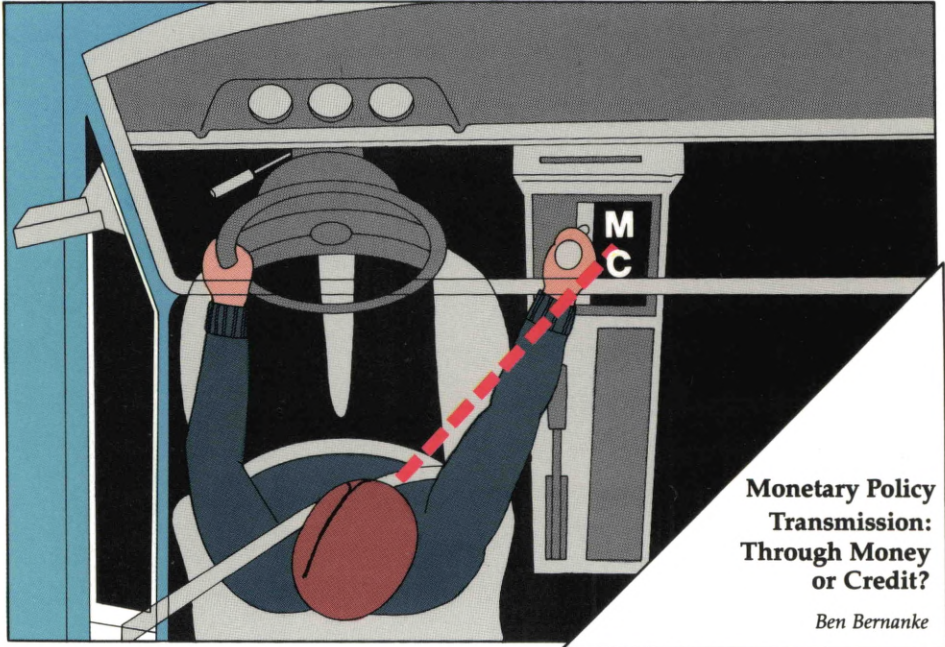


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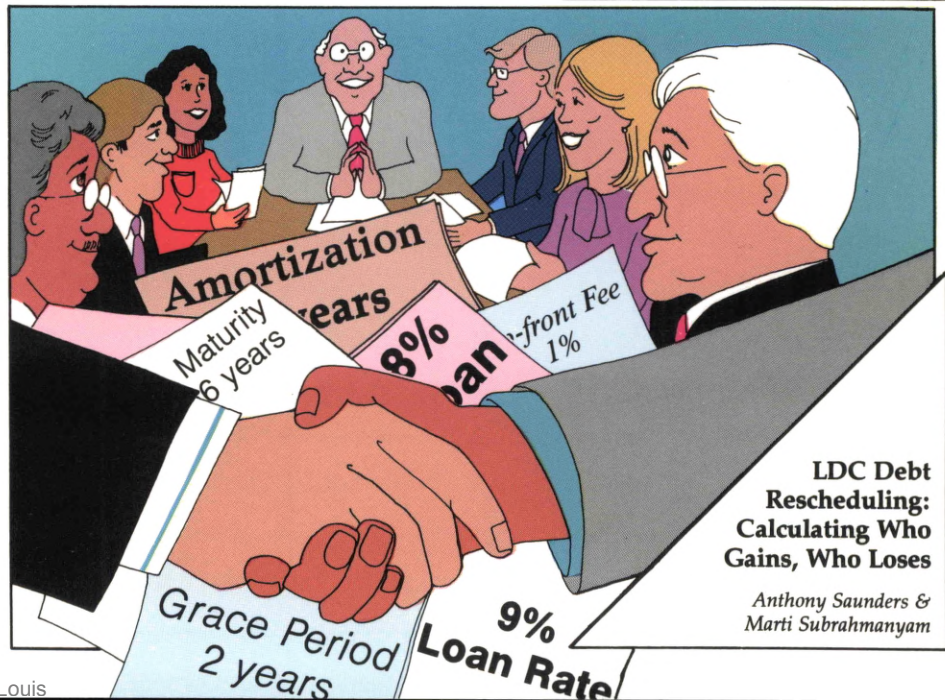
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**Monetary Policy
Transmission:
Through Money
or Credit?**

Ben Bernanke



**LDC Debt
Rescheduling:
Calculating Who
Gains, Who Loses**

*Anthony Saunders &
Marti Subrahmanyam*

BUSINESS REVIEW

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MONETARY POLICY TRANSMISSION: THROUGH MONEY OR CREDIT?

Ben Bernanke

Over the past decade, economists have been debating whether the monetary aggregates—M1 in particular—are still useful guides for monetary policy. Some have proposed that policy makers use measures of credit as alternative or supplemental guides. Initially, the theoretical foundations for credit's importance in transmitting monetary policy changes to the economy were not well developed. This article spells out the theoretical underpinnings of the "credit view" and argues its benefits in a framework that students of monetary policy will find easy to understand.

LDC DEBT RESCHEDULING: CALCULATING WHO GAINS, WHO LOSES

Anthony Saunders and Marti Subrahmanyam

It has been more than six years since Mexico suspended payments on its external debt, and still the less developed countries remain vulnerable to debt-repayment problems. To mitigate those problems, debtor countries and banks have rescheduled outstanding loans into the future through multi-year restructuring agreements, or MYRAs. But who gains from the MYRA—the country or the bank? This article shows that under certain conditions, there need not be a winner and a loser in a MYRA. In fact, both lenders and borrowers can gain something they want from the rescheduling.

Monetary Policy Transmission: Through Money or Credit?

*Ben Bernanke**

Aspirin is one of our most effective, versatile, and widely used drugs. Yet doctors do not completely understand how this important tool of their trade works. Economists are in a similar position with respect to monetary policy. Federal Reserve actions seem to have important effects on the macroeconomy, but precisely why is one of the most poorly understood and contentious issues in economics.

The prevailing economic wisdom traces out the following “monetary transmission mechanism”: 1) the Fed adds reserves to the banking system; 2) banks create more money; 3) the added liquidity reduces market interest rates; and 4) the lower market rates and greater liquidity encourage new spending. This chain of reasoning has led to the popular focus on the money supply and market interest rates as indicators of Fed policy. But this standard “money view” has proven misleading on occasion, and recently some economists have begun to take a different perspective on how policy works.

The alternative approach emphasizes that in the process of creating money, banks extend

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credit (make loans) as well, and their willingness to do so has its own effect on aggregate spending. Advocates of this "credit view" can point to a number of episodes in which the volume of bank lending seems to have had an independent impact on the economy. They suggest that the Fed keep an eye on the volume of bank loans, as well as the money supply and interest rates, when setting policy.¹

THE TRADITIONAL VIEW IS THAT IT'S THE MONEY THAT MATTERS...

Mainstream economists see the financial system essentially as a "market for money" — a market where the public's demand for money interacts with the supply of money, which is controlled by the Fed and the banking system, to determine market interest rates. The level of market interest rates, in turn, helps determine how much households and businesses decide to spend on new goods and services. From this perspective, it is the Fed's actions to control the money supply that influence developments in the economy.

A Market for Money. According to the money view, people face a fundamental financial decision: how much of their portfolio to devote to money, with which they can make purchases, and how much to devote to the other, less liquid assets, which presumably offer a higher yield. The higher the volume of expenditures people intend to make, the greater their demand for money; the higher the interest rates on alternative financial assets, the less money they demand.

Banks supply the public with the money it

wants in the form of deposits. Banks "sell" people these deposits in two ways: by making loans and by buying marketable securities. When a bank makes loans, it gives deposits to the customers it considers creditworthy in exchange for their IOUs. When a bank goes into the financial markets and buys Treasury bills or other types of securities, it gives the asset holders deposits in exchange for these claims. Supplying deposits in this way is a profitable undertaking for banks, because the interest rates they earn on the loans and securities they add to their asset portfolios are higher than the interest rates they pay on the relatively liquid deposits they issue. But the amount of money that the banking system can supply is limited, because banks are required to hold reserves in proportion to their outstanding checkable deposits and the Fed controls the available supply of reserves.

In the money view, the important thing is not how banks create money, but how much they create. Proponents of this view see financial markets settling at a level of interest rates that reconciles the public's demand for money with the supply that banks can make available. For instance, if banks can create more deposits than the public wants to hold at current interest rates, the banks can sell more deposits to the public by offering loans at lower interest rates. Alternatively, banks can offer to pay more for securities in the open market, thus bidding down the yield on these instruments.² Either way, banks effectively eliminate the excess supply of money by reducing interest rates.

Similarly, banks tend to eliminate any excess demand for money by raising interest rates. If banks find that they have insufficient reserves to meet the public's demand for deposits, they must reduce their "sales" of deposits to the public.

¹An important recent statement of the credit view is given by Alan Blinder and Joseph Stiglitz in "Money, Credit Constraints, and Economic Activity," *American Economic Review* (May 1983). This approach has a long history, however, with contributions having been made by many economists. The analysis here draws heavily on Ben Bernanke and Alan Blinder, "Credit, Money, and Aggregate Demand," *American Economic Review* (May 1988).

²Banks hold U.S. Treasury and municipal securities, so they would be bidding up prices in the markets for these assets directly. But to the extent that market participants view all marketable assets as substitutes, all asset prices will rise together (or, equivalently, all their yields will fall together).

So they discourage the public from taking down loans by raising loan rates. Or they offer to sell securities from their portfolios to the public at lower prices (in exchange for deposits), thus bidding up yields on these instruments.

The Money View of How Policy Works. Given this perspective on financial markets, the channel through which a change in Fed policy affects economic performance is easy to trace. Suppose, for example, that the Fed wants to pick up the pace of economic activity. Its first move is to increase commercial bank reserves. The increase in reserves gives the banks the "raw material" they need to issue new deposits. But just because banks can supply more deposits will not mean that the public will automatically demand more deposits for their portfolios. Banks must sell the new deposits to the public by cutting loan rates and bidding down interest rates on other market instruments. The lower interest rates increase the amount of money the public demands.

The impact of the increase in bank reserves shows up very quickly in the financial markets. The impact on the markets for goods and services occurs more slowly, but gradually the lower interest rates stimulate spending. Consumers increase their outlays on houses, cars, and other durables. Businesses increase their expenditures for new plant and equipment. And the higher spending, in turn, increases the level of economic activity and raises GNP.

...BUT PERHAPS MONEY CAN'T TAKE ALL THE CREDIT

Proponents of the credit view do not exactly disagree with those who hold the money view. They just think that the money view does not go far enough in recognizing the pivotal role of banks (and other financial intermediaries) in the economy. The money view treats bank deposits as special because the public uses them as money. Proponents of the credit view argue that bank loans deserve special treatment, too. They emphasize the qualitative difference between a borrower going to a bank for a loan and a borrower raising funds by going to the financial

markets and issuing stock or floating bonds. Taking this difference into account yields what credit view proponents consider to be a clearer picture of the transmission mechanism that links Fed actions to the overall level of economic activity.

Why Treat Bank Loans Differently? In what sense are bank loans "special"? And why should banks' decisions about how much lending to do influence overall economic performance? The answer is that banks frequently make loans to individuals and businesses who would find borrowing in the open market prohibitively expensive. Banks thus finance consumption and investment expenditures that would otherwise not take place.

The source of banks' special role is the fact that any transaction between a borrower and a lender involves costs. The lender has to collect enough information about the borrower's credit history and income potential to assess his creditworthiness. Then repayment schedules and the other conditions of the agreement must be formalized. Once the transaction takes place, the lender must monitor the borrower's performance.

Because banks specialize in such transactions, they can hold the costs of lending to a minimum. With their larger scale of operations and their expertise in lending procedures, banks can profitably supply loans at a much lower cost and hence a lower interest rate than could, say, individual private investors.

This is not to say that banks have a significant cost advantage in all types of lending. But in situations where transactions costs are high, the availability of bank loans can make the difference for a potential borrower. For example, when a billion-dollar company routinely borrows on a set of standardized terms, the transactions costs are so small that the company can offer its IOUs directly to the general public and find willing lenders at relatively low interest rates. On the other hand, if a small local firm wants to borrow a million dollars in order to double the size of its facility, the general public would probably

reckon the transactions costs to be so large that the interest rate it would require would be extremely high. In this circumstance, the firm would be forced to abandon the project—or turn to a bank for a loan. Indeed, as a practical matter, bank loans may be the only source of funds for many small firms trying to borrow.³ Even firms large enough to issue marketable securities may seek bank loans in circumstances where they need the flexibility bank lending arrangements can provide.

In short, bank loans are special because they represent the primary source of funds in situations where the amount of information and communication needed to complete the transaction is high. And because these situations are common, at least in the credit view, banks' willingness to make loans has a potentially powerful impact on spending and the economy.⁴

A Market for Bank Loans. The money view focuses on banks' role as suppliers in the market for money; the credit view explicitly considers banks' role as suppliers in the market for loans, as well. According to the money view, the volume of deposits that banks supply helps determine the overall level of interest rates. According to the credit view, the volume of loans that banks supply helps determine how close interest rates on loans come to the rates on marketable securities.

To see how banks' decisions affect the relationship between effective loan rates (interest rates on bank loans that take account of other fees, charges, or restrictions) and open-market interest rates (interest rates on marketable securities, such as corporate bonds or commercial paper), consider the market for bank loans.

³Similarly, banks (along with savings and loans) are an important source of loans to consumers.

⁴For more complete discussions of the economics of bank lending, see Christopher James, "Are Bank Loans Special?" Federal Reserve Bank of San Francisco *Weekly Letter* (July 24, 1987), and Mitchell Berlin, "Bank Loans and Marketable Securities," this *Business Review* (July/August 1987). See also Eugene Fama, "What's Different About Banks?" *Journal of Monetary Economics* (June 1985).

On the supply side of the market are the banks. The stock of reserves that the Fed makes available to them constrains the volume of deposits that banks can book on the liability side of their balance sheets. But they still must decide how to handle the asset side. How many loans should they hold in their portfolios? How many securities? Their decision depends on, among other things, interest rates. The wider the spread between the interest rate they can charge on loans and the interest rate they can earn on securities, the greater the share of their portfolios they will devote to loans. The upward-sloping supply schedule in Figure 1 captures the idea that the higher the loan rate, the more loans banks are willing to make, everything else, including open-market rates, constant.

On the demand side of the market for bank loans are businesses and households trying to finance their purchases of various goods and services. Some of these potential borrowers have no alternative but to approach a bank. If they do not get a loan from a bank, they do not borrow at all. Other potential borrowers have access to the open market. They can choose between taking down a loan and issuing their own securities. The downward-sloping demand curve in Figure 1 summarizes both groups' reaction to bank loan rates. The higher the rate on bank loans, the less the bank-dependent households and businesses choose to borrow, and the less the firms with open-market access choose to borrow at banks. So the total demand for bank loans declines as loan rates rise, everything else, including open-market rates, constant.

The prevailing bank loan rate is determined by the interaction of the supply and demand for loans. In equilibrium, the bank loan market settles at the loan rate that equates supply and demand, shown as ρ^* in Figure 1. Should any of the other factors affecting the supply or demand for loans change, their impact on the loan rate is registered through the workings of the loan market.

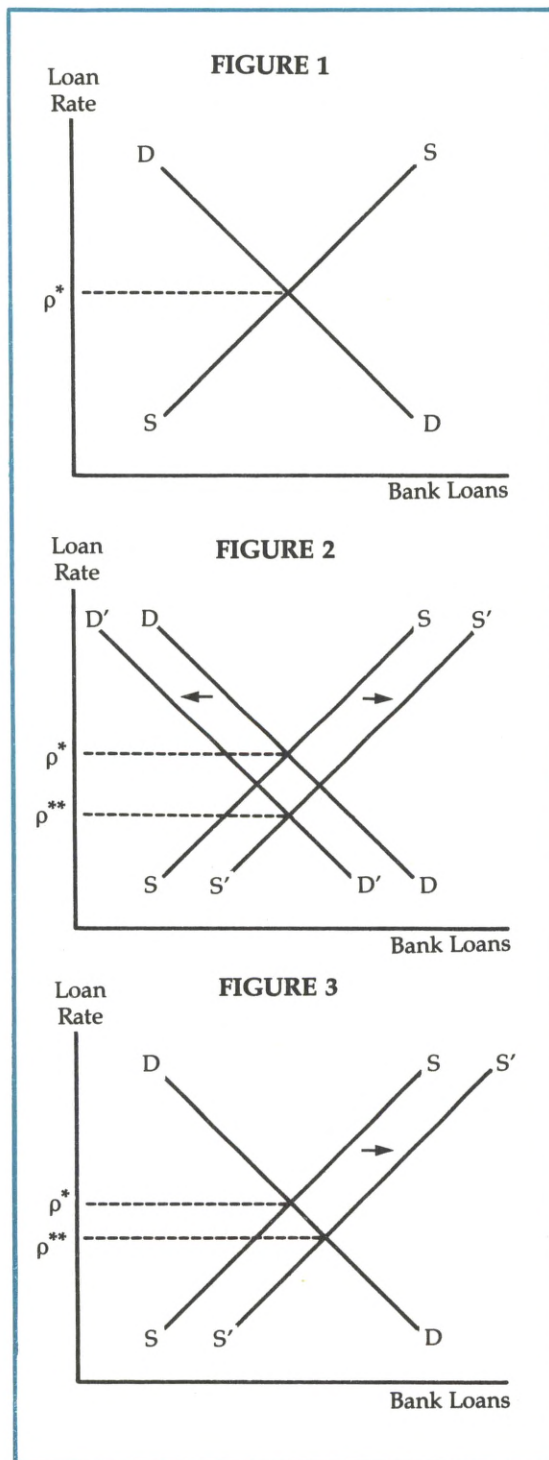
For example, Figure 2 shows the impact of a decrease in open-market interest rates. Banks,

seeing that they would now earn a lower return on securities, are more willing to offer loans, so the loan supply curve shifts right. Meanwhile, firms with access to the credit markets, seeing that they can now pay lower rates on the securities they issue, are less willing to borrow from banks, so the loan demand curve shifts left. The combination of weaker demand and stronger supply depresses the bank loan rate. How much loan rates must fall in response to lower open-market rates depends on how sensitive banks' loan supply and the public's loan demand are to open-market interest rates.

A change in the stock of reserves that the Fed makes available to the banking system can also have a direct effect on the market for bank loans. If the Fed increases the stock of reserves, then banks will be able to create more deposits. To the extent that banks choose to use this opportunity to increase the size of their loan portfolios, the loan supply curve shifts right, as shown in Figure 3. Thus, the increase in reserves tends to reduce bank loan rates.⁵

The Credit View Better Explains How Policy Works. Taking account of the market for bank loans explains more completely the transmission mechanism through which Fed policy actions affect the economy. Suppose, for instance, the Fed decides to stimulate the economy by increasing bank reserves. With more reserves on hand, banks seek to increase deposits. If banks seek to expand their deposits primarily by buying up securities in the open market, they drive up the price of securities and drive down open-market interest rates. This decline in open-market rates works through the loan market to induce some sympathetic decline in bank loan rates, as well. But the primary impact of the policy action will be to encourage new spending by firms with access to financial markets.

On the other hand, if banks expand their deposits mostly by offering to supply more loans,



⁵In addition, the increase in reserves would reduce loan rates indirectly, through its effect on open-market rates.

the primary effect of the increase in reserves will be to depress interest rates on loans. If the lower loan rates induce some firms to borrow less in the open market, then there may be some sympathetic decline in open-market interest rates. But the dominant impact of the expansionary policy will be to stimulate new spending by the bank-dependent sector.

In short, the credit view is consistent with the money view that an expansionary Fed policy reduces the overall level of interest rates. But the credit view emphasizes that banks' decisions about how to manage their asset portfolios determine whether the policy's impact will fall primarily on open-market interest rates or on effective bank loan rates. And this, in turn, determines which sectors of the economy increase their spending most in response to Fed stimulus. (See MONEY VERSUS CREDIT IN THE IS-LM MODEL.)

IF THE CREDIT CHANNEL SHUTS DOWN, THE ECONOMY SUFFERS

Perhaps more important than the credit view's insight into what happens when the Fed changes its behavior is its insight into what happens when the banks change theirs. Suppose banks suddenly curtail their lending and decide to hold open-market securities instead. Taken literally, the standard money view predicts that the banks' portfolio shift would have no effect on the economy at all. In this view, bank loans and marketable securities are essentially interchangeable, so borrowers who had been going to a bank for loans would simply go to the financial markets and issue securities instead. Overall interest rates and the level of spending would remain the same. According to the credit view, however, this prediction is unacceptably unrealistic.

Proponents of the credit view claim that banks' decisions to curtail lending would curtail private-sector spending and depress GNP. In the loan market, banks' decisions to hold fewer loans push up the prevailing loan rate and reduce the volume of bank lending. For bank-

dependent households and firms, taking down fewer bank loans means spending less on goods and services. And because the decline in bank lending depresses spending, GNP falls. In addition, the decline in spending motivates people to keep less money in their portfolios and to hold more interest-bearing financial assets. The increase in demand for these assets pushes up their prices, driving down their yields. So according to the credit view, a decline in banks' willingness to lend actually reduces GNP and open-market interest rates at the same time.⁶ (See A "CREDIT CRUNCH" IN THE IS-LM MODEL, p. 10.)

A View With a Basis in History. This analysis of a fall in banks' willingness to lend is not a purely academic exercise; it is a good description of events in the United States during the downward phase of the Great Depression. During this period, widespread bank runs and financial panic caused banks to scramble for liquidity and safety in their portfolios; they reduced lending as much as possible in order to hold safe and marketable securities. The heavy demand for open-market securities drove the yields on these securities down to record-low levels, giving the false impression that financial conditions were "easy." However, prices of illiquid and risky assets plummeted, loans were difficult to get (even for the dwindling number of solvent borrowers), and spending fell sharply. All of this is consistent with the credit-based model.⁷

Economists had a more recent opportunity to observe what happens when the credit channel

⁶Again, it should be emphasized that if banks are not "special," reduced bank lending would be irrelevant; the shift would just be offset by a reshuffling of the portfolios of banks and other providers of credit, including households. Ultimately, the real economic effects of reduced bank lending under the credit view stem from the loss of valuable intermediary services that occurs when banks cut back lending.

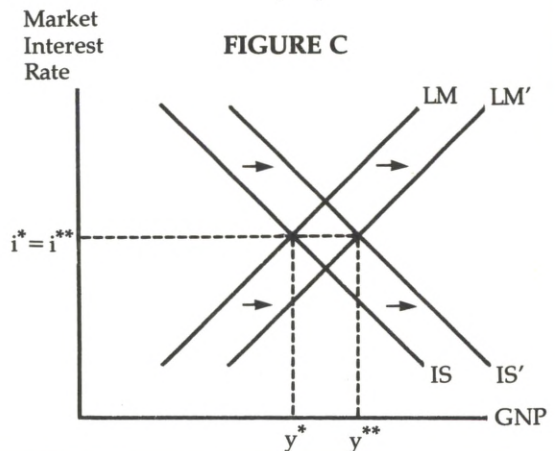
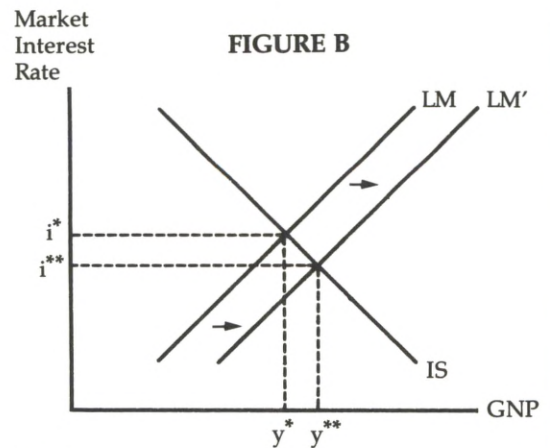
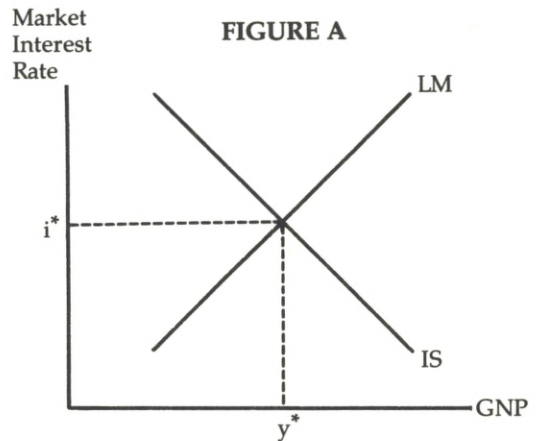
⁷Ben Bernanke, "Non-Monetary Effects of the Financial Collapse in the Propagation of the Great Depression," *American Economic Review* (June 1983) presents this case in greater detail.

Money Versus Credit in the IS-LM Model

The textbook IS-LM model provides a good way to summarize the money-versus-credit debate. The standard IS-LM diagram is illustrated in Figure A. The IS curve shows combinations of interest rates and output levels that keep the markets for goods and services in equilibrium. Its downward slope captures the idea that low interest rates generate an increase in spending sufficient to sustain higher levels of output of goods and services. The LM curve shows the combination of interest rates and output levels that keep the supply and demand for money in balance. It slopes upward because, when output and spending are high, the demand for money is high. As a result, interest rates must be high to equate demand with the existing supply. The intersection of the IS and LM schedules shows the open-market interest rate and spending levels, i^* and y^* , at which both the market for goods and the market for money are in balance.

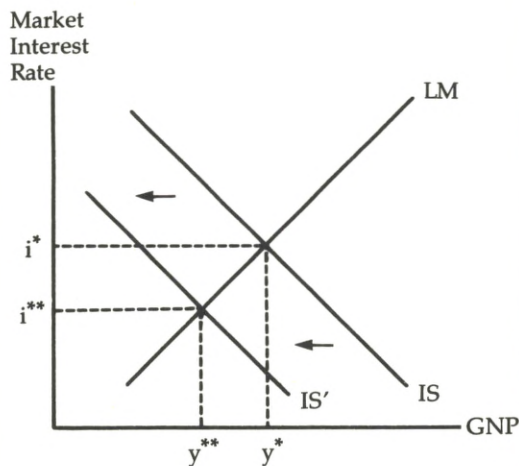
The standard money view of how Fed policy affects the economy is shown in Figure B. An increase in reserves by the Fed raises the money supply. At any given level of spending, the public must be induced to hold the extra money, which requires that interest rates fall. Graphically, the LM curve shifts down and to the right. So with an increase in the money supply, the economy settles at a lower open-market interest rate, i^{**} , and a higher level of output, y^{**} .

Advocates of the credit view agree that Fed policy shifts the LM curve. However, they argue that Fed policy shifts the IS curve as well, because aggregate spending depends on loan market conditions. When banks elect to increase deposits by supplying more loans, this raises the amount that bank-dependent firms spend at any given open-market interest rate; thus, the IS curve shifts right. Both of these shifts raise the level of output, but the overall impact on market interest rates is ambiguous. If LM shifts more than IS, market rates will fall; if IS shifts more than LM, market rates will rise. Figure C shows the result of an equal shift in IS and LM: output is higher and market interest rates are unchanged.



A "Credit Crunch" in the IS-LM Model

The effects of a change in banks' willingness to supply loans can also be illustrated in IS-LM terms. Under the standard money view, such a change would have no effect. Under the credit view, a reduction, say, in banks' loan supplies reduces the amount of spending that is done at any given open-market interest rate. Thus, IS shifts left (see figure). Output and open-market interest rates fall. As stated in the text, this may be a good description of the early stages of the Great Depression or of the effects of credit controls.



shuts down. Early in 1980, the Carter Administration authorized the Fed to impose direct controls on consumer lending by banks, department stores, oil companies, and other businesses. These credit controls, which were designed to slow the growth of consumer credit, were part of an overall anti-inflation strategy. During the few months that the controls were in place, the contraction in the supply of bank lending and other forms of consumer credit reduced aggregate spending. The economy fell into a recession while open-market interest rates declined. Again, these results cannot be ex-

plained by the money view, but are perfectly consistent with the credit view.

CONCLUSION

The credit view's most obvious implication for the Fed is that monetary policy actions can have an insignificant impact on market interest rates and still have substantial effects on GNP.⁸ And as we have seen, if banks' willingness or ability to extend credit are substantially impaired, declining market interest rates may even portend a decline in GNP rather than an increase.

Ultimately, the credit view holds that the impact of Fed policy on the economy depends both on the amount of money banks create and on how much lending they do in the process. So it is not surprising that proponents of the credit view suggest that the Fed look at both money and credit aggregates when judging a policy's impact. If both are growing strongly, then it is a safe bet that the economy is growing strongly; if both are growing slowly, then the economy is probably slowing too. But if money and credit are sending conflicting signals, then the Fed should concentrate more on controlling the supply of the aggregate that has shown a closer link to aggregate spending. And here credit may have the edge.

In recent years, the money supply has proven a very unreliable indicator of Fed policy, mainly because regulatory change has been shifting the public's demand for money so much. With the introduction of NOW accounts, super-NOW accounts, and money market deposit accounts, the public has been afforded a variety of ways in which to hold money without completely forgoing interest income. As a result, the public's demand for money has been increasing, in fits and starts, over the last 10 years. This shifting

⁸It must be emphasized that the problem alluded to here is different from the well-known problem of distinguishing between real and nominal interest rate movements.

demand for money makes it difficult for the Fed to determine the supply of money that would achieve its economic goals.

In principle, the demand for credit can be unstable at times, just as the demand for money can be. For example, a shift by firms from bank loans to open-market finance (such as commercial paper) would tend to reduce loan growth that would normally accompany a given rate of economic expansion. But there is at least some

evidence that credit demand has been more stable than money demand since the deregulation process began in 1980.⁹ If so, then credit should be getting more attention these days.

⁹See Bernanke and Blinder (1988) and James S. Fackler, "Should the Federal Reserve Continue to Monitor Credit?" Federal Reserve Bank of Kansas City *Economic Review* (June 1988).

LDC Debt Rescheduling: Calculating Who Gains, Who Loses

*Anthony Saunders and Marti Subrahmanyam**

Six years after the shock of Mexico's debt-repayment suspension in August 1982, the international debt problem remains with us. As of June 1987, Brazil alone had outstanding external bank debt plus nonbank trade-related

debt of \$89 billion.¹ This continuing debt problem has posed considerable difficulties both for the less developed countries (LDCs) and for the lending banks. Specifically, declining commodity prices and capital flight have made it far more

*This article is based in large part on a paper by Anthony Saunders and Marti Subrahmanyam, "Present-Value Analysis of Commercial Bank Debt Rescheduling," prepared in 1987 for the Country Studies Department of the World Bank. The authors are Professors of Finance at New York University's Stern School of Business. Professor Saunders is a Research Adviser to the Federal Reserve Bank of Philadelphia.

¹In the Bank for International Settlements standings as of June 30, 1987, Brazil's total indebtedness amounted to \$88,879 million. Mexico was next (with \$80,708 million), followed by Australia (\$40,718 million), the Soviet Union (\$37,457 million), Argentina (\$36,672 million), South Korea (\$35,592 million), Venezuela (\$25,577 million), Indonesia (\$23,284 million), and Norway (\$19,714 million). See *American Banker*, January 21, 1988.

difficult for the LDCs to meet their debt-repayment schedules, and U.S. banks have had to build up capital reserves (including their loan-loss reserves) in anticipation of potential defaults or write-offs on their loan portfolios.

In practice, LDCs and banks have dealt with these repayment problems by rescheduling outstanding loans into the future. The arrangement through which countries reschedule existing loans into the future is called a multi-year restructuring agreement, or MYRA. A good example of this restructuring was the Mexican MYRA signed in March 1985.² Under this agreement, a \$5 billion loan made by 526 commercial banks in 1983 was restructured along with 52 previous loans totaling \$23.6 billion. Basically, these 53 loans were repackaged into a new "loan" with principal (amortization) payments set to begin in 1987 and end in 1998. At the same time, a number of other contractual terms, such as interest rates, were also changed.

Who gains from the MYRA process—the country or the bank? And how much is gained or lost? In the jargon of bankers, the question might be rephrased this way: what is the size of the bankers' "concessionality"? This article proposes a method for measuring concessionality. It shows that under certain conditions, a MYRA is not a zero-sum game because both borrowers and lenders can gain something they want from the restructuring.

THE CONCEPT OF CONCESSIONALITY AND RESCHEDULING

Concessionality refers to the amount the lender gives up to the borrower when a loan is rescheduled. Traditionally, concessionality has been measured by a reduction in the interest rate the lender charges. For example, if before the MYRA the bank was charging 10% (the prime rate of, say, 8%, plus 2%) on a loan with a face value of \$5 billion, and the MYRA reduced this

loan rate to 9%, the bank was viewed as providing an annual concession of \$5 million (that is, .01 times \$5 billion) to the borrower. Note that the bank's concession typically is viewed as the borrower's gain.

Unfortunately, this simple measure overlooks the multi-dimensional nature of a MYRA. In addition to the interest rate, a number of other contractual terms are changed in the MYRA that will affect the loan's value. For example, the Mexican MYRA reduced interest rates, extended the maturity of the loan, granted a grace period before principal repayments began, changed the principal repayment (amortization) schedule, and imposed fees on the LDC to cover the MYRA's administrative costs. Each of these terms can be expected to have affected the (present) value of the loan. (See the GLOSSARY for brief definitions of the terms used in this discussion.)³

A better measure of concessionality, which takes into account all contractual aspects of the MYRA, is the present-value dollar amount that the lender gives up to the borrower at the time of the MYRA. Present-value calculations take into account the time-value of money. For example, a dollar of loans repaid next year is worth less than a dollar of loans repaid today. However, a dollar received (or paid) next year may be valued differently by different individuals. For example, John may have a strong preference for consuming today, while Jim prefers to consume in the future. So John is likely to discount a dollar received next year by a greater amount than is Jim. That is, John has a higher rate of time-preference, or time-value of money, than Jim does. Since lenders and borrowers may have different rates of time-preference, measuring concessionality using the present-value approach means that the lender's concessionality need not

²See "MYRA Makes the Years Roll By," *Euromoney* (October 1985) p. 29.

³Much of the terminology used in this paper was first suggested by Carl B. Weinberg, "The Language and Techniques of Multi-year Restructuring of Sovereign Debt: Lessons from the Mexican Experience," *Journal of Policy Modelling* (1985) pp. 477-90.

equal the borrower's gain. There need not be a winner and loser in a loan rescheduling.

A simple (present value) framework can be used to understand and measure the degree of concessionality a banker grants to an LDC at the time of a MYRA. This framework is general enough to be used in evaluating all types of loan rescheduling, domestic and foreign.

THE PRESENT-VALUE FRAMEWORK

The present-value approach measures the degree of concessionality to a borrower as the difference between the present value of the original (unrestructured) loan (PV_O) and the present value of the restructured loan (PV_R), taking into account all characteristics of the loan that may be changed in the restructuring.

That is:

$$\text{Concessionality} = (PV_O) - (PV_R)$$

If the difference is positive, there is a real element of economic subsidy to the LDC in the revised loan terms. If this difference is negative, it will imply that the borrower has lost out in the restructuring.

The Original Loan. Consider a country that currently (at time = 0) has a loan outstanding from an international banking syndicate. The face value of this loan is \$100 million and it has a maturity of two years. The terms of the loan require equal amortization (A) of the principal over the two years — so that \$50 million of the principal has to be repaid next year (year 1) and \$50 million the year after (year 2).⁴ The interest rate charged on the loan is the London inter-bank offer rate (LIBOR — see GLOSSARY) plus 1%, with interest charged on the outstanding balance of the loan. In this section we will assume that LIBOR is 9% for the life of the loan, so that the loan rate charged is 10%. These interest charges are represented by I . Since the borrower receives the funds now but will repay the funds

in later years, the time value of money has to be considered in evaluating the true return on the loan to the bank. That is, the bank has to discount the repayments of principal and interest by its (opportunity) cost of capital.⁵ The higher the bank's rate of discount, the lower will be the (present) value of principal and interest payments received from the LDC.⁶

In general, the present value of the original loan (PV_O) to the banker can be specified as being equal to:

$$PV_O = \frac{(A_1 + I_1)}{(1+r)} + \frac{(A_2 + I_2)}{(1+r)^2}$$

where

A_i = amortization (principal) payments in year i , $i = 1$ or 2

I_i = interest payments in year i , $i = 1$ or 2

r = the bank's discount rate (opportunity cost of capital).

Using the numbers in our example and assuming that $r = 8\%$, then

$$PV_O = \frac{(50 + 10)}{(1.08)} + \frac{(50 + 5)}{(1.08)^2} = \$102.71 \text{ million.}$$

Thus the bank would be earning a (present value) net amount of \$2.7 million (or a return of 2.7 cents per dollar) on the two-year loan.

The Restructured Loan. Suppose that soon after the loan is made the LDC unexpectedly finds these repayment terms and dates burdensome and asks the bank for a MYRA to avoid defaulting on the terms of the original loan.

⁵The bank's cost of capital reflects the risk-adjusted required return on investment by the bank's stockholders (i.e., their time-value of money).

⁶Note that the principal and interest received in year 2 are discounted at $(1+r)^2$, that is $(1+r)(1+r)$, where r is the bank's discount rate, because the lender has to wait (forgo consumption) for two periods before he receives the second year's dollar cash-flow repayments on his loan.

⁴Amortization refers to the periodic repayments of principal on a loan.

Under a MYRA, the two future principal payments of \$50 million each are combined and rescheduled to some future date(s). The number of years for which amortization payments on the original loan are restructured is called the restructuring *window*. In our example the window is assumed to be two years. In the case of the Mexican MYRA discussed above, the window was six years since the negotiators were considering restructuring all amortization payments falling due between 1985 and 1990 under the original loan agreement (or prior restructuring agreements).

In addition, in most restructuring agreements, a *grace period* is allowed before any of the revised amortization payments have to be made. In our example, let us assume that the grace period is two years so that no amortization payments will have to be made by the LDC in years 1 and 2. We

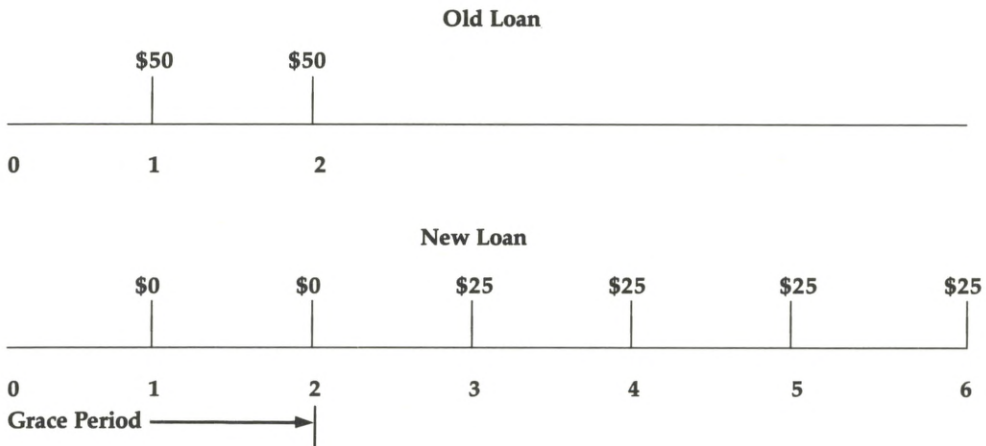
will also assume that the new amortization schedule is for four years beginning in year 3—after the two-year grace period—and therefore amounts to \$25 million a year (i.e., \$100 million face value divided by four).

The contrast between the old loan and the new MYRA loan principal repayments is shown in time-line form in Figure 1.

Now that we have restructured the principal repayments, we need to consider the interest payments. Let us suppose that the LDC will keep up interest payments on the original \$100 million even during the grace period but that the interest rate is lowered from the original LIBOR plus 1% to LIBOR, that is, from 10% to 9%. Those who just analyze interest rate *spreads* might argue that this is a “concession” from the lender to the borrower that will ease his debt burden. However, whether or not this is so in a present-value

FIGURE 1

Principal Repayments (Amortization Schedule) on the Old Loan and the MYRA



framework is a complex question and will depend on a number of factors, including the grace period, the revised amortization schedule, and so on.

The last part of the restructuring deals with the administrative costs involved in a MYRA, which are usually passed on to the borrower. Such costs include getting syndicate banks to agree to a MYRA's terms, as well as the legal and administrative costs associated with contractual revisions. These costs usually take the form of an up-front fee (F) based on a percentage of the face value of the repackaged loan. Here, it is assumed that the fee is 1% of the original \$100 million (i.e., \$1 million), which is not an atypical amount.

The terms of the repackaged/rescheduled loan are summarized below:

Maturity	= 6 years
Amortization	= 4 years (25% per year)
Grace period	= 2 years
Loan rate	= LIBOR = 9% (assumed to be constant in this example)
Bank's rate of discount	= 8%
Up-front fee	= 1%.

Thus, in this case, the present value of the restructured loan to the bank (PV_R) is calculated as:

$$\begin{aligned}
 PV_R = & F + \frac{I_1}{(1+r)} + \frac{I_2}{(1+r)^2} \\
 & + \frac{(A_3 + I_3)}{(1+r)^3} + \frac{(A_4 + I_4)}{(1+r)^4} \\
 & + \frac{(A_5 + I_5)}{(1+r)^5} + \frac{(A_6 + I_6)}{(1+r)^6}
 \end{aligned}$$

and

$$\begin{aligned}
 PV_R = & 1 + \frac{9}{(1.08)} + \frac{9}{(1.08)^2} \\
 & + \frac{(25 + 9)}{(1.08)^3} + \frac{(25 + 6.75)}{(1.08)^4} \\
 & + \frac{(25 + 4.5)}{(1.08)^5} + \frac{(25 + 2.25)}{(1.08)^6} = \$104.63 \text{ million.}
 \end{aligned}$$

Measuring Gains and Losses. Although it looks as if the bank has made a concession by cutting the interest rate on the loan, the effects of the fee, grace period, and revised amortization schedule, as well as the bank's discount rate, combine to *increase* the present value of the loan from the bank's perspective. Lengthening the maturity of the loan and instituting a grace period increase the LDC's interest costs (measured in dollars) and, therefore, the bank's interest earnings. So the present value of the bank's net earnings on the new MYRA is \$4.6 million compared to \$2.7 million with the original loan.⁷ The present-value framework clearly shows that the economic burden of the MYRA may be *favorable* to the lender even when the lender cuts the interest rate on the loan. (Although this particular example shows a MYRA that is favorable to the lender in present-value terms, lenders would be willing to negotiate MYRAs that involve concessions in present-value terms, provided the MYRAs' value exceeded the amount they would expect to receive if the borrower defaulted in part or in whole on the original loan.)

Just because the lender has gained from the

⁷In the case in which the grace period was extended to encompass year-1 and year-2 interest payments as well—such that the \$18 million of interest payments was allowed to be amortized over the years 3, 4, 5, and 6 at \$4.5 million per year—then the PV_R would have been \$101.35, i.e., less than when the grace period is applied to principal alone and less than the original loan.

restructuring does not necessarily imply that the borrower has lost. Whether or not the borrower loses, however, is a slightly more complex question. If the LDC used the same discount rate as the banker, then the banker's gain would be equal to the LDC borrower's loss (that is, \$4.6 - \$2.7 = \$1.9). Nevertheless, it is quite possible, perhaps because of concerns about the societal effects (favorable or unfavorable) from borrowing overseas, that a country may apply either a higher or lower (social) discount rate to its interest and principal repayments.

Suppose, for example, that an LDC's population had a relatively high rate of time-preference for current consumption, implying that the LDC was less willing to sacrifice current consumption for future consumption, or that it had a relatively high marginal productivity of capital. This would then be reflected in a relatively high discount rate being applied to future repayments of interest and principal. If the borrower used a discount rate of 10% (compared to the bank's 8% discount rate), then the present value of the original two-year loan to the borrower would have been \$100 million.⁸ And the present value of the rescheduled loan would be:

$$\begin{aligned}
 PV_R &= 1 + \frac{9}{(1.10)} + \frac{9}{(1.10)^2} \\
 &+ \frac{(25 + 9)}{(1.10)^3} + \frac{(25 + 6.75)}{(1.10)^4} \\
 &+ \frac{(25 + 4.5)}{(1.10)^5} + \frac{(25 + 2.25)}{(1.10)^6} = \$97.55 \text{ million.}
 \end{aligned}$$

⁸That is:

$A_1 = 50$ and $I_1 = .10 \times 100 = 10$, so $A_1 + I_1 = 60$
 and $A_2 = 50$ and $I_2 = .10 \times 50 = 5$, so $A_2 + I_2 = 55$.

Therefore: $\frac{60}{(1.10)} + \frac{55}{(1.10)^2} = 100$.

So, if the borrower has a high discount rate relative to the lender, it is quite possible for the borrower to "gain" at the same time as the lender gains from a MYRA.⁹ This possibility arises because of different valuations of the cash-flow repayments (interest and principal) over time by the borrower and the lender.

In sum, whether an LDC or any other borrower gains a concession from a lender under a MYRA will depend on a whole set of factors, including the bank's revised interest rate, fees, grace period, amortization period, and the discount rate applied to the revised schedule of payments to be made by the borrowing country.

EXTENSION OF THE PRESENT-VALUE APPROACH UNDER UNCERTAINTY

The simple framework developed above ignores interest rate, inflation rate, and exchange rate uncertainties, which have significant effects on the expected returns (and costs) of these loans. Moreover, actual contractual terms have been designed to deal with many of these uncertainties. However, uncertainty can be built into the simple model, in principle, with little difficulty.

Variable Spread. In the example above, it was assumed that the loan rate was fixed at a given percent above or below LIBOR for the life of the loan and that the underlying LIBOR did not change. These assumptions—which kept constant the spread between the loan rate and LIBOR—were made for simplification and can be relaxed in the present-value framework. Of course, LIBOR is likely to change over the life of the restructured loan (six years in our example). To handle this, we can make forecasts as to how LIBOR will change over the period of the restructured loan.¹⁰

⁹In this case, the borrower values the MYRA loan at \$97.55 million, compared to \$100 million under the original loan. Thus, the value of the savings is \$100 million - \$97.55 million = \$2.45 million.

¹⁰Alternatively, the cash flows can be valued on the assumption that they are swapped for a fixed-rate contract using an interest rate swap. For a discussion of interest rate

Then projected values of interest payments and estimates of concessionality can be made that are *conditional* on these interest rate projections.

In a similar fashion, we can relax the assumption that the spread between the loan rate and LIBOR is fixed. For example, in the 1985 Mexican MYRA the spread was variable (so-called *variable spread pricing*) with the LIBOR spread starting in 1985 at 87 1/2 basis points and rising to 125 basis points at the end of the loan.¹¹ This increase in the spread results in a larger nominal interest burden in the later years of the MYRA. While LDC borrowers with a very high (social) rate of discount might benefit from this (in a present-value sense) because they discount future interest rate payments at a high rate of time-preference, those borrowers with a relatively low discount rate might find such an arrangement less desirable. Indeed, for reasonable values of the fee, grace period, amortization, and so on, a borrower using a low discount rate may generally prefer a *declining* spread in the structure of interest payments rather than an increasing spread.

Inflation Uncertainty. One reason why LIBOR might fluctuate over time is because of changes in inflation expectations. LIBOR is a nominal interest rate, made up of a *real* rate of interest component and a premium component to adjust for expected inflation. Increases in the expected rate of future inflation will lead to increases in LIBOR. In addition, if the LDC's lending agreement provides that the loan rate will change as LIBOR changes (that is, the loan is a floating rate loan), then the future interest payments also will increase as the expected rate of inflation increases.

It is important to keep in mind, however, that if appropriate adjustments for inflationary expectations are made to forecast LIBOR, and to adjust the

interest payments in the present-value calculation, then it is also important to make adjustments for inflationary expectations in the discount rate in the present-value calculations. This is because the lender presumably cares about the *real* (inflation-adjusted) time-value of the money he has lent; that is, he cares about the purchasing power of the funds he has lent. If the percentage premium added for inflationary expectations in the discount rate were the same as that used to adjust LIBOR, the adjustment would not affect the present value of the return on the loan. However, if the premiums were different, then the present value of the loan would be affected. For example, if inflation premiums on loans were to rise faster than the discount rate, then the present value of the loan would increase.

In addition, if the loan is a fixed-rate loan, for which interest payments do not increase as expected inflation rises, or if the loan rates can be adjusted very infrequently over the restructured period, then a continuously rising rate of expected inflation (in dollar terms) reflected in a bank's discount rate will lower the present value of the loan from the bank's perspective. On the other hand, the borrowing country could be expected to gain, in present-value terms, if its social rate of discount also reflected an inflation premium.

Option Features. A common aspect of several recent debt-restructuring agreements has been the incorporation of option features into the package. Most of these options are exercisable by the lender. Three major option features are part of many recent agreements: an *interest rate option*, a *currency option*, and an *option to convert debt into equity*. For example, in the 1985 Mexican MYRA, banks were given an interest rate option: they could choose among a variable loan rate based on LIBOR, a variable rate linked to the U.S. six-month certificate of deposit rate (adjusted for the costs of meeting the Federal Reserve's reserve requirements and the FDIC's deposit insurance premiums), and a fixed loan rate with a comparable yield.

The *interest rate option* not only gives the lender a choice between two (or more) interest rates at

swaps, see Jan Loeys, "Interest Rate Swaps: A New Tool for Managing Risk," this *Business Review* (May/June 1985) pp. 17-25.

¹¹One hundred basis points equal 1 percentage point. See *Euromoney*, *ibid.*, for a description of the Mexican MYRA terms.

the time of the restructuring, it also gives him a choice between a fixed or a floating interest rate. In general, the choice between these interest rates has to be made at the time the restructuring takes effect or just before the first interest payment is to be made. Thus, the lender has the option for a limited time (usually three months to a year) to choose between a floating rate and a fixed rate. If these interest rates do not move in tandem, the lender has a valuable option that can be exercised between the date on which the agreement is signed and the date on which the restructuring agreement takes effect. In some cases, this right to switch from one interest rate to another may be available at future dates as well.

The *currency option* usually allows the lender the right to choose between two or more currencies in which to receive loan repayments. Often the lender has the right to switch from the currency in which the loan was made either into U.S. dollars or back into his own domestic currency. Usually, this option can be exercised at the time the loan was repaid as part of the debt-restructuring agreement or, if the loan was not repaid, on the first interest payment date. In the case of the 1985 Mexican MYRA, non-U.S. banks were given the option of switching at

most one-half of their loans into their home country's currency. (See VALUING A CURRENCY OPTION CONTAINED IN A MYRA.)

The March 1987 rescheduling of loans to the Philippines was a slight variation on the currency option in that it included an *equity conversion option*. In this plan, the country hoped to fund part of its interest payments by persuading lenders to accept foreign currency notes in lieu of interest payments. These notes, denominated in non-Philippine currencies and sold at a price well below face value, could be redeemed at any time during their six-year life for their full face value in Philippine pesos. If converted, the pesos could then be used to buy government-approved equity investments.

In a few equity conversion options, such as the one used by Chile, lenders are allowed to convert their debts directly into local currency at full face value—even if such debt has been bought at a discount. These local-currency-denominated loans may then be sold or exchanged for equity. This option is, therefore, essentially the choice between dollar-denominated payments versus local-currency-denominated payments.

Although valuing all three of these options

Valuing a Currency Option Contained in a MYRA

Suppose a lender makes a five-year loan to an LDC borrower. At the end of five years the lender has the option to be repaid either \$10 million or 6.5 million British pounds—that is, he can be repaid either in dollars or in pounds. Also, suppose that the pound's spot exchange rate in terms of dollars five years hence is equally likely to be either \$1.50 or \$1.60. If the lender chooses to be repaid in dollars, he would receive \$10 million regardless of the exchange rate. If the exchange rate at the end of the five years is \$1.60, then if he chooses to be repaid in British pounds, he would receive 6.5 million pounds, which could be converted into \$10.4 million. Since this is more than \$10 million, he would elect to be paid in pounds and get \$10.4 million. If the exchange rate at the end of five years is \$1.50, then by choosing pounds the lender would end up with \$9.75 million if he converted the pounds to dollars, which is less than the \$10 million he would get by choosing to be repaid in dollars. So in this case he would be better off choosing to be repaid in dollars and receive \$10 million. Consequently, under one exchange rate he would receive \$10.4 million, and under the other he would receive \$10 million. Since either exchange rate is equally likely, the lender should *expect* to receive a cash flow of \$10.2 million ($1/2 \times 10.4$ plus $1/2 \times 10$). We can now discount this *expected* cash flow under the currency option minus the cash flow without the option at the lender's rate of discount (r)—that is, $\frac{(\$10.2 - \$10.0)}{(1 + r)^5} = \frac{(\$0.2)}{(1 + r)^5}$ —to get the present value of this currency option.

precisely is highly technical, the basic intuition underlying their valuation is quite simple. The main determinant of value in all options is the uncertainty or *volatility* of the underlying variable, be it an *interest rate* or a *foreign exchange rate*. These options are valuable to the lender when the volatility of the underlying variables increases. This appears to have been particularly true of the *currency conversion* option, given the high degree of exchange rate volatility in recent years between industrialized countries' currencies (e.g., dollar versus yen, dollar versus mark, and dollar versus pound).

To illustrate the cost of ignoring or mispricing a currency option vis-a-vis an interest rate option, consider the case of the Sudan, which exercised an option in October 1985 to restructure the denomination of \$1 billion of its debt from U.S. dollars to Swiss francs in order to reduce the interest expenses on its debt.¹² At that time, the Swiss franc had been depreciating against the dollar for several years. The case is interesting (and unusual) because the borrower (Sudan) had the option rather than the lending banks.

To quote:

"...at the option of the debtor, all of the restructured bank debt (almost \$1 billion) was converted into Swiss francs from U.S. dollars. This transaction was part of a modification of the 1981 restructuring agreement and was signed in October 1985. The main reason for this transaction was to reduce the interest obligation on the restructured debt. The conversion was undertaken at a Swiss franc/U.S. dollar exchange rate of Swiss franc 2.17 per U.S. \$1; at the end of September 1986, the Swiss franc/U.S. dollar exchange rate was Swiss franc 1.64 per U.S. \$1."¹³

If the exchange rate between Swiss francs and dollars had remained constant at 2.17 francs per

dollar, the Sudan would have saved interest expenses by switching to "lower-cost" Swiss francs. But the Swiss franc actually *appreciated* about 30 percent to 1.64 francs per dollar by September 1986, so that the savings on the interest expenses were swamped by losses due to the change in the exchange rate. Since interest rate and exchange rate variables are strongly interconnected, the correlation between the two has to be taken into account when valuing such options.

Diversification of Risk. An important element of a debt-restructuring agreement is the risk attached to the future payment stream and the "risk premium," in terms of a higher interest rate, that the borrower promises the lender to compensate for the risk of default. A measure of this risk premium is the relative size of the spread, over an index such as LIBOR, charged on a particular loan compared to other loans.

What is an appropriate measure of this risk and, in particular, the risk for which the lender should be compensated? In the context of loans, the measure of default risk should compare the loss, in present-value terms, of not receiving future payments or of receiving an amount smaller than promised. One commonly used risk measure is the estimated variability of the future stream of cash flows from the loan.¹⁴

But not all of the *potential* variability of the cash-flow stream on a loan is relevant in measuring the risk from the lender's perspective. This is because an individual lender often diversifies by making loans to several different countries. While some factors are common to all borrowing countries in determining their future economic prospects, there are others that are country-specific and can be diversified away by holding a diversified portfolio of loans.¹⁵ For example, the

¹⁴This variability is typically measured by the standard deviation of the stream of cash flows from the loan.

¹⁵An article by L. Goodman, "Diversifiable Risks in International Lending: A 20/20 Hindsight View," *Studies in Banking and Finance* 3 (1986) pp. 249-62, provides empirical evidence on the diversification effect.

¹²For details, see Maxwell Watson and others, "International Capital Markets: Developments and Prospects," International Monetary Fund *World Economic and Financial Surveys* (December 1986) pp. 60-61.

¹³*Ibid.*, p. 61.

level of economic activity in industrialized countries, which determines the export earnings of the borrowing countries, may be a systematic or common factor influencing the earnings of all borrowers, as is the general level of world interest rates. On the other hand, the conditions in the market for a particular commodity, say, copper, may be specific to certain copper-producing countries. When the price of copper falls, the prices of some other commodities may rise.

To offset (or hedge) the risk of holding loans made to countries that depend on the copper industry, the lender can hold loans made to countries that depend on other commodities. For example, since some countries are big oil exporters and others are big oil importers, it is clearly possible to diversify international loan risk. This effect of portfolio diversification on the default risk the lender faces may be important in renegotiations between the lender and the borrower. Specifically, the borrower's knowledge that part of the default risk of the loan may be diversified away by lenders may help reduce the size of the risk premium or the margin over LIBOR in the restructuring agreement.

CONCLUSION

Measuring concessionality in a debt-restructuring agreement is a complex task given the number of contractual variables (interest rates, fees, options,

grace period, and so on) and other variables (discount rates) that have to be considered. This complexity is compounded by the large number of original loans that are often packaged in a restructuring agreement. For example, the 1985 Mexican case involved 53 original loans whose cumulative present values would have to be compared with the present value calculated under the MYRA. These original loans differed in maturities, face values, interest rates, and other terms and were originated at different times. This does not mean that implementing the present-value approach is impossible, but rather that, in practice, it would be difficult and time-consuming. What is clear, however, is that it is possible for both borrowers and lenders to feel that they gain from a debt restructuring.

Finally, multi-year restructuring agreements are not the only way in which banks are dealing with the ongoing debt problems of LDCs. Apart from building up loan-loss reserves and writing down the values of their LDC loan portfolios, U.S. banks are increasingly engaging in LDC loan sales to third parties who wish to invest equity in LDCs. However, it is far from clear that such actions will fully resolve these loan problems, and additional approaches might be needed. These could be assessed using the present-value approach outlined in this article.

Glossary

Amortization: Periodic repayments of outstanding principal on a loan.

Concessionality: The amount of money (in present-value terms) a lender gives up to the borrower under a MYRA; the difference between the present values of the original loan and the restructured loan.

Discount Rate: An interest rate that reflects a lender's or borrower's time-value of money.

Grace Period: Period of time during which the borrower does not have to pay back principal (and sometimes interest, as well) on an outstanding loan.

LIBOR: The London interbank offer rate; the deposit interest rate on interbank transactions in the Eurodollar market. Customer rates on loans are calculated as premiums on this basic rate.

LDC: Less developed country.

MYRA: Multi-year rescheduling agreement.

Present Value: The value of current and future principal and interest payments discounted by an agent's discount rate.

Spread: The difference between the loan rate and some base interest rate (such as LIBOR).

Time-Value of Money: The value an agent places on receiving \$1 today rather than in the future.

Variable Spread Pricing: Charging a loan rate that varies over the life of the loan relative to some base rate (such as LIBOR).

Window: The number of years of principal payments outstanding on an existing loan that is repackaged into a new loan under a multi-year rescheduling agreement (MYRA).

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