ISSN 0265-8003

EXTERNAL DEBT AND POLITICAL INSTABILITY

Sule Ozler and Guido Tabellini

Discussion Paper No. 582
October 1991

Centre for Economic Policy Research
6 Duke of York Street
London SW1Y 6LA
Tel: (44 71) 930 2963

CEPR Discussion Paper No. 582

October 1991

ABSTRACT

External Debt and Political Instability*

This paper provides a theoretical and empirical analysis of the role played by domestic political incentives in the accumulation of large external debts by developing countries between 1972 and 1981. The theoretical model characterizes two equilibrium regimes. In one the borrower is on its demand curve and changes in the loan size desired by the borrower are accommodated by lenders. In the other regime the borrower is credit rationed, and the loan size is determined by the perceived country risk. Increased political instability increases the equilibrium loan size in the first regime and decreases it in the second. Using out-of-sample evidence, we identify the two regimes in the data. We then find that in the unconstrained regime political instability has a significant effect on the loan size, whereas it has no significant effect in the credit rationing regime. Hence the evidence indicates a positive effect of political instability on the demand for sovereign loans, as predicted by the theory.

JEL classification: F74
Keywords: external debt, developing countries, investment, politics

Sule Ozler and Guido Tabellini
Department of Economics
University of California at
Los Angeles
405 Hilgard Avenue
Los Angeles CA
90024
USA
Tel: (1 213) 824 2997

*This paper is produced as part of a CEPR research programme on International Macroeconomics, supported by grants from the Ford Foundation (no. 890-0404) and the Alfred P Sloan Foundation (no. 88-4-23), whose help is gratefully acknowledged. We thank Jonathan Eaton, participants in the NBER Political Economy Conference, in seminars at Boston University, Harvard Institute for International Development, New York University, University of Pittsburgh and UCLA for several helpful comments. Graham Elliot provided excellent research assistance. Guido Tabellini acknowledges financial support from the NSF grant SES-8909263 and from the UC Centre for Pacific Rim Studies. Sule Ozler acknowledges NSF support under grant SES-8910253 and an NBER Ford Foundation Fellowship.

Submitted 18 July 1991

NON-TECHNICAL SUMMARY

A central unresolved question in the literature on sovereign borrowing is why some developing countries accumulated so much external debt during the decade preceding the 1982 debt crisis. Most of the suggested answers have focused on the supply side of the market for sovereign loans, emphasizing distorted incentives or irrational 'herd behaviour' by the banks. To date, however, we know of no systematic analysis of the borrower's incentives, despite the fact that the costs of the debt crisis have been so harsh for some sovereign borrowers that it is difficult to reconcile their large-scale borrowing with *ex ante* optimality. In this paper we attempt to answer this question by studying the incentives to borrow created by domestic political institutions in borrowing countries. Our central result is that political instability increases the demand for foreign borrowing.

The first part of the paper considers a simple two-period model of sovereign borrowing. The model combines two important features of international borrowing. First, a sovereign borrower cannot commit to repay its external debt, but it suffers from external sanctions if it defaults. Second, a moral hazard problem is present since a sovereign borrower cannot commit to invest (rather than consume) the proceeds of its borrowing. In the borrowing country there are different policy-makers that randomly alternate in office and prefer different compositions of the available public goods. Thus the model captures two features of a political system: political instability and political polarization. Political instability is captured by the probability of losing office, while political polarization is reflected in the extent of disagreement over the composition of public goods. High instability and polarization lead to a stronger preference for present, as opposed to future, government consumption. Our paper examines how this affects the equilibrium amount borrowed.

Most of the analysis focuses on two equilibrium regimes: (i) an equilibrium without credit rationing, but in which moral hazard imposes a binding incentive constraint on the equilibrium loan contract (the moral hazard regime); and (ii) an equilibrium where the borrower is credit constrained (the credit rationing regime); The model predicts that higher political instability and polarization lead to larger equilibrium loans in the moral hazard regime, but not in the credit rationing regime. Intuitively, greater instability and polarization make the borrower more myopic, thus increasing its demand for loans and reducing its willingness to invest. In the moral hazard regime, the larger loan demand is accommodated and hence the equilibrium amount borrowed increases. In the credit rationing regime, however, the smaller investment makes the credit constraint more binding, and hence the equilibrium loan size diminishes as instability and polarization increase.

The remainder of the paper investigates whether this prediction of the model is consistent with the evidence. The available data are a panel of 55 (mostly

developing) countries during the years 1972–81, a period of rapid debt accumulation. The dependent variable is the new loans made from Eurocurrency loan markets by each country in each year. An important feature of the loan data is that not every country in the sample took out new loans from their markets in every year, but we take account of this 'censoring' problem in our estimation.

Political instability is taken to mean the probability of an imminent change in government, as perceived by the incumbent. We estimate this probability using a technique developed in related work by Cukierman, Edwards and Tabellini, by estimating a 'probit' model of the probability of a change in government as a function of other political and economic events, based on combined cross-section and time-series data from a larger sample of countries over a longer time period. Using this model, we calculate forecasts of the probability of a change in government for each country over the period 1972–81.

Political polarization is harder to measure, and we use a number of proxies including whether the country was a democracy and the percentage of its population living in urban areas. We also introduce a variety of other variables such as political assassinations, strikes and riots by calculating the principal components and using them in our analysis.

Other variables used as regressors in the equation explaining borrowing include real GDP per capita, the penalty for defaulting, the rate of interest and the variability of future income.

Our theoretical model allows for the possibility of two equilibria and in an empirical study we used out-of-sample information to distinguish which regime a given country fell into in a given year. Specifically, we classified a country as credit rationed if it had an extended fund facility or a standby agreement with the IMF.

The empirical findings are remarkably consistent with the predictions of the theory. Political instability has an important positive impact on external borrowing in the moral hazard regime. We could not find any effect of political instability on loan size in the credit rationing regime, however. The empirical results concerning the effect of political polarization on the amounts borrowed are ambiguous, possibly because of our difficulties in correctly measuring polarization.

1. Introduction

A central unresolved question in the literature on sovereign borrowing is why some developing countries accumulated so much external debt in the decade just preceding the debt crisis of 1982. Most of the proposed answers have focused on the supply side of the market for sovereign loans, emphasizing distorted incentives or irrational "herd behavior" by the banks.[1] But to date we don't know of any systematic analysis of the borrowers' incentives. And yet, the costs of the debt crisis have been so harsh for several sovereign borrowers that it is difficult to reconcile their large-scale borrowing with ex–ante optimality. In this paper we attempt to answer this question by studying the incentives to borrow created by domestic political institutions. Our findings suggest that political instability has an important role in explaining the observed accumulation of external debt during the period 1972–81. As predicted by our theoretical analysis, the larger debts have been accumulated by the more unstable countries.

The first part of the paper considers a simple two-period model of sovereign borrowing. The model combines two important features of international borrowing: 1) A sovereign borrower cannot commit to repay its external debt, but suffers from external sanctions if it defaults. 2) A moral hazard problem is present since a sovereign borrower cannot commit to invest (rather than consume) the proceeds of its borrowing. In the borrowing country there are different policymakers that randomly alternate in office, and prefer different compositions of the available public goods. Thus, the model captures two features of a political system: political instability and political polarization. Political instability is the probability of losing the office. Political polarization is the extent of disagreement over the composition of public goods. Higher instability and polarization lead to a stronger preference for present, as opposed to future, government consumption. The question addressed in the paper is how this affects the equilibrium amount borrowed.

Most of the analysis focuses on two equilibrium regimes: (i) An equilibrium without credit rationing, but in which moral hazard imposes a binding incentive constraint on the

equilibrium loan contract (called the moral hazard regime) and (ii) An equilibrium where the borrower is credit constrained (called the credit rationing regime). The model predicts that higher political instability and polarization lead to larger equilibrium loans in the moral hazard regime, but not in the credit rationing regime. Intuitively, more instability and polarization make the borrower more myopic, thus increasing his demand for loans and reducing his willingness to invest. In the moral hazard regime, the larger loan demand is accommodated and hence the equilibrium amount borrowed increases. But in the credit rationing regime, the smaller investment makes the credit constraint more binding, and hence the equilibrium loan size diminishes as instability and polarization increase.

The rest of the paper investigates whether this prediction of the model is consistent with the evidence. The available data are a panel for 55 mostly developing countries during the years 1972-1981, a period of rapid debt accumulation. The dependent variable is the new loans made from Eurocurrency loan markets by each country in each year. A feature of the data is that each country has not borrowed every year (either because it was credit constrained or because it did not want to).

In carrying out the empirical investigation we face two problems. First, to estimate the model we need to identify the two equilibrium regimes (moral hazard and credit rationing). To do that we rely on out of sample information concerning a country's repayment difficulties.

The second problem concerns the measurement of the political variables. The conceptual definition of political instability relevant for our work is the probability of an imminent government change. Following the method of Cukierman, Edwards and Tabellini (1990), we estimate yearly measures of political instability for each country over the period 1972–1981. This measure of political instability is quite variable over time for a large number of countries in our sample and it tracks down the actual government change

quite well. Political polarization, which is more difficult to measure, is primarily captured by the yearly frequency of various forms of political expression: riots, executions, etc.

The empirical findings are remarkably consistent with the predictions of the theory. Political instability has an important positive impact on external borrowing in the moral hazard regime. But we could not find any effect of political instability on loan size in the credit rationing regime. The empirical results concerning the effect of political polarization on the amounts borrowed are ambiguous, possibly because of our difficulties in correctly measuring polarization. The paper is organized as follows: Section 2 formulates the theoretical model; Section 3 addresses empirical issues, including the data, estimation method and results. A summary of our findings and concluding remarks are in Section 4.

2. The Theory

This section outlines a simple two-period model of international borrowing and lending that will guide us in the empirical investigation. The elements of the political system are as in Alesina and Tabellini (1989), Tabellini and Alesina (1990). The typical sovereign borrower is the government of a country with the following political features. Two possible policymaker types, L and R, randomly alternate in office. The policymaker of type i maximizes:

$$U(H^i(g_1,f_1)) + EH^i(g_2,f_2) \tag{1}$$

where g_t and f_t denote the period t consumption of two different (public) goods, such as

bridges and weapons, $U(\cdot)$ is a well-behaved concave utility function, E is the expectations operator, and $H^i(\cdot)$ is defined as follows. If $i = L$, then

$$H^L(g,f) = \frac{1}{\alpha(1-\alpha)} \text{Min}[\alpha g, (1-\alpha)f], \quad 1>\alpha>0 \tag{2}$$

and if $i = R$, then $H^R(\cdot)$ is defined as in (2), but with α replaced by $(1-\alpha)$. Thus, these two policymakers types prefer different compositions of the goods g and f. For simplicity, their disagreement is parameterized by α. The more distant is α from 1/2, the more they disagree. Irrespective of who holds office in period 1, there is a given probability $(1-\gamma)$ of being reappointed in period 2; with probability γ, the other policymaker type will be reappointed.[2]

In the model, then, the political system has two central features: its instability, represented by the probability of losing office, γ. And the degree of polarization between the alternating governments, represented by the parameter α. As shown below, these two features determine the demand for sovereign loans.

Before studying the borrowing decision, let us rewrite the government objective function in a more convenient form. For concreteness, suppose $\alpha>1/2$, and define $x = g+f$ as the total amount of government spending. Clearly, if g^i and f^i denote the consumption of g and f when the i^{th} policymaker is in office, $i = R,L$, then:

$$\begin{aligned} g^L &= (1-\alpha)x & f^L &= \alpha x \\ g^R &= \alpha x & f^R &= (1-\alpha)x \end{aligned} \tag{3}$$

The value of the function $H^i(g,f)$ depends on whether the policymaker of type i is in office

or not. By substitution of (3) in (2), when i holds office,

$$H^i(g,f) = x\,, \qquad i = R,L \tag{4a}$$

and when he does not hold office,

$$H^i(g,f) = \frac{1-\alpha}{\alpha}\,x\,, \qquad i = R,L \tag{4b}$$

Since $\alpha > 1/2$, the right hand side of (4b) is smaller than that of (4a). Thus, as intuitive, both policymaker types achieve a higher utility when they are in office, since they then choose the preferred composition of public spending.

By assumption, both policymaker types face the same probability $(1-\gamma)$ of retaining office in period 2. Irrespective of who holds office in period 1, by substitution of (4) into (1), we can then write the sovereign borrower expected utility function as:

$$U(x_1) + \delta(\gamma,\alpha)Ex_2 \tag{5}$$

where $\delta(\gamma,\alpha) \equiv (1-\gamma) + \gamma(1-\alpha)/\alpha < 1$, and E is the expectations operator (now with respect to uncertainty other than about who is appointed next period).

Note that $\delta_\gamma\,,\ \delta_\alpha < 0$ (a subscript denotes a partial derivative). Thus, equation (5) summarizes a central result, studied more extensively in Tabellini and Alesina (1990) and Alesina and Tabellini (1990). More political instability (a higher γ) and more political polarization (a higher α) lead to a stronger preference for present relative to future government consumption. That is, political instability and polarization lead to government myopia.

We now complete the description of the economic environment. Lenders are risk neutral and competitive. They are willing to lend to sovereign borrowers up to the point where the (gross) expected rate of return on their loans is equal to the given risk-free rate, $r \geq 1$. Lenders face a large number of sovereign borrowers.

The rest of the model combines two features that have been studied separately in the literature on sovereign borrowing. The first feature is sovereign risk: a sovereign borrower cannot commit to repay its external debt. To name but a few examples, Eaton and Gersovitz (1981), Bulow and Rogoff (1989 a,b), Grossman and Van Huyck (1988) have examined the role of reputation and external sanctions in sustaining sovereign debt repayments. For simplicity, as in Cohen and Sachs (1987), Krugman (1985) and Ozler (1989), we assume that if a borrower defaults, he suffers from external sanctions that result in the loss of a fraction $q < 1$ of its second period output. The lender only recovers a fraction $\lambda < 1$ of the loss incurred by the borrower.[3]

The second feature of our model is moral hazard: a sovereign borrower cannot commit to invest (rather than consume) the proceeds of its borrowings. Hence, the loan conditions cannot be contingent on investment. Our formalization of this second feature follows Gertler and Rogoff (1989). Second period output, y, is random, and can take one of two fixed values: $\overline{y}$ or $\underline{y} < \overline{y}$, with probability π and $1-\pi$ respectively. The only role of investment, k, is to increase the probability that the good state occurs. Specifically, we assume that $\pi = P(k,\theta)$ where θ is a parameter known to everybody that refers to the economic structure and determines the riskiness of investment in this country: the greater is θ, the more likely is the good state $y = \overline{y}$. Thus:

$$P_k > 0, \quad P_{kk} < 0, \quad P_{k\theta} > 0 \tag{6}$$

where a subscript denotes a partial derivative.

Events unfold according to the following timing:

- In the first period, the policymaker contracts a loan. The loan specifies an amount b borrowed today, and a (gross) interest rate $R \geq r$ to be repaid tomorrow with the principal.
- Then, the borrower decides how much to invest and consume in the current period.
- At the beginning of the second period, the policymaker in the borrowing country is either reappointed or thrown out of office.
- Next, the appointed government in the borrowing country decides whether to repay the amount due, or to suffer the penalty, qy.

Based on these assumptions, the borrower's budget constraints are:

$$g_1 + f_1 + k \leq w + b$$
$$g_2 + f_2 = \text{Max}[y - Rb, (1-q)y] \qquad (7)$$

where w denotes a given first period endowment.

We now turn to the analysis of the equilibrium loan contract.

2.1. The Unconstrained Regime

This subsection characterizes the equilibrium in the event that the incentive constraints due to moral hazard and sovereign risk are not binding. For this case to occur, the equilibrium amount borrowed must be sufficiently small that it is always repaid in full, irrespective of the state of the world. If this is so, then the interest rate on the loan carries no spread over the risk-free rate: $R = r$.

Let b^* and k^* denote the equilibrium amounts borrowed and invested. They are

determined by the following optimality conditions:[4]

$$P_k(k^*,\theta)(\bar{y}-\underline{y}) = r \tag{8a}$$

$$U_x(w+b^*-k^*) = \delta r \tag{8b}$$

where U_x denotes the derivative of $U(\cdot)$. Equation (8a) equates the marginal product of investment to the risk-free rate. Equation (8b) is the familiar Euler's equation for the optimal intertemporal allocation of consumption, given the policymakers discount rate δ. Hence, investment is carried out up to the point where its marginal product equals its opportunity cost. And consumption is also allocated optimally, given the preferences.

For this to be an equilibrium, b^* must satisfy $b^* \leq qy/r$ so that it is in the interest of the borrower to always repay its debt, rather than suffer the penalty associated with default.[5] Under this condition, no incentive constraint is binding, and the equilibrium loan contract can be written so as to achieve full efficiency between the borrowers and the lenders.

2.2. Moral Hazard

Next, suppose that the equilibrium level of debt is such that the borrower repays in full only if the good state occurs. Otherwise, the borrower suffers a loss qy, and the lender recovers the amount λqy. The zero expected profit condition for the lender then implies that the interest rate on the loan is:

$$R = \frac{r}{\pi} - \frac{(1-\pi)\lambda qy}{\pi b} \tag{9}$$

Here moral hazard imposes a binding incentive constraint on the equilibrium loan contract.

The borrower cannot commit to an investment policy. Hence, the terms of the loan cannot be made contingent on investment. But the probability of default depends on investment. Hence, the borrower is prevented from taking into account the beneficial effects of investment on its cost of borrowing. This results in an insufficient amount invested compared to the unconstrained equilibrium.

Specifically, now investment is chosen so as to maximize (5), subject to (6) and (7) (but not (9), since π is taken as given because of the moral hazard constraint). After some simplifications, we obtain that the equilibrium amount invested is determined by:

$$P_k(k^*,\theta)(\bar{y}-\underline{y}) - P_k(k^*,\theta)(Rb^*-q\underline{y}) = r \tag{10}$$

The equilibrium size of the loan is still determined by (8b) from above (since the expected marginal cost of borrowing is still equal to the risk-free rate r). Since by assumption $Rb^* > q\underline{y}$, investment falls short of the efficient amount defined implicitly in (8a).[6]

For this to be an equilibrium, two conditions must be satisfied. First, if the bad state occurs, debt must be repudiated; hence, $b^* \geq q\underline{y}/r$ (or F1 in footnote 5 must be violated). Second if the good state occurs, the debt must be repaid in full. Hence, $Rb^* \leq q\bar{y}$ for R given by (9).[7] Making use of (9) we thus obtain the upper bound on b^*:

$$b^* \leq \frac{q[\pi\bar{y}+(1-\pi)\lambda\underline{y}]}{r} \equiv \bar{b} \tag{11}$$

2.3 Credit Rationing

If (11) holds as equality, then the borrower is credit constrained: he would not be able to borrow more, even if he wished to do so. Now the opportunity cost of investing is

the marginal disutility of foregoing period 1 consumption, which, if the credit constraint (11) is binding, exceeds the risk-free rate.

Specifically investment is chosen so as to maximize (5), subject to (6) and (7), with $b^*=\bar{b}$ cf. (11). Equilibrium investment is then implicitly defined by:

$$-U_x(w+\bar{b}-k^*) + \delta(1-q)P_k(k^*,\theta)(\bar{y}-\underline{y}) = 0 \qquad (12)$$

where $\bar{b}$, defined in (11), is the maximum amount that can be borrowed. The equilibrium interest rate on the loan contract is still defined by (9), with $b = \bar{b}$ in it.

2.4 Discussion

Summarizing, we can identify three equilibrium regimes. (i) The unconstrained equilibrium, in which $R = r$ and investment and debt are determined by (8). (ii) The equilibrium with moral hazard, in which R is determined by (9), debt by (8b), and investment by (10). (iii) The equilibrium with credit rationing, in which R is still given by (9), debt is determined by (11), and investment by (12). These three regimes lead to different comparative statics results and suggest different specifications of the regressions that will be carried out in the empirical analysis.

For our empirical investigation we are interested in two regimes: the moral hazard and the credit rationing regime. We can rule out *a priori* the unconstrained regime, since in the observed sample we always have $R > r$: the loans always carry a positive spread on the LIBOR rate.

In both regimes, the equilibrium size of the loan, b^*, is a function of all the parameters of the model:

$$b^* = B(\delta, w, r, q, \lambda, \bar{y}, \underline{y}, \theta) \tag{13}$$

But in the moral hazard regime, the function B(·) is defined implicitly by (8b), (9) and (10) whereas in the credit rationing regime B(·) is defined implicitly by (9), (11) and (12).

Applying the implicit function theorem, we obtain that in the moral hazard regime:

$$\begin{aligned} &B_\delta < 0, \quad B_w < 0, \quad B_r < 0, \\ &B_q \gtrless 0, \quad B_\lambda > 0, \quad B_{\bar{y}} > 0, \quad B_{\underline{y}} \lesseqgtr 0, \quad B_\theta > 0 . \end{aligned} \tag{14a}$$

whereas in the credit rationing regime:

$$\begin{aligned} &B_\delta > 0, \quad B_w > 0, \quad B_r < 0, \\ &B_q \gtrless 0, \quad B_\lambda > 0, \quad B_{\bar{y}} > 0, \quad B_{\underline{y}} \gtrless 0, \quad B_\theta > 0. \end{aligned} \tag{14b}$$

Consider first the moral hazard regime, (14a). The general intuition here is that the borrowing country is on its demand curve. Hence the equilibrium size of the loan reflects (i) the position of this demand curve, and (ii) the marginal cost of borrowing as captured by the interest rate R. The position of the demand curve for loans in turn depends on the country rate of time preference, δ, on its period 1 endowment, w, and on the variables determining investment. The marginal cost of borrowing depends on the risk-free rate, r, and on the riskiness of the country as determined by the equilibrium rate of investment.

In the credit rationing regime, on the other hand, the borrower is not on his demand curve. Hence the equilibrium size of the loan is determined by the perceived default risk,

which in turn depends on the equilibrium size of investment. Hence all the parameters in (14) — except the risk-free rate r — affect the loan size indirectly, by determining the country willingness to invest.

Note that the country rate of time preference, δ, has opposite effects on the loan size in the two regimes. In the moral hazard regime, a higher δ (i.e., a higher weight on future consumption) reduces the equilibrium amount borrowed, since it shifts down the demand for loans. In the credit rationing regime, on the other hand, a higher δ has the opposite effect: it increases the equilibrium size of the loan. The reason is that here a higher weight to future consumption leads to more investment, and hence it relaxes the upper credit constraint. As shown at the beginning of this section, the parameter δ is a decreasing function of political instability (γ) and polarization (α). The model thus leads to the prediction that more political instability and polarization is associated with larger loans in the moral hazard regime, but smaller loans in the credit rationing regime.

Before turning to the evidence, we close this theoretical section with a remark on the normative interpretation of these alternative regimes. From the point of view of a policymaker who is already in office in period 1, the unconstrained regime is preferred to any other, since no incentive constraint is binding. But from the point of view of a policymaker who does not yet know whether he will be in office in period 1 or not, the unconstrained regime may result in an excessively large loan (even though it results in the optimal investment size). Hence from an ex-ante point of view, the moral hazard regime or even the credit rationing regime may be preferred.[8]

Generally, the welfare comparison between these three regimes is ambiguous and depends on the parameter values: even though the moral hazard and credit rationing regimes lead to smaller loans (which is ex–ante welfare improving), they also lead to smaller investment (which is not). Hence no unambiguous normative ranking of these regimes is possible in general.

3. The Evidence

3.1 The Data

According to the theory formulated in the previous section, the loan size depends on five main variables, each of them referring to a parameter of the model. Table 1 summarizes how each variable affects the loan size in both equilibrium regimes.

We now discuss how to measure each of these variables, as well as the dependent variable. The dependent variable is the amount of new loans made in a year to each country from Eurocurrency credit markets, in the period 1972-81 and for a sample of 55 developing countries. The loans included are US$–denominated loans that have variable interest rates with LIBOR as the base rate. These restrictions are incorporated to avoid complications that may arise from comparisons across different types of financial instruments. The loan size is scaled by GDP and is measured in logs, and it is denoted AMNTY. An important feature of the loan data is that not every country in the sample has borrowed new loans from these markets every year in the sample. Lack of borrowing in a particular year could be either because of lack of demand for new loans or the borrower may simply by rationed. This censoring problem is taken into account in the estimation. Five groups of explanatory variables are used in the regressions.

(i) Political Instability

By political instability we mean the probability of an imminent government change, as perceived by the incumbent. Our procedure for constructing a measure of such probability extends that of Cukierman, Edwards and Tabellini (1990) by introducing a time variable measure. First, we estimate a probit model on pooled time series and cross–country data, for a large sample of countries (larger than the 55 countries on which

we have loans data) over the period 1957-82. The data contain annual observations on government change and other political and economic events. From these regressions we construct two yearly measures of political instability for each country over the period 1972-81. They are the in-sample and out-of-sample forecasts of the probability of a government change. Thus, for each country we obtain two series of 12 yearly observations of political instability, which we call INSTAB1 and INSTAB2. The in-sample forecast for country i and year t (INSTAB1) is obtained by estimating the probit model up to and including year t, and then computing the expected probability of government change for that year. The out-of-sample forecast for year t (INSTAB2) is obtained by estimating the model up to year t-1, and then using the explanatory variables for year t to compute the expected probability of government change for that year. Thus, we estimate 12 probit regressions on pooled time-series and cross-country data, one for the period 1951-71, one for 1951-72, and so on up to the period 1951-82.

The specifications of the probit regressions contain three broad classes of explanatory variables: economic variables, designed to measure the recent economic performance of the government; political variables, accounting for significant political events that may signal the imminence of a crisis; and structural variables, accounting for institutional differences and country-specific factors that do not change, or that change only slowly over time. These structural variables consist of three dummy variables that group countries in three categories, according to their political institutions: (i) democracies; (ii) democracies in which the election date is determined by the constitution; and (iii) democracies ruled by a single majoritarian party. Even though these three groups are too broad to account for the variety of existing political institutions, at least they discriminate between very different constitutional environments. Moreover, we have included a dummy variable for each country, to allow for fixed effects across countries. All

these variables, as well as their source, are defined precisely in Table A.1 of the Apendix, which also reports the results of three out of the twelve probit regressions. Table 2 reports the mean and standard deviation of our two measures of political instability, for every country in the sample, over the period 1972-81. They are quite similar to each other. The last column of Table 2 reports the frequency of government change during the period 1972-81: it is not too dissimilar from the means of our two measures of political instability.

To get a sense for how variable our measures of political instability are over time, we plotted both measures against time. To our surprise, we found them to be quite variable for a large number of countries. We also found that the in-sample and out-of-sample expected probability measures move closely together over time, and they track down the actual government change quite well. In the results reported below we use the out-of-sample forecast (INSTAB2). But in subsection 3.4 we describe what happens when the in-sample forecast is used instead.

(ii) Political Polarization

Political polarization is even more difficult to measure than political instability, and we rely on several different and imperfect proxies. First, the intensity of political conflict is presumably related to the broad nature of the political system and to the general organization of social and economic interactions. To quantify the first variable we constructed an indicator for democratic regimes (DEMOCRACY), taking a value of 1 if the country is a democracy in that year, and 0 otherwise, whereas we measured the second variable by the percentage of the population living in urban areas (URBAN). Presumably totalitarian regimes are more likely in highly polarized societies, where democratic forms of government would not be viable, and political conflicts are known to be more intense and disruptive in urban communities in comparison to rural areas.

Second, we measure political polarization by relating it to the yearly frequency of

various forms of political expressions such as riots, strikes, political assasinations. Since there are a large number of potential variables in this category, we constructed summary indicators using principal components analysis. The events that formed the basis of our analysis are: political assassinations, armed attacks, deaths due to political violence, executions, political protests, political strikes, riots, government sanctions, regime support demonstrations, and relaxation of government sanctions. Tables A.3 and A.4 of the Appendix provide summary statistics for the three factors identified (and called FACTOR 1–3 respectively). As is evident from the appendix, it is difficult to interpret the three identified factors, which is a known weakness of this statistical approach. In subsection 3.4 below we report on results that aggregate these political events by taking simple averages.

The remaining variables are easier to measure. Specifically:

(iii) Current income is measured by real GDP per capita (GDPCAP).

(iv) The penalty for defaulting is measured by two variables. The first is the percentage of the borrower exports to the three largest creditor nations (EXPRAT). This variable measures the degree of vulnerability of the borrower to trade embargoes. The second variable is the ratio of reserves to GDP (RESY). The presumption is that borrowers with higher reserves are less likely to suffer credit embargoes, and hence bear a smaller penalty for defaulting Hence, we expect the default penalty to be positively related to EXPRAT and negatively related to RESY. As the available data does not allow us to separately measure how much the lenders are likely to benefit from the costs they impose on the defaulters, we do not have an empirical counterpart for the parameter λ in the model.

(v) The risk-free rate is measured by LIBOR (London Interbank offer rate).

(vi) The variability of future income is measured by two variables. The first is the ratio of agriculture in GDP (AGGDP), as economies with larger agricultural sectors are

more likely to be prone to output and terms of trade shocks. Second, we measure income variability by the forecast error relative to a moving average of real GDP per capita over the sample period (INCVAR).

Summary statistics of the dependent variable and of all explanatory variables for both regimes are shown in Table 4.

3.2 Estimation Method

The theoretical model identifies two regimes, the moral hazard and credit rationing regimes. In addition, the data are censored as positive levels of borrowing are not observed every year for each country. Theoretically it is possible to write a likelihood function that captures both features. The estimation, however, is cumbersome, even when the complications that arise because of the censoring are put aside. Models with unknown sample separation have two major problems. First, there is considerable loss of information. Second, the likelihood function for this class of models is usually unbounded.

To overcome the problems that arise from the presence of two regimes we use out of sample information. The sample is split in two sub-samples with this information.[9] Furthermore we assume that disturbances are independent and normal for the two regimes, each of which has a censoring problem. Accordingly, we estimate the usual censoring model separately for each regime using a maximum likelihood procedure.

The out-of-sample information used in the classification of countries is based on the signing of IMF agreements.[10] Specifically, we classify a country as credit rationed if in the next period the country had an extended fund facility or a standby agreement with the IMF, and not rationed otherwise (as will be discussed later, we considered some variation of this approach so as to assess the sensitivity of the results to our classification). The justification for this approach is that, typically, a country experiencing "repayment

difficulties" does not have normal access to "new" loans from private creditors until an IMF agreement. Table 3 presents summary information concerning the observations classified in the credit rationing regime using this approach.

3.3 Results

The primary result of our investigation is that political instability leads to larger loans in the moral hazard regime, but it has no effect on borrowing in the credit rationing regime. The estimation results that lead to this main finding are discussed in this section.

First, we estimate the model on the two regimes separately by simple OLS, neglecting the censoring of the data. Table 5 reports the results. In the unconstrained regime, political instability has a positive and statistically significant impact, as predicted by the model. The parameter estimate of this variable and the related t value are 1.22 and 2.65 respectively. The parameter estimate for the instability variable in the credit rationing regime is -.13. Though the sign is as predicted by the model, the estimate is not statistically significantly different from zero.

Next, we reestimate the equations by maximum likelihood methods, now taking the censoring problem into full account. The results are presented in Tables 6 and 7, for different specifications. Consider Table 6 first. Columns (1a) and (1b) only employ the economic variables, as a base for comparison with the other specifications where political instability and polarization are introduced. In both regimes all variables have the expected sign, except for INCVAR which has the wrong sign in the credit rationing regime. Moreover, several variables change sign across the two regimes, as predicted by our theory. This is an indication that the sample separation criterion is correct. However the overall fit of the equations seems better in the moral hazard regime, where the estimated coefficients on 3 out of 6 variables are significantly different from zero (they are EXPRAT and RESY, that refer to the default penalty, and AGGDP that refers to the variability of

future income). In the credit rationing regime only the variable EXPRAT has a statistically significant estimated coefficient.

Columns (2a) and (2b) of Table 6 add our measure of political instability. Its estimated coefficient is positive in the moral hazard regime and negative in the credit rationing regime, as predicted by our theory. However, the estimated coefficient is significantly different from zero in the moral hazard regime but not in the credit rationing regime. The other estimated coefficients are virtually unaffected by the inclusion of this variable in both regimes.[11]

Finally, Table 7 adds our measures of polarization, first including only the variables DEMOCRACY and URBAN, and then adding the three FACTORS. The estimated coefficients of the economic variables and of political instability remain generally like in Table 6. In particular, political instability retains its positive and significant estimated coefficient in the moral hazard regime but not in the credit rationing regime. The variables DEMOCRACY and URBAN have a positive estimated coefficient in both regimes (our theory predicts a positive coefficient in the moral hazard regime and a negative coefficient in the credit rationing regime). However the t–statistics drop considerably in the credit rationing regime. The estimated coefficients on the three FACTORS are insignificantly different from zero and, because of their ambiguous interpretation, their sign is not very meaningful. Overall, therefore, our measures of political polarization do not have much explanatory power, presumably because of errors of measurement.

The main inference that we draw from these estimates is that political instability is positively associated with loan size in the moral hazard regime, but not in the credit rationing regime. Thus the evidence supports our theory, and in particular the proposition that political instability increases the loan demand of the borrower. However there is no evidence of the predicted negative relationship between debt and political instability in the

credit rationing regime.

The overall poor performance of the model in the credit rationing regime indicates that our formulation of the penalties of defaulting may be too simplistic. In particular, the theoretical predictions that less investment reduces the expected default cost and therefore leads to tighter credit rationing would not arise from more general models that allow for an effect of investment on the sectoral composition of output between traded and non-traded goods.[12] Moreover, political variables could have an independent effect on the credit constraint, if for instance the cost of default differs across political parties, as in Alesina and Tabellini (1989).

3.4 Sensitivity Analysis

In this subsection we report several results that indicate the robustness of the estimates in Tables 5–7.

(i) Specification

First, we redefined the dependent variable by scaling it to GDP and by population, rather than exports. The results are analogous to those of Table 7. Second, we added another variable capturing the costs of default, namely the share of exports plus imports over GDP, in the hope that this would improve the performance in the credit rationing regime. This new variable was generally insignificant and did not affect the other estimated coefficients. Finally, to allow for fixed effects in our panel, we added a list of dummy variables, one for each year between 1972-81, plus five regional dummies that grouped countries in the same geographic area. A few of these dummy variables were significant, but none of the other estimated coefficients were affected. In particular, political instability always retained its positive and significant estimated coefficient in the moral hazard regime, and its negative and insignificant coefficient in the credit rationing

regime.

(ii) Errors in Variables

Our measures of political instability and polarization are likely to be measured with error. To assess the robustness of our results, we replaced them with other, slightly different, measures. The out-of-sample forecast of the probability of a government change, INSTAB2, was replaced by the in-sample forecast, INSTAB1. And we replaced the three FACTORS by other measures of polarization, obtained by aggregating together the frequency of similar political events, to form four variables: political challenges to the regime, violent challenges to the regime, unsuccessful attempts of regime change, and political repressions. The variable INSTAB1 performed analogously to INSTAB2. And none of these four polarization variables ever had a significant estimated coefficient.

(iii) Sample Separation

The results reported in the text use as a criterion for sample separation whether the country signed an IMF standby-extended facility agreement in the subsequent year. To check the robustness of the results, we replaced this criterion with two other ones. First, we looked at whether the country signed the IMF agreements in the current year or not. Second, we incorporated information on bank reschedulings. The results did not change substantially, and in particular the political instability variable had a positive and significant estimated coefficient in the moral hazard regime, and an insignificant and negative coefficient in the credit rationing regime. This finding is reassuring because it suggests that the results are robust to small redefinitions of the samples. Furthermore, a likelihood ratio test cannot reject the nul hypothesis that the moral hazard and the credit rationing samples correspond to two different regimes.

(iv) Simultaneity

In principle the political instability variable could be correlated with the error term,

since large external borrowing could affect the probability of government change. Dealing with this problem in a satisfactory way would require joint estimation of the probit equations and the borrowing equations. We did not try it, because of the computational difficulties, but we strongly doubt that the data contain enough information to obtain reliable inferences from such a non-linear problem.

What we tried instead was simply to replace the current value of the instability index with its one-period legged value. The results were generally unchanged, even though the t-statistic on political instability dropped slightly in the moral hazard regime. This provides some indication that reverse causation is not driving our results.

5. Concluding Remarks

The central result of this paper is that domestic political instability increases the demand of sovereign borrowing. This result is derived theoretically from a simple model, and receives support from the evidence concerning Eurocurrency loans of developing countries during 1972-81. This result can thus contribute to explain why some countries accumulated so much external debt over a short period of history.

Sovereign borrowing entails two decisions: first to borrow and then to repay. In this paper we have focused mainly on how political incentives affect the decision to borrow. The repayment decision has been studied by several interesting recent papers,[13] all of which however have focused exclusively on the economic incentives to repay. Our empirical findings and the worse performance of the empirical model in the credit rationing regime suggests that an important direction for future research is to investigate how the repayment decision is also affected by political incentives.[14]

Footnotes

1 See Eaton and Taylor (1986) for a review.

2 These simplifying assumptions can be relaxed in several ways. All the results hold if the political process is modelled as in Alesina and Tabellini (1990), where rational voters elect the policymaker; under appropriate assumptions, the results also generalize to a concave function $H^i(\cdot)$; similarly, the symmetry of the model is not important.

3 Bulow and Rogoff (1989a) discuss how to derive this assumption from an explicit model of debt rescheduling. In a finite horizon model such as this one, reputation cannot create any incentive for repayment. Bulow and Rogoff (1989b) discuss why even in an infinite horizon framework reputation does not create strong incentives for repayment.

4 Equations (8a) and (8b) are the first order conditions of the problem of maximizing (5) with respect to k and b, subject to (7), (6) and for $R=r$.

5 By (8b), $b^* \leq \underline{qy}r$ if and only if:

$$-U_x(w+\underline{qy}/r-k^*) + \delta r \geq 0$$

where k^* is determined by (8a).

6 Using (9), equation (10) can be rewritten as:

$$P_k(k^*,\theta)(\bar{y}-\underline{y}) - [rb^* - \underline{qy}(\lambda+P(k^*,\theta)(1-\lambda))]\, P_k(k^*,\theta)/P(k^*,\theta) = r.$$

7 Inequality (11) holds if

$$U_x[w+q(\pi\bar{y}+(1-\pi)\lambda\underline{y})/r-k^*] \geq \delta r \ .$$

8 If the uncertainty about who will be in office in period 1 is the same as the uncertainty about who will be appointed in period 2, the ex–ante optimal policy is to invest according to (8a), but to borrow so as to satisfy:

$$U_x(w+b^*-k^*) = r \ .$$

See Tabellini and Alesina (1990) for a more extensive discussion of this point.

9 This approach does not take into account the problems that may arise from the presence of stochastic upper bounds, which would require numerical optimization methods.

10 An approach taken in Hajivassiliou (1987).

11 Since INSTAB2 is a fitted variable, the estimated standard error of its coefficient is biased. However, as shown by Pagan (1984), under the null hypothesis that its true coefficient is zero, the bias disappears. Hence, the t-statistics of INSTAB2 is still a correct Lagrange multiplier test of the null. The t–statistics of the other variables, on the other hand, are biased.

12 See for instance Gersovitz (1983), Kahn (1984) and Alexander (1987).

13 For instance Bulow and Rogoff (1989a), Grossman and van Huyk (1988) and Eaton and Gersovitz (1981).

14 Diwan and Verdier (1990) have taken a step in this direction. They empirically show that repayment behavior in democracies is better explained by economic variables than in totalitarian regimes.

References

Alesina, A., and G. Tabellini, (1989) "External Debt, Capital Flight and Political Risk," *Journal of International Economics*, November.

Alexander, L.S., (1987), *Three Essays on Sovereign Default and International Lending*, Ph.D. Dissertation, Yale University.

Bulow, J. and K. Rogoff, (1989a) "A Constant Recontracting Model of Sovereign Debt" *Journal of Political Economy*, February.

———————, (1989b) "Sovereign Debt: Is to Forgive to Forget?" *American Economic Review*, vol. 79.

Cukierman, A., S. Edwards and G. Tabellini, (1990) "Seignorage and Political Instability," NBER Working Paper No. 3199.

Diwan I. and T. Verdier, (1990), "Distributional Aspects of Debt Adjustment," World Bank Working Paper No. 657.

Gersovitz, M., (1983), "Trade, Capital Mobility and Sovereign Immunity," Research Program in Development Studies Paper No. 106, Princeton University.

Eaton, J., and M. Gersovitz, (1981) "Debt with Potential Repudiation: Theoretical and Empirical Analysis," *Review of Economic Studies* 48, 289-309.

——— and L. Taylor, (1986), "Developing Country Finance and Debt," *Journal of Development Economics*, 22, 209-265.

Gertler, M. and K. Rogoff, "Developing Country Borrowing and Domestic Wealth," forthcoming in *Journal of Monetary Economics*.

Grossman, H.I., and J.B. Van Huyck, (1988), "Sovereign Debt as a Contingent Claim: Excusable Default, Repudiation, and Reputation," *American Economic Review*, December 1088-1097.

Hajivassiliou, V.A., (1987), "The External Debt Repayment Problems of LDCs: An Econometric Model Based on Panel Data," *Journal of Econometrics.*

Kahn, R.B., (1984), "External Borrowing and the Commons Nature of Foreign Exchange" mimeo, Board of Governors of the Federal Reserve System.

Krugman, P., (1985), "International Debt Strategies in an Uncertain World," in G. Smith and J.T. Cuddington (eds.), *International Debt and the Developing Countries*, Washington, D.C.: The World Bank.

Obstfeld, M., (1986) "Capital Mobility in the World Economy: Theory and Measurement," in K. Brunner and A.H. Meltzer (eds.), Carnegie-Rochester Conference Series on Public Policy 24.

Ozler, S., (1989) "On the Relation between Reschedulings and Bank Value," *American Economic Review*, pp. 1117–1131.

_____, (1991), "Evolution of Commercial Credit Terms: An Empirical Study of Commercial Bank Lending to Developing Countries," forthcoming in *Journal of Development Economics.*

Sachs, J., and D. Cohen, (1985) "LDC Borrowing with Default Risk," *Kredit und Kapital*, Heft 8, 1985.

Tabellini, G., and A. Alesina, (1990) "Voting on the Budget Deficit," *American Economic Review*, March.

Appendix

1. Measures of political instability

Table A.1 defines the explanatory variables used in the Probit Regressions. Table A.2 reports three out of the twelve regressions that we ran. The remaining regressions have similar patterns. The coefficients are quite stable across the estimation periods. Most variables have the expected sign, even though only a few are significant. In particular, government change is made more likely by unusual inflation in the previous year (but the opposite is true for inflation in the previous two years), and by unusually low growth of private consumption over the current and previous two years. (As explained in Table A.2, these variables are measured in deviation from their country means.) Moreover, RIOTS, POLITICAL REPRESSIONS, EXECUTIVE ADJUSTMENTS and unsuccessful attempts to change the government (ATTEMPTS) all signal the imminence ofa political crisis. Two of the institutional dummies are significant: democracies have more frequent government changes than non–democratic regimes. And coalition governments or minority governments are less stable than majoritarian governments. Several of the country-specific dummies (not reported in the table) are also significant, indicating that there are additional factors contributing to instability of the political system which are not fully captured by our explanatory variables. These estimates are robust to changes in the model specification.

2. Measures of political polarization

To construct the three FACTORS used to measure political polarization, we applied principal component analysis on the yearly frequency of the events listed in the text.

Table A.3 contains the simple correlation matrix of these variables, and Table A.4 provides summary statistics for the three factors identified.

3. Data Sources

The political event data are all taken from Jodice and Taylor (1983). Real per capita GDP comes from Summers and Heston (1988). Urbanization and GDP of the agricultural sector is taken from The World Development Report, The World Bank, various years. Exports, imports, reserves, LIBOR, are obtained from the IMF, International Financial Statistics. Loan amount data are collected from Euromoney on a contractual basis. (For more details see Ozler (1991).)

Table 1

The Determinants of Sovereign Loans

Variable	Moral Hazard*	Credit Rationing
Political instability (γ)	+	−
Political polarization (α)	+	−
Current Income (w)	−	+
Penalty for defaulting (q)	+	?
Variability of income (θ)	?	+

*The signs refer to the partial derivatives of these variables on the equilibrium loan size, as determined by (14a), (14b) above.

Table 2

Measures of Political Instability

Country	IN-SAMPLE	(SE)	OUT–OF SAMPLE	(SE)	OBSERVED FREQUENCY
Algeria	.105	.010	.105	.012.	.167
Argentina	.373	.062	.359	.061	.583
Bolivia	.510	.058	.509	.057	.500
Brazil	.234	.010	.222	.011	.250
Cameroon	.0004	.0034	.0005	.0001	.083
Chile	.256	.093	.291	.102	.083
Colombia	.282	.014	.278	.020	.250
Congo, Peoples Rep.	.190	.027	.206	.034	.167
Costa Rica	.215	.020	.206	.019	.250
Ecuador	.349	.034	.361	.036	.250
El Salvador	.295	.024	.288	.022	.333
Ethiopia	.156	.059	.155	.053	.083
Fiji	.271	.017	.280	.021	.083
Gabon	.170	.017	.183	.022	0
Ghana	.296	.029	.288	.025	.333
Greece	.492	.061	.471	.059	.500
Guatemala	.208	.020	.199	.016	.250
Guyana	.232	.108	.247	.023	.083
Honduras	.277	.020	.266	.017	.417
India	.201	.036	.188	.033	.417
Indonesia	.054	.004	.055	.004	0
Iran	.450	.097	.509	.105	.417
Ivory Coast	.074	.008	.085	.013	0
Jamaica	.151	.012	.151	.012	.167
Kenya	.128	.017	.135	.017	.167
Liberia	.101	.029	.076	.021	.167
Madagascar	.175	.020	.167	.029	.333
Malawi	.121	.018	.146	.026	0
Mauritania	.054	.023	.039	.019	.333
Mauritius	.006	.005	.001	.0001	.083
Mexico	.072	.008	.065	.006	.167
Morocco	.389	.037	.408	.047	.167
New Zealand	.134	.016	.124	.019	.250
Nicaragua	.241	.034	.242	.029	.167
Niger	.048	.011	.042	.012	.083
Nigeria	.075	.014	.063	.012	.250
Pakistan	.324	.068	.331	.072	.250
Panama	.200	.020	.202	.027	.167
Papua New Guinea	.030	.029	.108	.053	.250
Paraguay	.040	.007	.049	.010	0

Table 2 (continued)
Measures of Political Instability

Country	IN-SAMPLE	(SE)	OUT–OF SAMPLE	(SE)	OBSERVED FREQUENCY
Peru	.429	.039	.440	.041	.250
Philippines	.264	.020	.260	.019	.250
Portugal	.318	.096	.286	.090	.583
South Africa	.161	.025	.159	.021	.167
Senegal	.164	.017	.179	.025	.167
Singapore	.087	.006	.084	.007	.083
Spain	.323	.085	.276	.089	.667
Sri Lanka	.273	.031	.279	.034	.250
Sudan	.431	.039	.443	.042	.250
Thailand	.414	.035	.408	.032	.500
Trinidad & Tobago	.049	.016	.035	.012	.250
Turkey	.429	.079	.316	.071	.667
Uruguay	.622	.047	.655	.044	.333
Venezuela	.197	.009	.214	.009	.167
Zaire	.248	.031	.299	.051	.083
Zambia	.007	.005	.003	.003	.083

Note: Means and standard errors of probabilities of government change, estimated from probit regressions (both in-sample and out-of-sample predictions) and actually observed frequency of government change.

Time Period is 1972–81, inclusive.

Table 3

Credit Rationing Sample*

Portugal	(1976–77)
Spain	(1977)
Turkey	(1977–79)
Argentina	(1975–76)
Bolivia	(1972, 79)
Chile	(1973–74)
Colombia	(1972)
Costa Rica	(1975, 79–80)
El Salvador	(1979)
Guatemala	(1980–81)
Honduras	(1978)
Mexico	(1976)
Nicaragua	(1978)
Panama	(1972–74, 76–79)
Peru	(1976–78)
Uruguay	(1974–76, 78–81)
Guyana	(1972–75, 77–79)
Jamaica	(1972, 76–78, 80–81)
Sri Lanka	(1974, 76, 78)
Pakistan	(1979–81)
Phillipines	(1972–75, 78–79)
Thailand	(1977, 80–81)
Congo	(1976, 78)
Guinea	(1975–76, 78, 80)
Ethiopia	(1980)
Gabon	(1977, 79)
Ghana	(1978)
Ivory Coast	(1980)
Kenya	(1974, 77–79)
Liberia	(1972–73, 78–81)
Madagascar	(1979–81)
Malawi	(1978–79)
Mauritania	(1976, 79–80)
Mauritius	(1976–81)
Morocco	(1979–81)
Zimbabwe	(1981)
Senegal	(1978–81)
Sudan	(1972, 73, 78)
Zambia	(1980–81)
Fiji	(1973)

* A country was considered credit rationed if a high tranche IMF agreement was signed in the following year.

Table 4A
Sample Characteristics
Moral Hazard Regime

	Zero Borrowing		Positive Borrowing	
	Mean	Std. Dev.	Mean	Std. Dev.
AMNTE	0	0	.14	.14
GDPCAP	1.87	1.66	2.79	1.72
LIBOR	9.27	3.37	10.22	3.14
EXPRAT	.44	.14	.43	.14
RESY	.09	.12	.07	.08
AGGDP	22.68	16.24	15.95	10.58
INCVAR	1.85	1.62	2.75	1.84
INSTAB1	.19	.18	.22	.18
INSTAB2	.18	.17	.20	.17
DEMOCRACY	.52	.50	.55	.49
URBAN	.32	.23	.46	.22
FACTOR 1	-.11	.47	.19	1.49
FACTOR 2	.04	.48	-.17	1.01
FACTOR 3	-.01	.28	-.07	.37
NOBS	200		215	

Table 4B
Sample Characteristic
Credit Rationing Regime

	Zero Borrowing		Positive Borrowing	
	Mean	Std. Dev.	Mean	Std. Dev.
AMNTE			0.17	0.27
GDPCAP	1.31	.89	2.09	1.16
LIBOR	9.95	3.22	10.38	3.41
EXPRAT	.44	.18	.43	.16
RESY	.05	.05	.04	.03
AGGDP	20.28	11.98	19.63	10.13
INCVAR	1.34	.85	2.12	1.33
INSTAB1	.24	.20	.30	.21
INSTAB2	.23	.22	.27	.21
DEMOCRACY	.53	.50	.79	.40
URBAN	.31	.19	.41	.21
FACTOR 1	-.10	.55	.43	.16
FACTOR 2	-.05	.22	.04	.80
FACTOR 3	.08	.74	.07	.91
NOBS		54		69

Table 5
OLS estimation
Dependent variable: AMNTE

	Moral Hazard	Credit Rationing
Constant	-3.68 (-3.80)	-4.28 (-2.71)
GDPCAP	-.10 (-1.40)	-.11 (-.48)
LIBOR	-.08 (-.38)	-.12 (-.26)
EXPRAT	1.69 (2.75)	2.83 (2.31)
RESY	-3.85 (-2.30)	6.89 (1.61)
AGGDP	-.03 (-2.82)	-.01 (-.66)
INCVAR	.01 (.30)	.24 (1.28)
INSTAB2	1.25 (2.70)	-.14 (-.14)
FACTOR 1	-.09 (-.56)	-.18 (-.84)
FACTOR 2	-.01 (-.20)	-.13 (-.45)
FACTOR 3	-.36 (-1.56)	0.30 (.27)
DEMOCRACY	.19 (.98)	.10 (.27)
URBAN	1.28 (2.01)	1.43 (1.54)
NOBS	215	69
R^2	.40	.30

Note: Numbers in the parenthesis are 't' values.
The method of estimation is OLS and the sample includes only observations with positive borrowings.

Table 6

Maximum Likelihood Estimation

Dependent variable: AMNTE

	Moral Hazard	Credit Rationing	Moral Hazard	Credit Rationing
Constant	-2.37 (-2.88)	-4.05 (-1.96)	-2.82 (-3.38)	-4.00 (-1.94)
GDPCAP	-.35 (-.30)	.10 (.04)	-.03 (-.25)	.02 (.09)
LIBOR	-.07 (-.25)	-.06 (-.10)	-.01 (-.05)	-.04 (-.07)
EXPRAT	1.40 (2.50)	2.45 (2.68)	1.63 (3.03)	2.78 (2.31)
RESY	-4.81 (-4.17)	5.06 (1.16)	-4.58 (-4.13)	5.12 (1.14)
AGGDP	-.02 (-2.16)	-.01 (-.55)	-.02 (-2.29)	-.01 (-.54)
INCVAR	.05 (.49)	.22 (1.25)	.04 (.36)	.27 (1.41)
INSTAB2			1.14 (2.82)	-.52 (-.43)
LL	-331	-101	-328	-101
NOBS	415	123	415	123

Table 7

Maximum Likelihood Estimation

Dependent variable: AMNTE

	Moral Hazard	Credit Rationing	Moral Hazard	Credit Rationing
Constant	-3.44 (-4.12)	-4.40 (-2.22)	-3.28 (-3.94)	-4.32 (-2.20)
GDPCAP	-.12 (-1.0)	-.10 (-.26)	-.11 (-.92)	-.07 (-.20)
LIBOR	-.01 (-0.02)	-.02 (-0.04)	-.06 (-.25)	-.11 (-.21)
EXPRAT	1.94 (3.52)	2.65 (2.17)	1.86 (3.41)	2.57 (2.08)
RESY	-4.29 (-4.86)	6.16 (1.23)	-4.47 (-5.0)	5.91 (1.19)
AGGDP	-.02 (-2.11)	-.01 (-.49)	-.01 (-2.91)	-.01 (-.39)
INCVAR	.04 (.06)	.22 (.99)	.001 (.10)	.23 (1.03)
INSTAB2	1.06 (2.51)	-.40 (-.32)	1.39 (2.63)	-.19 (-.15)
DEMOCRACY	.19 (1.02)	.13 (.33)	.15 (.83)	.13 (.32)
URBAN	1.45 (3.36)	1.37 (1.07)	1.32 (2.99)	1.38 (1.11)
FACTOR 1			-.05 (-.42)	-.17 (-.55)
FACTOR 2			.05 (.25)	-.09 (-.33)
FACTOR 3			-.38 (-1.09)	.09 (.08)
LL	-320	-99	-328	-98
NOBS	415	123	415	123

Table A.1

Variable Definitions for Probit Estimation

1. Government Change

Government change = Dummy variable taking a value of 1 for the years in which there is either a coup or a regular government transfer, and a value of 0 otherwise. [Source: Taylor–Jodice (1983)].

2. Economic Performance

Inflation = Annual rate of growth of GDP deflator. [Source: Constructed from Summers–Heston (1988)].

Consumption Growth = Cummulative rate of growth of private consumption in the current and previous two years. [Source: Summers–Heston (1988)].

3. Political Events [(Source: Taylor–Jodice (1983)].

ASSASS = Assassinations

ATTACK = Armed Attacks

DEATHPV = Deaths from Political Violence

ELECTIN = National Elections

EXADJUST = Executive Adjustments

EXECUTION = Political Executions

EXRENEW = Executive Renewal

PROTEST = Protest Demonstrations

PSTRIKE = Political Strikes

RELAXSCT = Relaxation of Sanctions

RPROTEST = Regime Support Demonstrations

SACTION = Imposition of Sanctions

SCOUP = Irregular Executive Transfers

STRANSFR = Regular Executive Transfers

RIOTS = Violent Riots

REPRESSIONS = Political executions and government imposed sanctions.

EXECUTIVE ADJUSTMENTS = Changes in the compsition of the executive not resulting in government transfers.

ATTEMPTS = Unsuccessful attempts to change the government, taking the form of unsuccessful coups and unsuccessful government transfers.

YEARS = Years from previous government change

4. Structural Variables

GDP Per Capita in constant US$ of 1975 = [Source: Summers–Heston (1988)].

DEMOCRACY = a dummy variable taking a value of 1 for democracies and 0 otherwise. [Source: Banks, various volumes].

ELECTION = a dummy variable taking a value of 1 if the election date is determined by the constitution and 0 otherwise. [Source: Banks, various volumes].

MAJORITY = a dummy variable taking a value of 1 for presidential systems or for parliamentary governments supported by a single majority party, and 0 otherwise. [Source: Banks, various volumes].

Table A.2

Probit Regressions

Dependent Variable: Government Change

Years	1951–71	1951–77	1951–82
Intercept	.0576 (.4105)	-.5462* (.3266)	-.5659* (.2935)
Govt Change (Lagged Once)	-.1900 (.1367)	-.1623 (.1087)	-.0386 (.0937)
Govt Change (Lagged Twice)	-.2268* (.1251)	-.1832* (.1029)	-.1939* (.0905)
Inflation (Lagged Once)	.0058 (.0041)	.0030* (.0014)	.0029* (.0013)
Inflation (Lagged Twice)	-.0092** (.0037)	-.0095** (.003)	-.0064** (.0024)
Consumption Growth	.5215 (.4532)	.3631 (.3621)	-.1005 (.3066)
Riots	.0029 (.0073)	.0059 (.0064)	.0051 (.0059)
Riots (Lagged Once)	.0088 (.0075)	.0074 (.0063)	.0095 (.0058)
Riots (Lagged Twice)	.0035 (.0072)	.0025 (.0064)	.0061 (.0056)
Repressions	.0025 (.0022)	.0051** (.0018)	.0039* (.0017)
Repressions (Lagged Once)	.0058 (.0037)	.0023 (.0015)	-.0003 (.0006)
Repressions (Lagged Twice)	.0022 (.0018)	.0021 (.0014)	.0011 (.0012)
Executive Adjustment	.1181** (.0355)	.1226* (.0297)	.1006** (.0268)
Exec Adjust (Lagged Once)	.0222 (.034)	.0096 (.0283)	.009 (.0259)
Exec Adjust (Lagged Twice)	-.0048 (.0324)	-.0281 (.0272)	-.0243 (.0247)
Attempts	.3878** (.1128)	.3796 (.1007)	.4633** (.0975)

The variables inflation, consumption growth, protests, riots, and repressions are all in deviation from their country–specific means computed by the last year of the repressions; thus, for the repression truncated in 1971, the mean is computed for the period 1951–1971, and so on.

Table A.2 (continued)

Probit Regressions

Dependent Variable: Government Change

Years	1951–71	1951–77	1951–82
Attempts (Lagged Once)	-.0296 (.1045)	.0336 (.0656)	.0308 (.0705)
Attempts (Lagged Twice)	.0416 (.1006)	.0755 (.0636)	.0599 (.0645)
Yrs since government change	.0594* (.0316)	.0084 (.0159)	.0099 (.0122)
GDP Per Capita	-.0004* (.0002)	-.0002* (.0001)	.000018 (.000068)
Democracy	.5595 (.3885)	.2554 (.2387)	.4769** (.1937)
Election	.3076 (.3854)	.1285 (.2569)	-.1391 (.1983)
Majority	-.2472 (.2588)	-.255 .2024	-.3266* (.1734)

Note: Standard error in parenthesis.
* denotes significance at the 5% confidence level.
** denotes significance at the 1% confidence level.

Table A.3

Partial Correlations: Political events

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	1.00									
(2)	.50	1.00								
(3)	.36	.69	1.00							
(4)	.27	.13	.42	1.00						
(5)	.20	.50	.11	.06	1.00					
(6)	.36	.36	.29	.004	.33	1.00				
(7)	.20	.30	.19	.11	.35	.64	1.00			
(8)	.34	.30	.17	.10	.40	.74	.64	1.00		
(9)	.32	.44	.40	.23	.28	.34	.44	.47	1.00	
(10)	.34	.50	.42	.18	.38	.72	.82	.74	.55	1.00

Note: Columns (1-10) correspond to the following variables respectively: ASSASS, ATTACK, DEATHDPV, EXCUTION, PROTEST, PSTRIKE, RELAXSCT, RIOTAN, RPROTEST, SACTION

Table A.4

Factor Pattern: Political events

	Factor 1	Factor 2	Factor 3
ASSASS	0.55	0.43	0.20
ATTACK	0.69	0.54	-0.25
DEATHDPV	0.54	0.60	-0.32
EXCUTION	0.22	0.26	0.88
PROTEST	0.54	-0.02	-0.15
PSTRIKE	0.78	-0.33	-0.11
RELAXSCT	0.76	-0.42	0.05
RIOTAN	0.79	-0.40	0.06
RPROTEST	0.67	0.15	0.16
SACTION	0.89	-0.21	0.01

VARIANCE EXPLAINED BY EACH FACTOR

Factor 1	Factor 2	Factor 3
4.50	1.44	1.06