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The International Debt Problem:
Could Someone Please Explain It
to Me?

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CONTENTS

ABSTRACT

The aim of this paper is to raise a few open questions and to bring to light some mismatches between existing theories and the evidence. (1) It is shown that many standard international debt models unwittingly require some agents to behave irrationally. A method using triadic interactions is developed here to explain the occurrence of lending with sovereign risk and fully rational agents. (2) The market structure underlying the existing models is often left unclear. It is shown that these models, contrary to what is widely believed, are often not competitive in the traditional sense — they require lenders to be locked into more severe competition than the borrowers. The real-life validity of this is questioned and a model is constructed in which lenders act monopolistically while borrowers compete with one another. (3) Though most existing models exhibit excess-demand for credit in equilibrium, there is considerable evidence of 'loan-pushing' having occured in the international credit market, with Third World countries being coaxed to take more loans than they would on their own. A preliminary attempt is made to model equilibria with loan-pushing.

1. INTRODUCTION

Picking faults in other people's work is the central concern of this essay. Some of these 'faults' are so diffused and difficult to isolate that this, in itself, can be the objective for a full paper. The few attempts that are made here towards contributing positive ideas on how to model sovereign debt are made in the spirit of raising open questions. I have not undertaken the more onerous task of constructing generalised mathematical models. The hope is that others will.

On the 13th of August, 1982, Mexico's Finance Minister, Jesus Silver Herzog, announced in the U.S. that Mexico was no longer able to service its enormous external debt. That day is conventionally treated as the start of the current international debt crisis. The Mexican announcement was, in Joseph Kraft's (1984) words, "a bombshell that shook an entire universe". Subsequently Mexico's declaration turned out to be a case not of debt repudiation but of a 90-day moratorium on repayments. In fact, De la Madrid's new government, which took office in December 1982, made its willingness to negotiate repayments very clear (Ros and Lustig, 1987) right from the start. Nevertheless a set of chain reactions got triggered off by Mexico's announcement. It caused banks to become cautious and cut back their lending to other Latin American countries,[1] which, in turn, made these countries incapable of continuing with their repayments, thereby forcing them to 'reschedule' these. The effects on the Latin American economies were quite dramatic. In Mexico in 1983 imports fell by

42 per cent and between 1982 and 1984 the wage bill dropped by 32 per cent, this being an outcome of contraction in employment <u>and</u> a fall in wages. In some ways, the crisis was inevitable. It is possible to go back to the fifties and sixties and study the changing <u>structure</u> of international lending (see, for example, Streeten, 1972, Chapter 10) to trace the roots of the present crisis. More recently, through the seventies, developing country debt grew at the alarming annual rate of 21 per cent and the debt-GNP ratio rose from 18 to 28 per cent during the decade (World Bank, 1988). Add to this the oil crunch and the rise in industrialised-country interest rates and the brew is ready.

A curious feature of a debt crisis is already transparent. That the Third World debt was beyond what could be easily repaid was quite evident well before August 1982. Why then was a mere admission of this the cause of such severe repercussions?[2]

A debt problem is on whenever a borrower uses up a loan without creating the ability to repay it. In such a situation the amount of wealth that all the people think they own exceeds what they actually own. This is because the former includes the money the creditor has lent and <u>believes</u> will be returned at a future date. Once a debt problem is on, some adjustment becomes necessary - people's evaluation of their own wealth has to be adjusted downwards. If this happens slowly, through inflation for instance, then a crisis is avoided. If, on the contrary, the realisation comes suddenly, we have a debt crisis on our hands. This can, in turn, make the situation worse than it really is by causing bank runs and economic stagnation.

A sudden announcement of debt repudiation by a heavily indebted country can precipitate just such a crisis. It is not surprising therefore that whenever a country is about to repudiate a loan, international organisations and even lender countries bend over backwards to convert potential defaults into 'reschedulings'.[3]

Another feature of the international credit market is the seemingly fragile structure of interpersonal conjectures on which it survives. Before the declaration of moratorium on repayment, Mexico had failed to raise large enough loans to repay earlier debts. Yet if banks had continued to lend, Mexico <u>may</u> have been able to avert the crisis by borrowing from one bank, paying another and continuing the juggling till it regained its liquidity. Cline's (1984) detailed study suggests that something like this was true for Peru during its 1983 debt problems (see Cline's Appendix A and pages 17-18).

The well-known Bengali writer, Shibram Chakravarty's short story, Ṛṇam Kṛtvā, sketches this paradoxical feature of debts very well. A gentleman desperately in need of Rs. 500 decides to touch a distant friend, Harshavardhan, for the money. After much cajoling and a firm promise that the money received that day - a Wednesday - will be paid back on Saturday, he manages to get the loan. Like so many loans, the 500 rupees is used up within a day and on Saturday morning he realises that it is a crisis once again. In desperation, he turns to another friend, Gobardhan, persuades him that the money will be paid back on Wednesday, takes Rs. 500 and pays back Harsha. On Wednesday, of course, he is back again to Harsha, who having seen his excellent repayment record gives him the 500 rupees more easily this time. He repays Gobar promptly and from then on, with his

credential firmly established, this becomes a regular pattern. Harsha to Gobar, Gobar to Harsha. Then one day the borrower, much to his dismay, bumps into both Harsha and Gobar at a street corner. But he quickly recovers his equilibrium and says, "It is my good fortune to find the two of you together because I have been meaning to ask you two for a favour. I have been wasting a lot of time unnecessarily and you can help me. Every Wednesday, Harsha, you give Gobar Rs. 500 and every Saturday, dear Gobar, you give Harsha 500. Remember this must never stop - Saturday, Wednesday, Wednesday, Saturday. There is no reason why I should remain between you two. Good bye!"

As long as this process continues the total wealth that people believe that they have is greater than what they actually have (by exactly 500 rupees in this example). The process will have an abrupt breakdown if H (or G) believes that G (or H) will not lend any more. The fragile informational foundation is more evident when one realises that the process could break down for a more devious reason: If H believes that G believes that H will not lend any more. Or even: If H believes that G believes that H believes that G will not lend anymore.[4] By varying our assumption of the nature of interpersonal conjectures among lenders we can explain several unusual phenomena observed in the international credit market. I demonstrate this with a simple model later.

The above story and also the Mexican experience can be used to warn economists against drawing too sharp a dividing line between 'illiquidity' and 'insolvency', two widely used concepts in the international debt literature. A country suffering from a temporary excess of expenditure over income is said be illiquid, whereas insolvency refers to the case

where the repayment burden exceeds the borrower's present value of all future incomes.

Suppose it is the case that a country would regain its ability to repay only if it can juggle lenders for some time (or else it would go to ruin) or that the borrower in Rnam Krtvā would be able to repay the 500 rupees after a year. In this case whether the borrower is insolvent or illiquid depends on the lenders' belief. If they think he is illiquid they will continue to lend and it would indeed turn out to be a case of illiquidity. Likewise for insolvency.

I shall, in this paper, not use the distinction between these two concepts in any important way. Moreover, as is being increasingly recognised (see, for example, Bulow and Rogoff, 1989), in the context of sovereign loans it is adequate to focus attention on the solvency problem.

The inter-lender interdependence of the kind just described can explain many features observed in international credit markets, but I shall turn to these later. The plan of this paper is to open section 2 by highlighting a serious rationality problem in existing theoretical models, and suggesting avenues for solving the problem.

Section 3 tries to show that most known models are one-sided in stressing the occurrence of excess-demand equilibria in credit markets. The facts are much more varied. Loan pushing, for instance, is a very real phenomenon. Two alternative routes, one which relaxes the assumption of perfectly-competitive lending and another which retains it but assumes a certain kind of informational interdependence among lenders, are explored

in, respectively, sections 3.3 and 3.4.

Some efforts have been made to use formal game-theory to model international debt transactions. What are the prospects of this line of research? Which particular kind of game model - of the plethora available - is likely to be more successful and therefore worth pursuing? Such questions are taken up in section 4, which precedes the concluding section.

In many ways the present paper is imprecise and speculative. I have not used the theorist's method of making assumptions to eliminate more and more features of the reality till the point is reached where all the propositions being discussed in a paper can be established axiomatically. This is because of a belief that much of the most interesting problems in this area get omitted by such an exercise; and, moreover, in the rapidly developing literature on debt, there is already an exceptionally high infant throw-out rate caused by efforts to throw out all the bath water.

Two aspects distinguish the international credit market from an endogenous one: sovereign risk can be different from the risk of lending within a country and this gives rise to interesing strategic problems. Secondly, repayment cannot often be made in ones own currency; 'hard' currency has to be used. This is especially true of Third-World borrowing. Both raise lots of interesting issues but in the present paper I focus attention on the former, since there is a large literature dealing exclusively with it and giving rise to a lot of attendant, open questions.

2. SOVEREIGN RISK AND RATIONALITY

2.1 A Problem

If one agent lends money to another within the same country and the borrower refuses to repay, the lender can in principle resort to the nation's laws. Such recourse to the law is not usually possible when the government of country A (or some agent in A) lends to country B (or some agent in B). Would country B not take advantage of this and renege on its loan commitments? And would not A, knowing this, refuse to lend to another country, namely B, in the first place? On the face of it the answers to these seem to be "yes". But international lending does occur; the present crisis is indeed a consequence of it. How do lenders cover themselves against 'sovereign risk', that is, the risk of lending to another country?

It seems to be widely agreed that country A would lend to B only when A has the ability to hurt B. It could then use the potential hurt as a mechanism for ensuring the repayment of loans. What form would this hurt usually take? A variety of answers have been given in the literature.

First, the lender can use the threat of cessation of future loans to a defaulting borrower. This is the heart of the well-known papers of Jaffee and Russell (1976), Eaton and Gersovitz (1981), Allen (1982), Eaton, Gersovitz and Stiglitz (1986). Secondly, the lender can place an embargo on future trade with the borrower (see for example, Kraft, 1984; Krugman, 1985; Bulow and Rogoff, 1989). Finally, a lender could actually militarily intervene. This happened in the case of Egypt in 1882 (Feder and Just,

1984). And when, on January 9, 1923, the Reparation Commission of World War I voted 3 against 1 (France, Belgium and Italy against Britain) holding Germany responsible for wilful default of its war damage responsibility and France and Belgium followed this up with the military occupation of Germany's Ruhr district it was again a case of this third kind of intervention.[5]

It seems natural that, if repayment of loans by a <u>rational</u> sovereign borrower is to be explained, the ability of the lender to inflict damages on the borrower needs to be emphasized. And almost all theoretical models are uniform in laying this emphasis (see references in above paragraph). But if this explanation is valid then we run into another serious rationality problem, which has been overlooked in most of this vast literature. To understand the problem, let us go along with the standard model and assume that the lender can inflict a certain maximum cost on the borrower. The borrower repays because this cost exceeds the amount of money it has to repay.

The difficulty with this explanation is that in attempting to provide a rational basis to the borrower's behaviour it opens up a serious question concerning the lender's rationality. If the explanation in the above paragraph is valid, why does the lender lend in the first place? It would be better off if it did not lend but nevertheless asked for 'repayment' using the same threats (like disruption of trade and seizure of assets), which we know from the above paragraph is sufficient to induce 'repayment'.[6]

One may try to retrieve the standard model by apealing to legitimacy and international norms. That is, we could argue that no country would ask for 'repayment' without having given a loan because that would be a violation of norms and be grossly illegal. But such an argument entails resorting to exactly what was ruled out in the case of the borrower on the ground that norms and the hand of law are too feeble in the international domain and cannot monitor cross-country relations.

It is therefore clear that to explain why international lending occurs it is not enough to establish that lenders can punish borrowers but we need something more. Let us call the following the monotonicity postulate: The amount of punishment that a lender can inflict on the borrower depends positively on the extent of the borrower's 'misconduct' (for example the size of the loan it repudiates) and is zero if the 'misconduct' is zero.

It is easy to show that once the monotonicity postulate is assumed, lending by rational agents can be explained. It is, in fact, a sufficient condition. In section 3.1 the monotonicity postulate is assumed and its consequences are examined. To explain why the monotonicity postulate is true is, however, a much more difficult task. But it is a line that certainly needs pursuing since so much of our modelling of international debt hinges on the validity of the monotonicity postulate. The next section is a tentative step in this direction.

2.2 Norms

In this section I want to argue that the international debt market cannot be understood without bringing in political norms; and even in models from which they seem to be ostensibly banished, they lurk behind axioms taken for granted. In particular, norms could provide a rationale for the monotonicity postulate.

Norms can be brought into economic analysis in two ways. First, we could assume that agents adhere to norms through habit or instinct and they do so even when this involves some sacrifice of selfish interest. The other, more complicated, view is that the adherence to norms _is_ in the selfish interest of the agent because deviation from norms make other agents respond in a way which is undesirable from this agent's point of view. This second approach does not require us to curtail the individual-rationality axiom in order to accommodate norms. It seems to me that political norms matter mainly (though not only) in the second way.

To understand this let us consider a two-agent problem,[7] the more realistic 'triadic' case is discussed later. The argument can be made to stand on the following assumption. If an agent i is 'unfair' on j - unfair being defined in terms of the existing norms - then j will take punitive action against i if he does not expect further retaliation in response to the punitive action. Now we can answer why a 'creditor', C, would not try to extract money from another country, B, by threatening punitive action without having lent money earlier. This is the problem that was raised in the previous section. This is because if B refuses to give this money and C take punitive action then this will clearly be unfair. By the above

assumption, we would expect B to take retaliatory punitive action. Since C knows this, it is not in C's interest to punish in the first place. Both agents can see this, which makes the initial threat hollow. Note also that if B had taken credit and refused to repay and C took punitive action then B would not take retaliatory action. This is because C's action would now not be considered unfair, which makes B's retaliatory action unfair. Hence such retaliatory action by B would induce further retaliation by C and therefore would not be desirable from B's point of view.

It is easy to extend the above analysis to provide a rationale for the monotonicity postulate. This is done by showing that if i is unfair towards j, it is not in j's interest to take a 'disproportionately' large punitive action. This is established by the above mode of analysis by simply noting that a disproportionately large punishment could be thought of as consisting of two parts: a justified punishment and an unjustified one.

The kind of interaction just described would be realistic if the two nations involved are of comparable strength. In the current debt context, where the lender is usually much more powerful than the borrowing nation, it may be impossible for the latter to   take punitive action against the former even if the lender had been blatantly unfair.

This shortcoming can fortunately be addressed by allowing for third and fourth party interventions. Such 'triadic' interactions (discussed in detail in Basu, 1986, though in a different context) are very important in international economic relations. Let me briefly indicate how the above analysis can be strengthened and be made more apt for the current debt

problem by introducing triadic considerations.

In reality it is quite possible that country A cannot impose sanctions on B which are blatantly unfair not because of what B will do in retaliation, but because other countries, C, D, E, ...,may impose some penalty on A. This could be small and may even take the simple of form of criticism in a public forum but there is evidence that nations are sensitive to international criticism (perhaps because this could, in the long run, hurt their credibility and authority). One could go a step further and claim that C (and, for that matter, D,E ...) would do so because if it did not do so, other countries would, in turn, penalise (perhaps in a smaller way) C. Therefore it is a network of potential sanctions which rules out country A from wrongly punishing country B in the same way that, in Akerlof's (1976) model of caste, social sanctions rule out certain kinds of behaviour. The same argument can be extended to show that neither can A disproportionately punish B even when B has reneged on a contract. That is, a disproportionately large punishment would also provoke C, D, E, ... into some punitive action against A and this behaviour is explained by the same network effect. This may be used to provide a rationale for the monotonicity postulate.[8]

In this analysis norms play the role of informing each agent as to what kind of behaviour to expect from others in response to his own actions. And given these expectations it is indeed rational for agents to behave in the way they are expected to behave. In brief, what has been argued is that norms have to be brought in to avoid the kind of problem discussed in the previous section, but that the presence of norms is fully compatible with rational, self-seeking behaviour.

The above description of the role of norms is clearly an abstract, theoretical characterization. In reality there will be 'noise' in the system and for understanding reality the model will have to be used in conjunction with the relevant noises. These can take a range of forms; and I shall here mention only three particularly important caveats which ought to be kept in mind in studying debt.

First, in reality we may have to distinguish between the interests of those who take the decision to borrow (for instance, the ministers and bureaucrats) and that of the nation as a whole. This divergent-interest problem may well mean that a country's borrowing behaviour will not be always explicable in term's of its social welfare considerations.

Secondly, the above argument hinges on there existing an agreed view of what is 'unfair' or what constitutes 'misconduct' in international relations. It may seem that the definition of misconduct may be problematic in general but in the context of international debt its definition is simple: A borrower's misconduct consists of repudiating a loan even when he has the ability to repay it and the misconduct may be thought of as larger if the loan in question is larger. But I shall argue later that there can be an interpretational problem even with this simple definition.

Finally, a variety of triadic interactions (over and above what has been allowed for above) can complicate the model (see Gwyne, 1983, for some illustrations). For instance, matters unconnected with debt could influence the political relation between a country A and a country B. This

in turn could affect the attitude of a creditor country C towards B. Thus the reasons for deteriorating borrower-creditor relations may lie in their relations with a third nation. This is the route by which political factors impinge on the debt problem and I shall refer to this as the political problem. While the role of politics in debt has been acknowledged (see, for example, Kahler, 1986) there is scope for more formal analysis here.

While in constructing formal models we are often forced to put aside these problems (because there may be advantages in the additional clarity that is gained thereby), in conducting actual case studies it is important to remember these caveats to formal theory. I shall also have to overlook many of these features in later sections where I turn to formal economic models. But before banishing these away to the sidelines, it is useful to see them actually at work. In fact many of the features of the international debt market discussed above and also later in formal models can be illustrated by studying any one indebted country. In the next section, I try to do this with Nicaragua. The choice is guided by reasons of familiarity and also because Nicaragua provides some relatively stark examples.

2.3 An Illustration

On 19 July 1979 the FSLN - or, more colloquially, the Sandinistas - overthrew Somoza's government in Nicaragua and took office. The foreign exchange reserve which they inherited was $3.5 million U.S. dollars - "enough to cover two days of normal imports" (Weinert, 1981). Somoza's

government had been borrowing heavily in the international market and instead of investing it wisely had squandered it on a small, corrupt elite. Before the government's fall in July, it had already begun defaulting on interest payments because of the acute foreign exchange crunch.

When the Sandinistas came into power the big question for the international banking community was whether the new revolutionary government would honour the previous government's international loans or not. It was initially felt that it would repudiate the loans, especially since parts of these had been used by Somoza to buy weapons for the repression of the Sandinistas. However much to the surprise of many onlookers, the Sandinistas negotiated with the 115 banks from 12 countries that had lent money to Nicaragua[9] and, in Weinert's (1981, p. 187) words, "Nicaragua held to its early commitment to honour all contracted debt and did not disavow a cent".[10]

Nicaragua's decision to repay its debts illustrates well the effectiveness of the threat of punitive action. There was clearly no love lost between the FSLN and the international banks that had lent money to Somoza. The decision to pay back was based on the need not to allow Nicaragua's relations with banks and lender countries to deteriorate. It could not afford to face punitive political action. In the short-run the strategy did pay off. As Stahler-Sholk (1987) notes, in the initial stages the Sandinistas enjoyed widespread international support from socialist and capitalist nations;[11] and during the first three years of FSLN rule the Nicaraguan economy was doing very well. Between 1979 and 1983 the annual growth rate of national income was 5% and investment was high

(Fitzgerald, 1987).

Before going any further it may be useful to put aside a doubt as to whether the FSLN was serious in its declaration of intention to repay or it was just a strategy to deter banks from taking immediate punitive action. After all the FSLN did manage to renegotiate a 5-year grace period for its repayments of the principal to begin, but it has failed to adhere even to the revised schedule of repayments. The strategic-behaviour thesis is however easily dismissed. It is very doubtful if the inexperienced revolutionary government could hoodwink experienced international bankers on banking matters. Confirming this view is the fact that the chief negotiater for Nicaragua was a 28-year-old revolutionary whose only experience in finance was what he acquired in his job as general manager of a sugar mill. Moreover, till June 1983, the Nicaraguan government continued to make its scheduled interest payments (recall that amortization had a 5-year grace period) even though the inflow of commercial-bank credit had virtually dried up and consisted mainly of short-maturity loans. The lapses in repayment occurred only from 1983 onwards.

While the Sandinista decision - right or wrong - to repay illustrates the power of the perceived threat of international action, it highlights the ambiguity that surrounds the concept of 'misconduct' (what was in the last section referred to as the interpretational problem) even within the restricted domain of international debt transactions.

The interpretational problem stems from the innate difficulty of determining a nation's identity. Suppose Pakistan borrows money from an international bank and later goes bankrupt, and the international bank

asks India to repay on grounds of its shared history. This would be considered a ridiculous claim and India would be able to safely disregard it.[12] To ask the Sandinistas to pay back the money which Somoza had borrowed is not the same case as in the India-Pakistan story but not totally dissimilar either. It has always been known that much of what Somoza borrowed in the name of the people of Nicaragua, he appropriated for himself or used for the repression of the widespread rebellion in the country.[13] There is almost always, as discussed in the previous section, some divergence between the interests of the rulers and the citizens. But this divergent-interest problem was so sharp in the case of the pre-1979 Nicaragua, that the norm which holds the people of Nicaragua responsible for the Somocista debt seems fragile and questionable.

It is not an ethical issue that I am raising here but merely pointing to the fact that, because of the interpretational problem, it may be possible for nations in a similar predicament as that of Nicaragua around 1980 to get away repudiating without giving rise to strong punitive action. There are examples in history. The newly-established communist government in Russia announced on 21 January 1918 that "all foreign debts are anulled, unconditionally and without exception" (Moulton and Pasvolsky, 1929, p. 62). The government claimed to be a representative of the people of USSR and maintained that its predecessor governments had taken money from abroad without the consent of the people. What is interesting is that in the Anglo-Russian conference held in London in 1924 the British government showed no evidence of belligerence which one may have expected in the light of the Soviet repudiation. And indeed Russia is now known for its "impeccable record for prompt repayment of debt" (Economist, 22 April

1989, page 75). It is a "favourite of international lenders" not because banks have forgotten its repudiation of 1918,[14] but because banks have noticed that USSR´s record of repaying <u>non</u>-<u>Czarist</u> loans is really excellent.

As a digression it is worth remarking that the divergent-interest problem suggests that nations will have an inherent tendency to borrow more than what is in their national interest. This is because those who decide to borrow, the people in power, have finite time-horizons because regimes fall and people die. A nation, on the other hand, has a much longer life which, for all practical purposes, could be treated as infinite. Hence for the ruler or the ruling regime there is always the possibility that the repayment of loans he takes will be the responsibility of someone else. This will make him inclined to borrow more than what is in the nation's interest. The fact that Somoza was taking loans almost up to the day of his fall provides atleast some <u>prima facie</u> evidence of this hypothesis.

Returning to the main discussion, note that since so much in international dealings, where the hand of law is lax, depends on political norms, nations will clearly have an interest in shaping these norms to their own advantage. Conditioning, as this is often called, plays a major role in sustaining the power of regimes (Lukes, 1974; Galbraith, 1984). Conditioning is to a political regime what advertising is to a large company − baffling to the layman but of critical importance to its user. What is also not understood is that influencing opinion is an extremely expensive activity, hence it is not equally open to poor and rich nations.

Finally, let us turn to the political problem in models of international debt and also the need to allow for triadic interactions for fully understanding this problem.

After Reagan come to power in 1981 the relation between Nicaragua and the U.S. deteriorated rapidly. The Reagan administration cut off bilateral aid to the Sandinista government, which had been granted by Carter,[15] and also stopped the PL-480 aid. On the trade front through a series of escalating moves the U.S. first cut its import-quota from Nicaragua and later placed an embargo on trade. The Reagan administration also blocked off multi-lateral aid by intervention at the level of the boards of the relevant doner organisations.[16] The costs of these to the fledgling government were enormous, as discussed by Fitzgerald (1987).[17]

Though Western European and Latin American countries opposed the Reagan administration's financial blockade of Nicaragua, the secondary and tertiary effects of the blockade were soon overwhelming. Credit from other sources (from countries that had nothing to do with the U.S.-Nicaragua problem) began to dry up, each fearing that Nicaragua would be unable to repay, and, following the logic of Rnam Krtvā, the end-result was inevitable: Nicaragua failed to make interest payments for the first time in 1983, resulting in reschedulings. It faltered again in 1984 and it has been a precipitous journey since. In addition, the economy is now badly mismanaged.

In this case, the political elements of the financial crisis are so dominant that it is doubtful whether a purely 'financial' solution is at all possible. But even in other cases, whether it be Mexico, the

Philippines or Korea, the international debt problem has significant political linkages. We have to put these aside with a chop of the ceteris paribus condition when building formal economic models. But every time we take these models out to the real world, to analyse real situations, we must remember to fill in the political and institutional details, the minutiae of which will depend on the context.

3. ECONOMIC MODELS: THE STANDARD APPROACH AND LOAN PUSHING

3.1 The Role of the Monotonicity Postulate

It is useful to begin the formal analysis by demonstrating the role of the monotonicity postulate. Its validity will now be treated as axiomatic following the rationale - whatever little - provided in the previous sections. I shall construct a model following a suggestion in Krugman (1985, p. 82), and show that some standard exercises are flawed unless allowance is made for the monotonicity postulate.

Consider a two-period model in which the lender lends L units in period 1 and charges an interest rate of i. That is, it asks for a repayment of R $\left[\equiv (1 + i)L\right]$ in period 2. If the borrower does not repay, the lender inflicts a cost, b, on the borrower. The extent of the cost that it can inflict is positively related to L. This is the monotonicity postulate, the basis of which was discussed in Section 2.2. Here this function is a primitive:

$$b = b(L), \qquad (1)$$

$$b'(L) > 0, \; b(0) = 0 \qquad (2)$$

I shall, in addition, assume that $b(.)$ is concave and bounded from above. That is, the punishment cannot be made endlessly large.

If the borrowing country's consumption in period i is C_i then its utility is $U(C_1, C_2)$. I assume that U satisfies the usual properties used in consumer theory: it is continuous, convex and strictly increasing in each of its arguments. Let $(\hat{C}_1, \hat{C}_2)$ be the country's consumption stream if it fails to borrow from abroad. Given the loan package (L, i), define

$$U^R = U(\hat{C}_1 + L, \; \hat{C}_2 - (1 + i)L)$$
$$U^D = U(\hat{C}_1 + L, \; \hat{C}_2 - b(L))$$
$$U^O = U(\hat{C}_1, \; \hat{C}_2)$$

Clearly, U^R is the utility if the borrower repays, U^D if he does not and U^O is the borrower's reservation utility. The borrower will therefore repay if

$$b(L) \geqslant (1+i)L$$

Let us turn to the lender's problem. Suppose that the lender's opportunity cost of lending money to the borrower nation is r. Hence, the lender's problem is to maximise profit, T, as follows.

$$\text{Max}_{\{L,i\}} T(L,i) = (i-r)L$$

subject to $b(L) \geqslant (1+i)L$ (3)

and $U(\hat{C}_1 + L, C - (1+i)L) \geqslant U^o$ (4)

(4) states that the package offered by the lender must not be so bad that the borrower is better off not borrowing at all. It may seem at first sight that (4) should instead have been written as $\max \{ U^R, U^D \} \geqslant U_o$, since the borrower is free to repay or default. It is however easy to see that, given (3), this condition is the same as (4).

I shall assume that $\hat{C}_1$ is 'small' compared to $\hat{C}_2$, which, explains why this is the borrower country. Purely for simplicity, I shall also assume that in the lender's maximisation problem (3) will bind before (4). Hence we could do the maximisation ignoring (4).

It is obvious that (3) will always be binding. Hence, we could rewrite the lender's profit as $b(L) - (1+r)L$, which gives us the following first order condition

$$b'(L) = (1+r).$$

Let L* be the solution to this. Inserting L* into (3) and treating it as an equality, we get

$$i^* = b(L^*)/L^* - 1.$$

The equilibrium is depicted in Figure 1. L* is the volume of loan that maximises the gap between the b(L) curve and the (1+r)L curve. The equilibrium point on the b(L) curve is marked A. The interest rate charged by the lender is given by the slope of the line joining A to the origin.

FIGURE 1 (Somewhere here; currently all figures appear at the end of the paper.)

Some implications of the above model are easily derived. The relation between the interest charged by the lender, i*, and his opportunity cost of lending money, r, is the relation between the 'average' and the 'marginal' of the b(L) function. This is obvious from Figure 1. It is easy to check that i* will always exceed r. It is possible to fill in the model a little more to show that this equilibrium can occur with credit-rationing and also with over-optimal credit use. In other words, if D(i*) is the borrower's credit demand at interest rate i*,[18] then it is possible for both the following to occur: L* < D(i*) and L* > D(i*).

In the absence of the monotonicity postulate the model runs into difficulty. To see this drop assumption (2) and suppose $b(L) = \bar{b}$, for all L. It is easy to see that in equilibrium L will tend to vanish. This is obvious from Figure 1.[19]

The intuition behind this is simple. If the amount of punishment the lender can inflict on the borrower is fixed, the amount that the lender can collect as 'repayment' is fixed. Then why should he lend at all? He should simply use his threat to collect the maximum he can extract from the borrower. This is exactly the point that was intuitively made in

section 2.1.

In the above model, the lender exercises monopoly power. However much of the standard literature (e.g., Eaton and Gersovitz, 1981; Kletzer, 1984; Eaton, Gersovitz and Stiglitz, 1986) assume competitive behaviour among lenders. In that case, it is claimed that the equilibrium will settle down at point B in Figure 1.

Actually the market structure in the existing models is usually not made fully explicit. As Guesnerie (1986, p. 519) remarks while reviewing a survey of the debt literature, "I found it difficult to understand in some of the models of international credit contract surveyed here the precise nature of competition which is assumed".

I shall try to argue in the next section that what gets dubbed as the 'competitive model' in this literature actually requires many lenders to compete over a more limited number of borrowers. This is not a very realistic assumption. The borrowers are a disparate group of governments and private agents in the Third World and the record of South-South cooperation is notoriously poor. Lenders, on the other hand, are much better organised with syndicates and conglomerates; so the assumption that they compete with each other to the point of driving profits down to zero seems questionable.

In the next section I begin by sketching the essentials of the standard model and try to make explicit its underlying market structure and equilibrium concept. This paves the way for modification and advance.

3.2 Competition and Credit Rationing

The standard model of international credit markets (e.g. Eaton and Gersovitz, 1981; Kletzer, 1984) is one where the lenders compete with one another and drive their profits down to zero. In the space showing interest rate and size of loan, the zero-profit curve is backward bending. In this model (assuming that lenders can observe the total indebtedness of the borrower) the equilibrium turns out to be one where credit is rationed. The standard models have been discussed and surveyed in several places (see, for example, Kletzer, 1988) and there is no need to go into them in any detail here. My aim in this section is to develop further the model of section 3.1 and draw out some implicit assumptions of the existing models.

We shall first consider a model (following Eaton, Gersovitz and Stiglitz, 1986) where the lenders complete to drive profit down to zero. From section 3.1 we know that $T = (i - r)L$. Hence, for profit to be zero, i must equal r. Setting $i = r$, we can use (3) to work out the maximum loan, L, that can be given without causing a default. Clearly $L = b(L)/(1+r)$. Hence in Figure 2, the line segment rE represents the set of all points where the lender earns zero profits.

Now for every interest charged by the lender from the borrower country, we can work out the maximum amount that can be lent without causing default. This can be done using Figure 1. For example, at interest rate i*, the maximum, that can be lent is L*. Clearly as i rises, the maximum that can be lent, without causing default, falls. Let the curve CE

in Figure 2 represent this relation. Then any point in the interior of CEr plus all points on CE, except E, gives the lender a positive profit. All points outside CEr earns him a negative profit.

Now on this diagram superimpose the demand curve for credit, derived under the assumption of no default. This demand curve is derived using the utility function $U(\hat{C}_1 + L, \hat{C}_2 - (1+i)L)$. Such a demand curve is shown in Figure 2. I have purposely chosen a demand curve which passes to the right of E. Now clearly a demand curve can be thought of as a line joining the peaks of iso-utility curves in the (i, L)-space. Figure 2 illustrates two such iso-utility curves.

If lenders compete among one another, the equilibrium in this market occurs at E. There is excess demand for credit in equilibrium.[20] There can be differences of opinion about the extent of excess demand. It will be equal to (i) ED if borrowers assume they will have to repay their debt (ii) infinity if borrowers realise that once they borrow more than L it is better to repudiate.

Taking account of Guesnerie's criticism that in models of this kind the market structure is not made explicit, I shall now make explicit a structure and an equilibrium notion under which E would formally turn out to be an equilibrium.

Suppose there are n lenders and m borrowers. A crucial assumption is that

$$m < n \qquad\qquad (5)$$

For simplicity, also assume (this is not an essential requirement) that each borrower can deal with at most one lender and each lender can deal with at most one borrower. Each lender k, offers a deal (i_k, L_k).

The equilibrium notion used will be that of Nash. An n-tuple of offers, $\{(i_k, L_k)\}_{k=1,...,n}$ is an equilibrium if for every lender k no unilateral change of offer can yield additional profit.

FIGURE 2 (Somewhere here.)

It is easy to show that E is the only equilibrium in this model. That is, any lender k whose offer is accepted by some borrower country must be offering the package (r, L) in Figure 2. To prove this, first note that since n > m, some lenders will be 'out' of the credit market (i.e. they will be unable to find borrowers). Hence in equilibrium all lenders must earn zero profit. Otherwise a lender who is 'out' will under cut a lender earning positive profit and earn a positive profit himself. Now if some lender who is 'in' offers a point like F in Figure 2, another lender could offer H. The borrower who was at F would clearly prefer H and the new lender would earn positive profits, which is impossible. Hence all lenders who actually lend must be offering (i, L) = (r, L), that is, the package represented by E.

The critical assumption in this is m < n. This, in intuitive terms, imply that while borrowers may compete against one another and lenders may compete among themselves, in some sense the latter group is locked in a more cut-throat competition. The empirical validity of this has already

been questioned and I shall now argue that it cannot explain some important real-life phenomenon like 'loan pushing'. Broadly speaking, we say that loan pushing occurs whenever lending banks try to supply more credit to borrowing countries than what they would voluntarily like to take at the going interest rate.[21] There is a large literature that recognises the occurrence of loan pushing in the international debt market (Kindleberger, 1978; Gwyne, 1983; Taylor, 1985; Darity, 1986; Eaton and Taylor, 1986).

Nevertheless, the theoretical literature is strangely silent on this. As just shown, the existing models explain credit rationing. The phenomenon of loan pushing is, in some sense, the opposite and is essentially a case of excess-supply equilibrium. I shall suggest two routes for explaining loan pushing.

The first route consists of reversing assumption (5). If borrowers are perfectly competitive and lenders are relatively few, I shall show that borrowers may be using more loan than they 'want to'. The model in section 3.3 formalises this.

What is the correct market-structure for anlysing international credit is indeed an open question. So the question must arise as to whether there is no way of explaining loan-pushing while remaining within the market-structure assumption (to wit, that of perfect competition among lenders) of the existing literature (e.g., Kletzer, 1984) as exemplified in the model just described? The second route is a model which tries to achieve precisely this. It makes use of the interdependence among lenders in a critical way to explain loan pushing and also some other phenomena

observed in credit markets. This is done in section 3.4.

3.3 The Extortionate Lender

Consider now the case where (5) is reversed. So there are more borrowers than lenders. We shall use this assumption to imply that borrowers will compete with each other up to the point where the 'profit' (in this case additional utility) from borrowing gets driven down to zero.[22]

For linguistic simplicity consider the case where several identical borrowers face one monopoly lender. In this section we shall assume that for exogenous reasons default never occurs since this is a complication which adds nothing here. Let a borrower's demand curve be given by DD' in Figure 3. We could suppose this is derived from the utility function $U = U(\hat{C}_1 + L, \hat{C}_2 - (1+i)L)$.

FIGURE 3 (Somewhere here.)

Let us now complicate the lender's story a little bit compared to the description above. Assume that if the lender lends L units, the opportunity cost of this to the lender is $C = C(L)$, where $C'(L) > 0$ and $C''(L) > 0$.[23]

If the monopolist money lender lends L units at interest rate i to a borrower, his profit from this deal is $T(L,i) = (1+i)L - C(L)$.

The traditional textbook monopolist maximises this by choosing i and taking into account the fact that the borrower will choose L to move to the corresponding point on his demand curve DD'. But, as is well-known, the traditional monopolist, does not extract all the surplus from the borrower - or the buyer, as the case may be (see, e.g., Spence, 1977). In several markets there may be natural reasons for this. If, for instance, a monopolist has to charge the same price from everybody (for reasons of law or politics) the textbook monopoly model serves well. But there are cases - for example, rural credit markets (Basu, 1987) - where the monopolist moneylender can use non linear prices to extract all the borrowers surplus.

In the international debt market as well where each credit transaction is separately packaged and the agreement takes the form of "You take L and payback a total of R" (and though a rate of interest is certainly implied by this, it is notional), it seems that the traditional monopoly model is inadequate. I shall here model the lender as offering a package (L, i), where the lender has to take a loan of L and pay back (1+i)L. In making the offer the lender has to keep in mind that if it is 'too bad' from the borrower's point of view, the borrower will turn it down.

If the borrower turns down the offer the borrower's welfare will be given by $U(\hat{C}_1, \hat{C}_2) = U^o$, the reservation utility. The lender's problem, then is to

$$\text{Max } T(L, i) = (1+i)L - C(L)$$
$$\text{subject to } U(\hat{C}_1 + L, \hat{C}_2 - (1+i)L) \geqslant U^o$$

I shall illustrate the solution to this in a way which contrasts this model with the standard one described in section 3.1.

As already pointed out, a demand curve like DD' in Figure 3 can be thought of as a line joining the peaks of iso-utility curves like KL and DJ. Note that at D, the borrower takes zero loan, hence his utility is U^o. Hence the iso-utility curve DJ depicts the reservation utility of the borrower, U^o. Clearly then, any offer (L, i) from the lender which lies to the north-east of DJ will be rejected by the borrower. Any offer on or below DJ will be accepted.

Superimpose on this diagram iso-profit curves of the lender, derived by varying k in the equation

$$(1+i)L - C(L) = k$$

Two such iso-profit curves, T' and T*, are shown. It is reasonable to expect these curves to be U-shaped. Under reasonable assumptions, e.g. C = L^2, this will certainly be the case.

It is now clear that equilibrium will occur at E*, where the borrowing country takes L* credit at an interest rate of i*.

At this equilibrium, the lender extorts whatever surplus is generated to the borrower and at equilibrium the borrower takes more loan than it would like to at the going interest rate i*. Its natural tendency would be to take L' amount of loan but it succumbs to what may be described as 'loan-pushing'.

3.4 Lender Interdependence and Loan Pushing

It has been widely noted that the international debt market is characterised by asymmetric information. A bank in an industrialised country usually has incomplete information as to how good a bet a Third World country (or a company in a Third World country) is. It is also well-known that in such situations banks derive confidence in a potential borrower by observing the attitudes of other banks. Lever and Huhne (1985, p. 59), for instance, talk of "the uncritical herd instinct" among banks: "when other people in the market had confidence in the debtors, your bank's debt could always be refinanced if you wanted to get out so that there was no need to get out".[24]

Once we allow for lender interdependence of a certain kind we can explain loan-pushing and excess-supply equilibria.[25] What is interesting about this model is that it can explain these phenomena even within the kind of market structure assumed in the standard model as in section 3.1, to wit, the case where many lenders compete with one another for a limited number of borrowers. I shall, in fact, consider a polar case where a single borrower confronts several lenders. Not that one needs to deny the existence of other borrowers but it is simply being assumed that borrowing countries, for example India and China, have so many differences that lenders do not treat them as close substitutes.

So there is one borrower who announces (L, i) where L is the total amount of money it wants to borrow and i is the interest rate it is willing to pay. At first sight   excess-supply equilibria seem very hard to explain in this model. In the presence of an excess supply of loans all

that the borrower has to do is lower the interest rate i. It can however be shown that in a situation where there is interdependence among lenders of a certain kind the supply curve of credit has a discontinuity which makes an excess-supply equilibrium entirely plausible. The strength of the model lies in the fact that the discontinuity in the supply is explained endogenously even though all the primitive behaviour functions in the model are continuous.[26]

Let H be the set of potential lenders to this country. Each lender it will be assumed lends either 1 unit or nothing.[27] Each lender j in H however has some doubts about how good a bet the borrower is. As argued above, a natural way in which j would judge how good the borrower is, is by observing whether others are trying to lend to the borrower. A good indicator of this is the excess supply of credit faced by the borrower.[28] Hence if w^e is the expected excess supply of credit, the lowest interest rate, r at which lender j is willing to lend to this borrower could be thought of as being inversely related to w^e.

$$r_j = r_j(w^e), \; r'_j \leqslant 0 \tag{6}[29]$$

Hence, given w^e and an interest rate of i, the total supply of loan to the borrower is given by

$$s = s(w^e, i) = \#\{j \in H \mid r_j(w^e) \leqslant i\} \tag{7}$$

Note that (i) this function is bounded above (since each lender has an upper bound on its potential lending and the total number of lenders is finite) (ii) $\partial s/\partial w^e \geqslant 0$ and (iii) $\partial s/\partial i \geqslant 0$.[30] We shall refer to (7) as

the s-function or s-curve.

If the borrower announces (L, i), where L is its total demand for credit and i the interest it is willing to pay, then supply, m, satisfies rational expectation if

$$m = s(m - L, i) \qquad\qquad (8)$$

Let M be the largest m satisfying rational expectation. Since M will be a function of the borrower's offer, (L, i), we shall write it as M(L, i).

For every L, the relation between M and i could be thought of as the supply curve of credit faced by the borrower. Of course in this model, for every loan demand L, a separate supply curve will be specified. It is easy to check that this supply curve is discontinuous, even if (7) is assumed to be continuous.

In Figure 4 let L be the amount of loan desired by the borrower. With this fixed and the interest rate fixed we can draw the s-curve (7) as a function of expected supply. If the expected supply of credit is OA, then with the interest rate fixed at i' the supply of credit will be given by s(A-L, i'). This is equal to AB in Figure 4. Since B lies above the 45° line through O, a supply OA is not compatible with rational expectations. The two supplies that are compatible are m_1 and m_2. The relation between the interest rate and rational-expectation-compatible supply is shown in the lower panel in Figure 4.

Now if the interest rate is lowered from i' to i'', the s-curve will

fall as shown in Figure 4 (since $\partial s/\partial i \gtrless 0$). Since M(L, i) is the largest rational-expectations compatible supply at each i, the M(L, .)-curve in the lower panel of Figure 4 is given by OC and DE. Thus the aggregate supply curve of credit is discontinuous.[31]

FIGURE 4 (Somewhere here.)

The borrowing country's aim is to choose (L, i) so as to:

$$\text{Max } U(\hat{C}_1 + \min\{L, M(L, i)\}, \hat{C}_2 - (1+i)\min\{L, M(L, i)\}).$$

The solution of this, (L*, i*), is the equilibrium in the credit market.

It is easy to see that this model can have an equilibrium where M(L*, i*) > L*, that is, there is an excess supply in equilibrium.

One class of situations under which this will be true is if $\frac{\partial s}{\partial w^e}(0, i) > 1$, for all i. If this is true, the equilibrium in the credit market could well look like (L, i'') in the lower panel of Figure 4. In this situation, the demand for credit is OL, the supply of credit OD' and the interest rate is i''. Though there is an excess-supply of credit, the borrower cannot lower interest rate because this will cause supply to 'tumble-down'. This tumble-down phenomenon arises from the interdependence between lenders and is, of course, a well-known feature of credit markets. Lipton and Griffith-Jones (1983) explain the booms and slumps in international credit by a very similar argument which relies on the differences in the perceptions of banks as a whole and as individual banks.

Observe also that this equilibrium will be characterised by loan-pushing activity, since lenders fall over each other to lend OD' whereas the borrower wants no more credit than OL. Intuitively, the borrower restricts the amount of credit it takes in order to keep up its credit-rating in the international market.

4. THE SCOPE FOR GAME-THEORY MODELS

People at times remark that a model is good but not game-theoretically sound. If this did happen, it would be reason to worry not about the model but about game theory. Fortunately, the purpose of game theory is not to provide a different kind of criterion for checking the validity of models but to provide a short-cut for checking the rationality of agents in strategic environments. Viewed in this light game theory models ought to be of use in understanding interactions between countries in the international debt market. Usually these interactions are highly complicated and it seems reasonable to assume that the agents involved in it are rational. In such a situation we may be able to predict outcomes by applying solution concepts of non-cooperative games instead of trying to work them out afresh from the first principles each time. Not surprisingly, formal game theory models of international debt are beginning to make their appearance in the literature.[32]

While there is a plethora of game-types, it is not difficult to isolate the kinds of games which would be most appropriate for studying international lending. As has been discussed at length above, in sovereign lending an important threat that one agent can use on another is the threat of cessation of future relations. To capture this in a game model we clearly need to talk of <u>repeated</u> games. In a repeated game model we can, when considering behaviour at any point of time, meaningfully talk of 'future' considerations.

The literature also talks of credibility as an essential trait for a threat to be meaningul. Though I feel that credibility as defined in game theory[33] is not, <u>in reality</u>, a necessary precondition for threats to be effective, if we go along with the literature, we should clearly narrow down our focus to the subgame perfect equilibria of repeated games. Eaton, Gersovitz and Stiglitz (1986, p. 490) clearly use the subgame perfection idea to explain lending behaviour in finitely-repeated games. Crawford (1987) has discussed 'trigger strategies' and 'tit-for-tat' (see, e.g., Friedman, 1986, for general discussions of these strategies) in the context of international lending.

Subgame perfection however has its limitations. In international relations it is well-known that at times there are advantages in appearing to be irrational - the 'mad man' hypothesis. If a mad man gives you a threat that he will blow up an aircraft if you do not give him your watch, you may take the threat seriously even though carrying out the threat is, unequivocally, worse for the mad man than not carrying it out. So there may be advantages in appearing to be irrational. However, in the

conception of subgame perfection no move by no agent reveals him as irrational to the others. This is so even if his earlier move is incomptable with subgame perfection. This causes several complications (see Basu, 1989) but what is of interest here is that this may prevent cooperation among players which otherwise would have been possible.

Even apart from this, there is a serious problem concerning cooperation in subgame perfection. It is easy to demonstrate that a repeated game may have two subgame perfect equilibria such that one is Pareto superior to the other. Economists have argued that in such a case there is no reason to expect the inferior equilibrium to ever occur. Surely the players would communicate (even though we may be unable to formally model such communication) and move to the superior equilibrium.

But once this is acceded a more general route to refining perfection becomes transparent. In most real-life repeated interactions, agents get to talk between rounds of interaction. This is particularly true in international lending. Negotiations, renegotiations and reschedulings occur all the time. Hence even if a threat is 'credible' in the traditional sense (see footnote 33), if it involves playing a Pareto sub-optimal perfect equilibrium it may not be effective because, before embarking on such a path, the agents will negotiate and realise the merit of abandoning the path. This has given rise to the recent literature on 'renegotiation-proof' equilibria for repeated games (Bernheim, Peleg and Whinston, 1987; Bernheim and Ray, 1987; Benoit and Krishna, 1988; among several other papers). Renegotiation-proof perfect equilibrium seems to be the most relevant solution concept to use, among the ones currently available, for studying international lending activity. Indeed it has

been used for debt analysis in some recent papers. This does not mean that it is free of conceptual difficulties.

To highlight just one problem, suppose after each period's game players negotiate afresh totally, that is, without any heed to history. Then the only paths that can occur consist of one-shot Pareto-optimal Nash-equilibria (i.e., a Nash equilibrium which is not Pareto-dominated by a Nash equilibrium) being played in each game. The reason is that while playing each game the players know that what they decide and do now can have no effect on future play (which will be renegotiated completely). But to the extent that renegotiation-proof equilibria do not necessarily consist of playing one-shot Nash in each game, it is obvious that (in terms of intuitive motivation) it entails renegotiations but at the same time is not completely uninfluenced by past negotiations. There must be room for earlier negotiations to influence future negotiations.[34]

It would be more satisfying if we could formally explain how one round of negotiations influences future negotiations instead of leaving this at the level of intuitive motivation.[35] But that is no reason not to apply the solution concept, in the mean time, to the international debt problem. It could yield rich insights and must therefore be high on the research agenda in this area.

5. CONCLUSION

The question which has been avoided altogether in this essay is: What should be done about the debt crisis? This has not been avoided because of

any belief that theory needs to be sorted out first before the normative issues can be answered. On the contrary, even without knowing the cause of something or having a definitive theory, we can, I believe, recommend cures. However in the context of the current international debt crisis the normative problem is itself   so large that there seemed little reason for tagging it on to a paper which is centred on positive issues.

Moreover, several economists, including some of the best, have addressed the question of how to solve the debt crisis.[36] An attempt to add to this in any serious way will have to be left for a separate paper. In the mean time I would simply point out that my perception of the normative problem is that a central aim (not denying, that there would have to be others) has to be to bifurcate the issue of repayment and repayment in hard currency. If a country has to pay back with its own currency or goods it would still suffer but that would be mitigated a little by the boost its exports will get. After all, the reason why the large U.S. debt is not as worrisome as the Third World debt is because the U.S. can pay it back in its own currency. This can cause diffused suffering but is unlikely to cause a crash and international financial breakdown. It may be recalled in this context that an important feature of the Dawes Plan (see Moulton, 1924, and Moulton and Pasvolsky, 1929) for Germany's payment of war damages, which was implemented in 1924, was the recognition that to insist on foreign currency payment was to almost compel default.[37] In the absence of international action for such a policy, the indebted Third World countries ought to strive towards a joint plan for limiting repayment to some ratio of their exports.

Whether a debtors' cartel can ever survive is an open question but its benefits can be large, not just for

the debtors but also the creditor nations. While this policy has much to recommend, a fuller discussion of it has to await another occasion.

The aim of this paper was to raise some open questions and to bring to light some mismatches between the existing theory and evidence. It was argued that some of the models based ostensibly on rational agents, unwittingly imply irrationality on the part of lenders. This problem needs to be solved to explain the functioning of credit markets. Secondly, in trying to explain credit shortage, the theoretical literature has ignored altogether phenomena like loan-pushing. The present paper suggested two ways of explaining this. It also attempted to render transparent the implicit market-structure assumption in most models, and argued about the inappropriateness of this structure, thereby, hopefully, paving the way for more work.

FOOTNOTES

1. In September 1982 lending to Brazil dropped to half the earlier rate and soon cutbacks in credit availability spread to Argentina, Peru, Chile and other Latin American nations (Cline, 1984). For further discussion of such secondary repercussion, see Kuczynski (1983). The general developments in international credit since 1982 are described well in Lever and Huhne (1985), Koht Norbye (1988) and I.M.F. (1989). The basic conceptual issues are summed up usefully in Stewart (1985) and Taylor (1985).

2. It is easy to formally demonstrate what at first blush seems impossible - that, even when everyone knows some fact, the announcement of that fact can have real-life repercussions. Suppose a school has a rule that whoever has red hair need not come back to class on the day following his realisation. Suppose also that people can see only other people's hair and in one class room there are only two boys, both of whom have red hair. The teacher enters the class and says, "Atleast one of you has red hair". Note that each of the boys knew this. Nevertheless as a consequence of this announcement none of the boys will return to class after two days. This is because the next day each boy seeing that the other has come will realise that he himself does have red hair because, if he did not, the other boy, in the light of the teacher's announcement, would realise that his hair is red. For a discussion of this in an n-student class, see Geanokoplos and Polemarchakis (1982).

3. That reschedulings may be in the interest of the lender can be formally demonstrated. In fact, it may even be in the lender's interest to write-off parts of the debt (see, e.g., Dooley, 1989, and Froot, 1989) because it could boost investment in the borrower country and result in better repayment. The inverse relation between the debt burden and investment is beginning to be widely noted: see the essay 'Debtor's Hangover', in the Economist of 20 May 1989, page 77.

4. In fact, anything short of 'common knowledge' of the continuation of

lending will cause a breakdown. A formal demonstration of this in an abstract model occurs in Rubinstein (1987).

5. While it is true that Germany was not being punished for failure to repay a loan but for "war damages caused by her", the problem of repayment and its enforcement was essentially the same as in credit markets (see Moulton and Pasvolsky, 1929). It is worth noting though that the UN Charter of nonaggression amounts to outlawing the use of state coercion to enforce international debt agreements. For discussions see Schafer (1987).

6. It may be emphasized that the problem being highlighted here is distinct from the one of credibility of threats, which has been discussed widely in the context of extensive-form games. I comment on the latter in section 4.

7. I have discussed some of these issues in a more trivial but more pervasive context in Basu (1983).

8. It is worth noting here that some of the same problems arise in the context of domestic lending. It is often asserted that in domestic lending the repayment problem is not serious because the lender can always resort to the law, that is, basically, it can call in the police. This seems an easy explanation because we do not, through our years of 'trained incapacity' question why the police would do its job. Once this question is raised, we have to explain how if the police does not take action against a defaulter, some others would take action against the police. In other words the problem of triads is present even here and it does not arise in our normal discourse only because we have learnt to look the other way. In other words, if there are difficulties in providing a completely consistent explanation of why sovereigns try to repay loans, there are the same difficulties in explaining why private borrowers repay their lenders even when both are citizens of the same nation.

9. It refused however to negotiate with the IMF which had signed an agreement with Somoza's government a few weeks before its collapse.

10. This is a slight exaggeration because Nicaragua did repudiate some specific arms loans taken by Somoza from Israel and Argentina (see Gibson, 1987, p. 19).

11. In fact, the U.S.S.R. and East Europe were more cautious in extending financial support than many Western European and Latin American governments. The largest single lender was Mexico (Stahler-Sholk).

12. Many would consider it equally impossible if a rural landlord, finding that the labourer who had borrowed money from him had either died or was absconding, held the labourer's brother responsible for 'repaying' the debt and managed to actually get repayments. To the extent that this does happen (see Breman, 1974) it shows that norms can differ sharply from one context (e.g., international relations) to another (e.g., rural relations). Moreover, the fact that the landlord needs a 'reason' to ask the brother to pay shows that it is indeed a case of different norms and not one of their absence.

13. As Stahler-Sholk (1987, p. 153) notes: "The 1972 Managua earthquake brought an influx of reconstruction financing, much of which was misappropriated by Somoza and his associates". There is also evidence that Somoza got cuts and bribes for the large loans to Nicaragua arranged through Ultramar Banking Coporation.

    The total loss during the struggle between the Somocista state and the FSLN was about 2 billion dollars, which is approximately the 1981 GDP. This figure is quoted in Gibson (1985, p. 347) citing World Bank sources.

14. As would be implied by the angry letter to the editor (Economist, 10 June 1989, page 6) berating the Economist for its favourable description of USSR's repayment record.

15. Carter had granted a 75 million dollar aid. When Reagan cut this off, 15 million dollars were still to be disbursed (Stahler-Sholk, 1987)

16. Fitzgerald (1987, p. 197) argues that 'the total amount of disbursements programmed for these loans i.e. loans from the World Bank and the Inter-American Development Bank between 1980 and 1984 would have been U.S. $200 million'.

17. Fitzgerald's final figure of the <u>direct</u> cost of military and financial aggression of 521 million dollars for the period 1980-85 is probably an overestimate given that the source of one component of this is the Government of Nicaragua's evidence provided at the International Court of Justice. However the enormity of the cost is not in doubt and when one brings in the indirect costs - the multiplier effects - the total cost is likely to be even larger.

18. $D(i^*)$ is the value of L which maximises U^R when $i = i^*$.

19. There is a technical difficulty in that if L is equal to zero, repayment cannot be defined by $(1+i)L$. But if we treat the repayment as R and assume that the lender chooses (L, R) instead of (L, i), then the optimum yields $L = 0$ and $R = b$.

20. In Figure 2 if the demand curve had cut through the line segment rE, then equilibrium would occur at the point of intersection of these two lines. (This will be transparent after the equilibrium is formally defined below). Hence in equilibrium either there is excess demand or demand equals supply.

21. Of course, in reality, interest rate is not the only feature of credit that matters. Maturity, default agreements, and even contingent agreements about trade matter. As in the phenomenon of interlinkage in rural markets in backward economies (Bardhan, 1984; Basu, 1984), the 'price' of loans may not be a single variable at all but a 'package of prices' ('loan packages', as Darity (1986, p. 204) calls them). There is scope for 'interlinkage' models in international debt which takes cue from the agrarian-structure literature. In the present context, however, we could continue with our analysis by replacing 'interest rate' with some index of a loan package.

22. This is a natural assumption, where 'additional utility' is defined as the utility that the borrower gets when taking a loan minus his reservation utility.

23. In the above sections this was supposed to be linear function with $C(L) = (1+r)L$.

24. In a similar vein Eaton, Gersovitz and Stiglitz (1986, p. 508) observe, "There is another informational externality of potential importance. The fact that one lender is willing to lend funds conveys information about the creditworthiness of the borrower". For detailed analysis of lender interdependence see Cline (1984).

25. For some other kinds of lender interdependence and their theoretical implications, see Sachs (1984, section 5).

26. The model in Basu (1987a) - though it applies to status goods and explains excess-demand equilibria - has a mathematical structure similar to the one being described here.

27. An argument based on fixed costs of lending could be used to justify such indivisibility.

28. An interesting evidence of market non-clearance being treated as an indicator of the quality of the good in question is the advertisement of Bajaj Scooters in India. The advertisement points out that Bajaj Scooters are "so popular that it still commands a waiting period". See, for example, The Times of India, 24 November, 1987, page 11.

29. We could treat r as dependent on other variables as well e.g., the prevailing interest rate, i, but such complications are unlikely to change the main implications.

30. I shall treat $s(w^e, i)$ as a primitive function, which is differentiable and satisfies (i) - (iii). That is, from here on the derivation of the s-function will be ignored.

31. This is a consequence of the perfectly acceptable assumption that there is an upper limit to the amount that the lenders can lend (i.e. $s(w^e, i)$ is bounded above).

32. Krugman (1985) uses a perfect equilibrium, finite-horizon model. Crawford (1987) has discussed the scope of such models in the context of the debt problem. Bernheim and Ray (1987) have an illustrative example of renegotiation proof equilibrium in an international-debt model. Bulow and Rogoff (1989a) use a sequential-equilibrium characterization to study the role of the borrower's reputation.

33. A threat is credible if the condition where the threat is to be carried out is also the condition where the carrying out of the threat is the optimal strategy for agents who are supposed to carry it out.

34. For example, if players decide that if strategy s occures now (which is the before last game) then they will play strategy t in the last game and if s' occurs now, they play t' in the last game (and both s' and t' are Nash equilibrium points which are undominated by Nash equilibrium points), then this agreement must not get superseded in the renegotiation just before the last game. That this is an essential property of renegotiation-proof equilibrium is evident from Benoit and Krishna's (1988) Example 3.

35. An interesting model where agents negotiate and benefit from the negotiation even though they know that they will later renegotiate away from the earlier agreement is by Huberman and Kahn (1988). In their model, the original agreement provides the threat point for a later-period bargaining game, which is played after some more information becomes available.

36. To mention just a few: Sachs and Huizinga (1987), Bird (1987), WIDER (1987), Sengupta (1987), Griffith-Jones (1987), Drèze, Lettenhove, Platteau and Reding (1988), Cline (1988), Griffin (1988), Corden (1988), Witteveen and Pringle (1988), and Sau (1989).

37. Also, historically, the weakening of a debtor country's terms of trade
    has probably played a larger role than any other factor in
    precipitating a debt crisis (see Fishlow, 1986).

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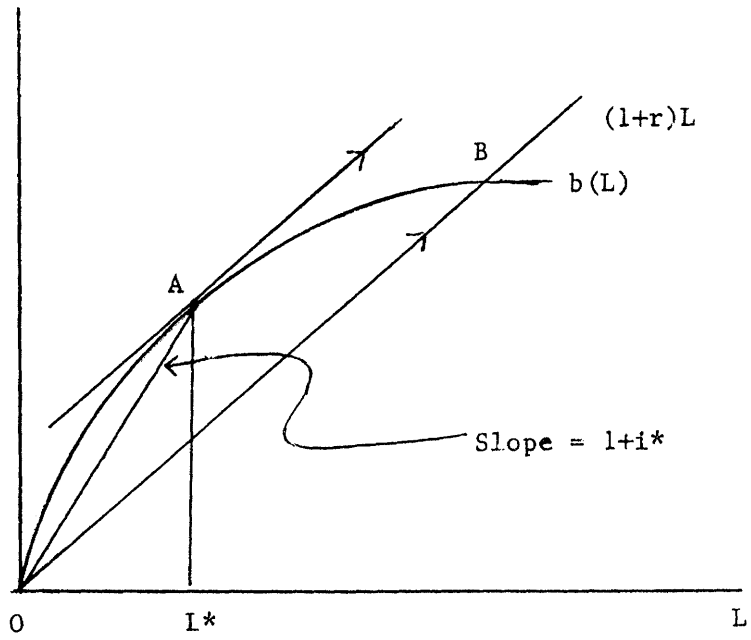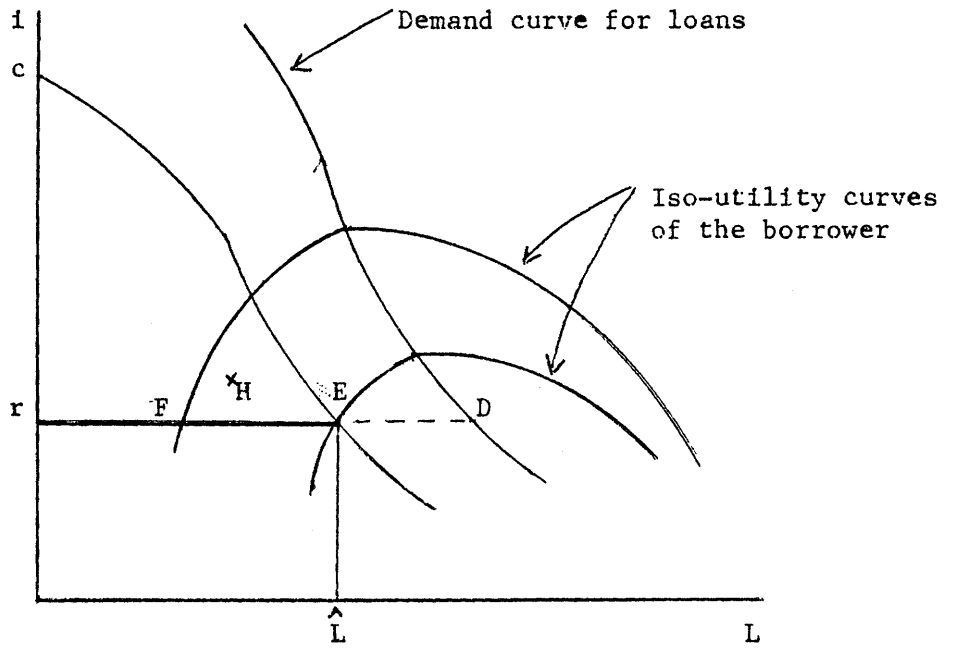World Bank (1988), World Debt Tables, Vol. 1, World Bank.

FIGURE 1

FIGURE 2

i
c

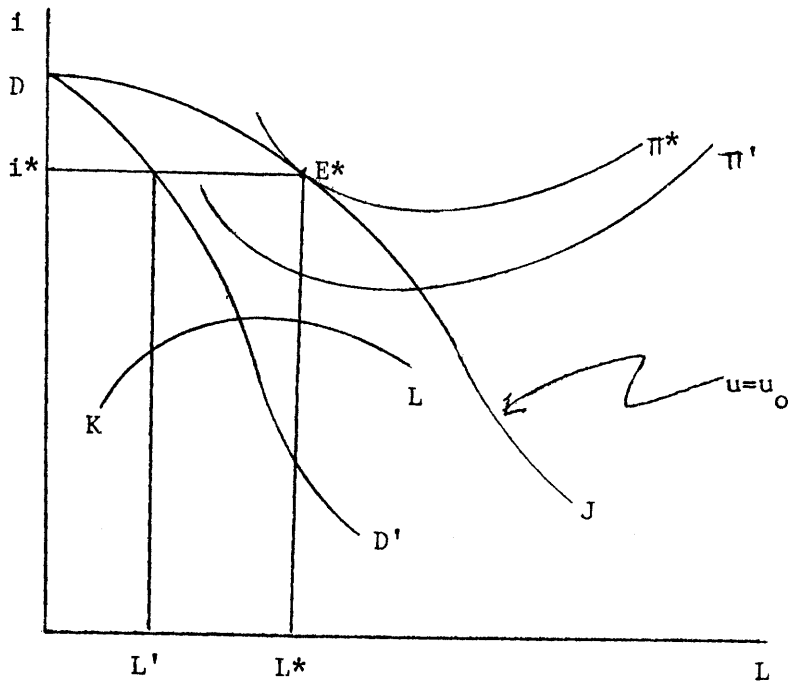Demand curve for loans

Iso-utility curves
of the borrower

r   F   ×H   E   D

L̂   L

FIGURE 3

i
D

i*   E*   π*   π'

                                            u=u₀

K   L

                              D'   J

L'   L*   L

FIGURE 4