde{T}(\theta_v) = v$ with $0 \leq s<v$ and we know from equation (36) that $\widetilde{T}(\theta_s) = s$ and, furthermore, $\widetilde{T}(\theta)$ is monotonically decreasing in θ for $\underline{\theta} > \alpha - 1/2$ it follows that $\underline{\theta} \leq \theta_v < \theta_s \leq \overline{\theta}$. Consequently, equations (39), (40) and (41) will be met for all possible realizations of s and v as well as for all θ.

Proposition 1:

As $\theta \geq \alpha - 1/2$ for all $\theta \in [\underline{\theta}, \overline{\theta}]$ and $\underline{\theta} \leq \theta_v < \theta_s \leq \overline{\theta}$, the announcement at any time $s \geq 0$ of a foreign transfer that will arrive at time v with s<v unambiguously accelerates stabilization if it has not yet been enacted at date s.

From equation (36), we know that the optimal concession behavior is described by $\widetilde{T}`(\theta)$ instead of T`(θ) for $T \geq s$ only. Intuitively, forthcoming foreign aid has to be announced to have any effect (that, by proposition 1, is known to accelerate stabilization). Thus, for any given date v, the earlier aid is announced, that is the earlier $\widetilde{T}`(\theta)$ instead of T`(θ) describes the optimal concession behavior, the earlier the expected date of stabilization.

Proposition 2:
For any given date v, the earlier aid is announced (the smaller s) the earlier is the expected date of stabilization.

Without a general closed form solution for $\tilde{T}(\theta)$ comparative statics concerning changes in v or β cannot be based on determining the signs of $\partial\tilde{T}/\partial v$ and $\partial\tilde{T}/\partial\beta$.

A smaller value of v has two implications: first, as $\tilde{T}(\theta)$ is decreasing in θ a smaller value of v induces an increase of θ_v that is defined by $\tilde{T}(\theta_v) = v$. Consider an increase of θ_v from level θ_{v1} to θ_{v2} induced by an earlier arrival date of foreign aid, $v_1 > v_2$. An increase of θ_v reduces the range of θ for which stabilization is accelerated: from date v on or, in terms of θ, for $\theta < \theta_v$, the optimal concession behavior is defined by T(θ) and the boundary condition $T(\theta_v) = v$ and converges to the original optimal time of concession function described by T(θ) and T($\bar{\theta}$)=0. As this convergence sets in earlier for an earlier disbursement of foreign aid, a first effect of a smaller v is to delay stabilization for those cost parameters $\theta < \theta_{v1}$. Second, the effect of an earlier disbursal of foreign aid for those $\theta \in [\theta_{v2}, \theta_s]$, that is the effect on $\tilde{T}(\theta)$, has to be taken into account. Intuition suggests $\partial\tilde{T}/\partial v$ being positive as the numerical example provided in the next section underlines: a later disbursal of foreign aid will increase the difference in the winner's and the loser's lifetime utility after stabilization which provides an incentive to delay stabilization. If $\partial\tilde{T}/\partial v$>0, a smaller value of v will imply an earlier optimal date of concession for those $\theta \in [\theta_{v2}, \theta_s]$. In sum, given that $\partial\tilde{T}/\partial v$>0, the net effect of a smaller v on the expected time of concession would be ambiguous since, for any given date s, a smaller v induces a rise of θ_v, but accelerates stabilization with probability one only if $\theta_{\max} \in [\theta_v, \theta_s]$. $\theta_{\max}$ is defined as the maximum cost parameter θ of those cost parameters characterizing the two competing interest groups, that is the θ that decides on the date of stabilization, T. Another approach to investigating the second effect could be based on examining the implications of a smaller v on the difference in the slopes given by $\tilde{T}`(\theta)$ and T`(θ). Since v enters $\tilde{T}`(\theta)$ via $\sigma(\tilde{T})$ only and a smaller value of $\sigma(\tilde{T})$ accentuates the difference in the slopes, the sign of

(42) $\partial\sigma/\partial v = (1-\beta)re^{-r(v-\tilde{T})}(1-\partial\tilde{T}/\partial v)$

determines whether a smaller v induces an earlier or later expected date of stabilization. Unfortunately, the sign of $\partial\sigma/\partial v$ cannot be determined without the knowledge of the sign of $\partial\tilde{T}/\partial v$.

The effect of a larger transfer (a smaller β) on the expected date of stabilization can neither be calculated directly by evaluating the sign of the derivative $\partial\tilde{T}/\partial\beta$ nor by analyzing the implications of the sign of

(43) $\partial\sigma/\partial\beta = e^{-r(v-\tilde{T})}(1-r(1-\beta)\partial\tilde{T}/\partial\beta)$

for the difference in the slopes given by $\tilde{T}`(\theta)$ and T`(θ) as this would also require the sign of $\partial\tilde{T}/\partial\beta$ to be known. Nevertheless it seems to be reasonable to expect a larger transfer to reinforce the transfer's effect and to further accelerate stabilization since a larger transfer reduces the marginal benefit of waiting that corresponds to the difference in the winner's and the loser's lifetime utilities after stabilization.

4. Numerical example

To illustrate the results laid down in the propositions of section 3 and to elaborate the consequences of changes in v or β, consider the following example: Let α=0.75, β=0.5, g=50, r=0.05 and assume θ to be uniformly distributed on [0.5, 1.5] so that the density function corresponds to f(θ)=1, and the distribution function is F(θ)=θ-0.5. Thus,

$$u = -(1/2+\theta)\cdot 50,$$

$$V_{fa}^{L} = -0.75\cdot 50[1-(1-0.5)e^{-0.05(v-T)}]/0.05 = -750[1-0.5e^{-0.05(v-T)}] \text{ and}$$

$$V_{fa}^{W} = -(1-0.75)\cdot 50[1-(1-0.5)e^{-0.05(v-T)}]/0.05 = -250[1-0.5e^{-0.05(v-T)}],$$

where the subscript fa stands for foreign aid. For foreign aid announced to arrive at date v, we know from equation (A1) in appendix A that the following maximization problem has to be solved to determine the equilibrium function describing the optimal concession behavior, $\tilde{T}(\theta)$:

$$\begin{aligned}(44)\ \max_{\hat{\theta}} EU(\hat{\theta},\theta) &= F(\hat{\theta})\,[\int_{\hat{\theta}}^{\bar{\theta}} -u(x)e^{-rT(x)}T`(x)dx + e^{-rT(\hat{\theta})}V^{L}(T(\theta))] \\ &+ \int_{x=\hat{\theta}}^{x=\bar{\theta}}[\int_{x}^{\bar{\theta}} -u(z)e^{-rT(z)}T`(z)dz + e^{-rT(x)}V^{w}(T(x))]f(x)dx \\ &= (\hat{\theta}-0.5)\,[\int_{\hat{\theta}}^{1.5}(1/2+x)\cdot 50\cdot e^{-0.05T(x)}T`(x)dx - e^{-0.05T(\hat{\theta})}750[1-0.5e^{-0.05(v-T(\hat{\theta}))}]] \\ &+ \int_{x=\hat{\theta}}^{x=1.5}[\int_{x}^{1.5}(1/2+z)\cdot 50e^{-0.05T(z)}T`(z)dz - e^{-0.05T(x)}250[1-0.5e^{-0.05(v-T(x))}]]\cdot 1dx\,.\end{aligned}$$

Taking the first derivative with respect to $\hat{\theta}$ yields:

$$(45)\ dEU/d\hat{\theta} = [\int_{\hat{\theta}}^{1.5} (1/2+x)\cdot 50\cdot e^{-0.05T(x)}T`(x)dx - e^{-0.05T(\hat{\theta})}750[1-0.5e^{-0.05(v-T(\hat{\theta}))}]]$$

$$+(\hat{\theta}-0.5)\ [-(1/2+\hat{\theta})\cdot 50\cdot e^{-0.05T(\hat{\theta})}T`(\hat{\theta}) + 0.05e^{-0.05T(\hat{\theta})}T`(\hat{\theta})\cdot 750[1-0.5e^{-0.05(v-T(\hat{\theta}))}]$$

$$- e^{-0.05T(\hat{\theta})}\cdot 750[-0.5\cdot 0.05e^{-0.05(v-T(\hat{\theta}))}T`(\hat{\theta})]]$$

$$+\int_{\hat{\theta}}^{1.5} -(1/2+z)\cdot 50e^{-0.05T(z)}T`(z)dz + e^{-0.05T(\hat{\theta})}250[1-0.5e^{-0.05(v-T(\hat{\theta}))}]]dx\,.$$

The two remaining integrals just cancel. Setting the first derivative equal to zero, dividing by $e^{-0.05T(\hat{\theta})}$ and combining terms we get the following expression after solving for $\widetilde{T}`(\theta)$:

$$(46)\ \widetilde{T}`(\theta) = -\frac{1}{\theta-0.5}\frac{500[1-0.5e^{-0.05(v-T(\hat{\theta}))}]}{50\theta-12.5}\,.$$

To be able to analyze the effects of anticipated foreign aid, a comparison of equilibrium behavior with and the one without foreign aid might be useful. This requires the calculation of the equilibrium concession behavior in the basic war-of-attrition model. For the given parameters, utility functions in the basic model correspond to $u = -(1/2+\theta)\cdot 50$, $V^L = -\alpha g/r = -750$ and $V^W = -(1-\alpha)g/r = -250$. Solving the general maximization problem stated in equation (A1) of appendix A yields

$$(47)\ T`(\theta) = -\frac{1}{(\theta-0.5)}\frac{500}{(50\theta-12.5)}\,.$$

The function describing the optimal concession behavior in the basic war-of-attrition model, that is in the absence of foreign aid, can be obtained by integration using the method of partial fractions and the boundary condition T($\overline{\theta}$)=0. For unspecified parameters, this yields equation (A8) in appendix B. Substituting the parametric choices made in equation (A8), one obtains

(48) T(θ)=-40[ln(θ-0.5)-ln(0.8θ-0.2)].

According to equation (36), the optimal concession behavior with anticipated foreign aid as a function of the individual-specific cost parameter θ is described by the following piecewise function:

T(θ) defined by equation (47) and the boundary condition $T(1.5)=0$ for $0 \le T <$ s

(36') $\widetilde{T}(\theta)$ defined by equation (46) and the boundary condition $\widetilde{T}(\theta_s) = s$ for $s \le T < v$

T(θ) defined by equation (47) and the boundary condition $T(\theta_v) = v$ for $T \ge v$.

Specifying the date at which foreign aid will be announced, s, and the one at which it will be disbursed, v, allows deriving θ_s and θ_v that are defined by $T(\theta_s) = s$ and $\widetilde{T}(\theta_v) = v$ and

consequently, offers all information necessary to evaluate the boundary conditions. The first line of equation (36') corresponds to equation (48). The solution to the second line is obtained by solving the ordinary differential equation specified in equation (46) for the general boundary condition $\tilde{T}(\theta_s) = s$, which yields:

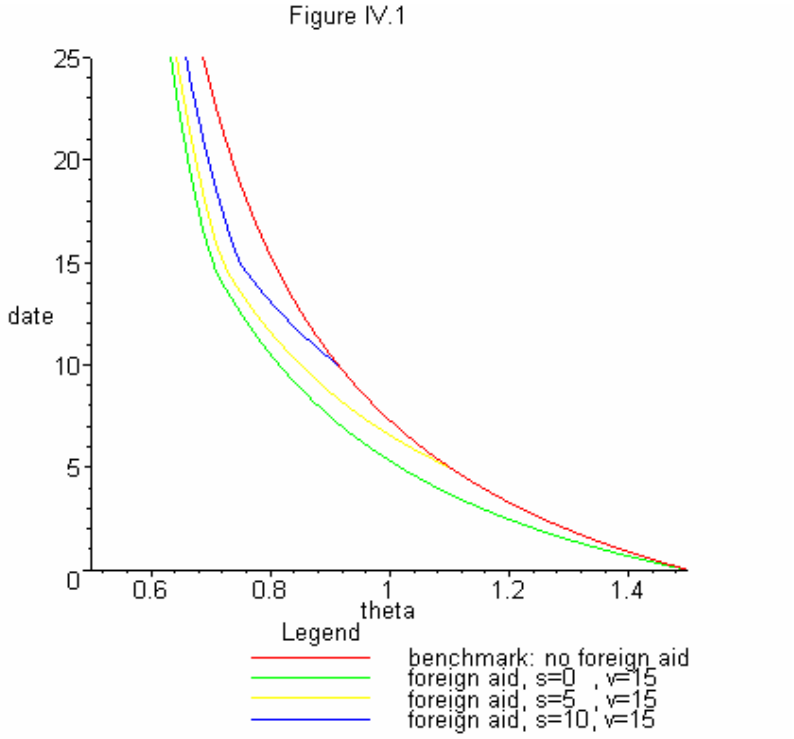
$$\tilde{T}(\theta) = v + 20\ln[-(4\theta-1)^2 e^{0.05(s-v)}(2\theta_s-1)^2 / \{-4\theta^2 + 4\theta - 1 - 16\theta_s^2 + 8\theta_s - 64\theta^2\theta_s^2 + 32\theta^2\theta_s^2 + 64\theta\theta_s^2 - 32\theta\theta_s + e^{0.05(s-v)}[-6\theta^2 + 2\theta + 16\theta^2\theta_s - 16\theta\theta_s^2 + 6\theta_s^2 - 2\theta_s]\}].$$

Integrating the expression in equation (47) by partial fractions where the constant of integration is defined by the general boundary condition $T(\theta_v) = v$ yields the explicit solution to line three of equation (36'):

$$T(\theta) = -40[\ln(\frac{\theta - 0.5}{\theta_v - 0.5}) - \ln(\frac{\theta - 0.25}{\theta_v - 0.25})] + v.$$

Figure IV.1 visualizes proposition 2: for any given date v, the earlier foreign aid is announced (the smaller is s), the earlier is the expected date of stabilization.

Figure IV.1



The red function serves as a benchmark as it describes the optimal concession behavior in the absence of foreign aid that is given by equation (48). The green, yellow, and blue functions show the optimal time of concession as a function of θ for foreign aid announced to arrive in

period 15 (v=15) for different announcement dates s, namely s=0, s=5 and s=10.[50] Obviously, the lower s the earlier is the optimal time of concession for any given value of θ smaller than the respective θ_s and consequently, the earlier is the expected date of stabilization.

Figure IV.2 illustrates the discussion of the two effects on the expected date of stabilization that are induced by a smaller value of v: while foreign aid is announced in period one for both the green and the yellow line, it is disbursed in period five for the former and only in period fifteen for the latter. As both graphs cross at $\theta \approx 0.865$, stabilization will be enacted earlier if foreign aid is disbursed in period five instead of in period fifteen for those realizations of $\theta_{\max}$ for which $\theta_{\max} > 0.865$, while the reverse is true for $\theta_{\max} < 0.865$. This underlines the claim that the consequences of foreign aid being disbursed earlier are ambiguous ex ante: while an earlier disbursal of foreign aid reduces the range of the cost parameter θ for which stabilization is accelerated, it reinforces the phenomenon of acceleration for those θs that remain in the (smaller) interval. Consequently, it depends on the realization of $\theta_{\max}$ whether an earlier disbursement of foreign aid will delay or accelerate stabilization.

Figure IV.2

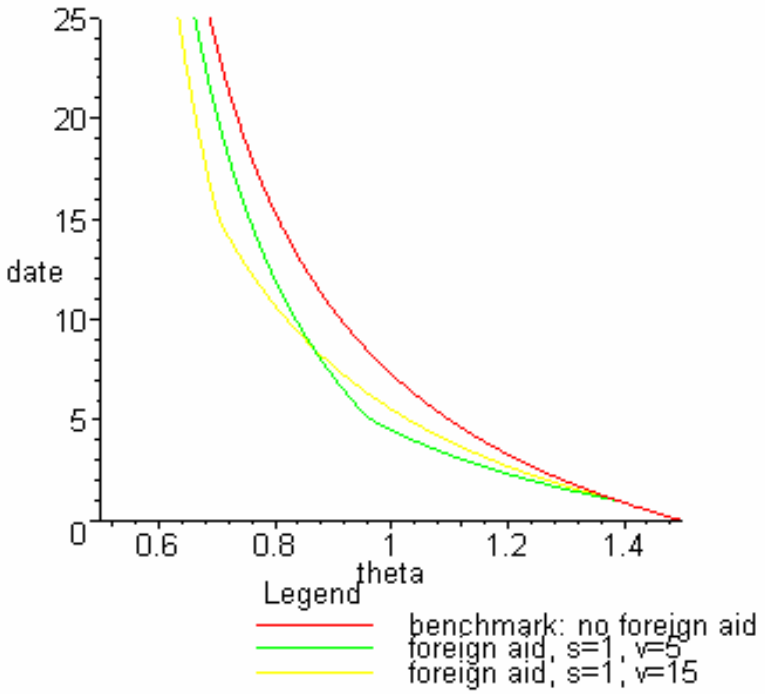
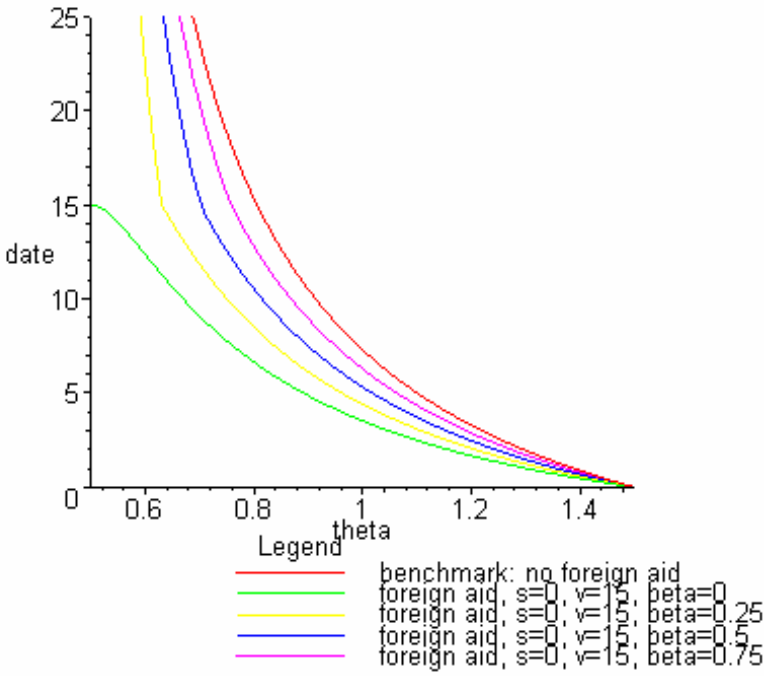


Figure IV.3 underlines that the larger a transfer (the smaller β) the larger is its effect on the expected date of stabilization. The green line corresponds to a case in which the amount of

[50] Appendix C exemplifies the calculation of the function describing the optimal concession behavior with foreign aid according to equation (36') for the parameters s=5 and v=15 as it has been conducted in Maple to produce the graphs.

foreign aid is large enough to cover 100% of discounted future government spending. This implies that after foreign aid has arrived neither the conceding nor the enduring interest group has to bear any fiscal burden at all. Since the only remaining change from stabilization is the end of utility reducing distortions, every interest group has an incentive to concede latest at the date at which foreign aid arrives. This explains the peculiar shape of the green line.

Figure IV.3



5. Criticism

Drazen criticizes that in Casella and Eichengreen's model "the recipient country can manipulate the amount of aid it receives"[51] without going into further detail. Examining how Casella and Eichengreen model lifetime utilities after stabilization helps to analyze this statement: e.g. the loser's lifetime utility after stabilization is given by

$$(31)\quad V_T^L = \int_0^{v-T} -\alpha g e^{-rt}\,dt + \int_{v-T}^{\infty} -\alpha\beta g e^{-rt}\,dt\,.$$

A later date of stabilization, T, with $T \in [s,v]$, induces a smaller value of v-T, the number of periods after stabilization in which foreign aid has not yet been disbursed. This implies that the length of the period in which the loser (and the winner) profit from the reduced amount of government spending that has to be financed internally, βg instead of g, increases relative to the one in which the total amount of government spending, g, has to be financed internally. For a country as a whole, this corresponds to a situation in which a government that stabilizes later, that is closer to the date at which aid is disbursed, will receive more aid. Probably, this

[51] Drazen (2000), p.612.

questionable way of modeling donor behavior is due to Casella and Eichengreen's attempt to stay as close to the basic war-of-attrition model as possible, in which lifetime utilities after stabilization, V_T^L and V_T^W, are evaluated at the date of stabilization (compare equation (23)). Evaluating lifetime utilities after stabilization at date zero would be more intuitive:

(49) $V_T^L = \int_T^v -\alpha g e^{-rt} dt + \int_v^\infty -\alpha\beta g e^{-rt} dt$.

Both equation (31) and equation (49) assume that the date at which the reduction of internally financed government expenditure starts corresponds to the one at which foreign aid is disbursed, v. Using the more intuitive equation (49), the share of per period reduction of government spending β that remains to be financed internally can be calculated by solving the following equation for β

(50) $\int_v^\infty (1-\beta) g e^{-r(t-v)} dt = f$,

where f corresponds to the absolute value of the disbursed amount of foreign aid at date v:

$$[\frac{(1-\beta)g}{-r} e^{-r(t-v)}]_v^\infty = f$$

$$\frac{(1-\beta)g}{r} = f$$

$$\beta = 1 - \frac{rf}{g},$$

where $0 < \beta < 1$ by definition. One could guess that this is the calculation that Casella and Eichengreen have in mind since they use a share β that is independent of the date of stabilization. But evaluating lifetime utilities after stabilization at date T instead of date zero, as they do as equation (31) underlines, implies that the date v-T is the reference date for determining β. Consequently, instead of equation (50) we have to use the following equation to determine the appropriate value of β:

(51) $\int_{v-T}^\infty (1-\beta) g e^{-r(t-v)} dt = f$,

which yields, after solving for β,

(52) $\beta(T) = 1 - \frac{rf}{g} e^{-rT}$,

that is, a β whose value does depend on the date of stabilization, T. More precisely, as

(53) $\beta`(T) = \frac{r^2 f}{g} e^{-rT} = r[1-\beta(T)] > 0$,

a later date of stabilization implies that a higher amount of government spending has to be financed internally. In other words, if the absolute amount of aid is spread over a longer interval the per period amount of reduction in internally financed government spending will be smaller. Specifying β as in equation (52) seems to be more reasonable than to assume that a later date of stabilization will be rewarded by a larger amount of foreign aid.

What are the implications for the equilibrium concession behavior of β being described by equation (52) instead of being an exogenous parameter? The loser's lifetime utility is now given by

$$(54)\ V_T^L = \int_0^{v-T} -\alpha g e^{-rt}dt + \int_{v-T}^{\infty} -\alpha\beta(T) g e^{-rt}dt = -\frac{\alpha g}{r}[1-(1-\beta(T))e^{-r(v-T)}],$$

with β defined by equation (52). Consequently,

$$(55)\ dV_T^L / dT = -\frac{\alpha g}{r}[-(1-\beta(T))re^{-r(v-T)} + e^{-r(v-T)}r(1-\beta(T))] = 0\,.$$

Substituting the functional forms depicted in equations (54) and (55) in equation (A3) yields the slope of the optimal time of concession function:

$$(56)\ \tilde{\tilde{T}}`(\theta) = -\frac{f(\theta)}{F(\theta)}\frac{[-(1-\alpha)g\hat{\sigma}(\tilde{\tilde{T}}) + \alpha g\hat{\sigma}(\tilde{\tilde{T}})]/r}{(\theta+1/2)g - \alpha g\hat{\sigma}(\tilde{\tilde{T}}) - 0} = -\frac{f(\theta)}{F(\theta)}\frac{(2\alpha-1)\hat{\sigma}(\tilde{\tilde{T}})}{r[\theta+1/2-\alpha\hat{\sigma}(\tilde{\tilde{T}})]},$$

where $\hat{\sigma}(t) = 1-(1-\beta(t))e^{-r(v-t)}$. Examining whether the condition for foreign aid to unambiguously accelerate stabilization, $\tilde{\tilde{T}}`(\theta) > T`(\theta)\ \forall\theta$, is met yields

$$-\frac{f(\theta)}{F(\theta)}\frac{(2\alpha-1)\hat{\sigma}(\tilde{\tilde{T}})}{r[\theta+1/2-\alpha\hat{\sigma}(\tilde{\tilde{T}})]} > -\frac{f(\theta)}{F(\theta)}\frac{(2\alpha-1)}{r[\theta+1/2-\alpha]}.$$

As long as the assumption justified above that $\theta+1/2>\alpha$ is maintained, this inequality can be shown to reduce to the condition $\hat{\sigma}(\tilde{\tilde{T}})[\theta+1/2] < \theta+1/2$ or

$$(57)\ \hat{\sigma}(\tilde{\tilde{T}}) < 1$$

that will always be met since $0<\hat{\sigma}(t)<1\ \ \forall t$.

Thus, the corrected model's central insight that anticipated foreign aid unambiguously accelerates stabilization policies carries over to a more realistic context in which a recipient country cannot manipulate the amount of aid it receives. As incentives to artificially delay stabilization will be eliminated if a later date of stabilization does no longer induce a higher inflow of foreign aid, one would expect stabilization to take place even earlier than in the corrected version of Casella and Eichengreen's model presented in section 3.

5. Robustness of results

How robust are these results with respect to changes in the underlying utility functions? It might be especially interesting to investigate whether Casella and Eichengreen's main result that the timing of foreign aid decides on whether stabilization is accelerated or delayed can be obtained for specific functional assumptions. For the timing of announcement and disbursal of foreign aid to be crucial, the cost parameter θ must not cancel when the slopes of the optimal time of concession functions, $\widetilde{T}`(\theta)$ and T`(θ), are compared at θ_s and θ_v to investigate the necessary and the sufficient condition for stabilization to be accelerated. As θ appears only in the term f(θ)/F(θ) that is the same for $\widetilde{T}`(\theta)$ and T`(θ) as well as in denominators, this requires the denominators of $\widetilde{T}`(\theta)$ and T`(θ), $-u+rV_{fa}^{L}-dV_{fa}^{L}/dT$ and $-u+rV^{L}$ respectively, not to be the same. But with continuous time it is easy to show that denominators will always be same as long as the loser's flow utility after stabilization before foreign aid has been disbursed, $U_{t<v}^{L}$, and the loser's flow utility after stabilization after foreign aid has been disbursed, $U_{t\geq v}^{L}$, do not depend on the date of stabilization, T. The loser's lifetime utility after stabilization with anticipated foreign aid is defined as

$$(58)\ V_{fa}^{L}=\int_{0}^{v-T}U_{t<v}^{L}e^{-rt}dt+\int_{v-T}^{\infty}U_{t\geq v}^{L}e^{-rt}dt=[-\frac{U_{t<v}^{L}}{r}e^{-rt}]_{0}^{v-T}+[-\frac{U_{t\geq v}^{L}}{r}e^{-rt}]_{v-T}^{\infty}$$

$$=1/r[U_{t<v}^{L}+e^{-r(v-T)}[U_{t\geq v}^{L}-U_{t<v}^{L}]]$$

so that

$$(59)\ \frac{dV_{fa}^{L}}{dT}=e^{-r(v-T)}[U_{t\geq v}^{L}-U_{t<v}^{L}].$$

The loser's lifetime utility after stabilization in the absence of foreign aid is given by

$$(60)\ V^{L}=\int_{0}^{\infty}U^{L}e^{-rt}dt=[-\frac{U^{L}}{r}e^{-rt}]_{0}^{\infty}=\frac{U^{L}}{r},$$

where U^{L} corresponds to the loser's flow utility in the absence of foreign aid. As $U_{t<v}^{L}=U^{L}$, it follows that

$$(61)\ rV_{fa}^{L}-dV_{fa}^{L}\big/dT=U_{t<v}^{L}=rV^{L}$$

and denominators of $\widetilde{T}`(\theta)$ and T`(θ) will always be the same. Consequently, it will not be possible to find any functional forms for U^{L}, $U_{t<v}^{L}$, and $U_{t\geq v}^{L}$ that support Casella and Eichengreen's claim that the timing of announcement and disbursal of foreign aid is decisive for whether foreign aid accelerates or delays stabilization as long as time is modeled

continuously and $U^L_{t<v}$ and $U^L_{t\geq v}$ do not depend on the date of stabilization, T. The latter condition is not met for the modified version of the model presented in section five in which $U^L_{t\geq v}(T)$. Thus, for the modified model, the line of reasoning offered above is not sufficient to exclude the possibility that there might be functional forms for which the timing of foreign aid is crucial.[52]

How robust is the result that anticipated foreign aid induces stabilization to be accelerated and not to be delayed? The result that the changes in rV^L and dV^L/dT induced by the addition of anticipated foreign aid to the war-of-attrition model just cancel has been shown to be valid for a huge class of functional forms. Keeping the assumptions that foreign aid reduces the amount of government spending that has to be financed by internal taxes and that the loser bears a larger burden of taxes after stabilization and consequently, profits more from the burden's reduction, the only remaining net effect of anticipated foreign aid on equilibrium behavior is that it diminishes the marginal cost of conceding by reducing $V^W - V^L$, the difference in lifetime utilities of loser and winner after stabilization. Thus, also the corrected model's prediction that the provision of anticipated foreign aid unambiguously accelerates stabilizations seems to be robust.

V. Conclusions

The main focus of this paper was to address the question whether budget support modeled as unconditional foreign aid accruing directly to the government budget accelerates or delays macroeconomic stabilizations. Both the different strands of theoretical literature on delayed stabilization and empirical evidence have been shown to provide some support for either hypothesis.

Most of the literature arguing in favor of delay builds on the crisis hypothesis that has a lot of intuitive appeal and is most convincingly formalized by Velasco's (1998) common property model. Drazen (1999) uses the common property model to show that providing foreign aid selectively is a means to accelerate stabilizations. Although the point that the

[52] In section five, addressing the criticism that the recipient country can manipulate the amount of aid it receives by the choice of the date of stabilization, T, has been shown to result in equation (52), that is a β that depends on T. Since β enters $U^L_{t\geq v}$ the loser's flow utility after stabilization and after foreign aid has been disbursed is a function of the date of stabilization, $U^L_{t\geq v}(T)$. Consequently,

(59') $dV^L_{fa}/dT = e^{-r(v-T)}[U^L_{t\geq v} - U^L_{t<v}] + \frac{1}{r}e^{-r(v-T)}\, dU^L_{t\geq v}/dT$

and the equality stated in equation (61) is no more valid.

conditions under which foreign aid is granted are crucial determinants of whether foreign aid delays or accelerates stabilizations is quite obvious, so far there have only been very few attempts to investigate it more carefully going beyond the distinction of conditional and unconditional foreign aid.

One of the rare specifications of the conditions of foreign aid programs that have been incorporated in models attempting to explain delayed stabilization processes is the fact that foreign aid is nearly never disbursed unexpectedly, but announced to arrive in government consultations long before it is actually disbursed. Casella and Eichengreen (1996) first used Alesina and Drazen's (1991) influential war-of-attrition model to investigate the consequences of anticipated foreign aid on the expected date of stabilization. In this paper, their result that foreign aid that is announced or disbursed after critical dates for announcement and disbursal will delay stabilization has been shown to be based on an invalidly modified equilibrium condition. A correct incorporation of anticipated foreign aid in the war-of-attrition model yields the result that foreign aid unambiguously accelerates stabilization, a result that has been shown to be robust to different specifications of functional forms.

VI. Appendices

Appendix A

Derivation of T`(θ) in the war-of-attrition model

Since the optimal time of concession, T_i, can be shown to be monotonically decreasing in the cost parameter θ_i, i.e. $T_i`(\theta_i) < 0$, what matters for the optimal time of concession is only a group's position on the known distribution function of the cost of distortions parameter θ, F(θ), relative to the expected position of the opponent. This result can be exploited in two ways: First, it establishes that 1-H(T(θ))=F(θ). The higher a group's realization of the cost parameter θ (the higher F(θ)), the earlier will it optimally concede (the lower T(θ)) and the lower is the probability that the opponent will already have conceded at the group's chosen date of concession (the lower H(T(θ)). Second, it implies that choosing a time of concession T_i is equivalent to choosing a value $\hat{\theta}$ and conceding at time T($\hat{\theta}$). Thus, another way to solve the maximization problem set up in equation (24) is to have a change in variables and to maximize over $\hat{\theta}$:

$$\text{(A1)}\ \max_{\hat{\theta}} EU(\hat{\theta},\theta) = F(\hat{\theta})\,[\int_{\hat{\theta}}^{\bar{\theta}} -u(x)e^{-rT(x)}T`(x)dx + e^{-rT(\hat{\theta})}V^L(T(\theta))]$$
$$+ \int_{x=\hat{\theta}}^{x=\bar{\theta}}[\int_{x}^{\bar{\theta}} -u(z)e^{-rT(z)}T`(z)dz + e^{-rT(x)}V^W(T(x))]f(x)dx\,.$$

Taking the derivative with respect to $\hat{\theta}$ yields, after simplifying the resulting expression and dividing it by $e^{-rT(\hat{\theta})}$, the following equation that implicitly defines T(θ):

$$\text{(A2)}\ -f(\hat{\theta})[V^W(T(\hat{\theta})) - V^L(T(\hat{\theta}))] + F(\hat{\theta})[u(\hat{\theta}) - rV^L + \frac{dV^L}{dT}]T`(\hat{\theta}) = 0\,.$$[53]

Solving (A2) for T`(θ) yields:

$$\text{(A3)}\ T`(\theta) = -\frac{f(\theta)}{F(\theta)}\frac{V^W - V^L}{-u + rV^L - dV^L/dT}\,.$$

[53] This expression corresponds to equation (A5) in Alesina and Drazen (1991) except that it is corrected for a missing minus sign in front of f(θ).

Appendix B

Use of the method of partial fractions to derive the expression for T(θ)

Solving equation (25) for T`(θ) yields

(A4) $T`(\theta) = -\frac{f(\theta)}{F(\theta)} \frac{2\alpha - 1}{r(\theta + 1/2 - \alpha)}$.

Assume θ to be uniformly distributed on $[\underline{\theta}, \bar{\theta}]$ so that $f(\theta) = \frac{1}{\bar{\theta} - \underline{\theta}}$ and $F(\theta) = \frac{\theta - \underline{\theta}}{\bar{\theta} - \underline{\theta}}$.

Consequently,

(A5) $T(\theta) = -(2\alpha - 1)\int \frac{1}{\theta - \underline{\theta}} \frac{1}{r(\theta + 1/2 - \alpha)} d\theta$.

The integral is evaluated using the method of partial fractions. The aim is to write

$$\frac{1}{\theta - \underline{\theta}} \frac{1}{r(\theta + 1/2 - \alpha)} = \frac{A}{\theta - \underline{\theta}} + \frac{B}{r(\theta + 1/2 - \alpha)} = \frac{Ar(\theta + 1/2 - \alpha) + B(\theta - \underline{\theta})}{(\theta - \underline{\theta}) r(\theta + 1/2 - \alpha)}$$

for some constants A and B. Setting the denominators equal implies

$1 = Ar(\theta + 1/2 - \alpha) + B(\theta - \underline{\theta})$ for all θ. Setting $\theta = \underline{\theta}$ yields

(A6) $A = \frac{1}{r(\underline{\theta} + 1/2 - \alpha)}$.

Setting $\theta = \bar{\theta}$ and making use of the expression for A yields

(A7) $B = -\frac{r}{r(\underline{\theta} + 1/2 - \alpha)}$.

Substituting the expressions for A and B given by (A6) and (A7) in (A5) yields

$$T(\theta) = -(2\alpha - 1) \frac{1}{r(\underline{\theta} + 1/2 - \alpha)} [\int \frac{1}{\theta - \underline{\theta}} d\theta - \int \frac{r}{r(\theta + 1/2 - \alpha)} d\theta]$$

$$= -(2\alpha - 1) \frac{1}{r(\underline{\theta} + 1/2 - \alpha)} [\ln(\theta - \underline{\theta}) - \ln(r(\theta + 1/2 - \alpha))] + C,$$

where the constant of integration, C, is defined by the boundary condition $T(\bar{\theta}) = 0$.

Evaluating the boundary condition yields the optimal time of concession function as depicted by equation (26)

(A8) $T(\theta) = \frac{2\alpha - 1}{r(\underline{\theta} + 1/2 - \alpha)} [\ln(\frac{\theta + 1/2 - \alpha}{\bar{\theta} + 1/2 - \alpha}) - \ln(\frac{\theta - \underline{\theta}}{\bar{\theta} - \underline{\theta}})]$.

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