Chapter 8

The Macroeconomics of External Debt

8.1 The debt crisis of developing countries of the 1980s

In 1982, the government of Mexico announced that it could no longer meet its external financial obligations. This episode marked the beginning of what today is known as the Developing Country Debt Crisis. Mexico's decision was followed by similar measures by other highly indebted developing countries, particularly in Latin America. In this section we present an analytical overview of the events leading to the Debt Crisis, its economic consequences, and its reversal with the capital inflows of the 1990s.

The fact that many countries were affected simultaneously suggests that international factors played an important role in the financial crisis of the early 1980s.

A number of external factors led to a large accumulation of debt by developing countries in the second half of the 1970s. The sharp oil price increase in 1973-74 led to huge deposits by middle eastern countries in international banks. Flush with funds, commercial banks were eager to lend. In addition, in general, bankers in industrialized countries strongly felt that developing countries could never go bankrupt. Two other external factors were important in explaining the unusual amount of capital that flowed to Latin America and other developing countries in the late 1970s: low real interest rates and large growth in exports.

There were also domestic government policies in Latin America that encouraged borrowing in the late 1970s. First, financial liberalization, led to

large expansions in lending, as interest rate controls in the banking sector were removed. In some countries, such as Argentina and Chile, the government provided loan guarantees. Thus, domestic banks had incentives to borrow at very high rates and invested in risky projects. In fact, it was as if the government was subsidizing foreign borrowing by domestic banks.

A second domestic factor was the exchange rate policy followed by a number of Latin American countries. In the mid 1970s, countries of the Southern Cone of Latin America pegged their currencies to the U.S. dollar in order to combat inflation. This policy resulted in a significant real exchange rate appreciation (i.e., in a fall in $S \cdot P^*/P$) and large current account deficits. Households expanded purchases of imported goods, especially durables such as cars and electrodomestics.

In the early 1980s, there was a dramatic change in the economic environment. World interest rates increased sharply due to the anti-inflationary policy in the U.S. led by Federal Reserve chairman Paul Volker (see table 8.1). In addition, the terms of trade deteriorated for the debtor countries as raw

Table 8.1: Interest rates in the late 1970s and early 1980s

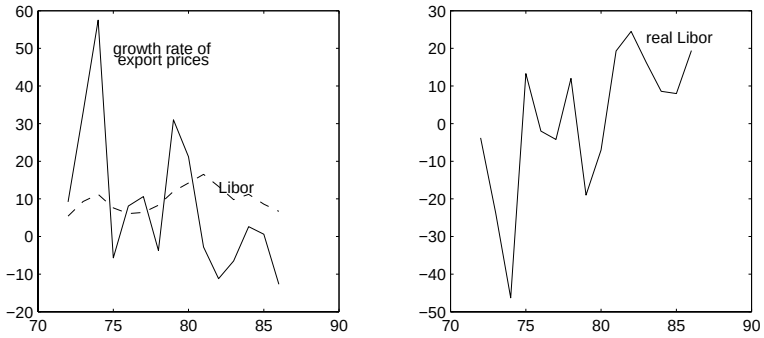
Year	Nominal LIBOR
1978	8.3
1979	12.0
1980	14.2
1981	16.5

Source: Andres Bianchi et al., "Adjustment in Latin America, 1981-86," in V. Corbo, M. Goldstein, and M. Khan, ed., *Growth Oriented Adjustment Programs,* Washington, D.C.: International Monetary Fund and The World Bank, 1987.

material prices fell. As a result, the real interest rate faced by developing countries rose dramatically (see figure 8.1).

Debtor countries were highly vulnerable to the rise in world interest rates because much of the debt carried a floating rate. In Latin America, 65% of the foreign debt had a floating rate. Thus, debt service increased rapidly and unexpectedly in the early 1980s. The combination of higher interest rates and lower import prices resulted in sharp increases in interest

Figure 8.1: Interest rates and export prices in Latin America (1972-1986)



Note: The real Libor rate is constructed by subtracting the rate of change in export prices from the nominal Libor rate.

Source: Andres Bianchi et al., "Adjustment in Latin America, 1981-86," in V. Corbo, M. Goldstein, and M. Khan, ed., *Growth Oriented Adjustment Programs,* Washington, D.C.: International Monetary Fund and The World Bank, 1987.

payments relative to export earnings in highly indebted developing countries (see table 8.2). External lending to developing countries and inflows of foreign investment abruptly stopped in 1982. For all developing countries, new lending was 38 billion in 1981, 20 billion in 1982, and only 3 billion in 1983.

Domestic factors also contributed to the slowdown in capital inflows. The exchange rate policy of pegging the domestic currency to the U.S. dollar followed by countries in the Southern Cone was believed to be unsustainable, in part because governments did fail to implement the required fiscal reforms. As a result, by the early 1980s expectations of real depreciation of the domestic currency induced domestic residents to invest in foreign assets (capital flight). In addition, the risky projects taken up by banks following the financial liberalization of the late 1970s and encouraged by government guarantees resulted in systemic banking failures.

As a result of the shutdown of foreign credit, countries were forced to generate large current account surpluses in order to continue to service, at least in part, their external obligations (see figure 8.2).

What does our model say about the macroeconomic consequences of a sharp world interest rate increase for a debtor country whose debt is at

Table 8.2: Interest payments in selected Latin American countries. Average 1980-81.

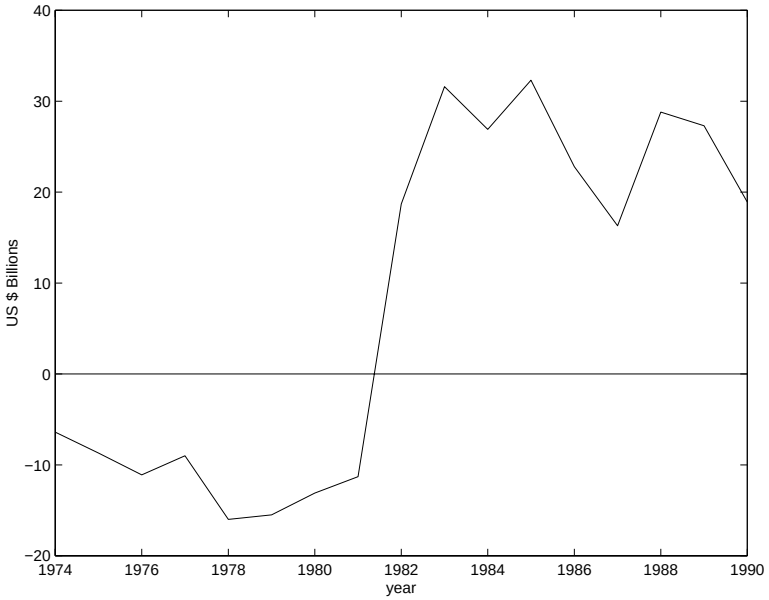
Country	Percent of Debt at floating rate	Interest Payment to Exports ratio (%)
Argentina	58	15
Brazil	64	28
Colombia	39	16
Chile	58	28
Mexico	73	19
All Latin America	65	28

Source: Andres Bianchi et al., "Adjustment in Latin America, 1981-86," in V. Corbo, M. Goldstein, and M. Khan, ed., *Growth Oriented Adjustment Programs,* Washington, D.C.: International Monetary Fund and The World Bank, 1987.

floating rates? Figure 8.3 depicts an endowment economy that starts with a zero initial net foreign asset position ($(1+r_0)B_0^* = 0$). The endowment point, (Q_1,Q_2), is given by point A in the figure. The initial equilibrium is at point B, where the economy is running a current account deficit (or borrowing from abroad an amount) equal to $Q_1 - C_1$ in period 1. The situation in period 1 resembles the behavior of most Latin American countries in the late 1970s, which, taking advantage of soft international credit conditions borrowed heavily in international capital markets. Consider now an increase in the world interest rate like the one that took place in the early 1980s. The interest rate hike entailed an increase in the amount of resources needed to service not only newly assumed obligations but also *existing* debts. This is because, as we argued above, most of the developing country debt was stipulated at *floating* rates. In terms of our graph, the increase in the interest rate from r^* to $r^* + \Delta$ causes a clockwise rotation of the budget constraint around point A.

We assume that households took on their debt obligations under the expectations that the world interest rate would be r^*. We also assume that the interest rate hike takes place *after* the country entered its financial obligations in period 1. However, in period 2 the country must pay the higher interest rate on the financial obligations assumed in period 1 because those obligations stipulated a floating rate. Therefore, households cannot reoptimize and choose point B', featuring a lower trade deficit—and hence lower

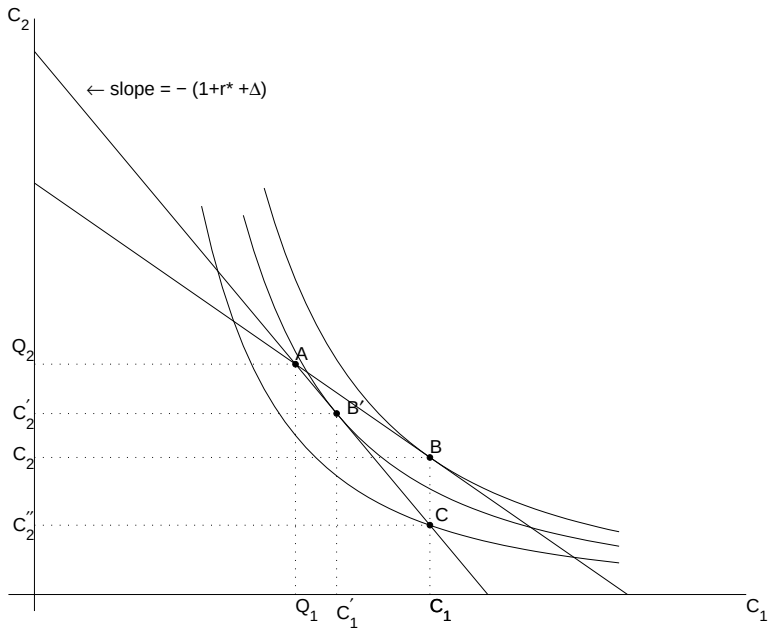
Figure 8.2: The trade balance in Latin America (1974-1990)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), Preliminary Overview of the Economy of Latin America and the Caribbean, Santiago, Chile, December 1990.

foreign debt—in period 1. They are stuck with $TB_1 = Q_1 - C_1$. This means that the new position of the economy is point C on the new budget constraint and vertically aligned with point B. The increase in the world interest rate forces the country to generate a large trade balance in period 2, given by $Q_2 - C_2''$ in order to service the debt contracted in period 1. Note that the trade surplus in period 2 is much larger than it would have been had the country been able to re-optimize its borrowing in period 1 ($Q_2 - C_2'$). It is clear from figure 7.7 that the improvement in the trade balance leads to a depreciation of the real exchange rate and a contraction in aggregate spending. The response of the economy in period 2 captures pretty well the adjustment that took place in most Latin American countries in the wake of the Debt Crisis. Figure 8.2 documents the spectacular trade balance reversal that took place in Latin America in 1982. Table 7.1, shows that in Chile, the improvement in the current account in the aftermath of the debt crisis

Figure 8.3: Floating Interest Rates and Current Account Adjustment



was accompanied by a dramatic (and traumatic) real exchange rate depreciation. The Chilean experience is not atypical. Large real depreciations were observed across Latin America after 1982.

8.2 The resurgence of capital inflows to developing countries in the 1990s

In the 1990s, developing countries in Asia and Latin America experienced a resurgence of capital inflows. About $670 billion of foreign capital flowed to these countries in the 5 years from 1990 to 1994, as measured by the total balance on the capital account. This is 5 times larger than the $133 billion of total inflows during the previous 5 years.

An article by Guillermo Calvo, Leonardo Leiderman, and Carmen Reinhart analyzes the causes of the resurgence of capital inflows to developing countries in the 1990s and argues that a number of factors were at work.[1] The widespread nature of the phenomenon suggests that global factors were

[1]See G. Calvo, L. Leiderman, and C. Reinhart, "Inflows of Capital to Developing Countries in the 1990s," *Journal of Economic Perspectives,* 10, Spring 1996, 123-139.

especially important. Many of these factors are the same that led to high capital inflows to the region in the late 1970s. Domestic factors also played a role in determining the magnitude and composition of capital flows.

First, interest rates in international financial markets in the 1990s were relatively low. After peaking in 1989, interest rates in the U.S. declined steadily in the early 1990s. In 1992 interest rates reached their lowest level since the 1960s. This attracted capital to high-yield investments in Asia and Latin America. Second, in the early 1990s, the U.S., Japan, and several countries in Western Europe were in recession, which implied that they offered fewer investment opportunities. Third, rapid growth in international diversification and international capital market integration, facilitated in part by financial deregulation in the U.S. and Europe, allowed mutual funds and life insurance companies to diversify their portfolios to include emerging market assets. Fourth, many developing countries made progress toward improving relations with external creditors. Fifth, many developing countries adopted sound fiscal and monetary policies and market-oriented reforms such as trade and capital liberalization (Chile, Bolivia, and Mexico in the 1980s, Argentina, Brazil, Ecuador, and Peru in the 1990s). Finally, there seemed to be what some researchers call contagion. The opening of a large developing economy to capital markets (like Mexico in the late 1980s) can produce positive externalities that facilitate capital inflows to other neighboring countries.

As shown in table 8.3, the capital inflows of the 1990s produced a number of important macroeconomic consequences, which are strikingly similar to those that paved the way for the debt crisis in the late 1970s: (1) The counterpart of the surge in capital inflows was a large increase in current account deficits, which materialized via investment booms and declines in savings. (2) In Latin America, the surge in capital inflows led to large real exchange appreciations. By contrast, in Asia such appreciation was observed only in the Philippines. (3) The decline in savings was associated with increases in consumption of (mostly imported) durable goods. (4) A significant fraction of capital inflows were channeled to accumulation of foreign exchange reserves by central banks.

8.3 Debt Reduction Schemes

In this section, we study the consequences of the debt crisis for the debt burden of developing countries and discuss debt reduction schemes. Our analysis follows closely the lucid article by Paul Krugman from Princeton

Table 8.3: Selected recipients of large capital inflows: macroeconomic performance 1988-1994

Country	Year Capital Inflow began	Cumulative RER appreciation	Average CA/GDP
Asia			
Indonesia	1990	-6.2	-2.5
Malaysia	1989	-3.9	-4.8
Philippines	1992	20.9	-4.2
Thailand	1988	1.9	-6.0
Latin America			
Argentina	1991	20.1	-3.1
Brazil	1992	57.9	-.2
Chile	1990	13.5	-1.8
Colombia	1991	37.1	-4.2
Mexico	1989	23.4	-6.8

Source: "Inflows of Capital to Developing Countries in the 1990s" by G. Calvo, L. Leiderman, and C. Reinhart, *Journal of Economic Perspectives*, Spring 1996.

University.[2]

8.3.1 The debt burden

A country's debt burden can be measured by its debt-to-GDP ratio,

$$\text{Debt burden} = \frac{D}{GDP},$$

where D denotes the country's stock of external debt and GDP denotes gross domestic product, both measured in terms of tradables. A notable characteristic of the debt crisis was that the debt burden of developing countries rose rather than fell. Table 8.4 shows that the debt burden of Argentina,

Table 8.4: The evolution of the debt/GNP ratio in selected countries, 1980-1985

	$\frac{D}{GDP}$		
	1980	1982	1985
Argentina	.48	.84	.84
Brazil	.31	.36	.49
Mexico	.30	.53	.55

Source: Jeffrey D. Sachs and Felipe Larrain B., *Macroeconomics in the Global Economy,* Prentice Hall, Englewood Cliffs, New Jersey, 1993, Table 22-9.

Brazil, and Mexico was 18 to 36 percentage points higher in 1985 than in 1980. The reason why the observed increase in the debt-to-GDP ratio is surprising is that, as we discussed in the previous section, with the onset of the debt crisis the flow of capital to developing countries came to an abrupt halt. Therefore, the observed rise in the debt burden must have been driven by a decline in GDP rather than an increase in debt.

The reason for the sharp decline in GDP is, among other factors, that large real exchange rate depreciations lead to a decline in the value of domestic output in terms of tradables. Domestic output in terms of tradables

[2]Paul R. Krugman, "Reducing Developing Country Debt," in *Currencies and Crises,* Paul Krugman (Ed.), Cambridge MA: MIT Press, 1995.

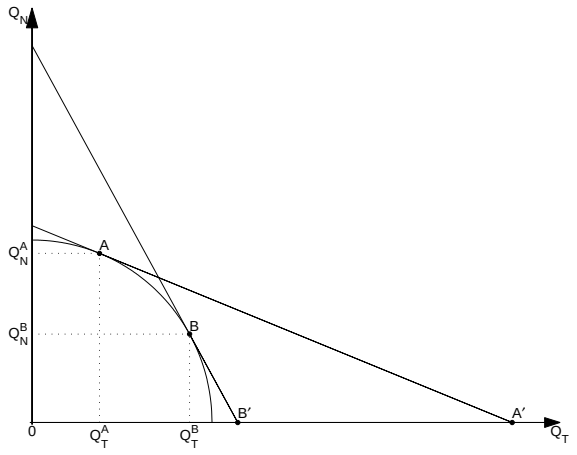
is the sum of tradable output and nontradable output measured in terms of tradables, that is,

$$\text{GDP in terms of tradables} = Q_T + \frac{P_N}{P_T} Q_N.$$

In response to a real exchange rate depreciation the production of tradables increases and that of of nontradables declines. The value of domestic output of nontradables measured in terms of tradables falls because both Q_N and P_N/P_T fall. On the other hand, production of tradables increases.

How can we determine that the net effect on output in terms of tradables is negative? Let's use the TNT model developed in chapter 7. Consider a small open economy that experiences a sharp deterioration of its real exchange rate. Suppose that initially the country produces at point A in figure 8.4. The equilibrium real exchange rate is given by the negative of

Figure 8.4: The effect of a real depreciation on the value of GDP in terms of tradables



the slope of the PPF at point A and GDP in terms of tradables is given by point A′, which is the sum of Q_T^A and $(P_N^A/P_T^A)Q_N^A$.[3] Suppose now that the real exchange rate depreciates and as a consequence equilibrium production

[3]To see that point A′ represents GDP in terms of tradables, note that the line connecting A and A′ has slope $-P_T^A/P_N^A$ and crosses the point (Q_T^A, Q_N^A); thus such line can be written as the pairs (x, y) satisfying $y = Q_N^A - \frac{P_T^A}{P_N^A}(x - Q_T^A)$. We are looking for the intersection of this line with the x axis, that is, for the value of x corresponding to $y = 0$. Setting $y = 0$ we get $x = Q_T^A + (P_N^A/P_T^A)Q_N^A$.

takes place at point B on the PPF. The new real exchange rate P_T^B/P_N^B is equal to the negative of the slope of the PPF at point B. As the relative price of tradables rises, production of tradables increases from Q_T^A to Q_T^B and that of nontradables falls from Q_N^A to Q_N^B. The new value of GDP in terms of tradables is given by point B$'$, which is equal to $Q_T^B+(P_N^B/P_T^B)Q_N^B$. A real exchange rate depreciation thus causes a decline in the value of a country's GDP in terms of tradables and as a consequence implies that the country must spend a larger fraction of its GDP in servicing the external debt.

8.3.2 Debt Reduction Schemes

Soon after the debt crisis of 1982, it became clear to debtor countries, creditors, and multinational organizations, such as the IMF and the World Bank, that full repayment of the developing country debt was no longer realistic and policy makers started to think about debt reduction schemes as a possible solution to the debt crisis.

By the late 1980s the debt of many developing countries was trading in the secondary market at significant discounts, often as low as 50 percent of its face or par value, reflecting the fact that market participants thought that the likelihood that the country would ever be able to fully repay its debt was very low. At the time many policy makers and economists argued that in such a situation it would be best to "face reality" and reduce a country's debt to what it would be able to pay. The idea was that the face value of the outstanding debt should be adjusted so that the debt would be trading around par and the adjustment should take the form of creditors forgiving part of the debt. This idea was not very often implemented because typically it is not in the creditor's interest to forgive debt unilaterally. We first show why debt forgiveness is often not in the creditor's interest.

Unilateral Debt Forgiveness

Consider the situation of a country that owes \$100. Assume that there is some uncertainty about whether the country will be able to repay its debt in full. In particular, there are two possible outcomes (see table 8.5). Either the country will be able to repay its debt in full, we refer to this scenario as the good state. Or it will only be able to pay 25, we call this the bad state. Suppose the probability of the occurrence of the good state is 1/3. Thus,

$$\text{expected repayment to creditors} = 100 \times 1/3 + 25 \times 2/3 = 50.$$

This means that the country's debt, whose face value is 100, is indeed worth only 50. The price of each unit of debt in the secondary market is accordingly

Table 8.5: Initial situation

	Good state	Bad state
Probability of state	$\frac{1}{3}$	$\frac{2}{3}$
Face value = 100		
Receipt of creditors	100	25
Expected repayment: 50		
Secondary market price:0.50		

Table 8.6: Unilateral debt forgiveness of 50

	Good state	Bad state
Probability of state	$\frac{1}{3}$	$\frac{2}{3}$
D = 50		
Receipt of creditors	50	25
Expected repayment: =33.33		
Secondary market price:=0.67		

only 0.50:

$$\text{secondary market price } = \frac{\text{Expected repayment}}{\text{Face value of the debt}} = \frac{50}{100} = 0.50$$

Suppose now that the creditors forgive 50 units of debt. Then the remaining debt outstanding is only 50 ($D = 50$). What is the new secondary market price? As shown in table 8.6, in the bad state the country can again only pay 25 but in the good state it will pay the face value of the debt, which, after the debt reduction, is 50. Expected receipts of the creditors then are: $50 \times 1/3 + 25 \times 2/3 = 33.33$. The secondary market price rises to $33.33/50 = .67$. The loss from debt forgiveness to creditor is the difference between the expected repayment without debt forgiveness, 50, and the expected repayment with debt forgiveness, 33.33, that is, 16.67. Clearly, in this example creditors will never agree to debt forgiveness.

However, in reality creditors sometimes do agree to forgive debt. For example, at the G-7 Economic Summit held in Cologne, Germany in June 1999, rich countries launched a program, dubbed the Cologne Initiative, aimed at reducing the debt burden of the so-called Highly Indebted Poor Countries (HIPCs).[4] To understand why it can be in the creditor's interest

[4]For more information on ongoing efforts to reduce the debt burden of HIPCs see the web site of the Center for International Development at Harvard University (http://www.cid.harvard.edu/cidhipc/hipchome.htm).

to forgive debt, it is important to note that one unrealistic assumption of the above example is that the ability of the debtor to pay is independent of the size of his debt obligations. There are reasons to believe that debtors are more likely to default on their debts the larger is the face value of debt. One reason why this is so is that if D is very large, then the benefits of efforts to improve the economic situation in the country mainly go to the creditors, giving the debtor country very little incentives to improve their economic situation. Another reason is that the debt burden might ultimately appear as a tax on domestic capital, and thus act as a disincentive for domestic investment. The idea that the probability of repayment is low when the level of debt is high has come to be known as the *debt overhang argument.*

We can formalize the debt overhang argument as follows. Let π be the probability that the good state occurs. Assume that π depends negatively on D:

$$\pi = \pi(D); \quad \frac{d\pi(D)}{dD} < 0$$

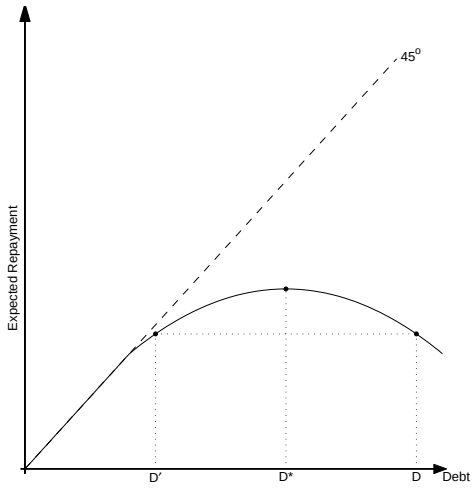
Assuming, as in our original example, that in the bad state the country pays only 25 and that the face value of its outstanding debt equals $D > 25$, expected receipts of the creditor are given by

$$\pi(D) \times D + (1 - \pi(D)) \times 25.$$

Is it still the case that expected receipts are decreasing in the amount of debt forgiven? The answer is no, not necessarily. If an increase in debt pushes up the probability of the bad state sufficiently, then it can be the case that expected receipts actually fall as D increases. Figure 8.5 shows the relationship between the magnitude of debt outstanding and expected receipts of creditors, also known as *the debt Laffer curve.* Expected repayment peaks at a value of debt equal to D^*. The creditor of a country with an outstanding debt equal to D, for example, can increase his expected receipts by forgiving debt in any amount less than $D - D'$. In particular, the creditor will maximize expected repayment by forgiving $D - D^*$ units of debt. Note that the optimal amount of debt relief does not result in a secondary market price of unity. In the figure, the secondary market price is given by the ratio of the debt Laffer curve to the 45 degree line. The secondary market price becomes unity only if the creditor accepts to reduce the debt to 25, for in this case the risk of default disappears.

Let's illustrate the concept of debt overhang by means of a numerical example. Consider again the case shown in table 8.5. Suppose now creditors

Figure 8.5: The debt Laffer curve



forgive 20 of the outstanding debt, so that the new amount of debt is 80. Assume also that this reduction in the debt burden increases the probability of the good state from 1/3 to 1/2. Expected repayments are then given by $80 \times 1/2 + 25 \times 1/2 = 52.5$. Thus expected repayments increase by 2.5 even though the face value of the debt fell by 20. Creditors would benefit from such a unilateral debt reduction. Debtors would also benefit because in case the good state occurs, they have to pay 20 less than in the absence of the debt reduction scheme. To sum up, if a country is on the "wrong" (downward sloping) side of the debt Laffer curve, then it will be the case that unilateral debt forgiveness is not necessarily against the interest of creditors. Thus, one should not be surprised to see debt forgiveness happen sometimes.

Even in the case that unilateral debt forgiveness benefits the creditors, in practice, such schemes might be difficult to implement. The reason is that they create a "free rider" problem. Going back to the above example, suppose that only some of the creditors forgive debt but others choose not to participate. As a result of the debt forgiveness, the secondary market price of debt increases from 0.5 to $52.5/80 = .66$ benefiting those who chose not to participate in the scheme. So, from the point of view of an individual creditor it is always best not to forgive any debt and hope that some of the other creditors do and then free ride on the debt reduction of the other creditors. Because of this free rider problem, if debt forgiveness occurs in practice it is usually a *concerted* effort, namely that *all* creditors agree on forgiving some part of the debt.

8.3.3 Third-party debt buy-backs

A debt-reduction scheme often considered by multinational organizations is third-party debt buy backs. A third-party debt buy-back consists in purchases of developing country debt at secondary market prices by a third party, such as the World Bank, the IDB, or the IMF, with the purpose of reducing the debt burden of such countries.

Consider our original numerical example of a country that has an outstanding debt of 100; the country can pay 100 in the good state and only 25 in the bad state. The good state occurs with probability 1/3 and the bad state with probability 2/3. The secondary market price of debt is 0.50 and expected payments are 50.

Suppose now that the World Bank announces that it will buy 75 units of (face value) debt in the secondary market. As soon as the announcement is made, the secondary market price jumps to a new value. Specifically, after the buy back the level of outstanding debt is 25, which the debtor country can pay in any state, good or bad. Thus, expected payments are 25, which is also the face value of the remaining outstanding debt. This implies that the secondary market price jumps up from 0.50 to 1 at the announcement of the buy-back and before it actually takes place. Who benefits from the buy-back? Creditors receive 75 from the World Bank and 25 from the debtor country. Thus, comparing the situation with and without buy-back, creditors benefit from the buy-back by 50, because before the buy-back their expected receipts were 50 and after the buy-back they are 100. Debtors have expected payments of 50 in the absence of the debt-reduction scheme and 25 when the debt buy-back is in place. So they benefit by 25. Summing up, the World Bank pays 75, of which 50 go to the creditors and 25 to the debtor countries.

We conclude that this method of introducing debt relief is expensive—the World Bank ends up paying par value for the debt it buys back—and benefits mostly the creditors rather than the debtors whom the World Bank meant to help.

8.3.4 Debt swaps

Another type of debt reduction scheme is given by debt swaps. A debt swap consist in the issuance of new debt with seniority over the old debt. The new debt is then used to retire old debt. It is important that the new debt is made senior to the existing debt. This means that at the time of servicing and paying the debt, the new debt is served first.

Consider again the original numerical example described in table 8.5. The debtor country pays the face value of the debt, 100, with probability 1/3 and 25 with probability 2/3. Thus, expected payments are 50 and the secondary market price is 0.5. Suppose now that the government issues 25 of new debt with the characteristic that the new debt has seniority over the old debt. Because the debtor has 25 in the bad state and new debt has priority, the government never defaults on the new debt. This implies that the government is able to introduce the new debt at par (i.e., the price of new debt is 1). Assume also that the debtor announces that it will use the proceeds from the issuance of the new debt to retire (purchase) old debt at the price of 1/3. Will holders of old debt be willing to sell debt at that price? To answer this question, we have to find out the secondary market price of old debt after the swap. At the price of 1/3, the government can retire 75 units of old debt, so that 25 units of this type of debt remain outstanding. Therefore, in the bad state the government defaults on the old debt, because it has to pay 25 to holders of new debt who have priority. In the good state, the government retires the old debt at face value. Thus, holders of old debt expect payments of $1/3 \times 25 = 8.33$. The secondary market price of debt is therefore $8.33/25 = 1/3$. It follows that holders of old debt would accept the swap proposed by the debtor government.

Who benefits from this operation? Clearly the debtor country. Before the swap, the debtor has expected payments of 50. With the swap, the debtor has expected payments of 8.33 to holders of old debt and 25 to holders of new debt. These two payments add up to 33.33. So the government gains 16.67=50-33.33 by implementing the swap. On the other hand, creditors see their receipts fall from 50 before the swap to 33.33 after the swap (25 from the new debt and 8.33 from the old debt).