Country-Risk Analysis

A handbook

Edited by
Ronald L.Solberg

London and New York

Country-Risk Analysis

Country-Risk Analysis is a comprehensive practical and theoretical guide to the management of cross-border lending and international investment risk.

The last two decades of international commercial bank lending, similar to other periods in history, have witnessed a classical boom-and-bust financial cycle. Yet as a unique corollary of this most recent global debt 'crisis', new secondary markets for LDC debt have arisen, informational sources have dramatically improved, and new theoretical and statistical concepts for country risk assessment have been implemented in the major international banks.

Dr Ronald Solberg's volume provides a state-of-the art review of the country-risk techniques that have evolved in the context of dramatic fluctuations in developing countries' debt service capacity and in international lending itself.

Dealing comprehensively with the analytics and reporting of sovereign creditworthiness, political risk, statistical credit-scoring methodologies, loan valuation, portfolio management and regulatory supervision, this handbook is an invaluable guide for international bankers, global investment specialists, regulators and developing-country policymakers, as well as advanced students of international banking and finance.

Ronald L.Solberg, the editor of *Country-Risk Analysis,* is a consultant in international finance based in Los Angeles, California. Until mid-1992 he was head of Portfolio Management and Risk Policy at Security Pacific Corporation (SPC) after having held various positions in SPC including Acting Chief Economist, Manager of International Economics and Senior International Economist covering Asia and Australasia. He previously spent several years with Wells Fargo Bank, NA, both in San Francisco and London, as a country-risk analyst. He has also been a consultant to the RAND Corporation, an Adjunct Assistant Professor at the Graduate School of Public Administration, University of Southern California and a lecturer at the University of California, Berkeley. He is active in the field of international economics and finance, particularly focusing on Asia and the Pacific Rim. He has authored and co-authored numerous papers on sovereign creditworthiness, financial innovation, and international trade and finance. He is the author of *Sovereign Rescheduling: Risk and Portfolio Management*. Dr Solberg received his Ph.D. in economics from the University of California at Berkeley.

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Preface

The idea for this book sprang from several inspirational conversations with the Economics and Business Editor at Unwin Hyman Ltd (London) in 1988. We felt that, given the advance in the methods and practice of country-risk analysis, it was appropriate to produce a new compendium of articles on this subject. This handbook serves to chronicle these advances by offering a single source document of state-of-the-art techniques, decision-making methods and organizational structures for country-risk analysis.

This handbook covers theoretical concepts and practical information relevant to professionals in international banking, multinational corporations, official regulatory bodies responsible for the supervision of commercial banks, private credit agencies, multilateral lending organizations and academe. It is meant to assist commercial banks, multinational corporations and other investors charged with assessing international risk-reward ratios and efficiently constructing and managing a portfolio of international assets.

The international multi-disciplines brought together in this encyclopedic volume create a comprehensive view of the current approaches and future directions of country-risk analysis. All the authors, by conveying their own specialized knowledge, skills and experience in their respective papers, have contributed to the wealth of expertise in this volume.

The editor wishes to express his personal appreciation to all the contributors and many other people, too numerous to name for fear of omitting someone, who have in some way helped in the preparation of this book.

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Introduction

Ronald L.Solberg

As the negative effects of the developing-country (LDC) debt crisis continue into the 1990s, albeit less acutely, a central question remains whether this market failure has been corrected by a combination of structural reforms, macro-economic discipline and debt relief. Are once debt-troubled developing countries becoming more creditworthy and is there a commercial bank role for development finance in developing countries?[1]

While limited debt relief has lowered the external liabilities and related service payments of the debt-troubled LDCs, economic growth has remained at sub-par historical rates. Constraints imposed as a result of rescheduling agreements, high domestic inflation and policy uncertainty have retarded gross fixed-capital formation in these countries. Thus, balance-of-payments adjustment for many of these countries has been achieved at the expense of forgone domestic output and income.

This uncertain operating environment has contributed to ongoing capital flight which has risen faster than the countries' external debt. Concurrently, foreign direct investment has been a small but rapidly growing component of the rationed external finance. While some of the requirements for crisis resolution—limited debt relief and a return to LDC macro-economic discipline by some debtor countries—have been achieved, others, such as renewed term lending by commercial banks, have not.[2]

Large commercial banks have a strategic interest in international business, including a responsibility for appropriately structured, cross-border lending to developing countries. Evidence of increased LDC use of interest rate and currency swaps, options, caps and commodity-linked facilities attests to the commercial opportunity to supply these important liquidity-management tools. Augmenting the sovereign debtor's own banking system with correspondent-bank relationships is a long-standing practice of international banks. Letters of credit, *a forfait* paper, clearing and settlement activities all facilitate international trade and the cross-border flow of money and credit. The next step is to resume appropriately structured asset-based lending and development finance.

Crucial requisites for a profitable and sustainable return of US banks to international business include: more industry consolidation and regulatory coordination; further improvements in capital adequacy; obtaining a nation-wide banking charter; and altering US tax codes which currently result in international competitive disadvantages. Most other Organization for Economic Co-operation and Development (OECD) countries possess less overbanked and more concentrated banking industries which capture economies of scale in technology from their national banking charters and favorable regulatory and tax treatment. However, they too are adjusting to the Bank for International Settlement's capital-adequacy guidelines which have tended to reduce the growth of global bank assets.

With the appropriate focus, international financial services extended by commercial banks to counterparties in both developed and developing countries can be mutually rewarding. The deleterious effect of the Latin-American debt crisis on employment levels in the US export sector attests to the positive externalities which would also accrue at the national level from the return to a sustainable lending program.

Profitable cross-border investment requires that the investor's portfolio is constructed and managed efficiently. This, in turn, requires that the risk-management function has observed appropriate underwriting criteria, accurately gauged the risk-return profile of the proposed investment and considered its wider impact on the bank's existing portfolio. The purpose of the papers collected in this handbook is to improve the effectiveness of these procedures.

This introduction provides a reader's guide to the handbook, summarizing the content and key findings or recommendations of each chapter.

In the first chapter, Solberg presents an overview of country-risk analysis and its role in selecting cross-border assets with an acceptable risk profile. A brief chronology of the industry's development reveals that greater availability of data and the application of new methodologies and technology have contributed during the 1980s to more effective international asset-risk identification in commercial banks and other multinational enterprises.

In addition to the assessment of sovereign risk, *per se,* the author recommends that the analyst should also focus on the risks arising from other asset attributes: counterparty, duration, industry classification, product type and contract structure. Evidence from the many sovereign rescheduling episodes during the 1980s reveals that assets classes were asymmetrically correlated to the risk of rescheduling, thus underlining the need to differentiate assets further according to their respective risk profiles.

Despite the advances achieved within the industry during the 1970s and 1980s, Solberg finds that many portfolio decisions continue to focus on the risk and expected return of an individual asset, tending to overlook other important issues, such as the covariance of risk across sovereign borrowers and the co-movement of risk and return of asset classes within a sovereign debtor country. The author concludes that more effort needs to be directed to developing an approximate portfolio-theoretic approach to the practice of country-risk analysis.

In chapter 2, Rawkins describes the analytical content of the country-risk report and checklist methodologies. He offers an in-depth description of the data requirements, relevant ratios and analysis needed to write a 'structured qualitative' country-risk report. Using many of the ratios and concepts in this report, Rawkins shows how these indicators can be aggregated into a composite 'risk score' (i.e. checklist) to aid in the comparison of trends across multiple countries.

The author explains how the structured qualitative report measures a single country's political and economic performance over time. Initial conditions, such as the structure of the debtor country and the external environment, domestic economic policy and short-term liquidity management are all important determinants of sovereign creditworthiness covered in the report.

Checklists quantify a number of economic, political and social variables and weight them subjectively. The total risk score can be used to compare risk ratings across countries and over time. This supports the risk-reward decision by the portfolio manager when considering alternative cross-border investment opportunities.

Rawkins concludes that both risk-assessment techniques—in-depth country reports and checklists—should be used concurrently to obtain a clearer picture of sovereign risk.

In chapter 3, Brahmbhatt identifies the models and variables used to forecast each line item in the current account of a sovereign debtor's balance of payments. His step-by-step review outlines the appropriate selection and specification of econometric models to forecast cross-border flows of merchandise, factor and non-factor services and transfers. Among the myriad model specifications, the author finds three basic types appropriate for this task.

The perfect-substitutes model is appropriate when there is a common world price for a commodity or service that is homogeneous in quality, such as primary commodities. For these traded items, external demand for home-country exports is perfectly elastic at a given world price. Similarly, the foreign supply of homogeneous goods and services is perfectly elastic at their respective world price. The focus of this modeling approach is on constructing aggregate domestic supply and demand curves for the product or service in question.

Use of the imperfect-substitutes model is justified when the internationally traded goods and services are heterogeneous in quality, such as manufactures. In this case, the demand for exports and imports depends on differences in price between imperfectly substitutable domestic and foreign output of the same product or service, as well as on activity variables such as income.

Forecasting the demand and supply of factor services usually requires a third basic model type. Brahmbhatt recommends that these are best dealt with by an approach using asset stocks and rates of return. Unrequited transfers, particularly worker remittances, require special treatment, relating flows to the total number of expatriate workers, foreign wage levels and a proxy measuring expectations of a devaluation of the home-country currency.

The author cautions that the selection of an appropriate model will also be influenced by pragmatic considerations such as the amount and quality of data that are available at an acceptable cost and by the human and pecuniary resources made available to the modeling exercise.

Fager, in chapter 4, extends the analysis of a sovereign debtor's balance of payments by focusing on the capital account and its implications for external debt. He outlines a novel accounting approach which highlights the capital account by type of creditor. This method judges a country's creditworthiness by forecasting a sovereign borrower's supply of and demand for external financial resources. The author argues that this methodology is superior to the traditional capital-account framework in identifying sovereign creditworthiness.

The mid-1980s was a period when many debtor countries were adjusting to the significant global shocks of oil-price deflation and the extreme exchange-rate fluctuations of key currencies. Fager, using Indonesia and India as case studies, shows that the application of this new approach, as compared to a more traditional debt-ratio analysis, is likely to have produced different (and more accurate) conclusions about these borrowers' creditworthiness at crucial junctures.

In chapter 5, Avery and Fisher review the literature on probabilistic models of sovereign-debt rescheduling. The authors emphasize that these studies have been primarily descriptive, focusing on macro-economic variables related to a country's ability, and sometimes willingness, to sustain external-debt service payments. This chapter presents the statistical techniques that have been applied in this area, including discriminant analysis, logit, probit and linear-probability models. It also describes the common characteristics of the data that are used in these studies and identifies some of their sources.

Avery and Fisher develop a method of estimating sovereign-debt reschedulings as a dynamic program. This forward-looking technique places the sovereign decision to reschedule in an inter-temporal framework. This decision depends on the trade-off between the current benefits of maintaining a payments schedule versus the potentially uncertain future costs of repayments entailed by a debt rescheduling.

In chapter 6, Simon offers an overview of political-risk methodologies used in the assessment of foreign investment and cross-border lending. The strengths and weaknesses of both subjective and objective political-risk methods are reviewed. Key political and social variables and their sources, which should be monitored and forecast, are identified. Bayesian decision analysis and the Delphi technique are among the techniques which are discussed.

As the rapid globalization of business for both commercial banks and multinational enterprises continues into the 1990s, the author argues that this decade will likely be one of the most significant in history for political-risk analysis. A turbulent decade of political discontinuity is forecast to follow what in retrospect were unheralded decades of continuity. The opening up of communist regimes in Europe and Asia, new regional powers, ethnic-religious conflicts and 'revolutions without guerrillas' present the international firm/investor with the need to assess these non-economic risks carefully. The paper concludes with an assessment of the prospects for the global political environment in the 1990s.

Dymski and Solberg, in chapter 7, develop a theoretical conception of systematic risk in bank lending to developing countries and consider its empirical relevance. Systematic risk is defined as the probability of default or arrears for the market portfolio of developing-country debt due to common or global factors that 'systematically' affect all borrower nations. Two empirical questions are posed: first, did systematic-risk factors significantly affect developing country creditworthiness—and hence, repayment difficulties—in the 1970s and 1980s, and, second, did international banks adequately incorporate systematic-risk factors in their lending decisions for developing countries? An empirical test finds first that systematic risk had a significant effect on debtor behavior during the 1970s and 1980s and should be included in a country-risk assessment. The results are particularly strong for newly industrialized economies (NIEs) and primary-product exporters; less so for oil-exporting countries. The test results, however, show that perceived systematic risk was an important determinant of bank lending only for loans to oil exporters. On the basis of these results, the authors argue that global economic trends were centrally important both in the build-up of developing-country debt in the 1970s and in the ensuing crisis in the 1980s. Thus, improving the global environment is a crucial requisite to adequate debt relief and a sustainable recovery of developing-country borrowers.

In chapter 8, Rasmusen applies concepts from information economics and game theory to sovereign external-debt negotiations. The standard economic theory of perfect competition assumes that there are many buyers and sellers, all possessing the same market information, so that no one player can act strategically. This standard theory is clearly not appropriate for analyzing debt renegotiations, where the buyer and seller are bound to 'deal' with each other and where information is asymmetric. Game theory is a set of techniques developed to analyze economic situations that, like games, involve few players and strategic behavior. The author argues that it is a useful tool to help understand some of the paradoxes of debt negotiation and renegotiation.

Rasmusen shows that the application of these techniques results in conclusions which, many times, are contrary to intuition: a nation can help itself by increasing the cost of default; a country can benefit from increasing its chances of carrying out a disastrous policy; debtors and relief agencies may deliberately choose policies that are to all outside appearances random; and profit-maximizing banks may hurt their earnings by trying to enforce loans too strictly. Beyond these and other surprising conclusions, he finds that game theory's most important contribution to the bank negotiator and the debtor-country representative is to provide a framework with which to conduct analysis regarding the negotiation and renegotiation of cross-border financial contracts.

Dropsy and Solberg, in chapter 9, examine the secondary market for LDC debt which emerged during the 1980s. Their chapter provides a brief description of this market, including its turnover and price trends and the growing list of participants. The theoretical issues underpinning banks' cross-border lending and sovereign repayment are reviewed, as is the empirical literature on the determinants of sovereign loan valuation. The authors present their own empirical study of the determinants of secondary-market LDC loan prices. The first-stage model specification estimates sovereign rescheduling risk based on macro-economic variables measuring willingness and ability to repay. The second-stage equation regresses loan-price movements on both supply and demand-related variables, including perceived rescheduling risk (an instrument from the first-stage regression).

This study found the real effective exchange rate to be the single most influential indicator of loan-price movements. It did not find strong evidence of a link between actual or perceived rescheduling risk and the secondary-market price of sovereign loans. This observation supports the oft heard contention that this market is not efficient. None the less, the empirical model was sufficiently robust to be considered useful in forecasting the short-term movement of secondary-market prices for developing-country loans. These forecasts, in turn, could be used by banks, brokers or other investors to develop an LDC debt-trading strategy.

Semones and Solberg, in chapter 10, describe the ‘stages’ of the LDC debt crisis. Besides resulting in the dramatic reduction of voluntary bank lending to many debt-troubled developing countries, this crisis also played an important role in the concurrent inception of new merchant-bank products during the 1980s.

During the 1980s, international banks treated most debt-troubled LDCs in a strikingly similar fashion, granting them a peripheral borrower status. The authors argue that this common response of international banks to debt-troubled developing countries has hindered both the economic recovery of debtor countries and the profitability of international banks.

Lessons from this experience suggest that banks should, first, better differentiate among debt-troubled LDCs based on each country’s respective fundamental *prospects* for overcoming present difficulties; and, second, begin selective voluntary lending—stratified by product type—to those sovereign borrowers considered able and willing to repay external debt. The authors offer a tiered ‘menu’ of product options as a guideline for banks to resume selective voluntary lending to those countries warranting renewed external borrowing. They argue that a renewal of bank lending, selectively by country and product, will strengthen the incentives for sovereign debtors to honor existing and future obligations, thus reducing the risk of moral hazard.

In chapter 11, Herberg discusses the use of political-risk analysis as a management tool in foreign direct investment decisions. Common conceptions and misconceptions of political-risk analysis are discussed in order to define its scope and objectives. A political-risk evaluation strategy, based on the experience of ARCO (a major American petroleum company), is outlined. It starts with the identification of current macro-political, economic and other investment-risk factors affecting a company’s cross-border operating environment. The author shows how scenarios are developed to forecast likely future outcomes and their respective impact on business operations. Micro-risk factors covering the investment, contract and regulatory environment specific to the upstream petroleum industry are also presented.

The chapter concludes by developing a set of risk-management strategies, based on several likely scenarios, to guide the investor's contract structure, thereby reducing the asset's vulnerability to changes in the host country's operating environment due to potential political and economic turmoil.

Clock, in chapter 12, describes the regulatory framework and policy issues involved in the supervision of international operations of US banks. Changes in international banking, resulting from both legislative and regulatory initiatives supporting debt reduction in the developing countries, are discussed. The author explores the increasing involvement of US banks in overseas capital markets and the important role of the US regulatory body charged with country credit-risk evaluation, the Interagency Country Exposure Review Committee (ICERC). Recent trends toward global supervisory convergence are also examined.

In chapter 13, Brainard reviews the major changes in US banks' business strategies brought about by the LDC debt crisis during the 1980s and the effect this shift has had on the role of country-risk analysis in bank decision-making. The capital-adequacy guidelines approved by the Basle Supervisory Committee in 1988 are discussed, particularly with regard to their implications for risk-adjusting exposures and rates of return on lending activities. He examines two distinct organizational structures for setting and implementing country-risk policy decisions: the committee and czar approaches.

The author observes a trend within the industry toward more centralized structures for country-risk decisions, allowing greater focus on overall portfolio management rather than just country-specific factors. Brainard offers a framework which allows decision-makers to integrate the risks across a portfolio by establishing risk-capital guidelines and return-on-equity targets.

In the final chapter, Newton and Solberg review the fundamental concepts of modern portfolio theory (MPT) and the capital-asset-pricing model (CAPM). They present a framework to develop quantitative measures of loan attributes, using them to construct and manage efficiently a portfolio of cross-border assets. The authors discuss the theoretical and informational differences between a marketable security and an international bank loan, revealing restrictions on the direct application of MPT and CAPM to the management of a portfolio of international loans. Common factors and their role in the analysis of non-systematic risk are discussed. The problem of managing only a segment of the loan portfolio (e.g., international loans), given knowledge of existing domestic assets, is also addressed.

NOTES

1 If the market failure has been corrected, then renewed commercial bank lending is warranted and thus more likely to occur. However, Hofman and Reisen (1990) find little empirical support for 'debt overhang' as the key impediment to stagnant investment in developing countries. Rather, they argue that the scarcity of financial resources due to capital net outflows may be more important. If the market failure has not been corrected, then the needed infusion of external funds to developing countries may require some additional form of official market intervention, perhaps by expanded creditor-government guarantees and insurance programs or even a new multilateral agency, before adequate voluntary capital inflows resume. The interested reader is referred to Rogoff (1990) and the entire collection of articles in that issue on the merits (or demerits) of new policies and institutions which may be required to solve the LDC debt problem. See Stiglitz (1989) and Mundell (1989) for further thoughts on market failures, international lending and economic development.

2 Sound policies by the debtor countries themselves are the single most important element for improved LDC performance and their renewed access to external credit markets. Structural adjustment such as removing price distortions and volume restrictions on imports and exports, financial liberalization, price and tax reform and reducing the government's direct role in enterprise is required. These actions, together with sound macro-economic policies targeting moderate fiscal deficits and a realistic real exchange rate, will reduce inflationary pressures, improve the efficiency of resource allocation and help reverse capital flight. These are important elements to restore creditworthiness and regain the confidence of the foreign investor. Cross-border capital flows then can help finance the myriad higher-return investments in developing countries needed for a return to sustainable economic growth and rising living standards.

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1 Managing the risks of international lending

Ronald L.Solberg

INTRODUCTION

This chapter presents an overview of country-risk analysis and its role in decisions regarding a bank's portfolio of international assets. It reviews the historical development of country-risk analysis, outlines the range of potential loan outcomes and their respective costs, defines the scope and objectives of sovereign risk assessment and presents other risks in international lending. It concludes with recommendations for the management of international risk.

A BRIEF HISTORY OF COUNTRY RISK ANALYSIS

The practice of country-risk analysis dates back to the origins of crossborder lending. Numerous early examples of 'sovereign' defaults span a period beginning with the borrowing of the city-states in the eastern Mediterranean in the fourth century BC.[1] England, France, Spain and Portugal each defaulted at least once to various external creditors during the period from the fourteenth through the sixteenth centuries, as did many of the colonies in the Americas in the nineteenth century.

Creditors suffered losses due to insufficient information on the debtor's financial position or an inaccurate assessment of the borrower's ability or willingness to repay. Often the country's inability to repay resulted from a combination of country-specific factors, such as fiscal mismanagement, poor harvests or unproductive expenditures relating to war. At other times, adverse global conditions, including weak growth in important export markets, declining terms of trade or a speculative lending cycle were the contributing cause. A country's unwillingness to repay could be interrelated with these economic events resulting in contractual non-compliance. Domestic or regional political instability, resulting in either a regime change or impediments to appropriate economic policy, were other hazards of sovereign willingness to pay.

During these earlier centuries, the analysis of risks relating to foreign lending was more an art than a science and certainly in some measure continues to be so today. Lending criteria were determined by individual financial houses and merchant bankers as ersatz country-risk analysts. This practice continued until the late twentieth century when another wave of international lending after the oil shock of the early 1970s prompted the creation of new international-risk departments within banks and multinational corporations.

Compared to the heuristic approach to country-risk analysis used by the early twentieth-century bankers and their predecessors, more analytical methods were developed beginning in the 1970s.[2] The computer revolution resulted in the greater use of quantitative methods, allowing a more sophisticated approach. Despite the increased availability of such quantitative techniques, however, most analysis within commercial banks continued to emphasize a more qualitative, albeit analytical, approach.[3]

Detailed individual country reports, using an established data-reporting format which presented historical and prospective trends in the supply and demand of the national-income accounts, the balance of payments, external debt and international reserve stocks, were commonplace. Some banks, devoting more resources to sovereign analysis, complemented this country-specific approach with cross-sectional or portfolio analysis. Weighted and unweighted checklists and various multivariate statistical techniques were used to create a composite country 'score' or risk rating which could be used to rank countries according to their creditworthiness at any point in time. These two techniques used together provided both a cardinal and ordinal measure of country risk, expressed either as a time-series or at a single point in time.

In the late 1970s, the civil war in Lebanon, revolutions in Iran and Nicaragua and the invasion of Afghanistan highlighted the need to emphasize political as well as economic factors in a country-risk assessment. Thus, in the early 1980s, the political-risk analyst joined the economists on the country-risk team in a growing number of international companies.[4] The invasion of Kuwait underlines the ongoing importance of political-risk analysis.

While the analysis of country risk improved during the 1970s and early 1980s, it continued to suffer from some critical problems. Improvements in methodology were slow to be applied in many institutions which lent or invested money in developing countries. Comprehensive data, especially on the external assets and liabilities of debtor countries, was also incomplete.

Perhaps the most acute problem was that many lending decisions during the 1970s were made without full consideration of country-risk issues. Much of the cross-border lending during the 1970s was driven by the desire to 'book international assets'. A dearth of credit demand in many developed economies during the concerted 1974–5 recession, meant that many banks looked abroad for the first time to enhance balance-sheet growth and profitability. The loan spreads and related fees on balance-of-payments loans to oil-importing developing countries offered banks the opportunity to enhance profitability. Many times, an aggressive marketing strategy sustained by excess bank liquidity (resulting from the wealth transfer from oil-importing nations to OPEC) overrode country-risk considerations.

Once the unsustainability of the 1970s 'recycling' process became apparent in the early 1980s, the pressures which non-performing assets placed on bank profitability often resulted in the sharp reduction in voluntary commercial-bank long-term lending to developing countries, followed by the reduction or elimination of country-risk departments. Nevertheless, in many institutions, country-risk practitioners continued to analyze the hazards of selective new cross-border lending, to judge the appropriateness of new money requirements associated with sovereign debt reschedulings and to recommend portfolio adjustments using debt-debt, debt-equity swaps and other financial-product innovations.

Thus, the analyst's role in decision-making has increased during the 1980s and into the 1990s, despite the fact that voluntary bank lending to many developing countries remains limited. Driven by continued globalization of business and the closer integration of countries through trade and investment, cross-border lending can be expected to rebound again. As debt-troubled countries selectively emerge from past difficulties, the role of country-risk analysis will further grow in importance. Lessons from the past two decades will help guide more effective lending, investment decisions and cross-border asset management into the twenty-first century.

UNCERTAINTIES, OUTCOMES AND COSTS

When a creditor extends a loan to a debtor, the range of possible outcomes is known, although their respective *a priori* probabilities of occurrence are not known. Because these probabilities are unknown, uncertainty exists surrounding the act of lending money. Thus, the decision to lend is subject to the risk of an unprofitable outcome. The objective of the country-risk analyst is to assess both the risks inherent in the proposed loan or asset exposure and their effect on the overall risk of the existing portfolio of cross-border assets, were this asset to be added. Along with data on the asset's expected return and its covariance with portfolio return, this assessment 'risk-adjusts' the considered asset's return, given the range of possible outcomes. This analysis will determine whether the international loan is an acceptable addition to that portfolio.

The array of outcomes for a bank's international loan is either full contractual payment, voluntary refinancing, involuntary refinancing (or rescheduling), default or repudiation.[5]

Rational creditors disburse loan funds on the presumption that full contractual payment of interest, fees and the original principal will be made according to the legal terms and covenants of the loan agreement. If we assume that the marginal expected rate of return on the loan, including its fees and spread (i.e. the difference between the loan's rate of interest and a risk-free rate of return), reflects the movement of the asset's return relative to the average market return (i.e. 'beta'), then the creditors have entered into an acceptable contract. Market risk has been accounted for in the loan spread.

Due to unanticipated events, a debtor may face a temporal mismatch of its asset and liability flows. This may force the debtor to fall behind in scheduled debt-service payments, accumulate arrears and request a loan renegotiation with the lenders. If the lenders, in reassessing the debtor's ultimate repayment prospects, conclude that the debtor is solvent but temporarily illiquid, and if the creditors can reset the terms and conditions of the additional loan without coercion on the part of the debtor, then the *voluntary refinancing* represents little, if any, loss.

When a new loan is disbursed or an existing loan is rescheduled with the implicit or explicit threat of default and/or if events make it impossible to reset the terms and conditions of the contract, then the loan represents an *involuntary refinancing* or rescheduling and signals some measure of loss. The decline in the loan's present value results from the risk premium (i.e. loan spread) no longer being sufficient to account for the higher level of perceived risk and the elongation of principal repayments. There is also an immediate opportunity cost to the lenders because these funds cannot be lent voluntarily to another, more promising borrower. Moreover, the increased staff time required to renegotiate and monitor the impaired asset represents an additional cost to the creditors.

A debt refinancing or rescheduling may not improve the ultimate repayment prospects of the loan when the debtor's 'illiquidity' (i.e. a shortfall of foreign-exchange receipts, international reserves and external credit access relative to foreign-exchange expenditure, liabilities and obligations) reflects an even more serious underlying problem.

When the debtor's gross liabilities exceed its gross assets, the debtor is insolvent and *defaults* on the loan.[6] The cost to the creditors includes both the loss of anticipated interest income and the partial or complete loss of principal.

Debtor's *de jure repudiation* of the financial obligation can occur whether or not the debtor is solvent or liquid. The cost to the creditors is similar to that of default, depending upon whether repudiation occurs with or without partial compensation. Compared to that in domestic lending, legal redress and the enforceability of loan covenants are less effective in cross-border lending.

COUNTRY-RISK ANALYSIS: SCOPE AND OBJECTIVES

The portfolio manager of international assets in a bank or multinational company attempts to minimize risk by diversification given a targeted average rate of return. The *ex post* performance (i.e. outcome) of an asset selection (e.g. international loan) will determine the profitability of the investment decision. This decision requires information on the asset's expected return, its volatility or risk, and the asset's covariance of risk relative to the investor's current asset mix to build an efficient, low-risk, portfolio.

The actual performance of a cross-border sovereign asset will be determined by both systematic risk and non-systematic risk. The latter component is, in turn, comprised of both common factors and country-specific risk.

Systematic risk refers to the asset's vulnerability to market risk. In the strict capital-asset-pricing model (CAPM) interpretation, it is the relationship in which the asset's return moves with that of the market's average return ('beta'), where the market here means the weighted average returns on all international bank assets. Systematic risk is influenced by the periodicity in the business cycle and fluctuations in the financial markets, including both supply, demand and price shocks. Fluctuations in the value of the US dollar and interest rates are examples of price disturbances, while economic recession and drought represent demand and supply shocks respectively. The transmission of all these environmental factors can occur across country, regional, sectoral or industrial boundaries, thus contributing to market risk and affecting market return. According to CAPM, since market or systematic risk is undiversifiable, it is the only risk factor which is reflected in market spreads.

To the extent that variables contributing to market risk are imperfectly correlated across countries, causing 'domino effects', they represent common factors which explain part of an asset's specific or non-systematic risk. Because an individual asset's performance is imperfectly correlated with important loan attributes, common factors can be identified which explain a portion of an asset's specific risk. This covariance of asset returns is determined, in part, by the pervasive but unequal impact which environmental factors can have on financial performance. For example, an unanticipated sharp rise in oil prices or an economic recession can adversely affect the credit quality of many seemingly unrelated loans. Common factors, and their impact on loan groupings, allow the analyst to identify risk concentrations within the portfolio and to address, with an approximate solution, the problem of risk covariance.

Country-specific risk arises from factors unique to the debtor country. The sovereign debtor's political stability, natural-resource endowment, structural (i.e. supply-side) and development strategies, open-economy demand-management policies and external asset-liability management are important areas of focus to guage this risk.

A bank's asset portfolio is subject to non-systematic risk (i.e. common and country-specific factors) when its asset composition differs from that of the market portfolio. It is diversifiable since a sufficiently large portfolio can replicate the composition of the market portfolio. In practice, probably all bank portfolios contain specific risk owing to their divergence from the market portfolio. Underweighting a particular asset in a bank's portfolio can be justified when the risk or expected return of a particular asset is considered unacceptable.

There are several particular problems which characterize international lending. Severe data limitations and potentially restrictive theoretical issues have precluded the application, to date, of CAPM and modern portfolio theory (MPT) to international bank lending. Market data on the *ex post* performance of loan contracts are unavailable. Hence, constructing the distribution of returns for bank loans, based on historical performance, is impossible. Moreover, any borrower, whether domestic or cross-border, holds privileged information on its ability and willingness to honor the loan contract. While a country's bankruptcy proceedings and legal codes improve the accountability of the local borrower in honoring the loan contract, this enforceability mechanism is less effective for cross-border debtors.

Borrowers may withhold their true intentions and abilities from the creditors, resulting in asymmetric information. Since the borrower/lender relationship has game-theoretic aspects, the ex post performance of debtors cannot be guaranteed ex ante, suggesting principal/agent issues. Furthermore, contract enforceability is weakened in international lending, since collateral across borders cannot provide ultimate security owing to diminished legal redress. Inability to positively identify the borrower's willingness and ability to repay when the loan contract is under consideration means that the bank is faced with the risk of adverse selection. Moral hazard arises because the bank does not know, and cannot ensure, the debtor's *ex post* financial performance.

The bank's elaborate methods to assess counterparty integrity and country creditworthiness are meant to address the risk of adverse selection. Similarly, contract structure and financial-market penalties are meant to promote 'good faith' behavior on the part of the debtor, once the lender-borrower relationship has been initiated. However, these problems preclude bank-loan performance from being described by well-defined probability distributions, a key assumption for building an efficient international portfolio.

While these conceptual difficulties limit the use of these techniques, they do not mean that sovereign borrowers are inherently unworthy of cross-border credit. The record of bank cross-border lending to sovereign borrowers suggests that those elements which underpin a country's willingness to repay are imperfectly correlated across sovereign borrowers. Hence, they should be considered common factors to which countries are differently exposed and treated as a component of non-systematic risk.

While it currently remains impossible to estimate a strict country 'beta' as can be done with marketable securities, Goodman (1981) estimated differential country exposure to common risk factors as a proxy measure. The author found that 'non-systematic' factors were predominant in determining overall country financial performance.

Ideally, country-risk analysis should contribute to the decision on, first, the appropriate share of domestic versus international assets in the bank's portfolio; and, second, the individual countries that represent acceptable business opportunities. Owing to the current restrictions on fully implementing a portfolio-theoretic approach to the management of international bank assets, most analyses have tended to de-emphasize both market risk and common factors, focusing instead on the assessment of risks arising from individual country factors. Thus, country-risk analysis has typically contributed insight into the second decision, not being prepared to answer the first. In practice, the analyst, by identifying incremental risk factors, tiers countries and counterparties according to their composite asset risk 'score'.

RISKS IN INTERNATIONAL LENDING

Sovereign risk

Sovereign creditworthiness is underpinned by the ability and willingness of a country to repay its foreign debt. Many analysts presume that ability to repay is synonymous with transfer risk, focusing on national economic performance, debt ratios and global trends to predict sovereign creditworthiness. A country's willingness to repay (given adjustment costs) is typically addressed by a political-risk assessment, although principal/agent issues dictate that contract structure is another important element.

Transfer risk encompasses potential restrictions on the ability to remit funds across sovereign borders. These restrictions can result in a price-related decline in the value of the asset, a tax or other restrictions on the remittance of dividends, debt service on loans, or other fees or royalties for financial products or other services. Transfer risk arises from hazards associated with global market conditions and the debtor government's policies and performance in three key areas—structural change (i.e. development strategy), balance of payments (i.e. aggregate demand) and external asset-liability management.

A successful development strategy must improve a debtor's ability to mobilize a sustainable domestic resource surplus over and above consumption. It must efficiently channel some of this savings into productive investment of potentially tradeable goods and services. It must also contribute to the country's ability to convert this domestic surplus into foreign-exchange receipts without lowering the country's secular terms of trade. Transfer risk is reduced when borrowed resources have contributed to this structural change, transforming the long-term borrowing requirement into a repayment source.

All economies experience both internal and external shocks to their balance of payments that affect external borrowing requirements and creditworthiness. For an indebted country, however, rapid containment of this economic disturbance is acutely required since, combined with the structural funding needs, total borrowing requirements could exceed that available from the international financial markets. Hence, timely and effective macro-economic policies, requiring flexible real prices in the debtor's factor and foreign-exchange markets, are necessary.

Short-term sovereign creditworthiness is maintained when the gross borrowing requirements for a given stock of external debt and its terms of repayment do not interrupt the 'roll over' process. Stock levels of international assets and liabilities must be managed so that a mismatch of external asset and liability flows, resulting in a liquidity crisis, does not occur.

Managing transfer risk is a dynamic process. Since debtor countries are continually buffeted by changing global economic and financial trends, their policy makers must concurrently manage policies in each of these three broad areas to ensure that long-run progress is made toward structural change while, in the short-run, an external funding (i.e. liquidity) squeeze is avoided. Because any one of these three elements of transfer risk can be sufficient to cause an interruption of debt service payments, the country risk analyst must continually monitor trends in each of them to assess sovereign transfer risk.

Political risk is the likelihood that overseas assets or their underlying collateral would become financially non-performing, in default, repudiated, expropriated, destroyed or of insufficient value as a result of, *inter alia,* revolution, war or a significant change in the policy stance of the debtor government. An assessment of the risks to willingness to repay would focus on factors which are entirely political (e.g. a government's political legitimacy) and strategic (e.g. regional stability) as well as others which are contractual or financial (e.g. moral hazard or the disincentive to perform).

However adroit the debtor government's management of transfer risk may be, political risk poses another major set of hazards to sovereign debt repayment. Measuring political risk requires an assessment of the likelihood of either a politically-motivated change in financial policy or a change in the political regime itself which, in turn, would erode a country's willingness to repay foreign debt.

Assessing prospects for the pace and scope of political change involves a review of the country's level of economic development, its political institutions, power elite, social classes and the country's external relations. The analyst should be aware that political instability, actual or perceived, can have significant interactive effects with both the formulation and implementation of domestic economic policy and with the ability of the soverign borrower to gain access to new international loans.

Social, ethnic and religious cohesion, the rate of population growth and urbanization, the distribution of power amongst political and social classes, the degree of social freedom and political participation are all important considerations for the political risk analyst. Another key element of the political risk assessment includes external political relations and alliances, which can affect the country's security, domestic fiscal demands (particularly military expenditures) and foreign concessional aid flows.

When a country reschedules its external debt, more than one financial product-type is typically impaired, just as affected counterparties include those from both the public and private sectors. Either transfer or political problems are sufficient to *directly* impair sovereign, 'full-faith and credit' and quasi-sovereign assets. Whether due to a country-wide shortage of foreign-exchange availability or by fiat, the government administered foreign-exchange rationing *indirectly* restricts the ability of many private-sector bank and non-bank borrowers to repay cross-border obligations, whether the firms are liquid and solvent or not. While a sovereign debt rescheduling will impede the repatriation of debt-service payments for many public- and private-sector borrowers, the impact of this financial problem will be asymmetrically distributed across product type and the debtor country's market sectors.

Thus, beyond an asset's sovereign classification, other incremental risk factors or asset attributes—duration, counterparty, industry, product—must be analyzed to identify total asset risk.

Duration risk

In accounting for the duration risk of asset exposure (i.e. its maturity and schedule of repayments over time), short-term products are considered less risky than those with longer-term maturities. This is simply due to the fact that an asset of longer duration is cumulatively exposed to greater market and country-specific risks. This classification is also borne out by the different treatment accorded 'tenor baskets' by sovereign debtors in the course of rescheduling exercises during the 1980s. For example, most of the countries which rescheduled long-term cross-border debt during the 1980s continued to maintain current interest and principal payments on their short-term and trade-related external financial obligations.

Counterparty Risk

Counterparty risk deals with the likelihood that a party to the contractual obligation will fail to perform. When the counterparty is unable (because of adverse market, credit or settlement conditions) or unwilling (due to fraud, moral hazard or high costs) to perform according to the loan's terms and conditions, then the asset is in arrears and requires restructuring.[7]

As argued earlier, when a financial institution extends credit to a debtor across sovereign borders, it faces, in most instances, a greater number of risks than when doing business with a domestic borrower. Amongst these international clients, however, loans to sovereign governments or 'full-faith and credit' borrowers represent the lowest risk, owing to the government's role as monetary authority empowered to alter the money supply directly. This lower risk status is also supported by the fact that while sovereign credit problems will adversely affect private-sector creditworthiness, private sector credit problems will not necessarily interrupt the government's ability to service its foreign debt.

Quasi-sovereign borrowers, such as government agencies and public enterprises are usually rank ordered between explicitly sovereign and private-sector debtors, owing to an implicit guarantee and the likelihood of a *de facto* financial safety net in the event of trouble.

Private-sector borrowers (either companies or individuals), by virtue of not possessing an explicit government guarantee, embody the greatest inherent counterparty risk. This is underlined further by the fact that, as already mentioned, a country-wide payments moratorium can restrict an otherwise liquid and solvent company from repatriating its debt service payments overseas.

A sovereign debt rescheduling is not the only way that the debtor government can impair the creditworthiness of the private-sector counterparty. Macro-economic policies intended to equilibrate the economy and avoid a sovereign rescheduling can be sufficient to cause widespread credit problems in the country's private sector. Companies will be more or less vulnerable to this stabilization program depending upon their specific risk profile. Relative corporate performance will be determined by such factors as management quality, the company's product line, cost structures, balance-sheet profile and leverage, political clout and specific regulatory and legal restrictions.

Industry risk

The performance of private-sector assets, whether domestic or crossborder, also can be differentiated by industry. Industry-risk analysis forecasts individual industry trends and measures how common factors affect asset returns by industry grouping. Since performance by industry can be classified by its respective asymmetric correlation to systematic risk (i.e. common economic disturbances), this risk matrix will provide important information on relative asset values. For example, an unanticipated sharp increase in oil prices will represent a larger shock to an energy-intensive producer (e.g. aluminium) than it would for a less energy-intensive industry (e.g. retail trade). By contrast, oil and other energy producers would, of course, be net beneficiaries.

An assessment of each asset's industry type and its exposure to common factors—such as fluctuations in oil and non-oil commodity prices and interest rates—will identify seemingly unrelated asset groupings which are vulnerable to common risks. Unwanted risk concentrations in a bank's portfolio can be recognized by using this method, and managed down to acceptable levels through diversification.

Product and contract-related risk

Product type and contract structure are other important asset risk factors. Each transaction involves one of many bank products and sometimes unique contract terms and conditions. As such, any transaction can possess a different matrix of risks which are dependent on the inherent characteristics of the financial product itself and on the way in which the deal is structured. For example a sovereign short-term debt (i.e. cash-equivalent instrument) denominated in the currency of the lender's country of domicile is considered to be a 'risk-free' asset, whereas an unsecured cross-border term loan to a private individual is an inherently very risky asset.

The many episodes of sovereign reschedulings during the 1980s offer ample evidence of the country-by-country treatment of various financial products. Balance-of-payments loans, project finance and other long-term loans, many times including both private and public-sector counterparties, were consistently part of the debt moratorium. Financial products which were always omitted from private-creditor sovereign rescheduling agreements include: publicly-issued bonds; floating-rate certificates of deposit (CDs); leases on movable property; legally recognized and collateralized security interests; and spot and forward foreign-exchange contracts.[8] By definition, loans made, guaranteed or insured by sovereign governments or multilateral agencies, although sometimes involved in a separate rescheduling exercise, were also excluded.

Many times other products were affected differently by individual debtor country's policy decisions. Those products which were selectively included in actual country rescheduling agreements are shown in table 1.1. It is apparent that many financial products are asymmetrically exposed to sovereign rescheduling risk.

In addition to this array of traditional bank products, numerous new product-risk profiles were established during the 1980s as financial innovation resulted in many products which unbundled 'old' risk groupings.[9]

The structure of a loan agreement, including its documentation, loan covenants, collateral and performance-induced pricing, represents

Table 1.1 Financial products included in sovereign rescheduling agreements

	Argentina	*Chile*	*Mexico*	*Philippines*	*Venezuela*
Precious metals contracts	X			X	
Yen-denominated private placements					X
Commodity hedging lines	X		X		X
Central bank overdrafts	X	X	X		X
Interbank placements in foreign branches of nation's banks	X				
Trade credit involving tangible goods (including letters of credit)				X	
Loans subject to interest makeup agreements				X	
Private placements		X			
Financial products impaired	4	2	2	3	3

another important element of an asset's risk. The deal's structure will influence the extent to which the creditor is exposed to moral hazard: the willingness of the borrower to perform in 'good faith'. If a workout is required, the loan's terms and conditions will also affect the bank's position in the ordering of creditor seniority, determining the likelihood of ultimate repayment.

International Risk Management

While the 'art' of country risk analysis has existed for centuries, it is only in the past several decades, with improved market data, greater computing capabilities and the benefit of new economic theories, that the 'science' of country risk assessment has emerged. Ironically, this advancement has occurred at a time when cross-border lending to developing countries, and hence the demand for country risk analysts, has been in decline.

Although there are many variations of method, the assessment of sovereign creditworthiness essentially focusses on the identification of prospective country-specific risks, namely those arising from economic, financial and political events. With this analysis, the risk specialist determines which countries represent acceptable risk and counsels bank management on the advisability of lending, and in what amounts, to a particular set of countries. Beyond prudential advice on the aggregate amount of exposure to a particular country or portfolio of countries, additional recommendations typically address the tenor profile, product mix and sectoral composition of any specific country portfolio.

The identification and assessment of quantifiable or judgmental asset attributes allow the analyst to estimate the riskiness of a particular counterparty, industry, product or country. By aggregating these incremental risk factors, the 'total' risk profile of any particular exposure can be determined. An international portfolio should be managed so that risk and exposure are stratified not only across countries but also within countries. As sovereign risk increases, the average size of the country limit should decline, just as the average tenor should shorten, the acceptable list of products decline and the sectoral mix narrow. In this manner, a 'second-best' approach to building an efficient portfolio is achieved.

This incremental approach to international risk management, omits two important elements: pricing and risk covariance. Intuitively, a higher-risk exposure may be acceptable if it is counterbalanced by a higher expected return. Ideally, the transaction's expected return should be expressed as the risk-adjusted rate of return on bank equity. Some banks have developed models which compute the risk-adjusted return on equity of a prospective deal to ensure that it exceeds a policy pricing threshold or hurdle rate. This risk-return analysis is a measured improvement over more traditional approaches which tend to overemphasize nominal yield. Yet it does not give any insight as to how this prospective additional exposure will alter the overall risk of the existing bank portfolio. This requires risk covariance to be incorporated into the analysis.

Due to limitations on applying a portfolio-theoretic approach to the assessment of international bank loans, the country risk analyst must address the covariance issue using approximate methods. Attempts should be made to identify the covariance of asset risk both across countries and within countries. Risk concentrations within the portfolio can be identified by measuring the asymmetric correlation of asset risk to common factors. Using this method, portfolio risk can be reduced by strategies of asset diversification.

The estimated risk-return of an asset, its co-movement with the risk and return of an existing portfolio and the risk tolerance of the lender will determine whether the asset under consideration is an acceptable addition to the portfolio. The asset will be an attractive addition either if it enhances the portfolio's rate of return while maintaining average risk or if it lowers the portfolio's overall risk while maintaining average return. Not all of these questions, however, can be answered precisely by the analyst. None the less, many conceptual aspects of this framework can be operationalized in evaluating the prudence of cross-border lending. A judicious, if approximate, appraisal of risk, return and covariance is required, while at the same time avoiding an approach which is too mechanistic or pretends to precise results. International risk management is still as much an art as it is a science. In cross-country comparisons, efforts toward data comparability and uniform analytical methods will aid an objective analysis. Moreover, a high degree of commonality in the credit-scoring systems for both domestic and international assets is preferred. A consistent conceptual framework and clear set of guidelines are needed to assess the risks and guide asset exposure and pricing decisions associated with international lending and the management of a bank's cross-border portfolio.

NOTES

1 See Bitterman (1973) and Dil (1987) for an historical record of sovereign defaults.

2 The paper by Frank and Cline (1971), which employed discriminant analysis, is the seminal work in applying statistical techniques to country-risk analysis. Dhonte (1974) identified factors relating to liquidity rescheduling using principal-component analysis. Feder and Just (1977) were the first to apply logit analysis to sovereign credit scoring. Refer to Cline (1984), McFadden, Eckhaus *et al.* (1985) and Solberg (1988) for further applications of logit analysis. See Fisk and Rimlinger (1979) and Cooper (1987) for the use of other multivariate techniques in country creditworthiness. McDonald (1982) offers a useful, if now somewhat dated, review of the literature on developing-country debt-service capacity.

3 According to a survey of American banks conducted by the US Export-Import Bank (1976), 62 per cent of the respondents covering 74 per cent of the banking industry's assets used the 'structured qualitative' approach: an individual country report utilizing a standard format of political and economic data and analysis. For studies which attempt to present a system for country risk analysis, see Friedman (1983), Nagy (1984), Calverley (1985), Krayenbuehl (1985), Mayer (1985), Heffernan (1986) and Samuels (1990).

4 Refer to Sacks and Blank (1981) for a chronicle of the new role for the political-risk expert in banking. For a representative set of political-risk methodologies, see Bunn and Mustafaoglu (1978), Haendel (1979), Ferrier, Gantes and Paoli (1980), Overholt (1982), Ghadar and Moran (1984) and Citron and Nickelsburg (1987).

5 These outcomes are presumed to be determined largely by the debtor's behavior. However, risks relating to creditor behavior which can influence the loan's outcome include that of possessing inadequate information. Quite simply, the risk is that the real situation with regard to a firm, industry or country may be different than the analyst's assessment because of inadequate knowledge. This information gap must be met by allocating sufficient resources to the research function. This, of course, does not address the issue of asymmetric information which results in 'hidden' data, lowering the confidence of the risk assessment. Once the assessment has been made, an attendant risk relates to internal control or the bank officer's adherence to credit and other guidelines. It is necessary that individuals in the credit, marketing and operations units are adequately trained for their respective tasks and responsibilities. Moreover, they must act in accordance with legal codes,

regulatory statutes and company rules regarding lending and credit-related procedures.

6 Only a company or individual can become insolvent as defined by gross liabilities exceeding gross assets. The country analogue to default is *de facto* repudiation, resulting from inability to repay (i.e. foreign-exchange shortage).

7 Settlement risk is the likelihood that technical or operational factors interrupt the delivery or repayment of funds, even when the counterparty is able to perform.

8 The financial-product classification is drawn from data in the term sheets or *de facto* policy of the following Baker-15 debt-rescheduling agreements: Argentina, 1982 and 1987; Brazil, 1983; Chile, 1987; Mexico 1982 and 1984; the Philippines, 1984; and Venezuela, 1985. This historical analysis is taken directly from Semones (1989).

9 Refer to reports by the Group of Ten (1986) and the OECD (1988) for descriptions of the new banking products developed in the 1980s (e.g. note-issuance facilities (NIFs), revolving underwriting facilities (RUFs), floating-rate notes (FRNs), interest-rate and currency swaps and other derivative instruments) and how they have 'repackaged' types of financial risk. For a discussion on which of these new instruments the private international creditors will offer developing-country borrowers, and how these instruments could be used in sovereign external-borrowing strategies, see Lessard (1986) and Solberg (1986).

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2 The analytics of country reports and checklists

Paul Rawkins

INTRODUCTION

The requirements of country-risk analysis are two-fold: to consider a country as a credit risk on its own merits and to measure the risk of lending to it *vis-á-vis* other sovereign candidates. The conceptual framework for evaluating country risk varies widely among banks. Nevertheless, two broad approaches can be discerned: a qualitative analysis which involves an in-depth political and economic assessment of a country; and a quantitative analysis which seeks to identify certain key variables common to every country, in order to rank all countries according to their perceived importance. In some cases a fully qualitative analysis may be prepared which could be very comprehensive. However, this approach can be very ad hoc in nature and less useful than the structured qualitative report which is written along well-defined lines and presented in a standard format. The qualitative approach may take the form of a checklist embodying quantifiable variables which are combined to produce one composite series, ranking sovereign borrowers. The use of a more rigorous methodology involving the application of econometric techniques to observed statistical phenomena is also possible. In practise most banks employ the structured qualitative analysis in conjunction with a weighted checklist.

The purpose of preparing a structured qualitative report is to measure a country's political and economic performance relative to itself over time. Such an analysis should begin with an examination of the structure of a country to expose its basic strengths and weaknesses and, hence, the broad parameters within which it can respond and adjust to changing circumstances. The report will need to highlight certain key economic and financial variables that impinge directly and indirectly on a country's ability to repay its external financial obligations on schedule. Above all, it must take account of the policies underlying these variables and the effectiveness of the policy response to changes in them. Based on these findings, the analyst should be in a better position to make an informed judgement about a country's future ability to repay.

Any assessment of a country's present and future creditworthiness inevitably involves some judgement about political trends. Political risk is a subject in itself, which is covered elsewhere in this book, and this chapter will not dwell on it in any detail. Willingness to repay is essentially a political decision. However, as a general rule, if a country is able to repay, willingness will normally follow, although there clearly are exceptions to this rule. To a large extent political judgements are implicit in the economic analysis, past and present policies often acting as a reliable indicator of the future, thereby conferring some sense of legitimacy and stability on the current political structure. Nevertheless, political events are unpredictable within very broad limits and one should at least be aware of the possibilities in terms of the country's record of political stability, the nature of the regime in power, the likelihood of change and the potential for violent upheaval.

The major drawback of the structured qualitative approach is that it is an absolute assessment of a country, which tells the analyst little about its overall performance relative to other sovereign risks. Banks have addressed this deficiency by developing the weighted (or unweighted) check list which attempts to score all countries on a common scale of risk. This approach explicitly defines a set of statistical factors, relating to a country's ability to service its debt, which can be applied uniformly across countries. The resulting scores are then aggregated to provide a risk-ranking of all countries. Many variations of the checklist approach exist as banks have tailored this system to suit their own requirements. Despite these refinements, the weighted checklist still lacks objectivity, since the choice of variables and the arbitrary weighting which banks assign to them are subjective. However, it could provide a framework in which the fruits of econometric analysis or the fully quantitative approach could be applied.

In spite of their inadequacies, the structured qualitative approach and the weighted checklist are insightful and still form the main building blocks of country-risk analysis. This chapter will examine in some detail the methodology used in compiling a structured qualitative country report; it will then describe how this report may be used in conjunction with the weighted checklist. Much of the analysis that follows would be applicable to any country, but the focus will be on developing market economies. These, too, have become a much less homogeneous group, ranging over the whole spectrum from least-developed, through middle-income to newly industrializing economies. However, these changes tend to take place over a long period of time and should in no way detract from the validity of the analysis.

THE STRUCTURED QUALITATIVE REPORT

To begin with, it is important to stress the inter-temporal nature of country risk analysis. Risk arises as a result of events and developments in the future. To some extent these occurrences can be foreseen, enabling an assessment to be made of the probable outcome; more often than not, all the analyst can do is alert the lender to the possibilities and their likely impact. Clearly the further ahead the analyst is required to look, the greater the degree of error. A critical choice must, therefore, be made about the time span of the report and the relative attention to be given to past trends, the present situation and the future. Forecasting demands a sound understanding of recent economic developments in an historical context. Hence, it is important to look back over a period of five to ten years, in order to assess the country's political and economics environment, the internal and external shocks that it has been subjected to and the policies that the government has pursued in relation to these.

The key factor which the report is seeking to establish is a country's future ability to generate net foreign exchange to service its external debts. A country's ability to earn foreign exchange will inevitably be subjected to internal and external shocks which by their nature are unpredictable. Internal shocks frequently imply political change; external shocks generally emanate from changes in the world economic environment. How effectively a country adjusts to changing external economic circumstances will depend upon the structure of its economy and the policy stance that it takes. The experience of the 1980s suggests that, aside from external economic shocks, the policies of debtor countries remain the single most important determinant of balance-of-payments adjustment and debt-servicing prospects. Thus, by focusing on a country's macro-economic policy framework, it is frequently possible to extrapolate from current trends with some degree of accuracy. Fundamental changes of policy clearly do occur from time to time, but stability is often evident. Moreover, correctly assessed, such policies can act as a leading indicator of a country's ability to repay.

A structured qualitative report should adhere to the following framework: structural factors, the use of policy instruments and the consideration of key short-term financial and debt variables. By undertaking this line of analysis, it should be possible to determine the likelihood of a country's encountering balance-of-payments difficulties in the first instance, the chances of its adopting the appropriate policy solutions in the second, and the early warning signs to look for in the third.

Structural factors

Domestic economy

In the long term, a country's capacity to earn foreign exchange will be determined by its endowment of natural resources, and the quantity and quality of labor and capital which it has at its disposal to develop those resources. The degree to which a country exploits these factors of production determines its output of goods and services and hence the size of its gross domestic product (GDP). The GDP forms the lowest common denominator for many of the key factors which are used to measure country risk. A first approximation of a country's relative stage of development can be gained from its per capita GDP (i.e. GDP/population). However, it is more important to evaluate how fast a country's output is growing, both absolutely and in relation to the growth of the population, and whether or not this trend is well established over time. An examination of the components of a country's GDP and their rates of change can reveal much about the structure of its economy and, therefore, its flexibility to respond to internal and external shocks (see table 2.1).

The starting point for this exercise would be a country's national accounts; these are normally presented on an output and expenditure basis, at both real (i.e. inflation adjusted) and market prices. Disaggregation by output highlights the structure of production and serves to identify the relative importance of each sector and its respective contribution to overall economic growth. A country with a large, well-diversified economy will generally be better able to withstand shocks than a small, narrowly based one. In the classic developing country, agriculture is normally the largest sector of the economy, providing the main source of income, employment and exports. The manufacturing sector is likely to be small, geared mainly to the domestic market and heavily protected from external competition. This type of economy can be expected to perform erratically, with climatic changes having a disproportionate impact on growth. A country primarily dependent on minerals or energy could be expected to exhibit similar characteristics. By contrast, rapid economic development is frequently synonymous with a fast-growing manufacturing sector. In some cases, this sector may have become sufficiently large to warrant classifying the country as a

Table 2.1 Output, expenditure and prices (% annual change)

	1988	*1989*	*1990*
Real GDP	6.2	6.0	4.2
By sector:			
Agriculture (30 % GDP)	3.5	4.0	3.0
Manufacturing (25 % GDP)	8.9	6.9	6.0
Construction (5% GDP)	9.5	12.0	7.0
Services (40% GDP)	6.3	6.4	3.7
By expenditure:			
Domestic demand	7.8	7.3	3.8
Private consumption	6.0	5.6	4.0
Public consumption	7.2	7.7	2.0
Fixed investment	15.5	19.8	10.0
Change in net foreign balance (% GDP)	−3.1	−2.8	0.5
Exports of goods and services	15.9	11.7	10.5
Imports of goods and services	33.4	22.5	8.1
Memorandum:			
GDP deflator	9.8	10.1	10.9
Consumer prices	8.7	10.6	12.3
Wholesale prices	13.4	11.0	15.0

newly industrializing economy. It may be necessary to take a country's development plan into account, if it has one, although this is not often done.

Disaggregation of the expenditure components of the national accounts offers a different insight into the economy, from the demand side. In the first instance, this approach offers some indication of the distribution of resources in the economy between consumption and investment and, therefore, future growth prospects. It also says something about the distribution of resources between the private and the public sector and the size of the external sector in relation to the rest of the economy. Reliable data on savings is frequently unavailable and must be derived from a rearrangement of the national income identities (i.e. savings=disposable income-consumption (S=Y-C)). The savings ratio is regarded as an important variable in the growth equation, while the savings-investment gap forms one corner of the triangular accounting identity thus: savings less investment equals exports less imports, equals income less expenditure. In each case, the difference must be met from foreign savings; the country's dependence on foreign borrowing to meet its domestic policy goals.

Low-income countries generally have a high propensity to consume and suffer from low gross domestic savings and investment ratios. Under these circumstances, the only entity capable of saving on any scale will be the government, and this will of necessity involve higher taxation. Middle- and higher-income countries will have a greater propensity to save, but it is essential that the conditions exist to mobilize these savings through an efficient financial system, paying market rates of interest. A repressive financial system will lead to lower domestic savings and contribute to capital flight abroad. Foreign borrowing may seem like an attractive alternative, but it can do no more than supplement domestic savings. World Bank studies show that net capital inflows to developing countries averaged 3–6 per cent of their GDP in 1973–85, sufficient to finance only 10–20 per cent of their gross investment.

Investment *per se* is not a sufficient condition for sustained economic growth and investment-led, high-growth strategies do not always succeed. A country may have a high-investment/GDP ratio and yet still record low growth because resources have been misallocated to areas in which it has little comparative advantage. Poor investment decisions will yield poor returns. Where foreign funds have been used, the project may not be able to generate sufficient return to service the debt. One measure of the efficiency of investment is the incremental capital/output ratio (ICOR), which measures the increase in a country's stock of capital relative to its increase in output; lower ICOR values indicate more productive investment, while higher values denote inefficiency. In practice, the ICOR tends to be a rather imperfect measure of efficiency, since it is difficult to distinguish new additions from the replacement of the capital stock. Moreover, the data provided is inevitably historical. Nevertheless, the ICOR can be a useful indicator of how well countries have invested funds in the past, a rise in the ratio over time often preceding debt-servicing difficulties.

Many developing countries have abundant pools of cheap, unskilled labor, yet still persist in investing in large, capital-intensive prestige projects which ultimately become expensive 'white elephants'. These projects may be generated by inward-looking policies which favor import substitution over export promotion, fostering high cost. These inefficient entities, built up behind tariff barriers and weaned on subsidies, are incapable of competing on world markets. Private-sector investment decisions may be similarly impaired by policy-induced distortions which send the wrong signals to the market. A large and unwieldy state sector is likely to limit the private sector's command of resources for investment, relegating it to a peripheral role in development. This regimen is likely to be reinforced by a hostile attitude to foreign investment. An open economy, where imports compete freely with domestically manufactured goods, the private sector is unfettered by controls, and the public sector limits itself to the provision of infrastructure and essential services, will be much more conducive to investment and faster growth.

The cost structure of a country's economy is an important determinant of its ability to compete on world markets. Developing countries exhibit diverse movements in prices and wages. Many factors can influence the course of these variables: agricultural supply-side shocks, import price increases, devaluations and structural adjustment; often their impact will be shortlived. A prolonged burst of inflation is invariably symptomatic of economic mismanagement or a more fundamental malaise. In some cases high inflation may be endemic, institutionalized by indexation and repeated devaluations of the home currency. The link between inflation, growth and the balance of payments is an important one. Persistently high inflation tends to be associated with low growth, declining investment and an overvalued exchange rate. This, in turn, leads to a loss of competitiveness, lack of confidence, capital flight and balance-of-payments difficulties. Greater exposure to international competition can act as a significant check on domestic price increases (*World Development Report,* World Bank 1987).

Monitoring inflation in developing economies is not always straightforward and demands a careful interpretation of official statistics. The broadest and most accurate indicator of inflation is the GDP deflator used in the preparation of the national accounts, but this is rarely available on a timely basis. A more accessible source is the consumer-price index, which most countries publish at regular (i.e. monthly) intervals. However, these indices are not always representative of price pressures in an economy and may simply be measuring suppressed inflation, if the index focuses on a narrow basket of goods whose prices are controlled by the government. An examination of wholesale-price and wage indices can help to identify future inflationary pressures. Significant rigidities may exist in the labor market such as wage-indexation or pervasive unionization. High real-wage increases are likely to be reflected in excess demand, rising inflation and growing imports.

External economy

Some idea of the relative importance of a country's external sector can be gained from the national accounts; in the case of a large economy exports and imports may account for less than 10 per cent of GDP, whereas in a newly industrializing economy their share could be well over 100 per cent. Thus, the impact of a rapid rise in exports on overall GDP growth can be quite different, depending on the structure of an economy and its degree of openness. In an open economy the potential for export-led growth is likely to be much higher, given the smooth reallocation of resources between the tradable- and non-tradable-goods sectors, indicating a higher degree of structural flexibility.

A country's ability to service its external obligations is directly linked to its capacity to export goods and services. Thus, a high and rising export/GDP ratio would indicate a greater ability to repay. While a country's exports may be large in absolute terms, there are a number of other factors which need to be taken into account. These include export-commodity concentrations; the geographical concentration of export markets; and the prospects for export growth.

Excessive reliance on one or two primary commodities is likely to leave a country exposed to wide fluctuations in prices and demand on world markets which could produce a windfall of foreign exchange one year and a dearth the next. To take an extreme case, a country where oil accounts for 99 per cent of exports, most of which is exported to markets in the developed world, will be highly vulnerable to any downturn in demand and/or fall in the price of oil. Alternatively, supply-side shocks such as a poor harvest or strikes could easily cripple the external sector. The volatility of exports will be a function of their structure and geographical concentration and is an important indicator of country risk. This risk may be reduced to some extent by the diversification of products and markets. Even so, a primary producer exporting a range of commodities to a wide variety of markets will still be vulnerable to a cyclical downturn in commodity prices. A country with a growing share of manufactured goods in its exports will be much less susceptible to price fluctuations on world markets and should enjoy more stable demand conditions. However, over-concentration on one or two markets could expose it to protectionist pressures in developed-country markets.

Country risk is not a static concept; hence it is important to examine the rate of growth of a country's exports and the longer-run prospects for their continued growth. High export earnings may simply be the result of rising prices rather than an increase in the volume of shipments. Capacity constraints may limit a country's ability to take advantage of favorable market developments in the short term. In the long term, exporters of primary products generally face slow growth of world demand and declining terms of trade (the ratio of export prices to import prices). Exporters of manufactured goods will enjoy better prospects for growth, although here too the analyst should be discerning. Narrow dependence on highly competitive areas like textiles and electronic assembly may offer only limited growth potential, due to restrictive quotas in developed-country markets and very high price elasticity of demand.

The composition of imports will provide further insight into a country's structural strengths and weaknesses and the degree to which imports would be compressible in the event of a foreign-exchange shortage. A country which is heavily dependent on food and energy imports will be more susceptible to a sharp rise in commodity prices and have less scope to minimize their impact on domestic inflation than one with a more broadly based import structure. Similarly, any cutback in imports of raw materials and intermediate goods could have an adverse impact on industrial production and depress exports. Non-essential consumer goods may appear to be most dispensable. However, in some cases this category may have been compressed to a minimum already by tariffs and quotas; in others, it may be too sensitive politically to reduce these imports. Few developing countries have well-developed capital-goods industries and imports of machinery and equipment usually account for a large share of total imports. In the short term, a country may find it least damaging politically and economically to cut back on these imports, but in the long term growth and employment will be lowered.

An important measure of the sensitivity of the domestic economy to external developments is the import/GDP ratio. The relationship between economic growth and the level of imports is often an unstable one. Generally, developing market economies have a high propensity to import, particularly in the early stages of development, underlining the balance-of-payments constraint on growth. A trade deficit caused by the rapid expansion of imports need not necessarily be a bad thing, if it is accounted for by an influx of capital-goods imports which will yield greater exports in the future. However, a high and rising level of non-essential consumer-goods imports often points to an over-expansion of domestic demand which is likely to prove unsustainable in the medium term. Alternatively, a country that needs to run a trade surplus to service capital inflows may compress some imports to achieve this. The trade balance is the chief determinant of the current account; hence it is important to understand the factors underlying it and the direction it is likely to take.

An example of how best the current account might be broken out and presented is shown in table 2.2. In the standard balance-of-payments

Table 2.2 Balance of payments (US$ millions)

	1988	*1989*	*1990*
Merchandise exports	31,390	34,215	39,347
% change	−8.8	9.0	15.0
Coffee	1,250	1,343	1,488
volume (million bags)	15.0	14.5	15.0
price ($/bag)	0.63	0.70	0.75
Soya	2,855	2,731	3,055
volume (million tons)	14.4	12.7	13.0
price ($/ton)	198	215	235
Iron ore	2,407	2,233	2,392
volume (million tons)	82	85	87
price ($/ton)	29.2	26.3	27
Other primary products	4,878	5,327	5,656
% change	1.6	9.2	6.2
Manufactured exports	20,000	22,582	26,756
% change	−8.8	12.9	18.5
Merchandise imports	20,363	22,015	25,971
% change	11.5	8.1	18.0
Oil imports	4,355	3,606	3,881
volume ('000 barrels/day)	568.2	571.0	585.3
price ($/barrel)	21.0	17.3	18.2
Non-oil imports	16,008	18,409	22,091
% change	7.6	15.0	20.0
Trade balance	11,027	12,200	13,376
Services account	(15,566)	(14,166)	(14,986)
Non-factor services (net)	(1,783)	(1,903)	(2,337)
Credits	2,864	3,122	3,590
Debits	4,647	5,024	5,927
Factor services (net)	(13,783)	(12,264)	(12,649)
Interest receipts	1,150	1,228	1,320
Interest payments	10,533	9,092	9,569
Multilaterals	1,206	1,034	870
Governments	1,593	1,358	1,492
Commercial banks	6,914	5,854	6,298
Other	820	845	909
Dividends and remittances	(4,400)	(4,400)	(4,400)
Transfers (net)	300	315	328
Current account	(4,239)	(1,650)	(1,282)
Memorandum:			
Primary surplus	6,294	7,442	8,287

format exports and imports will be reported on a free-on-board basis, with the associated costs of transportation, freight and insurance recorded separately under non-factor services. Tourism, a significant source of foreign exchange for many developing countries, will also be included under this heading. Factor services encompass profits and dividends and interest receipts and payments. Most developing countries incur a net outflow on profits and dividends which may be large, depending upon the stock of foreign investment in the country. Interest payments are potentially one of the largest and most volatile items in the current account and deserve close attention. If a country has run persistent current-account deficits in the past and borrowed abroad to finance them, interest payments are likely to be high; a breakdown by creditor will help to identify whether a country is borrowing at market rates or on concessional terms.

Transfers may be private or official. Private transfers are invariably workers' remittances from abroad and can rank alongside a country's leading export as a source of foreign exchange. Remittances often exhibit a similar degree of volatility to commodity exports, reflecting the changing nature of the political and economic climate of the host country. Official transfers refer to capital grants from abroad and are sometimes included in the capital account as non-debt creating flows.

The current-account balance is at the heart of country-risk analysis. In the first instance, it summarizes a country's total transactions with the rest of the world for goods and services (plus unilateral transfers) and represents the difference between national income and expenditure. In the second instance, it gives an indication of the rate at which a country is accumulating foreign liabilities (deficit) or building foreign assets (surplus). Most developing countries are, given their level of development, capital importers. In some cases this demand for foreign capital may be met by non-debt-creating flows, that is inflows of direct and portfolio investment which do not generate a stream of interest payments. However, this scenario is rare. Since no country's international reserves are unlimited, a decision to run a current-account deficit normally implies a decision to borrow abroad.

Theoretically, a country should be able to borrow abroad for as long as the rate of growth of its foreign-exchange receipts equals or exceeds the average interest rate on its external debt. This condition should be met if the borrowed funds are invested in projects which promote the growth of output and exports, thereby strengthening the current-account balance. However, if a country simply borrows to sustain consumption and/or postpone adjustment to changed external circumstances, its debt burden will increase, interest payments will rise and the current account will deteriorate. In certain circumstances the primary surplus (defined as the current account minus interest payments) may turn negative, indicating that the country has reached the potentially unsustainable position of borrowing to repay interest.

The relationship between the level of interest payments, the current account and foreign borrowing becomes highly interactive as debt rises. The analyst's task must be to reconcile the current account with the availability of external finance and assess whether the country's future borrowing requirements are consistent with its debt-servicing capacity. This will require certain assumptions about the future level of interest payments, prospects for export growth and the rate of economic growth which, in turn, will determine imports. Once these parameters have been established, the current account can be used as a framework to assess the impact of changes in government policies and their implications for the country's external creditworthiness.

Policy instruments

Balance-of-payments management is the fundamental determinant of international creditworthiness. This in turn will depend crucially upon the policies which a country pursues both in relation to its own internal goals and changing external circumstances. Sound macro-economic policies could be expected to be aimed at such broad long-term policy goals as sustainable economic growth with low inflation, the mobilization of domestic savings, a business climate conducive to investment and a viable balance-of-payments position. The policy instruments available to attain these goals are fiscal and monetary policies for demand management and capital flows; and exchange-rate policy and supplementary trade and exchange controls for balance-of-payments management.

Problems arise when a country experiences an imbalance between aggregate domestic demand and aggregate supply, which results in 'overheating' and leads to a deterioration in the current-account balance and a rise in domestic prices. The source of this disturbance may be an external shock beyond the country's control (e.g. rise in oil prices, industrial-country recession) and/or the pursuit of inappropriate policies by the debtor that over-expand domestic demand relative to supply. For instance, a country beset by a chronic fiscal deficit, an overvalued exchange rate, a trade regime biased towards imports and a repressive financial system that discourages saving could be expected to encounter serious balance-of-payments difficulties. Foreign borrowing under these conditions would be likely to lead to misallocation of funds for investment and private-sector capital flight.

Fiscal policy

A government's fiscal stance is summarized by its public-sector borrowing requirement (PSBR) as presented in its annual budget statement. The PSBR is the most comprehensive measure of the fiscal deficit; it represents the total excess of revenue over expenditure for all state entities. In practice, the term 'budget deficit' is widely used and can be very misleading since it is rarely apparent what level of government spending is being referred to. Thus, while the central government may be running a surplus, this could be offset by deficits at state- and local-government level (general government) or, more likely, deficiencies among state enterprises (consolidated public sector). Even then, the picture could still be distorted by the existence of large off-budget items that would count as contingent liabilities. (see table 2.3)

An examination of the PSBR is important to ascertain its size in relation to the level of GDP (fiscal deficit/GDP); the rate at which it is growing; and how it is being financed. Banks involved in sovereign lending will be dealing directly with the government, or an entity that enjoys the backing of a government guarantee, and will want to know whether the deficit is sustainable. A prudent deficit will be one that is consistent with the government's other macro-economic objectives (e.g. maintaining a high degree of external creditworthiness, stable prices, growing employment and rising private investment).

The size of the fiscal deficit can have a significant impact on the balance of payments; the link between the two is an imperfect one, but there is some evidence to suggest that they are connected; and that a deterioration in the first often leads to a crisis in the second. An expansionary fiscal stance drives up expenditure relative to output, invariably causing consumption to spill over into imports, thus narrowing the trade surplus or increasing the deficit. The additional saving required may lead the government to borrow abroad to finance the deficit. This imposes an additional burden on the current account through higher interest payments. Alternatively, domestic sources of financing may have inflationary consequences that give rise to an overvalued exchange rate, growing uncertainty and private capital flight abroad.

A large fiscal deficit invariably points to macro-economic mismanagement. Identifying the potential for divergent trends between public income and expenditure can help to pinpoint future payments problems. Government revenue may be constrained by a narrow tax base; in some cases whole sectors of the economy (e.g. agriculture) may be excluded from the tax net. External sources of revenue, chiefly taxes on international trade or the state monopoly of key export sectors,

Table 2.3 Consolidated public finance (% of GDP)

	1988	*1989*	*1990*
Revenue	28.5	27.5	28.1
Oil revenues	9.9	8.9	9.2
Other revenues	18.6	18.5	18.9
Federal government	10.7	12.0	12.3
State enterprises	7.9	6.5	6.6
Expenditure	−35.3	−30.8	−27.3
Federal government	−6.7	−6.7	−7.5
Current expenditure	−3.4	−3.3	−3.4
Investment	−1.2	−1.2	−1.7
Transfers	−2.2	−2.2	−2.4
State enterprises	−11.1	−10.3	−10.8
Current expenditure	−8.4	−7.9	−8.0
Investment	−2.5	−2.0	−2.4
Transfers	−0.3	−0.4	−0.3
Interest payments	−17.5	−13.8	−9.0
Domestic debt	−13.3	−9.8	−6.0
Foreign debt	−4.2	−4.0	−3.0
Other	−4.9	−2.3	−5.1
Consolidated deficit	−11.7	−5.6	−4.3
Memorandum:			
Primary surplus	5.8	8.3	4.7

frequently account for the largest proportion of revenue. Where a country has become accustomed to booming revenues from a single commodity (e.g. oil), the potential for overspending will be high and unsustainable growth is likely to result. The subsequent speed of adjustment to a sharp fall in revenue will be determined by the pattern of expenditure. Items of public consumption like higher remunerations and subsidies on production and consumption could be politically difficult to reduce. Initially, public investment may be cut back sharply; money is fungible, hence funds already borrowed for this purpose may be redirected into consumption.

The international debt crisis of the 1980s highlighted the close parallels between uncontrolled fiscal deficits and balance-of-payments difficulties. Many highly indebted countries experienced public-sector deficits equivalent to more than 10 per cent of GDP. Yet it is difficult to define numerically exactly what constitutes an unsustainable fiscal deficit. This judgement has to be based on the nature of the deficit, how it is being financed, the level of development of the financial system and the level of domestic savings. In some cases the internal public debt may equal or exceed the level of external debt, limiting the government's room to manoeuver. An important tool for evaluating the sustainability of a fiscal deficit is the primary balance, the consolidated public-sector deficit excluding all interest payments, which measures the evolution of the net indebtedness of the public sector. At some point, a primary deficit must be reversed, otherwise the government will find itself in the unsustainable position of borrowing solely to repay interest. Restoring the primary surplus generally presages fiscal reforms which will in turn imply structural changes to the economy.

Monetary policy

Fiscal policy cannot easily be separated from monetary and exchangerate policy; in practice all three have to be considered in unison. The mere fact that a government runs a deficit means that it must be financed by borrowing, either domestically or abroad, or by printing money. Domestic borrowing influences the cost and availability of credit to the private sector. Foreign borrowing may be seen as a non-inflationary route, but will ultimately prove unsustainable if the fiscal deficit persists. Developing-country governments often control the banking system and, in some of the more profligate cases, may treat it as an extension of the public purse. Monetizing the fiscal deficit is one of the most common causes of inflation in developing countries and invariably leads to balance-of-payments difficulties. Initially the supply of money exceeds demand, driving up prices. If the exchange rate fails to adjust, the currency becomes overvalued, stimulating imports and depressing exports. Confidence starts to erode and capital flight ensues.

To combat the inflationary consequences of monetary creation, banks may be subjected to very high reserve requirements, which effectively amount to compulsory loans to the central bank at low interest rates. Alternatively, banks may be forced to hold large amounts of low-yielding, government securities. In some cases, ceilings may be imposed on banks' lending to certain sectors in conformity with government policies. All of these measures will act to weaken the banking system and reduce the amount of credit available to the private sector, effectively crowding it out. High interest rates are likely to depress investment and cause widespread bankruptcies. Interest-rate controls may be imposed to overcome these difficulties. However, in a climate of high inflation there is a risk that real interest rates will turn negative with adverse consequences for domestic savings and capital flight. In the long term,

Table 2.4 Monetary developments (changes, billions of local currency)

	1988	*1989*	*1990*
Net foreign assets	0.2	−2.1	−17.4
Net domestic assets	26.2	29.3	38.0
Domestic credit	23.7	31.5	36.1
Public sector	16.7	33.9	17.8
Private sector	7.0	−2.4	18.3
Other liabilities (net)	2.5	−2.2	2.0
M2	26.4	27.2	20.6
Memorandum:			
M1 (% change)	17.0	13.3	15.0
M2 (% change)	12.5	14.8	12.6
Consumer prices (% change)	11.5	13.5	22.5

financial-sector development and the prospects for economic growth will be retarded.

Monetary statistics are usually the most up to date and reliable of all macro-economic indicators and should be readily obtainable from a country's central bank or the *International Financial Statistics (IFS),* published monthly by the International Monetary Fund (IMF). The statistics are presented in a standard balance sheet format; liabilities are broken out into the main monetary aggregates (M1, M2 and M3), while assets are classified as foreign (usually net) or domestic, the latter being subdivided between the public and private sectors (see table 2.4).

Analysis of monetary aggregates is normally conducted on the basis of changes in liabilities and assets (i.e. supply and demand) from one period to the next. Thus an excessive increase in the money supply induced by deficit financing could be expected to be reflected in a rise in domestic credit to the public sector and a squeeze on the private sector. In the absence of any exchange-rate correction, imports will rise and capital flight will ensue, increasing the demand for foreign exchange and shrinking new foreign assets. In this way, the analyst can relate changes in monetary and fiscal policies to changes in the balance of payments. Where a country has accepted the need for an IMF-sponsored adjustment program, monetary and balance-of-payments targets will often be defined in terms of changes in net domestic and net foreign assets.

Trade and exchange-rate policy

The exchange rate is a key policy variable in the management of the balance of payments. Exchange-rate regimes vary from country to country. In practice, few developing countries are prepared to subject their economies to the instability associated with a freely floating exchange rate. Most countries manage their currencies against a single currency like the US dollar or a basket of currencies of their major trading partners. In a few instances, the exchange rate may be fixed against a major currency, while some countries maintain multiple exchange rates where debt-servicing and capital transactions take place at a different rate to commercial transactions.

Movements in the nominal exchange rate are expressed in terms of an effective exchange-rate index which measures the value of the home currency against a trade-weighted 'basket' of other currencies. A better indicator of a country's international competitiveness is the real effective exchange rate which takes account of relative movements in domestic and international prices. A rise in the real effective index generally implies an appreciation (loss of competitiveness) and a fall, a depreciation (gain in competitiveness), although some indexes may work in reverse, depending upon how they have been calculated. If domestic inflation exceeds international inflation, a country must devalue its currency by the differential to maintain its real exchange rate constant, otherwise the rate will appreciate, exports will become less competitive and the trade balance will deteriorate. A competitive exchange rate will be one that promotes the rate of growth of exports in line with an economy's overall growth potential. The response time of some exports, particularly non-traditional manufactured goods, to changes in the real exchange rate can be very short indeed.

The exchange rate acts as a barometer of macro-economic policy management. Countries with high and variable rates of inflation caused by fiscal deficits often allow their currencies to become severely overvalued in real terms, to cushion the impact of imported inflation. Complex import-licencing procedures and high tariffs are frequently employed to restrain the demand for cheap imports and promote import substitution, while subsidies are used to maintain exports. These policies can be expected to distort relative prices with adverse implications for investment, growth and the balance of payments and, where interest rates are administered, may result in large-scale capital outflows. Exchange controls rarely deter capital flight which often takes the form of under- and over-invoicing of exports and imports respectively. To the extent that the central bank rations foreign exchange for current transactions, a parallel or black market usually develops. The differential between the official and the parallel exchange rate may be taken as a crude market valuation of the risk that the currency will be devalued.

Frequent nominal adjustments in a high-inflation environment, outward-oriented policies with few import restrictions and realistic interest rates all help to promote a stable real exchange rate. A large nominal devaluation may be followed by the adoption of a crawling-peg arrangement, whereby the exchange rate is devalued by preannounced increments at regular intervals, in an attempt to anchor inflation expectations. However, a country will find it difficult to sustain this strategy for long if inflation expectations remain deeply rooted. Similarly, an aggressive exchange-rate policy that seeks to compensate for policy deficiencies elsewhere in the economy may simply worsen these imbalances in the medium term.

Debt and short-term financial variables

Assessing the structure of a country's economy and the soundness of its policies are basic tenets of country-risk analysis, but the decision to lend cannot be based on these considerations alone. While each individual loan must by judged on its own merits, it will also be necessary to take account of a country's existing stock of external debt and the flow of resources required to service this debt. The distinction between liquidity and solvency needs to be drawn here. Measures of liquidity tend to dominate country-risk analysis, reflecting lenders' overriding concern that a country will be able to meet its debt-service payments in the near term. However, in the long term the lender will want to be reassured of a country's 'solvency', in other words, that principal will be repaid in full, notwithstanding short-term liquidity problems.

The debt crisis of the 1980s inspired a great improvement in the coverage of external-debt statistics. The World Bank and the OECD annually publish comprehensive external-debt tables for most countries. These can be supplemented by international banking statistics published monthly by the IMF in the *IFS* and quarterly/semi-annual data from the Bank for International Settlements (BIS). The Institute of International Finance in Washington has done a great deal of work on reconciling these sources and publishes this data in a form well suited to country-risk analysis for over fifty countries. In many cases, national sources will be available but these are not always reconcilable with data from other sources and should be treated with care. There are many definitional pitfalls associated with external-debt statistics. It is essential to take account of all debt, whether contracted by the government, with a government guarantee, or the private sector. The data should also be broken down by term—short, medium and long—and by creditor group, meaning IMF, multilateral, bilateral (governments), commercial banks and suppliers.

The absolute size of a country's debt has little meaning unless it is judged in relation to other variables. Different countries will be able to sustain different levels of debt, depending upon the size of their economies and the level of their foreign-exchange receipts. The debt/ GDP ratio is often used to rank countries according to the external-debt burden, but it conveys little about a country's ability to service its debt. For this reason, the debt/foreign-exchange receipts (exports of goods and services, plus transfers) ratio is much more significant for country-risk purposes. Studies between problem and non-problem debtor countries in the 1980s reveal relatively small differences between their debt/GDP ratios, but wide discrepancies in their debt/foreign-exchange receipts ratios, highlighting the markedly better export performance of the latter group. While it would be unwise to draw any hard and fast rules, experience has shown that a debt/foreign-exchange receipts ratio in excess of 200 per cent often heralds debt-servicing difficulties.

Debt ratios should not be treated as static measures of creditworthiness; they are more important for their changes over time (see table 2.5). If the rate of growth of exports exceeds the rate of growth of debt, then the debt/ foreign-exchange receipts ratio will fall (improve), implying that the proceeds from foreign borrowing are being used to increase the productive potential of the economy. A decline in the debt/ foreign-exchange receipts and debt/GNP ratio would point to an increased capacity to borrow. Underlying the debt/foreign-exchange ratio is the simple 'solvency' test which says that the rate of growth of exports must exceed the nominal interest rate on debt, otherwise the debt/foreign-exchange receipts ratio will grow without limit if policy remains unchanged. This condition holds true even if the current-account balance, excluding interest payments (the primary balance), is zero.

One of the most widely used ratios in country-risk analysis is the debt-service ratio which measures the annual repayments of principal and interest as a percentage of foreign-exchange receipts. The debt-service ratio can be influenced by many factors, chief among which will be the outlook for exports and interest rates and the maturity structure and currency composition of the debt. Hence, movements in the ratio need to be interpreted carefully. In practice, repayments of short-term debt, but not interest, are excluded from the calculation since short-term facilities are frequently rolled over. An amortization schedule for the existing

Table 2.5 Debt and liquidity indicators

	1987	*1988*	*1989*	*1990*
External debt (US$ millions)				
Total External Debt	27,666	31,814	35,202	42,601
% GDP	16.1	16.9	19.5	21.5
% Foreign-exchange receipts	216	236	251	321
Medium and long-term	26,772	30,762	33,931	40,580
IMF	2,876	4,150	3,932	4,290
Multilateral institutions	9,126	10,355	11,254	12,476
Governments	11,260	10,987	11,016	13,052
Commercial banks	2,022	3,396	4,799	6,520
Other private creditors	1,488	1,874	2,929	4,242
Short-term (net)	895	1,052	1,271	2,021
Debt service (US$ millions)				
Total debt service	2,544	2.836	3.780	5.314
% Foreign-exchange receipts	18.9	20.2	28.3	35.9
Interest due	1,118	1,212	1,780	2,882
% Foreign-exchange receipts	8.3	8.6	13.3	19.5
Principal due	1,426	1,624	2,000	2,432
% Foreign-exchange receipts	10.6	11.6	15.0	16.4
Reserves (US$ millions)				
Reserves, excluding gold	10,000	8,750	7,590	6,300
Months imports, cif	3.5	3.0	2.5	2.0
Potential IMF credits	4,675	3,229	2,810	3,375

medium- and long-term debt stock can help to identify any bunching or concentration of repayments in future years which would cause the debt service ratio to rise sharply. A shortening in the average maturity of debt could also point to an impending liquidity crisis. However, subsequent refinancing or, in more extreme circumstances, rescheduling could produce a sharp fall in the debt-service ratio which would not necessarily be commensurate with a higher credit rating. Exchange-rate fluctuations could have a similar impact if the currency denomination of the debt and hence the stream of repayments differ radically from that of foreign-exchange receipts.

Given the unstable nature of principal repayments, the ratio of interest payments to foreign-exchange receipts is perceived as a better indicator of liquidity, since interest cannot easily be rescheduled. It is important that the numerator should include interest due on all debts of any maturity and not interest paid, which may differ due to the accumulation of arrears. A country with a high debt/foreign-exchange receipts ratio will not necessarily have a high interest-service ratio; a large proportion of its debt may have been contracted on concessional terms at fixed interest rates from official creditors, lowering the overall debt-service burden and minimizing its sensitivity to interest-rate fluctuations. A country which has borrowed heavily at variable interest rates will be in a much more vulnerable position. Ideally, a country should maximize its use of concessional credit before turning to commercial sources, thereby lowering the average interest rate on its total debt. Once again, it is difficult to pinpoint a critical interest-service ratio beyond which a country's ability to repay is impaired. As a general rule, a ratio of 25–39 per cent would warrant close monitoring.

A country's gross foreign-borrowing requirement can be simply defined as the sum of its current-account deficit (including interest payments), principal repayments and any increase in the level of its international reserves; direct investment will lower this requirement, while private capital outflows will increase it. To avoid the problem of illiquidity a country needs to ensure that the net transfer of resources (disbursements less repayments of principal and interest) remains positive. In other words, the roll-over ratio (total debt service/ disbursements) should not exceed unity (100 per cent), otherwise the net transfer of resources will turn negative. In balance-of-payments terms a negative net transfer of resources translates into an unfilled financing gap. In the short term, this gap may be filled by the drawdown of international reserves. If the gap persists, a country will have to run a trade surplus, undertake steps to adjust its economy and refinance or reschedule principal. Exceptionally, it may impose a limit on debt servicing, resulting in interest arrears which would appear as a financing item in the capital account.

Estimates of a financing gap can serve as an important forward-indicator of liquidity problems, provided that other creditors' lending intentions are clear and timely data on disbursements is available, which is rarely the case. A more tangible indicator of a country's ability to withstand short-term pressures is the level of its international reserves in relation to its average monthly import bill. Data for imports should be on a c.i.f. basis, while figures for most country's international reserves are published monthly in the *IFS*. Because of the difficulty in evaluating gold holdings, it is customary to exclude these from the calculation or to value them below current market value. Three months' import cover is generally regarded as an adequate insurance against acute payments difficulties.

However, this may need to be higher for a heavily indebted country with a high interest-service ratio.

One of the drawbacks to using visible import cover as a short-term liquidity indicator is that there may be other claims on a country's international reserves such as IMF obligations, which are treated as reserve liabilities. Use of fund credit is shown on the relevant country pages of the *IFS,* always assuming that it is a member of the IMF. A country that has made little use of IMF facilities in relation to its quota would be in a stronger position to resist liquidity shortages, than one which has already borrowed heavily from this source. However, countries often delay approaching the IMF because of the conditionality attached to higher-tranche borrowing. Perhaps the surest sign that a country is running out of reserves is the sudden occurrence of long time lags in reporting figures to the IMF.

Another indicator of liquidity is the BIS figures which show movements in banks' assets and liabilities for the particular country in question. A rapid build-up of assets with an original maturity of one year or less often indicates that a country is facing reduced access to long-term funds, reflecting its deteriorating creditworthiness. A growing share of short-term/total debt heightens a country's vulnerability to liquidity crises; new borrowing could dry up very quickly, if banks choose not to renew short-term credit lines. The behavior of banks' liabilities can be more misleading since they often include private residents' deposits which are not available to the country for balance-of-payments purposes. Thus a sudden increase in these liabilities could be explained by capital flight, rather than any increase in reserves. Capital flight can be a significant contributory factor to liquidity crises, but it is almost impossible to measure directly. A large outflow under errors and omissions in the balance of payments can serve as a useful proxy for capital flight.

CHECKLISTS

There is no substitute for the structured qualitative report which equips the analyst to make an informed judgement of country risk. However, the need remains to quantify the risk in a way that can be readily understood by decision-makers who are not familiar with a particular country and in a way that can be easily related to other sovereign risks. The weighted checklist seeks to summarize all aspects of risk in a single country rating that can be readily integrated into the decision-making process. The application of a uniform scoring framework over time also has the advantage of highlighting changes in one sovereign risk relative to another in a way that is beyond the scope of the structured qualitative report.

The weighted checklist may be seen as a form of discriminant analysis aimed at predicting the probability that a country will be unable or unwilling to service its debts, causing it to reschedule or, at worst, default outright. Most banks have their own proprietary country-risk rating systems modeled on a weighted checklist of country-specific risk factors. These may be limited to a narrow range of statistical factors, but frequently employ a combination of statistical and judgemental factors. The objective is to arrive at a composite score which forms part of a risk spectrum ranging from zero to 100, where zero may be risk free and 100 totally unacceptable risk. This section will draw attention to some of the more important aspects of constructing a weighted checklist, rather than attempting to present a ready-made version.

Statistical factors are by their nature backward looking. They seek to assess the performance of a country's economy in the recent past in the expectation that this will provide an insight into the future. The inclusion of forecasts can help to overcome this weakness. There is a wide variety of statistical factors to choose from. However, the analyst would be well advised to select a limited number of these, rather than to attempt to include all of them which would add little to the analysis. The logic of the structured qualitative report points to a range of structural, debt and liquidity factors: real GDP growth, inflation, budget deficit/ GDP, export growth, the volatility of exports, interest-service ratio, debt/foreign exchange receipts, debt/GDP and imports/reserves.

The inclusion of judgemental factors adds an extra dimension to the weighted checklist by acknowledging the central role of economic policy and the political assumptions therein. Judgemental factors are forward looking; they try to give some indication of a country's future ability and willingness to repay. Scores in this section could be allocated according to political stability, the use of domestic-policy instruments and the balance-of-payments and external-debt management. For simplicity, it may help to subdivide these criteria; thus, the latter section would try to assess exchange-rate management, trade and investment policy and the handling of liquidity crises. These will be essentially qualitative judgements requiring an in-depth knowledge of the country concerned, unlike the statistical factors which can be compiled relatively easily.

Weighting of these factors need not be very sophisticated to achieve a meaningful result. Thus, in the case of the statistical factors ten variables could be selected; each variable could attract a score of 5, subdivided according to an appropriate range (i.e. debt/foreign-exchange receipts 0–500, 1 point=100), with the whole summing to 50. Weighting of the judgemental factors is likely to be more arbitrary, reflecting the difficulty of assigning scores to qualitative judgements. Assuming that the latter also attracted a maximum of 50, the sum of the two sets of factors could be used to derive a risk ranking for a range of countries. This is a simplistic example and it is important not to attribute any spurious accuracy to the results of such a model. A change in the choice of variables could easily alter the outcome. For example, the inclusion of more debt and liquidity factors would lend greater weight to the short-term risks, than a checklist which put more emphasis on structural and judgemental factors.

The weighted checklist clearly has its limitations, but it can serve a useful function in helping to obtain a more dispassionate view of country risk. Thus, while the Latin-American specialist may consider one country to be a particularly good risk compared with others in the region, a cross-country comparison with an Asian borrower could reveal quite a different picture, causing the analyst to reconsider. Similarly, a change in an exogenous factor, such as a rise in oil prices, could result in a reassessment of the risk attached to lending for a whole category of sovereign borrowers.

SUMMARY AND CONCLUSIONS

This chapter has argued the case for an ordered, analytical approach to country-risk assessment that is applicable to a wide number of countries and ensures uniform treatment. To summarize, the structured qualitative report seeks to highlight certain factors which would indicate a change in the country risk. A large and growing current-account deficit would normally be the first sign of a deterioration in that risk. This could be the result of some internal or external shock and/or inappropriate macroeconomic policies. In the absence of an effective policy response, the problem of external imbalance could be expected to intensify. The risks attached to continued lending will depend upon how much a country has borrowed in the past and the expected burden of servicing these obligations both now and in the future. If heavy debts have already accumulated, the country's room for maneuver will be limited, while the structure of its economy may preclude rapid adjustment, raising more fundamental issues of illiquidity versus 'insolvency'. Conversely, by the same line of analysis, it should be possible to identify an improvement in country risk.

The weighted checklist recognizes the shortcomings of considering a country in isolation and the difficulty decision-makers may have in digesting all the information contained in the structured qualitative report. By scoring countries on a common grid, it seeks to quantify changes in country risk over time and present this in a form that is directly comparable with other sovereign risks and may be more easily assimilated by portfolio managers.

In conclusion, country-risk analysis is a difficult task; it demands constant monitoring of key variables and accurate assessments of governments' abilities to formulate and implement the correct policies. Reliable and up-to-date information is essential; periodic country visits can greatly enhance the analyst's understanding. Even so, it may not always be possible to identify a sharp deterioration in country risk until it is too late. Often, banks' perception of risk will differ, sometimes due to differential access to information. During the 1980s significant progress has been made by agencies like the Institute of International Finance and the multilateral institutions in upgrading the data base on debtor countries. These developments should ensure that the structured qualitative report and the weighted checklist continue to have a role to play in banks' lending policy.

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3 Current-account forecasting

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INTRODUCTION

A country's balance-of-payments statement records its economic transactions with the rest of the world, including trade in goods and services, certain unilateral transfers between countries, and changes in claims on and liabilities to the rest of the world. Goods, services and transfers are conventionally grouped under the current account of the balance of payments, while changes in a country's international asset and liability position are grouped under the capital account.

Economic models of the balance of payments also observe this distinction because flows on the two accounts are thought to be determined by different forces. Flows of goods and most kinds of services on the current account are generally held to be determined by income and relative prices, and are thus modeled in a supply-and-demand framework similar to that used for individual commodities. Flows in the capital account, viewed in a portfolio-balance framework, are, on the other hand, thought to be determined by factors such as the total wealth of individuals and relative rates of return on assets.

The conventions of double-entry bookkeeping ensure that a current-account deficit, for example, is exactly matched by a capital-account surplus (or inflow), defining the capital account to include all types of long- and short-term capital flows as well as changes in the official settlements balance. How this equality comes about in practice will depend on the nature of the economic regime in force. In a fixed-exchange-rate regime the part of a current-account deficit not financed by other capital inflows will be covered by a change in the official settlements balance; that is, by a reduction in official foreign reserves or by official short-term overseas borrowing. In a flexible exchange-rate regime, the exchange rate itself will be among the economic variables that adjust to equate the flows on the current and capital accounts.

This chapter concentrates on the analysis and forecasting of the current account, a fundamental macro-economic concept which plays an important role in country-risk analysis. Since the current-account balance is identically equal to the change in a country's net foreign-asset position, a forecast of the current account is essential in evaluating a country's future foreign-borrowing requirements, its capacity to service and repay existing foreign debt or, in the case of a creditor country, its capacity for further foreign lending. A current-account projection that is inconsistent with likely capital flows signals the need for and likelihood of an economic adjustment such as an exchange-rate adjustment or a change in fiscal or monetary policy.

The current account is divided by convention into the goods or merchandise trade balance, the services balance and the balance on unrequited transfers. We follow this classification in the remainder of this chapter.

The treatment of current-account forecasting which follows is a practitioner's approach in that it concentrates on models that are commonly used by working economists; it does not attempt to survey the much wider field of theoretical and empirical research on the subject.

MERCHANDISE TRADE

Two models of the quantities and prices of exports and imports have predominated in the empirical trade literature: the imperfect-substitutes model and the perfect-substitutes model. (In this classification we follow the survey by Goldstein and Khan (1985).) These two models are better considered as complements rather than as competitors, the first being better suited to, for example, countries which export manufactures and the second to primary-commodity exporters. The next section considers the treatment of exports in the imperfect substitutes model. Since the treatment of imports in the model is broadly symmetrical to that of exports it is dealt with more briefly. A further section covers the application of the perfect-substitutes model to both exports and imports.

The imperfect-substitutes model

A basic equilibrium model

A simple imperfect-substitutes model of aggregate exports can be stated, in logarithmic form (a listing of the variables used can be found in the appendix on page 77), as

$$1 \quad xd = a0 + a1.(px - pxw) + a2.yw, \quad a1 < 0, a2 > 0,$$
$$2 \quad xs = b0 + b1.(px - pd) + b2.yd^{*}, \quad b1, b2 > 0,$$
$$3 \quad xd = xs.$$

In equation 1 the volume of exports demanded, xd, (measured in, say, 1980 prices) is inversely related to the ratio of home-export prices, px, to foreign-export prices expressed in local currency terms, pxw, with a1 representing the price elasticity of demand for exports.[1] It is this latter feature from which the model derives its name: domestic exports are imperfect substitutes for foreign exports, so that a rise in the domestic-export price relative to foreign prices reduces the volume of exports demanded but does not eliminate it entirely. By contrast, in the perfect-substitutes model to be considered below, the country sells exports at the prevailing world-market price or not at all.

Export volumes demanded are also related positively in equation 1 to real income in the rest of the world, yw, with a2 representing the income elasticity of demand for exports. Foreign income yw might be an index of real GDP in individual foreign markets weighted by each market's share of the home country's total exports. Equation 1 is the everyday workhorse of trade-forecasting models.

In equation 2 the volume of exports supplied by domestic producers, xs, varies positively with the ratio of the export price to the price of all domestically produced goods, pd (the domestic wholesale-price index for example). The export supply curve defined in 2 is thus upward sloping and not perfectly elastic. The higher export prices are relative to general domestic prices, the greater should be the relative profitability of production for export. Higher domestic prices might also proxy higher production costs and, thus, lower absolute profits in the export sector. Equation 2 also suggests that export supply will rise with the overall production capacity of the home economy, yd*, which is usually measured in the empirical literature by trend real GDP.[2]

Equation 2 can be normalized for the export price, px, to yield the export price equation:

$$2.1 \quad px = c0 + c1.xs + c2.yd^{*} + c3.pd,$$
$$c0 = -b0/b1, cl = 1/b1 > 0, c2 = -b2/b1 < 0,$$
$$c3 = b1/b1 > 0.$$

Equation 2.1 states that the export price must rise to induce a greater supply of exports for a given level of production capacity and domestic prices. If production capacity, yd*, rises, export prices and, thus, profitability must fall if export supply is to remain constant. Higher domestic prices must be matched by higher export prices if the proportion of a given capacity used for exports is not to fall.

Table 3.1 Priors for export volume and price[1]

		Independent Variables			
		pxw	yw	yd*	pd
Dependent	x	+	+	+	–
Variables	px	+	+	–	+

1 For a list of variables see appendix, page 77.

Equation 3 closes the model with the equilibrium assumption that the export market clears in the time period considered, say a quarter or a year. With this we may drop the demand and supply subscripts on the xd and xs variables. Equations 1 and 2.1 then comprise a simultaneous two-equation model of export volume, x, and export price, px. The comparative static impact of changes in the independent variables on the dependent variables—volume and price—can be solved for algebraically and their signs are set out in table 3.1

The export-volume equation

The foreign-income variable, yw, in the export-volume equation 1 refers to 'the rest of the world', which, taken literally, means assembling real GDP data and forecasts for all other countries in the world. In practice the forecaster will probably only be able to consider the country's main foreign markets on a regular basis. An index of real GDP in the Group of Seven (G7[3]), or a slightly wider group of industrialized countries, is often an adequate proxy for total foreign income.

Restricting the foreign-income variable to the G7 countries does not imply that price competition abroad will take place only with producers from the G7 countries. On the contrary, the key price competition in the G7 market may take place with exporters from third countries outside the G7. Thus Korea's real competitors in G7 markets may be Taiwan, Singapore, Hong Kong, Brazil and other newly industrializing countries. The export-volume equation (equation 1) can be amended (for example, Bond (1985)) to reflect third-country competition:

1.1 $$x = a0 + a1.(px - pxw) + a2.yw + a3.(px - pxc), a3 < 0.$$

In 1.1 pxc is an index of export prices of third-country competitors in the foreign markets described by yw, say the G7 countries. The price variable, pxw, now refers only to G7 producers.[4]

So far it has been assumed that the single variable, yw, foreign real GDP, for example, is an adequate measure of foreign demand for home exports at a given set of prices. Some studies go further and split foreign income between a long-run underlying trend and the cyclical swings around that trend. Such an approach is relevant where the elasticity of demand for home exports is affected by cyclical movements in foreign income. Periods of cyclical upswing, for example, may be characterized by excess demand in the foreign market, non-price rationing by foreign suppliers and costs to the foreign buyer not fully captured in the product price, such as greater delivery lags, disruption caused by non-fulfillment of orders and lower product quality. In such situations purchasers may turn to overseas suppliers more readily than in normal times. In this case the cyclical income elasticity would be greater than the trend elasticity.

To capture such effects the export volume equation can be restated:

$$1.2 \qquad \mathbf{x = a0 + a1.(px - pxw) + a2.(yw - yw^*) + a3.yw^*,} \quad \mathbf{a.2, a3 > 0.}$$

yw* represents the trend level of foreign income and (yw-yw*) the cyclical component of income. Deppler and Ripley (1978) note the use of this formulation in the IMF's world-trade model equations for trade in manufactures. Goldstein and Khan (1985) note that empirical studies usually find the coefficients on both trend and cyclical components to be positive and significant and that there is some tendency for the cyclical elasticity to exceed the trend elasticity.

The models discussed so far have assumed that exports are homogeneous in terms of their responsiveness to foreign income and relative prices. The need for a disaggregated analysis of exports should however be considered. The price and income elasticities of various exports of course differ considerably. Manufactures, for example, are generally more responsive to price and income changes than are raw materials. Where elasticities differ widely across export products, the econometric estimation of a single equation for aggregate exports will be subject to a specification bias. The income coefficient, a2, in an aggregate-export equation such as 1, will be related in a complex way to the different income and price elasticities of all the individual products and will, in general, be biased. The aggregate price coefficient, a1, will be similarly determined by all the individual income and price coefficients of the different product types. Only under special conditions will the estimates of the aggregate income and price elasticities not be biased. (See Maddala (1977) for a summary of Theil's (1954) analysis of the relation between the parameters of the aggregate equation and those of disaggregated equations.)

The estimation of disaggregated equations is therefore recommended, though here the analyst will have to settle the trade-off between theoretical validity on the one hand and the costs of data collection, computation and model management on the other. The DRI model of the US economy, for example, divides exports into seven categories: food, feed and beverages; oil and petroleum products; industrial supplies and materials other than oil; capital goods except automobiles; automobiles; consumer goods; and other goods (DRI 1989). A simple disaggregated equation format might be:

$$1.3 \qquad x(i) = a0(i) + a1(i).(px(i) - pxw) + a2(i).yw.$$

The symbol (i) refers to commodity type i, with individual price and income elasticities still being measured against aggregate foreign prices, pxw, and aggregate foreign income, yw.

A more detailed approach will disaggregate the foreign variables as well. For example:

$$1.4 \qquad x(i) = a0(i) + a1(i).\,(px(i) - pxw(i)) + a2(i).Ew(i).$$

Ew(i) now refers not to aggregate foreign income but rather to foreign expenditure on commodity class (i), say consumer goods. In this case the home country's exports of consumer goods, x(i), depend on, first, the relation between the export prices of home consumer goods, px(i), and consumer goods prices in the rest of the world, pxw(i), and, second, on the total amount of consumer spending in the rest of the world, Ew(i).

Underlying this equation is an assumption that economic agents abroad employ a two-stage decision-making process. They first decide how much to spend on commodity (i) regardless of the national origin of its supply. This stage, which determines the quality Ew(i), is outside the scope of the current-account model being considered here. In the second stage, considered in equation 1.4, foreign purchasers determine, on the basis of relative prices, how much of Ew(i) to source from imports.

For exports of food and beverages, for example, the appropriate expenditure variable might be foreign consumer expenditure (Deppler and Ripley 1978) or, data permitting, foreign food consumption. Exports of capital equipment in this framework would be based on aggregate foreign investment in producers' durable equipment. In these two examples the relevant foreign expenditures are elements of final demand (consumption and investment). Industrial raw materials, on the other hand, are overwhelmingly used as intermediate inputs in production so that an index of foreign industrial production is likely to provide a better demand indicator.

The export-price equation

The export-supply equation 2 and its restatement as the price equation 2.1 have been less intensively studied than the export volume equation, 1.1. In practice it is often assumed that export supply is infinitely elastic with respect to export prices; this is implied when the export price, px, is modeled solely as a function of the domestic goods price, pd. One econometric advantage of this simplifying assumption is that the export-volume and price equations are no longer simultaneous, and so can be estimated by ordinary least-squares methods without fear of simultaneous-equation bias. Where higher prices are needed to induce greater supply, the less then perfectly elastic supply curve expressed in 2.1 should however be used. A number of estimation techniques (two-stage least squares, limited information maximum likelihood and others) are available to treat the econometric problems arising from simultaneity.

Some analysts have introduced a cyclical-income variable in equation 2.1 in addition to the trend domestic income variable, yd*:

$$2.2. \qquad px = b0 + b1.xs + b2.yd^* + b3.pd + b4.(yd - yd^*), b4 > 0.$$

While b2, the coefficient on the trend-income variable, is expected to be negative, that on the cyclical-income variable (yd-yd*) is expected to be positive. A cyclical domestic-demand expansion, it is argued, increases the profitability of producing for the home market beyond that captured in an increase in the domestic-goods price, pd. Less risk, marketing effort and inconvenience may be attached to domestic sales, for example. Other things being equal, a cyclical domestic expansion then requires a higher export price to induce a given export supply.

The measure of profitability in the export sector, (px-pd) in the supply equation 2, can also be treated in more detail. Moran (1988) introduces two relative price terms in his supply equation for manufactured exports: the price of all tradable goods, pt, relative to non-tradable goods, pnt, and the price of exports, px, relative to tradable goods. Both of these terms are assumed to have a positive impact on desired export supply. The advantage of this approach is that it does not artificially constrain these impacts to be identical. It results in a price equation of the form:

$$2.3 \qquad px = b0 + b1.xs + b2.yd^* + b3.pt + b4.(pnt - pt), b3, b4 > 0.$$

A practical problem with this approach is that price indexes of tradable and non-tradable goods are not commonly or promptly available.

It is sometimes noted that the export-supply function expressed in equation 2 is theoretically valid only where firms have no influence over price; that is, in the case of perfect competition or in that of prices supplied by a central planning authority. In situations of imperfect competition where the firm has some degree of control over price, there is no supply function defined independently of the demand function. The firm selects price to maximize profit in the light of demand conditions. A standard profit-maximization exercise (see, for example, Varian 1978, chapter 2) yields the optimal price as a markup on marginal cost, with the markup margin inversely related to the price elasticity of demand for the product. For example, the markup margin would be higher on goods whose market demand is inelastic relative to those with more elastic demand. Marginal cost will vary with the unit labor, raw material and other factor costs of inputs used in production. Marginal cost is usually presumed to rise with output, and therefore will also change with the factors underlying demand for output.

Recall that in the demand equation 1 the factors affecting export demand include foreign income, yw, and the foreign goods price, pxw. A rise in either of these foreign variables will increase foreign demand for home exports, and, by generating a higher level of marginal production cost, will result in a higher export price. A possible price equation is then:

2.4 $$\text{px} = \text{d0} + \text{d1.w} + \text{d2.r} + \text{d3.pxw} + \text{d4.yw}, \quad \text{d1, d2, d3, d4} > 0.$$

In equation 2.4, w is unit labor cost and r is an index of domestic rawmaterial costs. In the IMF trade model equation described by Deppler and Ripley (1978), the unit labor-cost term in the equation for manufactured-goods prices is further divided between trend and cyclical effects. It is possible to show that the greater the price elasticity of demand for home exports, the more will its price be determined by the external world price, pxw. In the limiting case of perfectly elastic demand (perfect competition or the perfect-substitutes model considered on page 63), the export price, px, will be determined solely by the foreign price, pxw. Conversely, the smaller the elasticity of demand, the more will the export price, px, be determined by domestic resource costs.

A similar price equation results when our initial price equation, 2.1, is expressed as a reduced form; that is, as a function only of the variables exogenous to the basic model set out in equations 1 to 3. Substituting 1, the expression for export demand, into the price equation, 2.1, and simplifying yields:

2.5 $$\text{px} = \text{e0} + \text{e1.pxw} + \text{e2.yw} + \text{e3.yd*} + \text{e4.pd}, \quad \text{e1. e2. e4} > 0\text{. e3} < 0.$$

Corker (1989) provides an example of an export-price equation similar to 2.5 in his model of Japan's current account balance. The significance of the explanatory variables in the general reduced form, 2.5, will vary according to the type of economy under consideration. The foreign price, pxw, may be more important than the domestic price, pd, in the case of small open economies which are likely to be price takers, and vice versa in the case of large economies with a low exposure to foreign trade.

Disequilibrium models

It may be that the equilibrium assumption that markets are cleared in every time period is inappropriate. In this case the equilibrium equation, 3, can be replaced by a dynamic adjustment mechanism that brings desired demand and supply into balance over the course of time. Different adjustment mechanisms imply quite different export-volume and price equations, even where the underlying structural equations of demand and supply are identical.

To demand equation 1 and supply equation 2, we now add, following Goldstein and Khan (1978), a dynamic volume-adjustment mechanism:

$$4 \qquad x(t) - x(t-1) = f.(xd(t) - x(t-1)), 0 < f < 1,$$

and a dynamic price-adjustment mechanism:

$$5 \qquad px(t) - px(t-1) = g.(x(t) - xs(t)), g > 0.$$

Equation 4 states that export volumes adjust to excess demand conditions in the foreign market. Only some proportion, f, of the gap between current demand abroad, xd(t), and the actual flow of exports in the last time period, x(t-1), is accomplished in any time period. This lag may be the result of rigidities in production such as some factor supplies being fixed in the short run. Restating 4 as:

$$4.1 \qquad x(t) = f.xd(t) + (1 - f).x(t-1),$$

and substituting for xd(t) from equation 1 yields the export-volume equation:

$$4.2 \qquad x(t) = h0 + h1.(px(t) - pxw(t)) + h2.yw(t) + h3.x(t-1), \quad h1 < 0, h2, h3 > 0.$$

The price-adjustment mechanism 5 postulates that prices adjust in response to situations of excess domestic supply. Prices adjust to equate desired supply, xs(t) to the actual output level x(t) determined in 4. Restating equation 5 as:

5.1 $px(t) = g.x(t) - g.xs(t) + px(t - 1)$,

and substituting for xs(t) from equation 2 yields the price equation:

5.2 $px(t) = j0 + j1.x(t) + j2.pd(t) + j3.yd^*(t) + j4.px(t - 1)$,
$j1, j2, j4 > 0, j3 < 0$.

Equations 4.2 and 5.2 are analogous to the volume and price equations 1 and 2.1 of the equilibrium model both in their form and in the signs of their coefficients, being distinguished only by the inclusion of the lagged terms x(t-1) and px(t-1).

Browne (1982) has criticized this model, stating that the assumed adjustment mechanisms in equations 4 and 5 are inappropriate to the circumstances of small open economies (SOEs). An SOE is likely to be more accurately described as a price taker than a price setter. In that case the assumption in 5 that price adjustment is determined by domestic-supply conditions is inappropriate. Rather, it is proposed that the export-price adjustment is based on excess demand in foreign markets and that export quantities then adjust to the desired supply determined by the export price. In this case the export-volume adjustment mechanism becomes: .

4a $x(t) - x(t - 1) = f'.(xs(t) - x(t - 1)), 0 < f' < 1$,

and the price-adjustment mechanism:

5a $px(t) - px(t - 1) = g'.(xd(t) - x(t)), g' > 0$.

Going through the same manipulations as in the previous example leads to an export-volume equation:

4.3 $x(t) = k0 + k1.(px(t) - pd(t) + k2.yd^*(t) + k3.x(t - 1)$,
$k1, k2, k3 > 0$,

and a price equation:

5.3 $px(t) = m0 + m1.pxw(t) + m2.yw(t) + m3.x(t) + m4.px$
$(t - 1)$,
$m1, m2, m4 > 0, m3 < 0$.

Export volume in 4.3 depends on domestic-supply conditions: it rises with the ratio of export to domestic prices, (px-pd), and with domestic production capacity or trend growth of GDP, yd*. The equation differs in form from the earlier export-volume equations (i.e. equations 1, 1.1–1.4 and 4.2), which were all based on foreign variables. Export prices in 5.3, by contrast, are based on foreign-demand conditions, rising with both foreign prices and income. This differs from the earlier export-price equations 2.1–2.5 and 5.2 which focused on domestic factors.

It is worth repeating that both this model (equations 4.3 and 5.3) and the preceding one (equations 4.2 and 5.2) are based on the same underlying export-demand and supply functions 1 and 2. The econometrically estimated coefficients of these two models both yield estimates of the structural parameters in 1 and 2. For example, if the adjustment mechanism in 4 and 5 is empirically appropriate, then the income elasticity of demand for exports, a2, in demand equation 1 is calculated from the estimated equation 4.2 as h2/(1-h3). If an SOE is being modelled, and assumptions 4a and 5a are used, then the same income elasticity a2 is calculated from the estimated equation 5.3 as m2/m3. For example, Browne (1982) finds the SOE assumptions empirically superior in the case of Ireland. Moran (1988) also studies the manufactured exports of 15 developing countries within an SOE dynamic adjustment structure.

Merchandise imports

The modeling of imports is in principle symmetrical to that of exports. A basic equation for import volumes, m, is thus:

$$6 \qquad m = a0 + a1.(pm - pd) + a2.yd, a1 < 0, a2 > 0.$$

In equation 6, which parallels the export- volume-demand equation 1, import volumes are positively related to real domestic income, yd, and negatively related to the ratio of import prices, pm, to domestic prices, pd. Because all the variables in equation 6 will be available as domestic data series the practical problems of data compilation will, however, be smaller than in the case of the export-volume equation, where the series for foreign income and foreign price had to be compiled from the data for several different foreign countries. Where appropriate, we may wish to separate domestic income into a trend component, yd*, and a cyclical component (yd-yd*), and following the argument for exports, we would expect the coefficients on both to be positive, and that on the cyclical component to be larger than that on the trend.

The modeling of disaggregated import types also follows the export equation 1.4 in form:

Imports of type i, m(i), depend on domestic spending on commodity

$$6.1 \qquad m(i) = b0(i) + b1(i).(pm(i) - pd(i)) + b2(i).Ed(i), \\ b1(i) < 0, b2(i) > 0.$$

type i, Ed(i), and on the relation of import prices and domestic prices for commodity i. It should be noted that in practice the procedure of using different types of final and intermediate demand measures in trade equations is more commonly used in import than in export equations. This is because the trade model is likely to be embedded in a macromodel of the domestic economy, where data on final and intermediate demand is readily available. For export equations, assembling data and forecasts of separate demand components for several foreign countries is a considerably more laborious procedure.

The modeling of import prices tends to be rather simpler than that of export prices. There are few countries so large that an increased supply of imports to them from the rest of the world economy requires an increase in the import price. That is to say, we can more reasonably assume that the supply of imports is perfectly elastic with respect to price. Import prices are therefore nearly always modeled as a simple function of foreign-export prices times the exchange rate:

6.3 $\quad pm = c0 + c1.pxw, c1 > 0,$

where pxw are rest-of-the-world export prices stated in local currency.

Merchandise trade: the perfect-substitutes model

The perfect-substitutes model is applicable to trade in products that are relatively homogeneous in quality and for which there is a single world-market price. It is typically used to model trade in agricultural products and other primary commodities. Since there is only one price, differences between domestic and foreign prices for the product cannot be a factor in determining export or import demand, as they are in the imperfect-substitutes model.

A simple perfect-substitutes model is as follows:

7.1 $\quad px(i) = pm(i) = pd(i) = pw(i).$

7.2 $\quad d(i) = a0 + a1.(pd(i) - pd) + a2.yd, a1 < 0, a2 > 0.$

7.3 $\quad s(i) = b0 + b1.(pd(i) - pd) + b2.yd^*, b1, b2 > 0.$

and

7.4 $\quad x(i) = s(i) - d(i), s(i) > d(i),$

or

7.5 $\quad m(i) = d(i) - s(i), d(i) > s(i).$

Equation 7.1 states that the export price of good i, px(i), its import price, pm(i), its price in the domestic market, pd(i), and its price in the world market, expressed in local currency, pw(i), are all the same. (The treatment clearly abstracts from taxes and subsidies which would lead to differences between the various price concepts.) The country, which is a price taker, can sell as much of good i as it desires in the world market at the given world price, pw(i). In other words, world demand for the country's output is perfectly elastic at price pw(i). The model explains only a single country's interaction with the world market and takes pw(i) as given.

Equation 7.2 determines total domestic demand d(i) for the good i. It is analogous in form to the demand function 1 in the imperfect-substitutes model. But where that equation determines foreign demand for our exports, this equation determines domestic demand for the product regardless of whether it is produced at home or abroad. For a consumer product, the demand function 7.2 states that demand falls as the good's own price, pd(i) (which equals pw(i)) rises relative to a general domestic price index, pd, and rises with real domestic income, yd. (Given the vast theoretical and empirical literature on demand theory, 7.2 is only meant to be indicative of a variety of specifications that could be used here.) If the good is a raw material used in production, 7.2 is interpreted as a factor-demand function that is inversely related to the factor price, pd(i), and positively related to industrial production, yd.

Equation 7.3 determines the domestic supply, s(i), of good i. It is analogous in form to the supply equation 2 in the imperfect-substitutes model. But where that equation determines the domestic supply of exports, this equation determines the total supply of the good regardless of whether it is to be consumed at home or exported. Supply, s(i), is positively related to the ratio of its own price to general domestic prices and to the trend level of income, yd*, which proxies production capacity. The rationale is identical to that for equation 2 and so is not repeated here.

If domestic supply, s(i), is greater than domestic demand, d(i), then the balance, x(i), is exported as in (7.4). If domestic demand is greater than domestic supply, as in equation (7.5), then imports, m(i), are the result.

Recent empirical applications of the perfect substitutes model include the analysis of energy imports in the DRI model of the U.S. economy (DRI1989). Energy imports, as in 7.5, are the excess of domestic energy demand over domestic energy production. Demand is disaggregated into various types of consumer and industrial demand for energy, which in turn depend, in essence, on the two factors noted in 7.2: the relative (or 'real') price of energy products and scale variables such as disposable income or industrial production, as well as specific factors such as weather temperature. As in 7.3 the different types of energy supplied depend positively on the price of energy products relative to general non-energy price indexes and to proxies for capacity. Oil imports in the IMF's Multi-region Econometric Model (MULTIMOD) follow the same approach except that oil production is exogenous. See Masson, Symansky and Meredith (1990). Another recent application is the OECD's Ministerial Trade Mandate (MTM) model of trade in eighteen agricultural products described by Huff and Moreddu (1989/90), which is used to analyze the impact of changes in public agricultural support policies in the OECD countries.

SERVICES AND TRANSFERS

With the models of the section on merchandise trade providing a framework, the issues specific to services and transfers are considered in this section. This section also treats international receipts and payments for the use of factors of production, such as capital and labor. These factor services require a modeling approach based on asset stocks and rates of return which differs from that appropriate to non-factor services.

Characteristics of services trade

Data on international trade in services, following the recommendations of the IMF in its *Balance of Payments Manual* (1977), are generally grouped under five heads: shipment; other transportation; travel; investment income; and other services. We begin by noting the content of these categories.

'Shipment' comprises freight, insurance and other distributive services, such as warehousing, packing, packaging and forwarding performed by the residents of one country on goods owned by the residents of another country. The IMF manual discusses several methods for compiling data on shipment receipts and payments and recommends:

> the compiling country: (a) to enter as credits all services performed by residents on its exports once these have been loaded on board the carrier at its custom frontier and (b) to enter as debits all services performed by foreigners on its imports once these have been loaded on board the carrier at the customs frontier of the country from which they are being exported.

This definition will be of relevance later in developing an appropriate forecasting model.

The main constituents of the 'other transportation' category are passenger services and port services. Passenger services provided by carriers of one country to residents of another comprise fares, goods and services which passengers purchase on board the carrier. Port services are the goods and services provided by one country for use by carriers of another country in their operations. Examples are fuel, ship provisions, repairs and maintenance, and harbor and airport charges of various kinds. Shipment and other transportation are sometimes merged in a general transport category.

'Travel' refers to the goods and services acquired by travelers from one country in another for their own use or as gifts. The rice bought by Japanese tourists in California is a US service export while an American businessman's Tokyo hotel bill is a US service import. Travelers are defined by the IMF as persons staying for less than a year in a country where they are not resident. The main exceptions to this definition are persons working for their own government in a foreign country and temporary laborers working abroad, these persons being treated in the 'other services' category considered below. Bond (1979), in her lengthy study of the treatment of services in the IMF's world-trade model, merges passenger services into the travel category, since, for analytical purposes, the two kinds of expenditures are likely to be closely related. (For the same reason she groups port services with shipment to create a freight transportation category.)

'Investment income' is the income of residents in one country from their investments in other countries. The main types of investment income are income from direct investments abroad, dividends and other formal distributions of earnings from overseas equity holdings, and interest on loans, deposits and debt securities abroad.

Income from direct investments abroad includes the share attributable to residents of one country in the undistributed earnings of incorporated enterprises in another country. The profits reinvested by Volkswagen in its Brazilian operation should thus show up as German direct-investment income. (Note that reinvested profits will also be recorded as an offsetting capital outflow on the capital account later in the balance-of-payments statement, something that is not necessarily true of dividend and interest flows.)

The last category, 'other services', is something of a portmanteau for a wide range of activities not covered elsewhere in the balance of payments. It includes transactions between embassies and other government agencies abroad with the residents of that foreign country. Wage payments to foreign employees by a US embassy or purchases of foreign goods and services by US diplomats or armed forces overseas would be treated as a service import under this head. Labor income earned by temporary workers from one country employed by residents of another country is included here; 'temporary' being defined as a period of less than one year.

Income from patents, copyrights and other intangible, non-financial assets is included in this category. Other services and transactions considered here include communications, advertising, brokerage, managerial services, professional and technical services and insurance other than for merchandise trade.

This survey of the diverse activities grouped under the rubric of services helps to identify some of the issues associated with forecasting services trade. The degree of diversity implies that no single model will be universally appropriate. In particular, income flows associated with what are called factor services, such as interest on capital employed abroad or wages from labor services performed abroad, will require a different modeling framework from expenditures on non-factor services such as shipment, other transportation, travel and most of the elements of the other services category. The analysis of factor income is based on rates of return to factors of production and the outstanding stocks of those factors, while that of non-factor services is usually treated within the imperfect- or perfect-substitutes frameworks used for merchandise trade. Within the non-factor services group, it will usually be appropriate (given the different motivations for the various kinds of expenditures) to estimate separate equations for transportation related to merchandise trade, passenger travel and other services.

Another consequence of this diversity, unlike merchandise-trade data which is based on the foundation of customs reports, is that services-trade data are pieced together from a variety of unrelated sources of differing quality which make greater use of estimates. Sources include reports by intermediaries such as banks and securities companies, questionnaires returned by shipping companies, multinationals and other entities involved in transactions with non-residents, administrative records, such as tax records, and sample surveys of such things as spending by tourists. Data on investment-income flows are sometimes estimates derived by applying information on market rates of return to estimates of stocks of assets abroad.[5] The possibility and extent of error are thus greater than with merchandise trade data and this will increase the standard errors of econometric model estimates.

In addition, most services data are available only in nominal or value form. Price deflators or indexes for services trade are not readily or frequently available for most countries. While specialized time series can be created for individual research studies, this is usually not feasible in a recurrent forecasting context. The use of proxy price series to deflate the value data introduces another potential source of inaccuracy. In sum, modeling services trade must of necessity be a more rough and ready exercise than is the case with merchandise trade.

Transportation, travel and other services

These components of services trade are usually modeled in the imperfect substitutes framework (see Corker (1989) for example). Transportation, defined here to include shipment and the port services component of ‘other transportation’, comprises services relating to the transportation of merchandise. Merchandise-trade flows are thus central in modeling transportation flows. Basic equations for exports and imports of transport services demanded might be, in logarithmic form:

8.1 $xsvt - pyd = a0 + a1.(x + m) + a2.(pyd - pyw), a1 > 0, a2 < 0.$

8.2 $msvt - pyw = b0 + b1.(x + m) + b2.(pyw - pyd), b1 > 0, b2 < 0.$

Nominal exports of transportation services, xsvt, deflated by an appropriate domestic-price deflator, pyd (the GNP deflator is sometimes used), are, first, a positive function of the total volume of goods exports and imports. Shipment receipts, the main component of transportation receipts, would, if the IMF recommendation quoted above were followed, refer to services performed by residents on the country’s goods exports and so only goods-export volume x would need to be included.

Port-services receipts refer however to services provided to nonresident carriers who may be carrying either exports or imports, and so the volume of goods imports is included as well. The second term in equation 8.1, the ratio of domestic to foreign price, pyd-pyw, attempts to capture the relative competitiveness of domestic to foreign carriers, though in practice we may well be using something as broad-brush as the ratio of the domestic to the foreign GNP deflator. Since a2 is negative, a rise in the domestic to the foreign GNP deflator is presumed to reduce the business secured by domestic carriers for a given amount of merchandise trade.

The treatment of payments for transportation services in equation 8.2 is quite symmetrical: nominal payments, msvt, deflated by pyw, the foreign deflator expressed in local currency, depend on the volume of goods exports and imports and on the relative competitiveness of foreign to local carriers. Having defined demand functions for transport service exports and imports, note that we do not attempt to define supply functions or price equations as we did for goods in equations 2 and 2.1. Since we are usually obliged to use broad price measures such as GNP deflators, the issue is moot. Such deflators will be exogenous to a model of the current account.

Travel is defined here to include goods and services purchased by travelers abroad and the passenger-services component of 'other transportation'. A possible model for exports and imports of travel is:

$$9.1 \qquad xsvtv - pcd = a0 + a1.yw + a2.(pcd - pcw), a1 > 0, a2 < 0.$$

$$9.2 \qquad msvtv - pcw = b0 + b1.yd + b2.(pcw - pcd), b1 > 0, b2 < 0.$$

These equations are identical in structure to the basic imperfectsubstitutes model equations for goods export and import demand. The nominal value of travel-service exports, xsvtv, deflated by the domestic-consumer-price index, pcd, is positively related to foreign real income, yw. It is also negatively related to the ratio of domestic consumer prices to pcw, an index of foreign consumer prices expressed in domestic currency. In equation 9.2, real imports of travel services, msvtv-pcw, are similarly related to domestic real income, yd, and to the ratio of foreign and domestic consumer prices.

We use consumer prices to deflate nominal values and for the relative price-competitiveness terms on the assumption that they are the most relevant to spending by travelers on goods and services. Since travel as defined here also includes passenger services, it may be appropriate to include also a term for the relative cost of domestic and foreign transportation services. It may also be appropriate to introduce some of the modifications to the basic imperfect-substitutes volume equation discussed above on page 55. Thus it may be useful to introduce a price term to capture third-country competition with the home country, (see equation 1.1 above), or to refine the income variable by using a trend or permanent-income variable where that is felt to be a more appropriate determinant of travel spending. Bond (1979), for example, uses permanent income defined as a geometrically declining six-period moving average of real GNP.

Other services are, as noted earlier, something of a residual category. There are three subcategories that may require separate treatment. Goods and services purchased by official agencies abroad are sometimes simply treated as exogenous. Where government purchases of this type are relatively fixed in real terms, as might be the case with a constant number of embassies abroad, the nominal value of expenditure may simply follow inflation trends in the main foreign stations and could be modeled as the product of a fixed real expenditure and a variable foreign price index. Where military expenditures abroad are significant it may be appropriate to link them to a country's overall domestic military budget.

Labor income of temporary workers is similar in substance to the remittances of workers who are employed abroad for more than a year and which are conventionally treated in the unrequited-transfers section of the balance-of-payments statement. The two are discussed together in the section on transfers below.

That still leaves a mass of additional ‘other services’, including income from patents and copyrights, communications, non-merchandise insurance, professional and technical fees and so on. It is sometimes possible to build highly specialized structural or time-series models of these various flows which are of interest to the participants in the relevant industries, as, for example, the detailed models of international telephone traffic built by telecommunications companies. Such resource-intensive and specialized efforts will, however, rarely be justified when the focus is on forecasting the current account as a whole. A more broad-brush approach in the imperfect-substitutes framework is usually adequate, resulting in equations similar to 9.1 and 9.2.

Investment income

With investment income we move away from the imperfect/ perfectsubstitutes framework that is used to analyze flows of tradable goods and services. Foreign-investment income is the return earned on an asset abroad and the forecasting approach is now in terms of rates of return abroad and at home, and of stocks of foreign assets and liabilities. A dynamic modeling consideration is introduced by the fact that a country’s net stock of foreign assets (gross foreign assets less gross foreign liabilities) is the cumulative sum of the current-account surpluses or deficits it has run in the past. These stocks of foreign assets and liabilities in turn determine flows of investment income, which themselves are constituents of services flows in the current-account balance.

The most compact approach to the problem is to consider only the net flow of investment income. The simplifying assumption here is that assets are homogeneous, so that intercountry and intra-country differences in asset risk, return, maturity and other characteristics can be ignored. Under this assumption a country would be either a creditor or a borrower, but not, as in fact is nearly always the case, both. Under these circumstances only the net foreign-asset position need be considered. In a practical modeling context it may sometimes be that the compactness and simplicity of the net flows approach outweigh the lack of realism the assumptions.[6]

Using upper-case letters to denote ordinary numbers rather than logarithms, a stripped down model of the net flow of investment income is the following:

10.1 NETSVII(T)=XSVII(T)-MSVII(T)=RR(T).NFA(T-1).

10.2 NFA(T) = NFA(T − 1) + CA(T).

In equation 10.1 the net flow of investment income in period t, NETSVII(T), which is the gross inflow XSVII(T) less the gross outflow MSVII(T), is equal to the net stock of foreign assets at the end of the previous period, NFA(T-1), times the average rate of return on net foreign assets in the period, RR(T). Equation 10.2 states that the change in the net foreign-asset position is equal to the current-account balance.

The rate of return realized on net foreign assets in period t, RR(T), is then econometrically estimated as a function of different relevant market-interest rates and yields in the current and previous periods. (Previous periods will be relevant where assets are yielding income at fixed interest rates. The empirical estimation of the rate of return is considered further below, when returns on different types of assets are considered.) While the net-flows approach is parsimonious in its data requirements, it is, as previously noted, unrealistic in its assumption that rates of return on assets and liabilities are the same and that the parameters of the gross-income inflow and outflow equations are also identical.

The gross flows approach does not make these restrictive assumptions. It assumes that assets are, in fact, heterogeneous, with a wide range of risk, return and other characteristics. If foreign and home assets have different characteristics, then there is a basis for domestic residents to both buy foreign assets and to sell domestic assets to foreigners (i.e. to acquire foreign liabilities). There are also many different types of foreign and domestic assets, but we delay considering that further level of complexity and start by differentiating only between gross foreign assets and liabilities:

11.1 XSVII(T) = RRW(T).GFA(T − 1).

11.2 MSVII(T) = RRD(T).GFL(T − 1).

11.3 [GFA(T) − GFL(T)] = [GFA(T − 1) − GFL(T − 1)] + CA(T).

The nominal inflow of investment income in period t, XSVII(T), is the product of the rate of return prevailing abroad in period t, RRW(T), and the country's gross stock of foreign assets brought forward at the end of the previous time period, GFA(T-1). The nominal outflow of investment income is similarly related to the domestic rate of return on foreign liabilities, RRD, and the gross stock of foreign liabilities, GFL. (For a small, price-taking country the domestic rate on foreign liabilities, RRD, may simply equal the foreign rate, RRW, say the six month LIBOR

(London interbank offered rate) rate, plus a risk premium.) Equation 11.3 restates 10.2, that the change in the net foreign-asset position over the current period is equal to the current-account balance in the period, CA(T).

As it stands the model is not yet closed. Equation 11.3 is rewritten:

11.3.1 $[GFA(T) - GFA(T-1)] = [GFL(T) - GFL(T-1)] + CA(T).$

It can be seen that we need another rule to determine the change in either gross assets (capital outflow) or gross liabilities (capital inflow).

The simplest course might be to determine changes in either assets or liabilities exogenously. For example, if changes in liabilities are set exogenously, then the current account balance will determine the path of assets. This is not always as unrealistic a course as it may at first sight seem. For some developing countries, notably those in Africa and some in South Asia, official foreign-exchange reserves are the main form of foreign asset, while loans from foreign public-sector creditors are the main type of foreign liability. If the amount of loans from creditors is set exogenously, based, say, on foreign-aid budgets, the borrower's credit record and an evaluation of the political importance of the borrower to the lender, then 11.3.1 yields the implied change in foreign reserves.

Alternatively the change in foreign reserves could be derived from a simple rule such as maintaining reserves at a certain number of months' worth of goods imports. This would yield the foreign borrowing needed for a given current-account balance. The alternative to exogenous determination of either gross capital outflows or inflows is to estimate a behavioral relationship for one of them. Using a portfolio-balance approach, for example, the stock of gross foreign assets could be modeled as a function of the country's total stock of wealth (both domestic and foreign), and variables such as asset yields at home and abroad, expected changes in the exchange rate, risk premia and institutional factors such as tax rates and controls on foreign-exchange and capital movements. But, since the modeling of flows on the capital account of the balance of payments is beyond the scope of this article, we do not pursue it here. (See Krueger 1983 or Niehans 1986, among others, for more on models of the capital account.)

A more detailed analysis of investment income will differentiate between different types of gross income inflows and outflows. A typical breakdown is between private direct investment abroad, other private holdings of financial capital, such as stocks, bonds, and long and short-term loans, and official investment income from abroad, such as that on official foreign-exchange reserves. As with the preceding and more aggregate models, the starting point in modeling the inflow of, say, direct-investment income, XSVIIDI, is the identity that it is the product of the gross stock of direct-investment assets held abroad, GFADI, and a foreign rate of return on those assets RRWDI:

12.1 $$\mathrm{XSVIIDI(T) = RRWDI(T).GFADI(T-1).}$$

The rate of return on direct-investment assets is hypothesized to depend on the rate of real economic growth and the rate of inflation abroad. Reverting to lower-case letters for logarithms, the following equation could be estimated:

12.2 $$\mathrm{rrwdi(t) = a0 + a1.(yw(t) - yw(t-1)) + a2.(pyw(t) - pyw(t-1)),}$$
$$\mathrm{a1, a2 > 0.}$$

Lagged values of the growth and inflation terms will usually be necessary in quarterly models. Bond (1979) varies this model somewhat by replacing overseas inflation with the long-run rate of interest abroad, which should, in part, reflect overseas inflation. The equations for direct-investment income outflows, MSVIIDI, will follow the same basic format, but can usually be more richly detailed because of the greater availability of detail on conditions of domestic profitability. More detail can be introduced to capture the specific characteristics of a country's direct investment liabilities. For example, direct-investment outflows from a country with heavy foreign investment in a large primary-commodity-producing sector may well be closely correlated with the international primary-commodity price cycle.

Investment-income inflows on financial capital holdings abroad such as bonds, loans and stocks, XSVIIFC, are, as in equation 12.1, the product of the stock of financial capital brought forward and the rate of return on such capital abroad, RRWFC. Given the types of assets being considered, RRWFC is regressed on current and lagged values of foreign short- and long-term interest rates and foreign-dividend yields. Sometimes only foreign interest rates are used, reflecting the preponderance of bond and loan holdings over stocks in overseas portfolios.

The rate of return on foreign holdings of financial capital in the home country, RRDFC, can similarly be modeled on domestic short- and long-term interest rates and dividend yields. In the DRI US model, for example, the rate of return is a function of current and lagged values of the yield on three- and twelve-month treasury bills, the yield on ten year treasury bonds and the dividend yield on the S&P 500 stock index (DRI 1989). For developing countries in particular, the domestic rate payable on foreign financial liabilities will, as noted above, be simply equal to the foreign rate plus a risk premium. Thus the interest rates payable on LDC debt are typically modeled as a function of the six-month LIBOR rate, and various other industrialized country interest rates and bond yields.

Finally, official investment income inflows will usually be modeled in a similar way, as the product of the stock of official reserves and an econometric estimate of the rate of return on official reserves.

Unrequited transfers

Most entries in the balance-of-payments statement refer to transactions where one economic value has been exchanged for another. Unrequited transactions differ from such exchanges in that 'one transactor provides an economic value to another transactor but does not receive a quid pro quo [they] are transactions stemming from noncommercial considerations such as family ties, or legal obligations, that induce a producer or owner of real resources and financial items to part with them without any return in those same forms.' (IMF 1977).

Unrequited transfers are classified as either private or public. In the former case the donor and the recipient are both private residents. In public transfers one or both parties are official entities.

Public transfers refer for the most part to inter-government transactions such as subsidies, foreign-aid grants, voluntary cancellations of debt, indemnities or reparations imposed under peace treaties and contributions to international organizations. They also refer to transfers between the government of one country and private residents of another, such as scholarships, prizes, fees for fishing rights and so on. Public transfers are usually treated as exogenous in current-account models.

When private unrequited transfers are important in a country's current-account flows, they are usually comprised in large part of workers' remittances. Workers' remittances differ from the labor income of temporary workers noted in the 'other services' category above only in that they refer to remittances from people working abroad for more than a year. They are an important source of foreign-exchange receipts for a number of countries, such as India, Pakistan, Bangladesh, Sri Lanka, Egypt, Jordan and Yemen, which service labor demand in Saudi Arabia and the Gulf, as well as for countries providing labor to Western Europe such as Poland, Turkey, Greece, Portugal, Yugoslavia and the countries of North Africa.

We assume for simplicity that the supply of migrant labor from the labor-exporting country is perfectly elastic at the wage being paid in the labor-importing country. (This is not unrealistic for many of the labor-surplus countries mentioned in the preceding paragraph.) Attention can then be focused on the demand conditions in the labor-importing country. A country's inflow of workers' remittances will depend on the total earnings of its workers in the foreign country. These earnings will depend on the number of workers abroad and the average wage they are paid, which in turn will depend on employment conditions abroad. A simple model would thus relate remittance inflows to total employment and wage rates abroad.

The portion of overseas earnings remitted home may also depend on some domestic variables. For example if a devaluation of the home currency is expected, workers abroad may delay remitting earnings until after the devaluation. Bond (1979) found the ratio of the official to the black-market exchange rate, a measure of expected currency depreciation, to be significant in explaining remittances into Italy, for example. A weakening of domestic economic growth may lead to an increase in remittance inflows from workers already abroad who are concerned to support their families, as well as an increase in the number of workers going abroad. For example, we find remittance inflows into Turkey to be positively correlated with employment and wages in Germany and negatively correlated with the previous year's rate of economic growth in Turkey. There will also be a need for dummy variables to capture changes in laws on immigration and the taxation of overseas earnings, as well as to reflect discrete shifts in the supply or demand for labor arising from political events, the flight of workers from Kuwait and Iraq in 1990 being a prime example.

Typically, the foreign employing countries provide inadequate data on their own employment and wage conditions as for example, is the case with the Gulf countries.

Broader proxies for demand conditions may then be necessary. The level of real GDP in the Gulf countries and the world price of oil, which largely determines their foreign-exchange resources, can be used as explanatory variables for Indian remittance inflows, for example. When the object is to model private unrequited transfer inflows generally (i.e. without focusing on workers' remittances), the level of nominal GDP abroad is probably the best single explanatory variable. Private-transfer outflows would then depend on nominal domestic GDP.

CONCLUDING COMMENTS

The variety of models appears to increase as current-account flows are studied at more disaggregated levels. However, this diversity is more apparent than real, arising chiefly from the need to select explanatory variables that are appropriate to the diverse market conditions associated with different commodities and services. All the models discussed belong, however, to one of three basic types.

The perfect- or imperfect-substitutes models are used to forecast flows of goods and non-factor services. The perfect-substitutes model is appropriate where there is a common world price for a commodity or service that is homogeneous in quality. It is unlikely, for example, that the difference between Saudi and Texas oil prices is an important determinant of US oil imports. Foreign trade is viewed as the difference between domestic supply and demand at the prevailing world market price. The focus is on modeling aggregate domestic supply and demand curves for the product or service rather than on specific supply and demand functions for exports and imports. World demand for home exports of the homogeneous good or service is perfectly elastic at the given international price, while, if we are importing it, world supply is also perfectly elastic at that price.

In the more widely used imperfect-substitutes model, on the other hand, the demand for exports and imports depends on differences in price between imperfectly substitutable domestic and foreign output of the same product or service, as well as on activity variables such as income. US exports of tractors or tourism are here presumed to be affected by the relationship between US prices for these goods or services and foreign prices for the same. Finally, flows of factor services, and investment income flows in particular, are modeled as the product of rates of return and asset stocks.

The choice and specification of an appropriate model will also be influenced by pragmatic considerations such as the amount and quality of data that are available at an acceptable cost, and the resources that are available to manage and use the model once it is built. For many developing countries important data sets such as the national income accounts or the balance of payments comprise fewer than thirty annual data points. The paucity of data frequently extends along other dimensions such as the lack of split between real volumes and prices or the absence of breakdowns by commodity sectors. It may be possible to construct more complete data sets by further basic research. But the costs of such work make it more likely in a one-off analytical research project than in a recurrent forecasting context. Data constraints will thus often require the adoption of simpler model structures than would be ideally desirable.

The rapid augumentation of computing power in recent years means that computational cost is no longer the restraint on model size and complexity that it once used to be.

The same cannot be said of human intervention; the amount of the analyst's time that has to be devoted to model formulation, construction and validation, to forecasting, evaluating forecast results, making judgemental adjustments to forecasts, updating of historical data sets and re-estimation of models grows at least linearly with the size of the model. The human element and the available budget are thus equally influential factors in the choice of an appropriate model.

APPENDIX: VARIABLE LISTING

ca	Current-account balance.
d(i)	Domestic demand for good i-real.
e	Exchange rate in local currency units per foreign unit.
Ed(i)	Domestic expenditure on good i-real.
Ew(i)	Foreign expenditure on good i-real
gfa	Gross foreign assets-nominal.
gfl	Gross foreign liabilities-nominal.
gfadi	Gross foreign direct-investment assets-nominal.
m	Volume of merchandise imports-real.
msvii	Service imports-investment income-nominal.
msvt	Service imports-transportation-nominal.
msvtv	Service imports-travel-nominal.
netsvii	Net investment-income balance-nominal.
nfa	Net foreign assets-nominal.
pcd	Domestic price index for consumer goods.
pcw	Foreign price index for consumer goods, in local currency.
pd	Price index of domestically produced goods.
pd(i)	Domestic price index of good i.
pm	Price index for merchandise imports.
pm(i)	Price index for merchandise imports of good i.
pnt	Domestic price index for non-traded goods.
pt	Domestic price index for traded goods.
pw(i)	International price of homogeneous good i, in local currency.
px	Domestic-goods export-price index.
pxc	Export-price index of third-country competitors in foreign market.
px(i)	Domestic-export-price index for good i.
pxw	Foreign-export price, in local currency.
pxw(i)	Foreign-export price of good i, in local currency.
pxw*	Foreign-export price, in foreign currency.
pyd	Domestic GNP deflator.
pyw	Foreign GNP deflator, in local currency.

r	Domestic raw-material cost index.
rr	Average rate of return on net foreign assets.
rrd	Average rate of return on gross foreign liabilities.
rrw	Average rate of return on gross foreign assets.
rrwdi	Average rate of return on gross foreign direct-investment assets.
s(i)	Domestic supply of good i.
w	Domestic unit-labor-cost index.
x	Volume of merchandise exports-real.
xd	Volume of merchandise exports demanded-real.
x(i)	Volume of exports of good i-real.
xs	Volume of merchandise exports supplied-real.
xsvii	Service exports-investment income-nominal.
xsviidi	Service exports-direct-investment income-nominal.
xsvt	Service exports-transportation-nominal.
xsvtv	Service exports-travel-nominal.
yd	Domestic income-real.
yd*	Trend domestic income-real.
yw	Foreign income-real.
yw*	Trend foreign income.

NOTES

1 We could introduce into the model an identity for the foreign-export price in local currency.

3.1 pxw=pxw*+e,

where pxw* is the foreign-export price in foreign currency and e is the exchange rate expressed as local currency units per foreign-currency unit, all the variables continuing to be expressed in logarithms. A depreciation of our currency—an increase in e—thus increases the foreign price in our currency, and, following equation 1, makes our exports more competitive. Equation 3.1, or its equivalent, is always included in actual models of the current account because it introduces the exchange rate as an explicit variable. We omit it from this exposition for compactness, but all references to changes in foreign prices (expressed in local currency) should be understood as deriving from either a change in the exchange rate or a change in foreign prices (expressed in foreign currency).

2 The trend of real GDP is commonly obtained by regressing the logarithm of real GDP on a time trend.

3 The Group of Seven consists of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.

4 The omission of third-country competition where it is significant would worsen the fit of the model (R^2) and may also bias the coefficients a1 and a2 in equation 1. In particular, if the competition terms (px-pxw) and (px- pxc) are

positively correlated, then the omission of the (px-pxc) terms will bias the a1 coefficient on the (px-pxw) term upwards.

5 The types of compilation systems for services data and the possible sources of error are discussed in the IMF's *Report on the World Current Account Discrepancy* (IMF 1987).

6 The theoretical underpinnings of the net-flows model are discussed at length in Niehans (1986).

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4 External financing and debt analysis

Gregory B.Fager

INTRODUCTION

The emergence of the international debt problem in the early 1980s focused considerable attention on the effectiveness of country-risk analysis. External creditors have often been criticized for extending cross-border loans without properly assessing a borrowing country's future debt-servicing capability. But country-risk analysis was poorly focused and included diverse techniques, tailored to individual tastes and prejudices, that often lacked clarity and predictive value. A common pitfall was the tendency to reduce the analysis to a uniform matrix of indicators or simple set of ratios that attempt to assess creditworthiness by comparing debt and debt-service payments with economic performance. This paper presents a new approach to estimating the balance of payments that is specifically tailored to external financing and debt analysis of developing countries. The effectiveness of this approach in documenting emerging balance-of-payments pressures is then demonstrated by reviewing economic conditions in Indonesia and India during the 1980s.

ANALYTICAL PROBLEMS

The most serious obstacle to country analysis is the use of the commonly accepted balance-of-payments presentation that records liability flows on the capital account by type of borrower.[1] While this classification may provide useful information for economic analysis of developed economies, it is less suited for documenting the particular institutional and economic factors that govern the external payments of developing countries. In these countries, the distinction between various borrowers is often blurred by the prominence of the public sector. In many cases, the domestic banking system and the public sector enterprises conduct external relations under the direction of the central authorities. This means that a large share of transactions on the capital account can often be driven by explicit policy actions of the government rather than by market forces.

The usefulness of the traditional balance-of-payments presentation for country analysis is also hampered by the prevalence of rescheduling agreements. The direct assumption of external obligations by the central authorities or the extension of foreign exchange guarantees on private sector obligations further blurs the borrower classification. Documenting the impact of rescheduling agreements (including the rescheduling of previously rescheduled debt, the maintenance or rescheduling of short-term trade and interbank lines, and the treatment of payments arrears) within this framework have proven to be cumbersome and often incorporated in the official balance of payments only after a long lag.

The availability and accuracy of relevant economic information present serious challenges to any approach to country analysis. The capacity of governments to collect and disseminate information varies considerably across countries, and economic time series are often inconsistent and unreliable. These problems are apparent in advanced economies where vast bureaucracies are devoted to the collection and preparation of data, but they are often monumental in the less developed countries where data collection is given a much lower priority. Overcoming these shortcomings and managing with limited and often conflicting information is a central, although under-appreciated part of country analysis. Use of national sources is fundamental to the analysis. Independent or third-party sources play a vital role, although this information must be thoroughly scrutinized.

METHODOLOGY FOR ASSESSING CREDITWORTHINESS

The methodology for assessing creditworthiness must address these special circumstances of the debtor countries. It must cope with the inherent statistical problems and identify the key factors that determine a country's current and projected near-term external payments position. A country is creditworthy if its demand for external financing does not exceed the available supply. The demand for external financing integrates appraisals of the domestic economy, government policies and the external accounts. The supply of external financing is determined by the actions of the external creditors. It is the interrelationship of these forces that determines the external financing profile of the debtor country and its debt-servicing capabilities. But developing countries are capital importers and typically face external financing constraints. The significance of this interrelationship has been clearly illustrated by the debt crisis: countries that relied heavily on external resources to promote development and growth faced balance-of-payments constraints when their creditworthiness became questionable and the external creditors became reluctant to provide new credits and refinance maturing obligations.

REDESIGNING THE CAPITAL ACCOUNT

Documenting a country's external payments position for this analysis can be accomplished by redesigning the capital account to classify external financing flows by source of creditor rather than by resident borrower as is the case in the traditional balance of payments. In this respect, the key issue in country-risk analysis is less related to who is doing the borrowing from within the country than it is to who is supplying the financing from outside the country and in what amounts. This approach allows for a clear presentation of the roles of the individual creditors which is necessary to determine the available supply of external financing.

The supply of external financing available to a country includes debt-creating liability flows and non-debt-creating asset transactions. In documenting liability flows, it is important to distinguish between official and private creditors. Official creditors include the IMF, the World Bank, other multilateral agencies (such as the Inter-American Development Bank and the Asian Development Bank), and the export credit agencies of the creditor governments (including both direct and guaranteed lending programs). Private creditors include the commercial banks and non-bank suppliers. The roles of each of these creditors can vary significantly over time and can, in part, reflect the external payments performance of the debtor country.

For countries that have rescheduled or postponed repayment of maturing obligations, the actions of the various creditors are governed by moratoria, bilateral agreements, or the accumulation of interest arrears. In some cases, the contributions of the various creditors is determined as part of an IMF-supported concerted lending program. Even for those countries that have not rescheduled maturing obligations and have retained access to the international capital markets, despite the recent debt problem, the activities of the individual creditors can be interdependent; a debtor country's relationship with the IMF and the World Bank, or the cover policies of the official export credit agencies, can influence commercial bank lending.

It should be noted that in this approach IMF flows are treated as contractual obligations extended by an external creditor rather than as a reserve movement below the line or outside the capital account. In addition, this approach is directed at documenting total resource flows and no distinction is made between general or balance-of-payments financing and trade or project-related credits.

Non-debt-creating asset transactions are also included in the capital account. Equity investment is classified as this type of transaction, although it is usually only a small part of total financing in debtor countries. In contrast, non-reserve asset transactions by the resident official and non-official sectors often make up a large and volatile component of the capital account. These flows include resident export financing and external asset transactions by domestic deposit money banks, state enterprises as well as the private sector. Net transactions involving monetary gold and official foreign-exchange reserves are also included as part of the debtor country's external financing.

The demand for external financing is a function of a wide range of factors that determines a country's ability to generate and spend foreign exchange or hard-currency earnings. Natural physical and human endowments and the structure and development of the manufacturing and agricultural sectors are examples of a country's basic economic characteristics that influence external trade and service flows. But estimating the demand for external financing integrates these characteristics with appraisals of monetary, fiscal and exchange-rate policies.

The external payments profile of a debtor country is obtained by matching the supply and demand for external financing. This approach does not allow for gaps in financing, and a mis-match between *ex ante* demand and supply must be financed by additional funds from external creditors, a drawdown of official international reserves, or eliminated by policy measures taken by a debtor country designed to conserve the use of foreign exchange. The failure of any one or some combination of all of these to occur means that the country will experience a shortage of foreign exchange and the financing gap will be closed *ex post* by an interruption in debt-service payments.

External debt

Constructing the capital account to document creditor flows provides a direct link between external financing and debt. Since the terms and conditions of external loans vary considerably among the external creditors, it is essential to document the level and change in external debt owed to each creditor properly to forecast future debt-service payments. For example, the tenor of foreign bank loans is determined by market conditions, but a large share of the loans from official creditors are made at below-market rates and have long repayment schedules.

Accounting for external debt in dollar terms adds a complicating factor to the analysis. Since not all external debt is actually denominated in dollars, external debt can also change as a result of fluctuations in exchange rates. If the dollar depreciates (appreciates) against the other currencies in which debt is denominated, the dollar value of that debt will increase (decrease). This 'valuation effect' on debt owed to foreign banks is likely to be relatively small, since a large share of this debt is typically denominated in dollars. But the valuation effect on debt owed to official creditors is likely to be relatively large since a large share of this debt is denominated in non-dollar currencies. For example, debt owed to the IMF is entirely denominated in Special Drawing Rights (SDRs). Debt owed to official bilateral creditors is often denominated in the home currency of the government extending the external credits. The currency composition of debt owed to the International Bank for Reconstruction and Development (IBRD), however, changes annually. Debt and debt-service payments owed to the IBRD are revalued annually based on a basket of currencies determined by its funding sources.

The link between external financing flows and external debt also helps overcome some of the data limitations that exist for the debtor countries. The official exchange record of a debtor country that is used to construct the balance of payments is often incomplete or publicly available after only a long time lag. Debt statistics, however, tend to be more current and more accurate. Therefore, historical annual net external financing flows are estimated from the change in the end-year debt stock owed to each creditor, adjusted for the dollar valuation effect. For the current period and near-term outlook, external financing inflows are determined by prevailing debtor-creditor arrangements. These net flows and the dollar-valuation effect are added to the stock of debt owed to each creditor at the end of the previous year.

Most countries publish external debt statistics and these can be checked against the statistics reported by the Debt Reporting System (DRS), which is compiled from borrowing country sources, and the Creditor Reporting System (CRS), which is compiled from lending sources.[2] A key DRS source that is published annually with quarterly updates for select countries is the IBRD, *World Debt Tables*. This publication includes medium- and long-term debt that is made directly to or guaranteed by the public sector of the borrowing country. Debt and debt-service payments owed to the international multilateral organizations, including the IMF and the IBRD, can also be obtained from this source. Only part of the debt and debt-service payments owed to bilateral creditors, however, can be obtained from this source. This publication explicitly accounts for direct government-to-government debt, but includes debt arising from guarantees extended by the official export-credit agencies as part of debt owed to commercial banks and other private creditors.

Debt owed to official bilateral creditors under guarantee programs can be obtained from the CRS. This debt is reported to the OECD by the official export-credit agencies and published semi-annually in the OECD/BIS, *Statistics on External Indebtedness*. This publication includes debt owed to commercial banks by country of residence and specifically identifies that portion of debt that has been extended by banks under a guarantee program and is actually owed to official bilateral creditors. (In the case of non-payment, commercial banks claim the guarantee and the debt is converted to government-to-government debt.) Historical debt and debt-service payments by this creditor classification are published annually in the OECD, *Financing and External Debt of Developing Countries*. The CRS provides more up-to-date information than the DRS on debt owed to the IMF in the monthly publication by the IMF, *International Financial Statistics* (IFS). The IFS also lists the facility on which IMF loans have been drawn to determine the debt-servicing obligations. More current information in the CRS on disbursements and debt owed to the IBRD is published quarterly in the IBRD, *Statement of Loans*.

The CRS also provides information on commercial bank claims on borrowing countries that are published by the Bank for International Settlements quarterly in *International Banking and Financial Statistics* and semi-annually in *The Maturity and Sectoral Distribution of International Bank Lending*.[3] The quarterly publication includes the offshore banking centers and is more inclusive than the semi-annual publication. However, the semi-annual publication includes claims by maturity so that short-term and long-tern bank claims can be identified. For both publications, however, debt owed to banks is by country of residence and not by country of guarantor and must be adjusted for guarantees extended by third-party governments. More importantly, the BIS data is reported bank claims on a country and is not strictly debt owed to banks. For countries that have not rescheduled debt, reported bank claims and debt owed to banks are similar. But for countries that have rescheduled debt, reported bank exposure or claims can often differ considerably from actual debt owed to banks. This difference may result from banks' provisioning for nonpayment of debt service, write-offs, debt-equity swaps and secondary-market sales at discounts from the face value.

The official exchange record can be used to document non-debt-creating transactions on the capital account.[4] Direct investment is an example of this type of transaction, although it is important to include only net equity flows and not loan capital which is captured in the debt statistics. The official exchange record also includes non-reserve external asset transactions of the deposit money banks, and resident official and non-official sectors of the developing country. These transactions are documented as resident lending abroad in the redesigned capital account with an increase (decrease) in net external assets held abroad treated as an outflow (inflow). For most developing countries, non-reserve asset transactions are dominated by the activities of the deposit money banks and can be influenced by domestic monetary conditions, interest-rate differentials and exchange controls. An indication of more current transactions of the deposit money banks can be obtained from the IMF's, *International Financial Statistics*. The IFS documents outstandings of both external assets and liabilities of deposit money banks, although calculating the flow resulting from the change in outstandings requires an estimation of the currency composition to exclude the valuation effect. The official exchange record and the IFS can also be used to document the net official reserve transactions, although the use of stocks in the IFS to document these also requires an adjustment that excludes the valuation effect.

This approach to country analysis will be demonstrated by reviewing trends in domestic economic conditions and the external accounts in Indonesia and India during the 1980s.

CASE STUDY: INDONESIA

Indonesia is a heavily indebted developing country that did not suspend debt-service payments or reschedule external debt during this period despite severe strains in its external payments position. In 1985, the oil sector accounted for almost 70 per cent of total merchandise exports (similar to that of Mexico which did reschedule its external debt). The sharp decline in the world oil price in 1986 reduced the value of total exports by $4 billion to $14 billion. This contributed to an increase in the current account deficit, and the country's demand for net new external financing, from $2.3 billion in 1985 to $4.2 billion in 1986 (table 4.1).

In addition to an increase in the current account deficit, the demand for external financing was boosted by the country's large amortization payments due on external debt and by unrecorded capital outflows (i.e.

Table 4.1 Indonesia: current account balance (billions of dollars)

	1985	1986	1987	1988
Trade balance	5.8	2.3	4.7	5.7
Exports, f.o.b.	18.5	14.4	17.2	19.5
(Oil)	(8.3)	(8.6)	(7.7)	(12.7)
Imports, f.o.b.	−12.7	−11.9	−12.5	−13.8
Balance on services, income and transfers	−8.1	−6.7	−7.0	−7.1
Receipts	1.6	1.6	1.6	1.9
Payments	−9.8	−8.5	−8.8	−9.2
(Interest)	(−2.5)	(−2.8)	(−3.0)	(−3.3)
Net transfers	0.1	0.3	0.3	0.3
Current account balance	−2.3	−4.2	−2.3	−1.4

Source: The Institute of International Finance, *Country Database*

negative errors and omissions), which surged in response to the uncertain economic outlook. The available supply of external financing was insufficient to cover the increased demand, and the difference was covered by a $3.3 billion drawdown of official international reserves. By the end of 1986, official reserves had fallen to $4.6 billion, equivalent to less than three months' imports of goods and services. The use of official reserves was a short-term solution to the supply-demand imbalance, but that rate of reduction meant that they would have been depleted before the end of the following year. Moreover, the forecast at the time for total debt-service payments in 1987 amounted to $7 billion, equivalent to 42 per cent of projected exports of goods and services and considered to be exceptionally high.

Indonesia met its contractural debt-service obligations in 1987, despite the difficult external-payments position and relatively high debt-service ratio. This successful performance was the result of a shift in government policies designed both to reduce the demand for external financing and to raise the available supply. Demand-reducing policies centered on a maxi-devaluation of the exchange rate. The exchange rate was devalued in real effective terms by 23 per cent in 1986 and by 26 per cent in 1987 (Table 4.2). The effectiveness of exchange-rate policy was reinforced by restrictive credit policies that slowed the growth in reserve money from almost 22 per cent in 1986 to less than 11 per cent in 1987. In addition, restraints on government spending lowered the government budget deficit from 3.4 per cent of GDP in 1986 to less than 1 per cent in

Table 4.2 Indonesia: policy indicators and economic growth (% change from previous year)

	1986	*1987*	*1988*
Policy indicators:			
Real effective exchange rate	−22.9	−26.4	−4.7
Reserve money	21.6	10.6	−7.2
Government budget deficit % GDP	3.4	0.7	3.4
Economic growth:			
Real GDP	5.9	4.9	5.7
Real domestic demand	3.3	1.8	1.5
Change in net foreign balance % GDP	2.5	3.2	4.3

Source: The Institute of International Finance, *Country Database*

1987. The shift in economic policy helped restrain domestic demand and shift resources to the external sector. Growth in real GDP slowed from 5.9 per cent in 1986 to 4.9 per cent in 1987, but growth in real domestic demand slowed from 3.3 per cent to 1.8 per cent, respectively. In contrast, the contribution to growth from the change in the net foreign balance increased from 2.5 per cent of GDP in 1986 to 3.2 per cent in 1987. This economic adjustment helped lower the current account deficit by $2 billion in 1987 to $2.3 billion, sharply reducing Indonesia's demand for net new external financing.

At the same time, the government sought additional inflows of external financing. Increased lending by official creditors in support of the government's adjustment program significantly strengthened the country's external payments position during this period. Indonesia did not receive external financing from the IMF in 1986, but drew $0.6 billion in net new credits under the Compensatory Financing Facility in 1987 (table 4.3). Net financing from other official multilateral creditors rose from $0.8 billion in 1986 to $1.3 billion in 1987 in part as the result of disbursements from a $0.3 billion trade-adjustment loan provided by the IBRD.

More importantly, the Intergovernmental Group for Indonesia (IGGI), which is the official aid and credit consortium, increased commitments from $2.6 billion in 1986 to $3.2 billion in 1987. A large share of the disbursements of these commitments was made under the IGGI's Special Assistance Facility, which provided quick-disbursing, untied financial credits. These credits, which included $0.9 billion from the Export-Import Bank of Japan, were directed at budgetary support to ensure that local counterpart funds would be available for external

Table 4.3 Indonesia: external financing (millions of dollars)

	1985	*1986*	*1987*	*1988*
Current account balance	−2,292	−4,232	−2,282	−1,397
Equity investment, net	310	258	385	576
Net external borrowing	307	1,505	3,595	2,640
IMF	−385	0	598	−56
Disbursements	0	0	598	0
Repayments	−385	0	0	−56
IBRD	612	579	1,004	1,219
Disbursements	739	810	1,360	1,648
Repayments	−127	−231	−356	−429
Other multilateral creditors	179	196	315	483
Disbursements	212	238	367	551
Repayments	−33	−42	−52	−68
Official bilateral creditors[1]	998	−162	1,028	639
Disbursements	2,257	1,100	2,649	2,245
Repayments	−1,259	−1,262	−1,621	−1,606
Commercial banks[2]	−690	357	209	106
Disbursements	830	1,482	1,920	2,143
Repayments	−1,520	−1,125	−1,711	−2,037
Other private creditors	−407	535	442	249
Disbursements	43	1,116	1,104	1,030
Repayments	−450	−581	−662	−781
Resident lending abroad, net	−604	1,853	1,211	323
Export financing	165	1,305	944	443
Deposit money banks	−769	−548	−267	−120
Errors and omissions, net	1,389	−2,675	−1,618	−2,562
Reserves excluding gold, net (− = increase)	890	3,290	−1,292	−420

1 Includes bank loans guaranteed by official creditors
2 Excludes bank loans guaranteed by official creditors

Source: The Institute of International Finance, *Country Database*

project financing provided by the IBRD and other official creditors. As a result, the official bilateral creditors received $0.2 billion in net repayments in 1986 but provided over $1 billion in net inflows in 1987, despite an increase in amortization payments.

An increase in gross lending by foreign banks in 1987 was partly offset by an increase in amortization payments. However, the Indonesian authorities also arranged $2.5 billion in stand-by commitments from the foreign banks, most of which were not utilized by the end of the year. In addition, net inflows from private creditors other than banks rose sharply in both 1986 and 1987. Most of this financing was for the expansion of Indonesia's liquefied natural gas (LNG) facilities, and was on a non-recourse basis, i.e. debt-service payments were scheduled to be made with future LNG exports.

In contrast to 1986, the supply of external financing exceeded the demand in 1987 and official international reserves were replenished by $1.3 billion. Total external debt increased from $43.6 billion at the end of 1986 to $55.2 billion at the end of 1987 (table 4.4). Since only about one-third of Indonesia's debt was denominated in dollars, the fall in the dollar against other currencies in which its debt was denominated accounted for $7.2 billion of the $11.6 billion increase in external debt during 1987. The increase in external debt resulting from net external borrowing during the year amounted to $4.4 billion. Although net external borrowing amounted to $2.3 billion in 1988, total external debt rose by only $0.3 billion by the end of the year. The appreciation in the dollar during that year is estimated to have reduced the dollar value of non-dollar debt by almost $2.1 billion.

Total external debt rose from about 43 per cent of GDP in 1985 to almost 73 per cent in 1987 and from 186 per cent of exports of goods and services to 293 per cent, respectively (table 4.5). Total debt service payments increased by almost $2 billion from 1985 to 1987, which boosted them from less than 30 per cent of total exports of goods and services to over 42 per cent. Despite the deterioration in these indicators, Indonesia continued to service its external debt by matching its demand for external financing with the available supply.

CASE STUDY: INDIA

Although India is a heavily indebted developing country that did not suspend debt-service payments or reschedule external debt in the late 1980s, the progressive divergence between the demand and supply of external financing over the past several years signaled emerging balance-of-payments pressures. These pressures can be traced to underlying imbalances in the domestic economy that were not corrected by policy measures and were intensified by an unfavorable change in world economic and financial conditions.

India's current account deficit increased sharply during the 1980s. After amounting to less than $3 billion in the fiscal year ending March 1985, the deficit reached $8.5 billion in 1988/9 before falling slightly to

Table 4.4 Indonesia: total external debt (billions of dollars)

	1985	*1986*	*1987*	*1988*
Total external debt	37.4	43.6	55.2	55.5
Official creditors	20.8	24.2	31.5	32.3
IMF	0.0	0.1	0.7	0.6
IBRD	3.6	5.1	7.4	8.0
Other multilateral creditors	1.7	1.9	2.2	2.7
Official bilateral creditors[1]	15.5	17.1	21.1	21.0
Private creditors	16.6	19.4	23.7	23.2
Commercial banks[2]	14.0	15.7	18.1	17.7
Other private	2.6	3.7	5.6	5.5
Memorandum:				
$ Exchange-rate valuation effect	4.1	4.5	7.2	−2.1

1 Includes bank loans guaranteed by official creditors
2 Excludes bank loans guaranteed by official creditors

Source: The Institute of International Finance, *Country Database*

Table 4.5 Indonesia: debt and debt-service indicators

	1985	*1986*	*1987*	*1988*
Total external debt ($ billion)	37.4	43.6	55.2	55.5
% GDP	42.9	54.5	72.7	65.8
% Exports of goods and services	185.9	273.2	293.1	259.6
Total debt service ($ billion)	6.0	5.9	7.9	0.9
(% Exports of goods and services)	(29.6)	(37.1)	(42.1)	(42.1)
Gross interest payments	2.5	2.8	3.0	3.3
Amortization payments	3.4	3.1	4.9	5.7

Source: The Institute of International Finance, *Country Database*

$7.9 billion in 1989/90 (table 4.6). Rising rural incomes resulting from three consecutive years of bumper harvests since the drought-induced weakness in 1987 contributed to strong growth in real domestic demand. Exports grew strongly during the late 1980s, but this was from a low base. However, the relatively high level and strong growth in imports contributed to a deterioration in the trade balance. At the same time, the current account was increasingly driven by the deficit on invisibles, which rose from less than $0.1 billion in 1985/6 to $2.6 billion in 1989/90. In addition to higher transportation costs associated with the increase in

Table 4.6 India: current account balance (billions of dollars)[1]

	1987/8	*1988/9*	*1989/90*	*1990/1e*	*1991/2f*
Trade balance	−5.2	−7.0	−5.3	−5.7	−1.3
Exports, f.o.b.	12.6	14.2	16.9	18.5	17.9
Imports, f.o.b.	−17.8	−21.2	−22.2	−24.2	−19.2
(Oil)	(−3.1)	(−3.0)	(−3.8)	(−5.7)	(−5.9)
Balance on services, income and transfers	−0.7	−1.5	−2.6	−3.2	−2.7
Receipts	4.1	4.3	4.8	5.3	4.8
Payments	−7.8	−9.0	−10.2	−11.0	−10.0
(Interest)[2]	(−2.8)	(−3.4)	(−3.8)	(−3.9)	(−3.6)
Net transfers	3.1	3.2	2.8	2.5	2.5
Current account balance	−5.8	−8.5	−7.9	−8.9	−4.0

e = estimate, f = forecast
1 Fiscal year beginning April 1.
2 Includes accrued interest on Non-Resident India (NRI) deposits.

Source: The Institute of International Finance, *Country Database*

Table 4.7 India: policy indicators and economic growth (% change from previous year)[1]

	1987/8	*1988/9*	*1989/90*	*1990/1e*
Policy indicators:				
Real effective exchange rate	−5.7	−7.6	−7.0	−10.2
Money supply (M3)	15.7	18.1	19.9	15.3[2]
Central government deficit % GDP	8.4	8.0	8.4	8.4
Economic growth:				
Real GDP	4.5	10.4	5.2	4.7
Real domestic demand	4.1	10.4	4.1	4.2
Change in net foreign balance % GDP	0.7	−1.2	0.8	0.2

e = estimate
1 Fiscal year beginning April 1
2 February 1991

Source: The Institute of International Finance, *Country Database*

imports, gross interest payments on external debt increased by more than 50 per cent, in the three years to 1989/90, to $3.8 billion.

The authorities did adhere to the policy of devaluing the exchange rate in real effective terms through the late 1980s to encourage exports, but fiscal and monetary policies exerted a pro-cyclical impact on the economy. The budget deficit declined from 9.4 per cent of GDP in 1986/ 7 to 8 per cent in 1988/9, but rose again to 8.4 per cent in 1989/90 (table 4.7). The government's reliance on the domestic banking system for deficit financing made it more difficult for the authorities to control growth in domestic liquidity. The broad money supply, M3, rose 15 per cent in 1986/ 7 and increased by almost 20 per cent in 1989/90, almost 8 percentage points greater than the growth in nominal GDP.

The large and growing current account deficit in the late 1980s boosted the demand for external financing above the supply. The difference was covered by a drawdown in official foreign-exchange reserves that reduced them from $6.1 billion at the end of 1984/5 to $3.2 billion at the end of 1989/90, equivalent to less than three months' imports of goods and services. Although the IBRD, the Asian Development Bank and the official bilateral creditors sharply increased net lending to India, this was partly offset by large net repayments to the IMF, which averaged over $0.9 billion a year from 1987/8 through 1989/ 90 (table 4.8).

India had increasingly relied on foreign banks to supplement the large inflows from official creditors. But growing concerns about the rising current account deficit and the near-term outlook are likely to have played a role in reducing net inflows from foreign banks from $ 1.9 billion in 1986/7 to $0.3 billion in 1989/90. The authorities sought additional external financing from private creditors other than foreign banks by establishing Non-Resident India Accounts (NRIs), which allowed Indians living abroad to hold foreign-currency deposits in domestic Indian banks. Net inflows of NRIs (including accrued interest) amounted to about $1.7 billion in 1988/9 and $1.6 billion in 1989/90, largely in response to government policies of maintaining interest rates on these deposits above those prevailing in the international capital markets. Although a large share of India's external financing from official creditors was on concessional terms, recourse to market-priced bank loans and the growth in the NRIs contributed to the rapid increase during the late 1980s in gross interest payments due on external debt. (The official Indian balance of payments excludes interest accrued on the NRIs from the current account.[5] The practice adopted here is to include total interest payments due on the current account and to record interest accrued or unpaid as an inflow on the capital account.)

The sharp rise in oil prices following the Gulf crisis in late 1990 made the adjustment in the external accounts more difficult and more urgent. The value of oil imports amounted to $3.8 billion in 1989/90 and is estimated to have increased to $5.7 billion in 1990/1 largely due to the

Table 4.8 India: external financing (millions of dollars) (1)

	1988/9	1989/90	1990/91e	1991/92f
Current account balance	−8,459	−7,858	−8,872	−4,040
Equity investment, net	270	341	112	100
Net external borrowing	6,252	4,454	5,434	3,247
IMF	−1,070	−873	1,139	−518
Disbursements	0	0	1,786	0
Repayments	−1,070	−873	−647	−518
IBRD	1,413	1,094	747	1,007
Disbursements	1,716	1,445	1,219	1,530
Repayments	−303	−352	−472	−523
Other multilateral creditors	815	545	887	841
Disbursements	909	660	1,021	1,000
Repayments	−94	−115	−134	159
Official bilateral creditors	1,783	954	949	709
Disbursements	2,418	1,646	1,705	1,685
Repayments	−635	−691	−756	−976
Commercial banks	527	269	498	0
Disbursements	1,234	893	1,150	716
Repayments	−707	−624	−652	−716
Other private creditors, net (2)	2,784	2,465	1,214	1,210
Resident lending abroad, net	163	350	250	250
Errors and omissions, net	665	1,845	1,174	0
Reserves excluding gold, net (− = increase)	1,109	867	1,902	440

e = estimate, f = forecast
1 Fiscal year ending March 31
2 Includes NRI deposits

Source: The Institute of International Finance, *Country Database*.

price increase. (A $1-per-barrel annual change in world oil prices alters the value of India's oil imports at constant volumes by $0.2 billion.) In addition to higher oil prices, importers advancing purchases in anticipation of a shortage of foreign exchange and the government's likely recourse to import controls contributed to strong growth in non-oil imports. Higher imports and the outlook for a larger deficit on invisibles implied that the current-account deficit was likely to increase by $2 billion in 1990/1 to $8.9 billion.

The need to use official reserves to cover the difference between the demand and supply of external financing reduced them from $3.6 billion in August 1990 to $1.5 billion in December, equivalent to only two weeks' imports of goods and services. Reserves were falling by $0.5 billion a month and would be depleted at that rate of reduction within three months. (The Indian government also has held about $4 billion in gold reserves at current market prices, but the authorities stated that these were not to be used to support the balance of payments.) However, a near-term payments crisis was averted when the Indian government obtained $1.8 billion in disbursements from the IMF in January 1990, including $1 billion under the Compensatory and Contingency Financing Facility (CCFF) and $0.8 billion under a three-month standby arrangement. Including $0.6 billion in repayments, net inflows to India from the IMF amounted to $1.1 billion in 1990/1. This financing helped boost reserves (excluding gold) to $2.7 billion in January 1991, although they fell to $2.4 billion in February.

Government import controls that were imposed in March 1991 and a tightening in monetary policy in mid-1990 are likely to constrain the growth in non-oil imports. At the same time, however, the size of the current account deficit and the amount of imports are likely to be determined by the supply of external financing. This in turn, could depend critically on the Indian government's implementing a new IMF-supported adjustment program. In the absence of a new IMF arrangement and on the assumption that the authorities do not allow reserves to fall below $2 billion, the current account deficit consistent with the external financing flows assumed for 1991/2 would fall by $5 billion to $4.0 billion. This would require a contraction in imports if India is to continue to service its external debt. Moreover, it suggests the balance of payments would remain vulnerable to unpredictable changes in the domestic and world economic conditions.

The near-term outlook for India's external payments position would be substantially altered by a new IMF arrangement. In addition to $2 billion to $3 billion in new credits from the IMF, an IMF-supported economic adjustment program would most likely be accompanied by an increase in new policy-based loans from the IBRD. An IMF program would also signal to the international capital markets that the Indian government is taking appropriate steps to strengthen the balance of payments and might encourage foreign banks to increase lending. However, the change in the Indian government in early 1991 delayed implementation of the 1991/2 budget and postponed negotiations with the IMF. As this raises uncertainties about the likelihood and timing of a new IMF arrangement, additional IMF credits are excluded from the projected external-financing profile for 1991/2.

Table 4.9 India: total external debt (billions of dollars)[1]

	1988/9	*1989/90*	*1990/1e*	*1991/2f*
Total external debt	58.9	63.0	68.9	73.5
Official creditors	36.9	38.8	43.4	48.2
IMF	2.4	1.5	2.7	2.3
IBRD	5.6	6.6	7.7	9.5
Other multilateral creditors	12.5	13.0	14.1	15.0
Official bilateral creditors[2]	16.5	7.7	19.0	21.5
Private creditors	22.0	24.2	25.5	25.3
Commercial banks[3]	10.5	10.8	11.4	11.6
Other private creditors	11.5	13.5	14.1	13.7
Memorandum:				
$ Exchange-rate valuation effect	−3.1	−0.1	0.09	−1.3

e = estimate, f = forecast
1 As of end of fiscal year beginning April 1
2 Includes bank loans guaranteed by official creditors
3 Excludes bank loans guaranteed by official creditors

Source: The Institute of International Finance, *Country Database*

Table 4.10 India: debt and debt-service indicators[1]

	1988/9	*1989/90*	*1990/1e*	*1991/2f*
Total external debt ($ billion)	58.9	63.0	68.9	73.5
% GDP	21.6	23.7	23.8	30.5
% Exports of goods and services	317.6	289.3	288.9	324.3
Total debt service ($ billion)	6.5	6.7	6.9	6.9
(% Exports of goods and services)	(35.0)	(30.9)	(29.0)	(30.7)
Interest payments due	3.4	3.8	3.9	3.7
Amortization paid	3.6	2.9	3.0	3.3

e = estimate, f = forecast
1 Fiscal year beginning April 1

Source: The Institute of International Finance, *Country Database*

Total external debt is estimated to have risen from $63.0 billion at the end of 1989/90 to $68.9 billion at the end of 1990/1 (table 4.9). Debt owed to official creditors accounted for 63 per cent of the total and debt owed to foreign banks accounted for 17 per cent. Total external debt is projected to increase by $4.6 billion in the fiscal year 1991/2 to $73.5

billion. The external financing profile assumes that net external borrowing will amount to $3.3 billion in 1991/2, but the valuation effect resulting from the projected appreciation of the dollar would reduce external debt by $1.3 billion.

The weakness in India's external payments position during the late 1980s and early 1990s would most likely not have been revealed by simple debt and debt-service indicators. Although total external debt is estimated to have risen from 22 per cent of GDP in 1988/9 to about 24 per cent in 1990/1, it fell from 318 per cent of exports of goods and services to 289 per cent (table 4.10). Total debt-service payments rose by only $0.4 billion from 1988/9 to 1990/1 and fell from over 35 per cent of exports of goods and services to about 29 per cent.

CONCLUSION

This approach to country analysis assesses current and near-term creditworthiness of a borrowing country by focusing on the relationship between the demand and supply of external financing. Indonesia faced a serious shortage of foreign exchange in the mid-1980s when the value of its principal export declined sharply. However, the country continued to meet its contractual debt-servicing obligations as a result of government policies that reduced the demand for external financing relative to the available supply. Country analysis that focused on simple debt indicators would most likely not have foreseen this outcome. Despite the strengthening in Indonesia's external payments position in 1987, debt indicators alone would have incorrectly signaled that Indonesia's debt-servicing capability continued to deteriorate.

India faced balance-of-payments pressures in the late 1980s and early 1990s brought on by a persistent imbalance between the demand and supply of external financing. The government's delay in implementing corrective stabilization policies to reduce the demand relative to the supply required a sharp reduction in official foreign exchange reserves to cover the difference. Debt-servicing difficulties were averted largely as a result of an increase in external financing from the IMF. However, the relatively low level of official foreign exchange reserves and near-term prospects that the external financing imbalance may not be corrected suggests that the balance of payments would remain under pressure. Despite the persistent weakness in India's external payments position, debt indicators alone would have incorrectly signaled that India's debt-servicing capability was improving.

NOTES

1 The methodology of the traditional presentation of the balance of payments is presented in the 1977 issue of the International Monetary Fund, *Balance of Payments Manual*.
2 For a detailed review of the debt-reporting systems, see International Working Group on External Debt Statistics (1988).
3 For a detailed review of these statistics, see Bank for International Settlements (February 1988), *Guide to the BIS Statistics on International Banking*.
4 Balance-of-payments statistics by country are contained in International Monetary Fund, *Balance of Payments Statistics*.
5 The official balance of payments for India is presented in Reserve Bank of India, *Bulletin*.

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5 Empirical models of debt rescheduling with sovereign immunity

Robert B.Avery and Eric O'N.Fisher

INTRODUCTION

The purpose of this chapter is to review the literature on empirical models of debt-rescheduling in international financial markets. The discussion focuses primarily on the statistical techniques that have been developed. These fall into two areas: discriminant-analysis and probabilistic-choice models. We also present other methods that might prove useful in future empirical research in this area. In particular, we discuss debt-rescheduling from the point of view of an explicitly dynamic economic analysis.

This chapter is divided into three sections. In the first section, we review the applied literature on international debt-rescheduling. We focus primarily on empirical studies and give only cursory discussion of the theoretical models of debt with sovereign risk. We also describe the common characteristics of the data that are used in these studies and give some of their sources. In the second section, we present summaries of the statistical techniques that have been used to determine the creditworthiness of the debtor countries. In the third section, we present a method of estimating debt-reschedulings as a dynamic program where the relevant control variable is a debtor country's decision to reschedule or not. This framework employs a forward-looking technique that has not yet been implemented in this literature.

REVIEW OF THE LITERATURE

There are two excellent surveys of the literature on international debtrescheduling: McDonald (1982) and Solberg (1988). McDonald's survey discusses both theoretical and empirical issues. Because McDonald wrote at a relatively early date, his work suffers from the disadvantage of not including the recent theoretical literature applying game theory and information economics to debt-rescheduling. In his discussion of the empirical work, McDonald subdivides the work into studies employing discriminant analysis and logit analysis. Solberg employs a similar taxonomy but provides a more analytic discussion and a wider survey of the relevant empirical literature.

Most of the empirical analyses of the determinants of debt-rescheduling have been descriptive rather than derived from theoretical frameworks. This has not occurred because of a lack of good theoretical models. For example, Eaton and Gersovitz (1981) develop a particularly elegant theoretical model considered to be the seminal piece in this area. Kletzer (1984), Bulow and Rogoff (1987), Fernandez and Rosenthal (1990), and Hart and Moore (1989) also make noteworthy contributions. The theoretical literature focuses upon the fact that the decision to reschedule debt occurs in a dynamic framework. It also emphasizes the fact that debt contracts in situations in which sovereign immunity is a concern have to be self-enforcing. Because there are strategic elements in a debtor country's decision to reschedule, it is not true that a simple model of the supply and demand of loanable funds is an accurate one. Indeed, much of the development of the theoretical literature in the last decade has consisted of incorporating increasingly sophisticated concepts from game theory and the economics of information into the applied analysis of debt contracts.

The first systematic published empirical study of debt rescheduling was undertaken by Frank and Cline (1971). They use discriminant analysis to differentiate between countries that had rescheduled debt and those that had not. The fundamental unit of analysis was a country-year. They examined data from twenty-six countries over a period of nine years, but, because of problems with incompleteness of data, they were able to use only 145 country-years in their sample. In these data, there were thirteen reschedulings. Frank and Cline included eight different macro-economic variables in their analysis; they found that three of these had significant explanatory power in being able to discriminate between cases of rescheduling and cases of normal repayment. These three factors were the lagged ratio of the stock of debt to trend exports, the inverse of the maturity of a country's loans, and the ratio of a country's imports to its international reserves.

A second important early empirical analysis is that of Feder and Just (1976). They were the first authors to use a logistic model of debt-rescheduling. Again, the fundamental unit of analysis was the country-year. Their sample included 238 country-years spanning 41 countries and eight years. They too encountered problems with incomplete data. In their sample there were 21 cases of rescheduling. They found six macro-economic variables that were statistically significant in explaining a country's likelihood of rescheduling debt. These were the ratio of imports to foreign-exchange reserves, the ratio of amortization to the stock of total debt, the ratio of debt-service payment to total exports, the rate of growth of exports, per capita income, and the ratio of capital inflows to debt-service payments. Feder and Just were the first authors to point out that there are some difficulties in defining exactly when an episode of debt-rescheduling has occurred.

Fisk and Rimlinger (1979) conducted an analysis using precedent-based non-parametric methods, similar to 'nearest neighbor' techniques. Annual data on 49 countries from 1960 to 1975 were collected on ten factors believed to influence the choice to reschedule. They were: the ratio of international reserves to imports; the debt-service ratio; the ratio of the IMF reserve position to imports; the ratio of exports to gross domestic product; the ratio of the stock of external debt to exports; the inflation rate; the ratio of imports to exports; the ratio of the stock of 'supplier-disbursed debt' to the stock of external debt; the ratio of interest payments to the stock of external debt, and the ratio of the stock of 'supplier-disbursed debt' to imports. The model was tested by selecting 90 sample observations at random and then determining how accurately a decision to reschedule could be predicted on the basis of the historical performance of other countries with similar characteristics for the ten variables. Using a probability of one-half as a cutoff, the best Fisk-Rimlinger model had an error rate of 8 per cent versus nineteen per cent for a naïve model in which no countries were predicted to reschedule.

Although Eaton and Gersovitz (1981) do not analyze the probability of debt-rescheduling directly, they do conduct an extensive examination of the underlying supply and demand equations for international debt. They argue that the rates of return for international debt must be at least as great as that of alternative investments; that is, loans to 'risky' less developed countries must be larger than the market rate of interest on safe investments. Eaton and Gersovitz use a switching regression to distinguish between regimes of supply-constrained debt and demand-determined debt for a sample of 45 countries during the years 1970 and 1974. Their total sample included 82 country-years. Eaton and Gersovitz interpret variables that increase the quantity of debt in the supply-constrained regime as those that lower the likelihood of debt rescheduling. They show that increases in the variability in export revenues and increases in the ratio of imports to gross national product tend to increase the quantity of loans available to a debtor country precisely because these variables increase the effectiveness of a penalty for default. They also show that an increase in the stock of debt a country owes increases the probability that it is in a supply-constrained regime.

Most analysts have approached the problem of debt-rescheduling from the perspective of the debtor country, although a few studies have examined it from the perspective of the creditor. Since most creditors are commercial banks in developed countries, this type of analysis has focused on the evaluation of such firms; in particular, how their market value is related to their holdings of debt in less developed countries. Two examples of this approach are Bruner and Simms (1987) and Musumeci and Sinkey (1990). Musumeci and Sinkey analyze the effects of the announcement of Brazil's 'open-ended' debt moratorium, reported in *The Wall Street Journal* on 23 February 1987. They examined how the values of the equity of a sample of bank holding companies in the United States were affected by the announcement. They found that it had a significantly negative effect on the stock prices of these holding companies, and moreover, the size of the effect was significantly related to the size of their Brazilian exposures.

Although direct tests on bank equity value may seem appealing because of the wide availability of data, they may be very inefficient since many other factors influence equity value. Secondary-market price data for country debt offers an alternative data source from creditor countries with great potential value for the study of rescheduling. If rescheduling represents the only significant credit risk associated with country loans, such price data should be able to give strong inferences about the probability of future reschedulings. If time-series data are available, price changes can be related to measures of the economic and political environment in the debtor countries. Such data may be particularly useful in understanding the short-run dynamics associated with rescheduling. This is an open area of research.

DISCUSSION OF THE DATA

Surprisingly, it is difficult to get a complete list of all the debtreschedulings that have taken place over the past three decades. Indeed, most of the studies cited above used their own idiosyncratic sources for reschedulings. The primary difficulty stems from a lack of agreement as to what constitutes a rescheduling. Fixing the precise timing of a rescheduling is even more problematic. Often a country misses a scheduled payment and then begins a process of renegotiation. The final agreement on rescheduling is typically reached many months after the first payment is missed, and this process may cover two calendar years.

The best single current source for debt-reschedulings is the International Bank for Reconstruction and Development's *World Debt Tables*. These are published annually, and the recent issues contain exhaustive lists of the debt-reschedulings that occurred in the last decade. These publications also contain convenient macro-economic data relevant to research in this area; they are available at an annual frequency. The most important data that are presented are the stocks of foreign debt owed by the less developed countries. Another good source for a list of reschedulings between 1976 and 1987 is Keller and Weerasinghe (1988). They discuss the recent experiences with rescheduling with a primary focus on the negotiations within the Paris Club of the creditor countries.

The International Monetary Fund's *International Financial Statistics* is another standard source for macro-economic data in a unified format for the member countries of the Fund. These data are available at both quarterly and annual frequencies. These data are available on tape at many universities and other research institutions, and they are relatively easy to retrieve.

Most studies on debt-rescheduling have used country-years as the fundamental unit of analysis. Although most relevant variables are available on a quarterly basis, the crucial foreign-debt data will typically be reported with a lag which varies from country to country. It might be possible to obtain data with a better alignment from the creditor countries; however, such data have typically not been made public. Analysis with monthly or weekly data is even more problematic. Very few macro-economic statistics are available at a higher than quarterly frequency; this is especially true of data from the less developed countries. There are monthly series on industrial production, interest rates, exchange rates, prices, and the merchandise-trade balance for several less developed countries, but this is the exception rather than the rule. The fact that there is a lag between the shipment of exports from a foreign country and the month they are eventually reported makes the use of monthly trade statistics highly problematic.

STATISTICAL TECHNIQUES

A variety of statistical methods were employed to estimate models of debt-rescheduling in the studies cited above. Since most authors chose their dependent variable to be a discrete binary variable which took on the value one when a country 'rescheduled' within a given time-period and zero otherwise, the statistical methods used have been those designed for dichotomous dependent variables. These methods include discriminant-analysis, linear-probability, probit, and logit models. In this section we briefly describe each of these methods and then discuss criteria to use when choosing among them. Perforce, our discussion will be brief. Those wanting more detail can refer to Altman *et al.* (1981), Maddala (1983), Amemiya (1985) or other similar sources.

Linear-probability model

Although the linear-probability model has generally not been used for the study of debt refinancing,[1] it is one of the more popular methods of modeling dichotomous dependent variables. The model is defined as follows. Assume that observations are country-years, and consider the i-th observation. Then the dependent variable, y_i, is given by

$$y_i = \begin{cases} 1 & \text{if rescheduling occurs} \\ 0 & \text{otherwise.} \end{cases}$$

Furthermore, let the conditional probability that y_i equal one be linear in X_i, a K×1 vector of independent variables. This implies that

$$\text{Probability } (y_i=1)=P_i=X_i\text{'}ß,$$

where ß is a K×1 vector of coefficients. It can be shown that the assumption that the probability is linear implies that the expression

$$y_i=X_i\text{'}ß+\varepsilon_i,$$

where ε_i is a random error term, meets all of the assumptions of the classical linear-regression model. Thus y_i can be simply regressed against X_i using a standard regression package, with the estimated coefficients being consistent and unbiased estimates of ß in the probability equation.

Although coefficients will be consistent and unbiased, several practical problems arise with the use of standard regression estimates of the linear-probability-model coefficients. First, because the dependent variable is dichotomous, the error terms, ε_i, will not satisfy the assumption of equal variance. This means that the standard errors and t-statistics reported from a standard regression program will be biased. The standard way of dealing with error terms with different variances is to use weighted least squares. It can be shown that if each observation is weighted by the term

$$1/(X_i\text{'}ß*(1-X_i\text{'}ß)),$$

then the standard errors reported from standard regression programs will be unbiased and the coefficient estimates will be asymptotically efficient. It should be noted, though, that this adjustment requires that ß be known. In practice, estimates from an initial unweighted regression are used.

A second problem with regression estimates of the linear-probability model is the fact that probability estimates, P_i, can be less than zero or greater than one. Several methods have been proposed to deal with this, generally involving setting inadmissable probability estimates equal to bounds like.98 and.02.

Logit model

The logit model is very similar to the linear-probability model. Let y_i be defined the same as for the linear probability model. If the conditional probability that y_i equal one is

$$P_i=1/(1+\exp(-X_i'ß)),$$

then the model meets the assumptions of the logistic model.

Because of its functional form, the logistic model's predictions are constrained between zero and one. Moreover, the model shows diminishing returns. This means that the partial of the probability with respect to each variable in X_i is proportional to P_i* $(1-P_i)$, whereas the partial is constant for the linear-probability model. Thus, changes in the independent variables will have less and less impact on the probability that y_i is one as the probability moves away from one-half. In other words, the function's ability to discriminate is most sensitive near its midpoint.

Although the logistic model employs what many analysts believe are more realistic assumptions than the linear-probability model, one major cost is that the model cannot be estimated using a standard regression package. Coefficient estimates for models such as those of individual-country debt reschedulings must be computed using iterative techniques, generally maximum-likelihood methods. Although many good software programs are available to do this, they can be expensive to operate and may require some knowledge of non-linear estimation to use.

Probit model

The probit model is virtually identical to the logit model; indeed, the logistic model was developed historically as an approximation to the probit model. Again, defining y_i as in the linear-probability model, if the conditional probability that y_i equal one is

$P_i=F(X_i'ß)$,

where $F(\cdot)$ is the cumulative standard normal distribution function, then the model meets the assumptions of the probit model.

Like the logit model, the probit model shows diminishing returns with partials proportional to $f(X_i'ß)$, where $f(\cdot)$ is the standard normal density function. Similarly, coefficients must be computed using non-linear iterative methods. However, the probit model is scaled somewhat differently than the logit. Typically, the logistic-model coefficients will be 1.8 times as large as those of the probit model. However, t-statistics of the coefficients and probability predictions for specific observations are likely to be very similar.

Discriminant analysis

The linear-probability, logit, and probit models evolved from the traditional regression model. The most popular method used for modeling debt-rescheduling, discriminant analysis, evolved from a different tradition, that of analysis of variance. Instead of a dependent variable, y_i, caused by X_i's, two groups of country-years are assumed: years in which a country reschedules its debt; and years in which a country does not reschedule. Each country-year observation, i, is assumed to be characterized by measurements on a set of independent variables, X_i. The crucial additional assumption is that, within each group, the X variables are distributed according to a *Multivariate Normal Distribution:*

$X_i \sim N(\mu_1, \Sigma_1)$ if observation i is in the rescheduled group,

$X_i' \sim N(\mu_2, \Sigma_2)$ if observation i' is in the non-rescheduled group,

where μ_1, and μ_2 are K×1 group mean vectors, and Σ_1 and Σ_2 are K×K group covariance matrices.

Unlike the early probability models, the causal flow is assumed to be from group membership to the X_i's. Thus membership is determined first, and this determines the values of the X_i's. The concept of prediction is also different from those of the techniques presented earlier. We do not try to predict rescheduling on the basis of the values of the X_i's, but rather we try to infer to which group a country-year observation belongs on the basis of its X_i values. This is akin to forming a posterior probability in classical Bayesian analysis.

Another difference between discriminant analysis and the techniques presented earlier is that there are no real parameters to estimate in discriminant analysis. Instead, analysis generally consists of two procedures: first, testing whether the two groups have the same mean vectors, i.e. $\mu_1=\mu_2$; and second, constructing an expression for the posterior probability for a random country-year observation. Each of these procedures requires knowledge of the mean vector and covariance matrix for each group. Generally these are estimated using the sample means and covariances.

Tests for the difference in the means depend upon whether or not the two group covariances are assumed equal. If the covariance matrices are equal, then, under the null hypothesis of group mean vector equality, the expression

$$(X_1 - X_2)' S^{-1} (X_1 - X_2) * \frac{N_1 + N_2 - K - 1}{N_1 + N_2 - 2} * \frac{1}{K} * \frac{N_1 * N_2}{N_1 + N_2} ,$$

is distributed as an F statistic with K and N_1+N_2-K-1 degrees of freedom. Here N_1 and N_2 are the number of observations in groups one and two respectively, X_1 and X_2 are the respective group-sample mean vectors, and S is the sample within-group covariance matrix. There are similar, but more complicated tests when group covariances are not assumed to be equal (see Altman *et al.* 1981).

The posterior probabilities for a random country-year i are derived from the likelihood expressions for each group. Define

$f_{1i}=(1/(2\ p \mid \Sigma_1 \mid)^{1/2}) \exp[-(X_i-\mu_1)'\ \Sigma_1^{-1}\ (X_i-\mu_1)/2]$, and
$f_{2i}=(1/(2\ p \mid \Sigma_2 \mid)^{1/2}) \exp[-(X_i-\mu_2)'\ \Sigma_2^{-1}\ (X_i-\mu_2)/2]$.

If Q_1 and Q_2 are the relative sizes of the rescheduled group and nonrescheduled group respectively, then the posterior probability that a random country-year with values X_i was drawn from the rescheduled group is

$$\text{Probability } (X_i \text{ is in group one}) = \frac{Q_1 * f_{1i}}{Q_1 * f_{1i} + Q_2 * f_{2i}}$$

The probability that X_i is in group two is defined similarly. This is often referred to as ‘quadratic classification’ since it does not assume that the two groups have the same covariance matrix. If we assume that the two groups have the same covariance matrix, then the probability that a random country-year comes from the rescheduled group reduces to

Probability (X_i is in group one)$=1/[1+(Q_2/Q_1) \exp(-X_i'\beta+\alpha)]$,

where $\beta=\Sigma^{-1} (\mu_1-\mu_2)$, $\alpha=(\mu_1+\mu_2)'\beta/2$, and Σ is the population within-group covariance matrix. The vector ß is often referred to as the ‘linear discriminant function’, and classification using this formula is referred to as 'linear classification'. In practice, the function is formed using sample group mean vectors X_1 and X_2 and the sample within-group covariance matrix S.

MODEL SELECTION

The similarity of the regression, logit, probit, and discriminant-analysis models we have presented in this section raises the question as to how the choice of model should be made. Although some authors have argued otherwise, there is nothing that should categorically exclude any of the models from consideration. A case could be made for each of the models we have presented on the grounds of computational ease, theoretical structure, or functional flexibility. Indeed, there are conditions where data can be consistently described by more than one model.

Although the choice of model will often not greatly affect the implications of a study, there are a number of considerations that can be used in making this choice. These range from the researcher's beliefs as to the theoretical causal structure of the process being modeled to the 'fit' of each potential model with actual data. Moreover, there are several different ways to measure fit. Model fit can be judged by how well the model correctly classifies historical country-year observations. The criterion of fit is measured by how often the predicted 'most likely' group or choice actually occurs. Alternatively, model fit can be measured by how accurately predicted probabilities reflect observed group frequencies.

If the first method is used, the misclassification rates of models can be compared and used to select the best model. Thus, for example, if a discriminant-analysis model predicted better than a logit model, then the former model would be chosen. Although this is an attractive mechanism for model selection, several words of caution should accompany its use.

First, there is a question of which sample to use. If the original sample used to estimate parameters is used, misclassification rates will be biased in small samples. Alternatively, another or 'holdout' sample could be used. This yields unbiased estimates of misclassification rates; however, it has the disadvantage of requiring large samples and not using all the data to estimate the model. Note that misclassification estimates constructed from either original or holdout samples may be poor indicators of how the model would work prospectively, particularly if structural changes occur.

A second concern with using misclassification rates as a measure of goodness of fit is that it weighs both misclassifications equally. Clearly, saying that a country will reschedule, when it does not, may not be as serious an error as saying it will not, when it does. Finally, perhaps the most serious flaw with using misclassification rates to choose among models is that it is sensitive only to observations with probabilities near the one-half threshold. Since rescheduling is a rare event, the evidence of a good model will not be that it predicts rescheduling with probabilities of one-half or more; rather, a good model predicts rescheduling with higher probabilities for countries in the years that they do reschedule than in years they do not.

The inadequacies of the misclassification-rate criterion have led to alternative measures of model fit that take into account the predicted group or choice probabilities, not just 'most likely' predictions. One suggested approach is to compare the average predicted probabilities for each group. For example, the mean predicted failure probability for known reschedulings could be compared to the mean probability for non-rescheduled observations. The wider the difference, the better the model. Another similar approach is to rank observations by predicted probabilities and compare the actual rescheduling rates of, say, the lowest decile to the next lowest, and so on. Both of these approaches are primarily descriptive. Other, more objective criteria have been proposed that are variations of the regression multiple-correlation coefficient R^2 (see McFadden 1976).

An attractive feature of these R^2 measures of goodness of fit is that they can be used to compare the performance of different model forms on the same data. If, for example, the logit model appeared to have a significantly better fit than the discriminant-analysis model, it would offer a persuasive argument to adopt the logit-model form. However, these statistics should not be used blindly. It is quite possible for 'wrong' models to perform better in particular small samples, even though in an infinite-sized sample they would not. The predictions of a particular model are quite sensitive to the distribution of the independent variables. Thus the policy analyst should be wary of changing models simply in order to fit better a new sample of data.

Thus far we have focused on measures of how different models fit actual data. Often, however, researchers may have to make model decisions before examining data. It may also be desirable to have the model decision guided by theoretical rather than empirical considerations and to choose the model form most consistent with the structure of the problem being modeled. We now focus on the problem of model selection on theoretical grounds. We will consider arguments for and against the linear probability, probit, logit, and discriminant-analysis models.

To begin with, there is nothing inherently wrong with any of the models we have presented. Each rests on sound statistical grounds and under appropriate assumptions can be properly used to model any categorical dependent variable problem. Statements such as ‘it is improper to use a linear-regression model with a dichotomous dependent variable’ or ‘discriminant analysis cannot be used if groups are ranked’ are dangerous and inaccurate generalizations. However, each of the models rests on different distributional and, to some extent, structural assumptions. Thus, for a given problem it may be that the assumptions required for one model are more appropriate than those of other models and therefore argue for the model’s use. The researcher’s goal is to match the assumptions to the problem. Running the risk of violating our own caveat about generalizations, we can use several general guides in matching problems and models.

If the researcher’s problem involves measuring the association between rescheduling and a group of independent variables, where the only goal is to estimate parameters of a forecasting function for reschedulings, then theoretical considerations should not preclude any model. The regression, probit, logit, and discriminant-analysis models merely represent different prediction functions. Model selection in these circumstances should be based primarily on empirical fit and statistical considerations. Robustness, computing costs and sampling concerns may also be important. For example, most analysts having access to a personal computer will be able to estimate linear-probability models because regression software is so readily available. Software designed to implement logistic models is not as widely available. We caution that selecting on the basis of fit limits the ability to draw causal inferences from the estimated coefficients and parameters. It would be a mistake to choose a model because it ‘fits well’ and then interpret its parameters as supportive of a particular hypothesis.

If the researcher, however, is interested in estimating and perhaps testing a causal model, it may appear that there are strong theoretical reasons for choosing one of the three probabilistic-choice models. It appears that a particularly good argument can be made for probit and logit models in this case, since a number of authors have shown that both models can be derived from utility-maximizing behavior. However, it can be shown that the linear-probability model can also be derived from utility-maximizing behavior with a slightly different assumption about the error terms. Moreover, McFadden (1976) shows that a case can be made for the discriminant-analysis model, even if the independent variables are assumed to cause rescheduling. He shows that, if appropriate distributional assumptions are made, then discriminant analysis will provide consistent estimates of the parameters of an underlying causal process running from the independent variables to the rescheduling decision. He does voice concern, though that this justification of the discriminant analysis is not very robust with respect to assumptions.

THE DECISION TO RESCHEDULE AS A DYNAMIC PROGRAM

The decision to reschedule a country's debt occurs in time. It is also a decision that is taken under uncertainty. Both of these facts make it attractive to model the phenomenon of debt-rescheduling as a stochastic dynamic program. This is an avenue of research that has not yet been pursued very far in the empirical literature. In this section, we will build upon the seminal work of Rust (1987) in describing how one might estimate a dynamic program describing a country's decision to reschedule debt.

Consider a debtor country making the decision to reschedule its stream of debt service. It must decide whether to service its debt this year or to seek rescheduling. This entails deferring some payment now for the possibility of a stream of higher payments in the future. The decision depends upon the trade-off between the current benefits of maintaining a payments schedule versus the potentially uncertain future costs of repayment entailed by a rescheduling agreement.

Consider a given debtor country. Let y_t be the real gross national product of this country in year t, and let D_t be the real stock of outstanding sovereign debt in year t. Then we can impute the real debt-service burden at time t as

$$d_t=r_t D_t,$$

where d_t is the flow payment for debt service and r_t is the real interest rate facing the country in year t. Even though inflation expectations are not observable, it is convenient here to assume that the real interest rate is observable; this point will become clearer below. Now we can define the state of the system at time t as the 2×1 vector

$$x_t=(y_t, d_t)'.$$

The policy-maker's decision is whether to reschedule foreign debt, conditional upon this year's realization of real gross national product and the real debt service. We shall assume that the policy-maker is concerned about the total consumption available to the economy. In particular, we write:

$c_t = y_t + b_t - d_t$,

where c_t is national consumption and b_t is new borrowing at time t. In year t, the policy-maker must choose one of two options. We shall model this as a choice i_t e {0, 1}, where 0 is the decision to maintain a payment schedule and 1 is the decision to reschedule. The set {0, 1} is the set of controls available to the policy-maker at time t. Notice that this set is independent of the state; this is a convenient simplification and it suits our problem well. If the policy-maker chooses to reschedule, national consumption is y_t—P, where P is a penalty. Otherwise, consumption is as above. If the policy-maker has constant relative risk aversion, the reward function is

$$u(x_t, i_t, \tau_1) + \varepsilon_t(i_t) = \begin{cases} f(y_t - P) + \varepsilon_t(1) & \text{if } i_t = 1 \\ f(y_t + b_t - d_t) + \varepsilon_t(0) & \text{if } i_t = 0 \end{cases}$$

where $f(c_t) = c_t^{1-\tau_1}/(1 - \tau_1)$, and $\varepsilon_t(i_t)$ is the error term associated with choice i_t.

The term ε_t (i_t) is known to the policy-maker, but it is not observable to the econometrician. A large realization of $\varepsilon_t(1)$ might be interpreted as the policy-maker's perception that the penalty from rescheduling is less burdensome than P, and a small realization of $\varepsilon_t(1)$ reflects the policymaker's belief that the penalty from rescheduling is actually more onerous than P. We may state analogously that a large value of $\varepsilon_t(0)$ is the perception that continued unencumbered access to international credit markets is quite valuable, whereas a small realization of $\varepsilon_t(0)$ reflects the notion that the policy-maker places little value on free trade.

These error terms make the problem of debt-rescheduling a truly stochastic one. Without the errors, the solution to a control problem of this type with only two variables would be simple and consist only of finding the threshold level of gross national product above which the country would not seek rescheduling. Such a simple rule is belied by the data. It is traditional to assume that $\{\varepsilon_t(0), \varepsilon_t(1)\}$ are independently and identically distributed and that they follow a multivariate extreme-value process. This implies that the choice of whether to reschedule in state x_t can be described by a logistic function; such a function is practical in the estimation of the model.

It is necessary to specify the transition function in order to complete the description of the dynamic program. This function describes how the state evolves from year to year. We can write

$$h(x_{t+1} \mid x_t, i_t, \tau_2) = \begin{cases} (g(y_t, \tau_2), d_t) & \text{if } i_t = 1 \\ (g(y_t, \tau_2), d_t + b_t r_t) & \text{if } i_t = 0 \end{cases}$$

where the function $g(y_t, \tau_2)$ describes the distribution of next year's gross national product conditional upon this year's y_t. The parameter τ_2 captures the natural rate of growth of the economy. Although y_{t+1} is a realization from the continuous distribution $g(y_t, \tau_2)$, it is typical in practical problems to make the state space discrete. We are assuming here that the debtor country's debt service next year does not decrease if it seeks rescheduling this year, and we have allowed next year's debt service of a country in compliance with its agreements to increase by the debt service on new borrowings.

We are now in a position to describe the policy-maker's dynamic program fully. An optimal policy for rescheduling is one that maximizes

$$V(x_t \mid \tau)=u(x_t, i_t, \tau_1)+\varepsilon_t(i_t)_+ß\ E\{V(x_{t+1}, i \mid \tau)\}$$

where $t=(\tau_1, \tau_2)$ is the vector of parameters to be estimated and the expectation of $V(x_{t+1} \mid \tau)$ is taken with respect to the joint distribution of x_{t+1} and e_{t+1}. Knowing the current value of gross national product and the current realizations of e_t, the policy-maker forecasts the future path of national product and then decides whether to seek rescheduling in this period.

The assumption that the policy-maker's private information follows an extreme-value process allows us to write the probability of rescheduling (i=1) or not rescheduling (i=0) as

$$\text{Prob}(i \mid x, \tau) = \frac{\exp\{u(x,i,\tau_1) + \beta\, E\, V(x,i,\tau)\}}{\exp\{u(x,0,\tau_1) + \beta\, E\, V(x,0,\tau)\} + \exp\{u(x,1,\tau_1) + \beta\, E\, V(x,1,\tau)\}}$$

which is identical to Rust's (1987) formula (4.13). This states that the policy-maker's probability of choosing to reschedule can be represented as a non-linear function of his degree of risk aversion, given the expected costs of rescheduling.

In order to make the estimation of τ feasible, it is necessary to assume that x_t and ε_t are conditionally independent. First, the econometrician assumes that the distribution of x_{t+1} depends only on x_t, not on ε_t; this states that the distribution of next year's gross national product is independent of the policy-maker's private information. Second, the econometrician assumes that any dependence between ε_{t+1} and ε_t is transmitted through the state variable x_t; this implies that next year's gross national product is a sufficient statistic for next year's realization of the policy-maker's private information.

The estimation of τ can be accomplished in two steps. The first consists of determining the probability distribution of x_t conditional upon x_{t-1}. Although both gross national product and debt service are continuous variables, it is necessary to use discrete approximations of them. For a given country, the econometrician chooses levels of gross national product that correspond to relevant stages in the growth process. Then the estimate of τ_2 is a Markovian transition probability corresponding to the likelihood of moving from one level of growth to another.[2] This transition probability is conditional upon the observed level of debt service.

The second step consists of estimating the parameter τ_1, representing the policy-maker's degree of risk aversion. This involves estimating the choice probabilities described in the logistic formula given above. This step requires the use of a nested fixed-point algorithm. For a given value of τ_1, it is necessary to calculate the entire value function defined on a discrete state space. Then the nested fixed-point algorithm[3] searches for the value of τ_1, that maximizes the product

$$\prod_{t=1}^{T} \text{Prob}(i_t \mid x_t, \tau)$$

where these probabilities are defined above. Rust (1985) has developed an efficient algorithm for implementing this step on a personal computer.

This technique can be implemented for a given country or for a set of different countries. It will estimate jointly a country's natural rate of growth and the degree of risk aversion of its policy-makers—information which would be of tremendous use to lending institutions in creditor countries. The primary advantage of using the technique of dynamic programming is that it captures the essence of the decision a country makes in deciding to reschedule and puts it in its proper intertemporal setting.

CONCLUSIONS

Several points of conclusion can be drawn from this chapter. First, despite the fact that a number of good theoretical models of country debt-rescheduling have appeared in the literature, virtually all the empirical studies have been primarily descriptive. These studies have focused on macro-economic variables related to a country's ability to sustain debt-service payments. Some of the most important of these variables are the openness of the debtor country's economy, the ratio of debt-service payments relative to export revenues, and measures of economic growth. These data typically appear at an annual frequency. Further, several authors have noted that the definition of an episode of rescheduling can be problematic. Hence, the unit of analysis has almost uniformly been a country-year.

Second, although several authors have advocated particular statistical techniques, there appears to be little justification for choosing one technique over another. Both discriminant-analysis and logistic models have been used in the literature, and, because of the dichotomous nature of the debt-rescheduling variable, probit and linear-probability models could also be used. Little guidance has emerged from the theoretical literature on debt-rescheduling on the error-distributional assumptions needed to select among these techniques. Thus a strong case could be made for selecting a model form on the basis of sample fit. However, because the probability of a rescheduling is low, the predictions from all of these models are likely to be very similar. Therefore, model selection could very well be made on the basis of technical concerns such as the availability of software.

Third, new econometric techniques based upon dynamic programming have a ready application to issues of debt-rescheduling. These techniques have been used before in studying patent renewals and bus-engine replacement, and they are beginning to be used in many other applied fields in economics. New software has been developed to implement solution algorithms for these models on the personal computer. Data on reschedulings and the economies of the debtor countries are rich enough so that it is practicable to these kinds of models. Indeed, the extension of applications of dynamic programming to forecasting debt-rescheduling seems quite promising.

NOTES

1 A notable exception is Solberg (1988).
2 See Feller (1950) for a discussion of Markov models.
3 See Rust (1987) for a description of this procedure.

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6 Political-risk analysis for international banks and multinational enterprises

Jeffrey D.Simon

INTRODUCTION

Political risk has long been an important consideration in international business decisions. Although there is no consensus as to the exact definition of political risk, there is agreement on the types of situations that involve political risk. Basically, political risk refers to those political and social developments that can have an impact upon the value or repatriation of foreign investment or on the repayment of cross-border lending. These developments may originate either within the host country, in the international arena, or in the home-country environment.

Early conceptual and analytical work conducted in the 1960s and 1970s focused on how to assess the effect of non-economic variables upon foreign investment.[1] It was not until the early 1980s, however, that the political-risk industry was formally launched. Revolutions in Nicaragua and Iran at the end of the 1970s caught many international banks and multinational enterprises (MNEs) off guard. The large financial losses associated with radical regime changes in both countries clearly demonstrated the importance of political events in host-country environments.

Yet expectations about what political-risk analysis could accomplish exceeded the emerging profession's capabilities. This was the fault mainly of the advocates of the new discipline. Many in the business community remained skeptical about what political analysis could really deliver for assessing financial and economic investments. For professional business analysts and decision-makers accustomed to 'hard' data on economic and financial trends, the political world represented uncertain subjective terrain. Political-risk analysts, however, ranging from individual entrepreneurs to large consulting services, offered their expertise to international banks and MNEs and in the process raised unrealistic expectations. This included leaving the impression that, with the right methodological framework or well-placed contacts, political risk in a given country could be accurately forecast.

Political-risk analysis, however, has never been a foolproof predictive scheme of future political and social environments. There are simply too many different events and situations that can unfold in host countries. What political-risk analysis can offer the business community, however, is a guide for reducing some of the uncertainty in foreign political and social developments that can affect foreign lending and investment.

The 1990s will likely be one of the most significant decades in the history of political-risk analysis. It will challenge the profession to keep several steps ahead of a dizzying array of events worldwide. These events range from the spontaneous and powerful phenomenon of revolutions *without* guerrillas that has already toppled several regimes in Eastern Europe, the former Soviet Union and Asia, to the effect of economic austerity measures on political stability in debtor nations.

The opening up of the communist world for foreign investment will necessitate careful assessment of the types of non-economic risks that may arise. This includes the eruption of deep-seated ethnic, religious, and nationalist conflicts that had long been suppressed under dictatorial rule. The democratic revolutions in Eastern Europe will be followed by the painful and long process of building democratic institutions where none had previously existed, or at least not since the inter-war period. The political future of the former Soviet Union and China remains very much in doubt, and will be a source of continual uncertainty for the international business community. The Third World will also continue to undergo significant changes which are likely to affect the business climate. Major political dislocation could occur from challenges to authoritarian regimes, the spread of Islamic fundamentalism, or various guerrilla and ethnic-religious conflicts. New regional powers, such as India and China, among others, are also likely to emerge in the post-Cold War era.

For these reasons, political risk is likely to be more volatile in the 1990s than earlier decades. As one observer notes:

> rapid changes in international politics and policies, rather than domestic economies, are likely to dominate the 1990s…The past 40 years, despite tensions and crises, were years of political continuity. The next ten will be years of political discontinuity…(P)olitical life since 1945 has been dominated by domestic economic concerns

> such as unemployment, inflation, or nationalization/privatization. These issues will not go away. But increasingly international and transnational political issues will tend to upstage them.
>
> (Drucker 1989)

This chapter therefore addresses the issue of how multinational enterprises and international banks can utilize political-risk analysis in the management of foreign investment and cross-border lending.

The next section presents an overview of political-risk methodologies, and further sections identify key political and social variables in political risk and assess prospects for the future global international political environment.

OVERVIEW OF POLITICAL-RISK METHODOLOGIES

There are several ways that political-risk analysis can be obtained. Those firms and banks that require analysis of overseas political events can either utilize the abundant supply of risk services (e.g. newsletters and country rankings on a variety of political-risk factors); design their own system using personnel at headquarters and overseas to engage in gathering and assessing relevant information; or retain, often on an as-needed basis, the services of various experts offering political assessments of foreign-country prospects.[2]

We can identify four basic methodological approaches to political risk analysis, each of which have advantages and disadvantages for international banks and MNEs. These should be weighed carefully so that the methodology selected will be appropriate for the required analysis.

Subjective-individual analysis

The subjective-individual assessment is the most elementary form of political-risk analysis. This tends to be used in place of more elaborate risk-assessment methodologies and is an attempt by a business organization to take some account of the non-financial environment that can affect their investments. Subjective-individual analysis involves the overall impressions of individual analysts within the organization or of outside consultants. The analysis is oftentimes based on either personal contacts with key government officials in a particular country or through ‘networking’ (phone calls, fax communications) with various experts outside the country in question. The advantage of this approach is a quick turn around in producing studies or assessments. It also allows the bank or MNE to gain particular information that may be highly important for assessing the future political-business environment in the host country. For example, an analyst or expert who has contacts within the host government or other groups may be able to provide special information on a wide range of issues.

The disadvantage of this approach is that the information can be highly selective and represent the self-interests of the host-country officials who are used as sources. Furthermore, the subjective-individual approach does not allow for coordination or consistency among the potentially numerous assessments on a given country that the corporate decision-maker may receive. Thus, it can result in confusion or lack of clarity concerning bottom-line assessment for political risk in a particular country.

Subjective-group analysis

Political-risk analysis can also include assessments by several individuals or groups of analysts whose judgements are then collated through the use of various statistical tools. Two popular methods in the subjective-group category of risk assessment are Bayesian decision analysis and the Delphi technique.[3] *Bayesian decision analysis* involves assigning probabilities to a set of alternative hypotheses and then revising the probabilities as new information is received. This allows for on-going monitoring of a specific forecast. For example, a probability is assigned to the hypothesis or scenario that a Third World country is planning to repudiate its entire foreign debt, and a probability is assigned to the hypothesis that it is not planning such action. Information is then received which includes a statement by the country's finance minister that his government will be building a new international airport during the next year and will be seeking new international credit for the project. The probabilities initially assigned to the two hypotheses on repudiation of debt are then adjusted in accordance with the new information. Probabilities are assigned to the hypothesis that the Third World country would be planning the airport project and seeking new credit if it intended to repudiate its foreign debt, and to the hypothesis that the airport construction would be initiated and credit sought if the country did not intend to repudiate its foreign debt. A new probability is then derived for the original hypotheses according to Bayes' theory.

The attractiveness of the Bayesian approach to political-risk analysis is that it draws upon the knowledge and experience of more than one analyst by the use of statistical techniques. It provides structure to subjective assessments and allows for the continual updating or revision of conditional forecasts as new information is received. Its major drawback is that it relies on the subjective definition of a situation by an analyst or group of analysts who assign the initial probabilities to the competing hypotheses. Furthermore, the accuracy of the new information that is attained may not always be verified or verifiable, and the final Bayesian forecast can thus be based on faulty information.

Another subjective-group approach to political risk analysis is the *Delphi technique*. This methodology involves submitting a series of identical questions to a group of experts in order to elicit their views on various future scenarios. The group is provided with continual feedback as to the responses by other members of the group (who remain anonymous to each other) with the aim being eventually to reach a group position on a particular issue. Successive rounds of questionnaires are thus sent to the respondents with the results continually being tabulated and analyzed. The advantages of the Delphi technique are that it utilizes various experts' opinions and knowledge of a country situation and is relatively inexpensive to implement. Its disadvantages are that it is based on soft data (i.e. impressions, opinions) which may require a long time-lag from the period when the questionnaires are prepared until the final assessment is reached. The 'risk' becomes that the original purpose of the exercise—to attain a political-risk rating for a particular country or a forecast for a particular scenario—could be overtaken by events and no longer be relevant.

Objective-individual analysis

Political-risk analysis can also be based on the use of 'objective' data and quantitative techniques to assess the potential for political upheaval in a given host/borrowing country or group of countries. Subjective interpretations or 'soft' data are replaced with the use of various statistical indicators to forecast political risk. This can be conducted by an analyst either within the organization or by external consultants. While it is virtually impossible to achieve complete value-free or 'objective' analysis on any socio-political topic, the use of quantitative indicators of political risk eliminates some of the bias in subjective assessments. However, the selection of the indicators and the methods chosen to analyze the data are subject to individual biases. Moreover, many concepts underlying political-risk analysis are not always quantifiable.

Nevertheless, the use of more objective or quantifiable criteria to measure political risk (e.g. trends in political violence in the host country, policy stances of various interest groups) helps to eliminate some of the pure speculation and biases present in subjective assessments. This approach also tends to improve the consistency of cross-country analysis in as much as identical indicators, leading to a composite risk score, are used for every country being analyzed.

Objective-group analysis

Objective-group analysis is based on a consistent cross-country quantitative approach. Several staff members or outside consultants are needed to derive 'objective' rankings of countries along various political-risk criteria, such as potential for civil war, radical regime change, and general strikes. These criteria can be used both to 'predict' political risk (e.g. 'if there is a civil war, then certain types of business and industry are likely to be affected') or to explain the potential for instability in a country ('country x is more likely than country y to face a civil war in the next six months'). Unlike the Delphi or Bayesian approaches to risk analysis, an attempt is made to reduce subjective interpretation of events and instead to rely on 'hard' indicators of political instability (e.g. number of strikes, number and targets of terrorist attacks, public protests, etc.). The advantage of this approach is that political risk across a large number of countries can be compared using identical criteria, facilitating decisions on which host/borrowing countries may be more or less vulnerable to political and social upheavals. The disadvantage, though, is that the data can be misleading due to country-specific characteristics. For example, the number of general strikes or terrorist incidents in one country may have different implications for political risk than in another. Some governments and societies may be better equipped for dealing with or adapting to internal disorders than others. That is, different countries can have different probability thresholds to identical explanatory variable values (Brewer and Rivoli 1990:357–69; Citron and Nickelsburg 1987:385–92).

IDENTIFYING KEY VARIABLES FOR POLITICAL-RISK ANALYSIS

While international banks and MNEs should determine the most appropriate methodology or combinations of methodologies for their political-risk needs, a critical aspect of political-risk assessment is to document what types of developments can adversely affect foreign investments or loans. Identifying the key political and social variables that are related to political risk is as important as the choice of methodology for those interested in conducting political-risk assessment.

The two main categories of political-risk variables are those relating to macro and micro risk. This distinction was first identified by Robock (1971) in a landmark article. According to Robock (1971:6–20), *macro political-risk variables* include those actions and policies that are directed against all foreign business in a host country, while developments that affect only selected businesses or specific sectors are defined as *micro risk variables*. The importance of this distinction was that it highlights the importance of changes in industry-specific conditions versus widespread political and social upheavals.

Within the macro/micro range of political risk fall two sub-categories that are crucial for those organizations that are monitoring foreign political and social developments. These are societal-related risk and governmental-related risk, each of which can have macro or micro components.[4] Political risk can be due to events and conditions evolving within the society of the host country, or they can result from decisions and actions originating with the host government. Societal-related macro political risk would include revolutions, civil war, ethnic-religious turmoil, and widespread riots. These are among the developments that would have the potential to affect negatively and disrupt virtually all business activity in a particular country. Societal-related micro political risk would include terrorist attacks against selected businesses, strikes and protests against particular firms, sabotage, etc. This sub-category would also include unrest in certain regions or cities which affect only those firms that are operating in the troubled areas.

Government-related macro political risk includes those developments that are usually associated with catastrophic losses for foreign business, i.e. nationalizations, expropriations, and repatriation restrictions. Micro political risk in the government arena would include breaches of contract, selected nationalizations and expropriations, seizure of particular assets, environmental laws, and discriminatory taxes against specific firms.

While there can be similarities in some of the political risks that both international banks and multinational enterprises face, there can also be significant differences. This is due to the different nature of the investments that MNEs and banks make in a particular country, and the potentially different ways both the host/borrowing government and society view the activities of MNEs and banks.

MNE investments in host countries tend to evolve around 'visible' assets such as plants, factories, buildings, and other facilities. These can become targets of sabotage, terrorist attacks, and strikes by various groups. Civil disorder and instability in the host country can directly affect MNE investments through the disruption of normal business activity (e.g. disruption of supplies, intermediate goods, transportation), restrictions on remittances, and other developments. An international bank with physical assets in the host country, such as local branches or other equity investments, could face similar types of risks; however, the main political risk for an international bank would be the borrowing country's inability, usually synonymous with economic factors, or unwillingness, usually equated with political factors, to repay its loan. (The distinction between inability and unwillingness to repay a loan is discussed below.) The bank's claims, being strictly financial, are less visible than MNE investments in the host country, and thus less susceptible to direct societal or governmental actions (e.g. terrorism, strikes, expropriations). However, the host government's imposition of economic austerity measures as conditions for new loans can lead to civil disorders that undermine the stability of the government and its ability to repay its foreign debts.

Table 6.1 depicts some of the similarities and differences that international banks and multinational enterprises face in assessing political risk. As pointed out above, for international banks, the most serious macro government-related political risk would be the repudiation of all foreign debt by the borrowing country's government, which rarely occurs. Suspension of interest and amortization payments, requests for rescheduling of loans, demands for cancellation/forgiveness of part of the debt are among the other risks that would stem from government-initiated actions. When these actions and decisions are directed only at specific loans or specific foreign banks (which is usually not the case since the decision tends to affect all banks, although typically not all products), the risk would classified as micro-level. International banks also face macro societal-related political risks: public and interest-group pressure on the government to repudiate, default, or reschedule its foreign debt; mass protests against austerity measures that become translated into anti-foreign business sentiment; and instability due to civil war and revolutions. Micro societal-related political risks for international banks would include societal protests against a specific foreign bank, or, for those banks that have branches in the host country, terrorist attacks on employees or sabotage of facilities.

For the most part though, the most significant and probable political risk that international banks face is in the macro area of risk. This is due to the likelihood that a borrowing country's policy toward debt repayment and arrears will equally affect all foreign lending institutions with exposure to the debtor nation. MNEs, on the other hand, can be, and usually are, selectively targeted, either directly or indirectly, through both host government and host societal actions. Selective expropriation

Table 6.1 Political risks for international banks and multinational enterprises

	International bank	*Multinational enterprise (MNE)*
Macro-government	Repudiation of all foreign debt	Expropriation/nationalization of all foreign business
	Suspension/cancellation of interest payments	Remittance restrictions for all foreign business
	Demands for debt rescheduling	Foreign-exchange controls
Micro-government	Repudiation of selected debt	Selective expropriation of foreign business assets
	Suspension/cancellation of selected interest payments	Discriminatory taxes Local content laws
	Demands for selected debt rescheduling	Breach of contract
Macro-societal	Interest-group/public demands for repudiating debt	Terrorism/violence directed at all foreign business
	General instability due to revolution, civil war, etc.	General instability due to revolution, civil war, etc.
Micro-societal	Societal protests against a particular bank	Strikes, boycotts, etc. against a particular MNE
	Terrorist attacks against a particular bank	Terrorist attacks against a particular MNE

of its assets in the host country, or nationalization of companies it is involved with, would be the most serious micro-level government-related risks. Discriminatory taxes against a particular firm, local content laws for a specific product, and breach of contract are additional micro-government risks. Macro-government risks include industry wide nationalization, imposition of repatriation restrictions, and foreign exchange controls. Macro societal-level risks for MNEs include terrorism and violence, general strikes, rioting, and civil war that affects the majority of business. Some of these activities will be directed at specific firms, thereby constituting micro-societal risks.

The political-risk analyst must systematically assess the key variables that can lead to each of these different political risks. Much information and data on host/borrowing country developments is readily available through a variety of sources. This information can serve as the basis for an organization's political-risk system, which can be supplemented by specific information gained through the organization's network of contacts and overseas staff. Among the more valuable sources of data are public news reports, including international newspapers, television and radio broadcasts, and host- and home-government reports. Using these sources, a bank or MNE can readily begin to monitor political developments in a particular country.

Ironically, a bank may be in a better position than an MNE to survive a radical regime change or periods of instability in a borrowing/host country. This is due to the fact that the new government is likely to see the need for new loans to rebuild an infrastructure that was destroyed by civil war, or to satisfy rising expectations of the population. Thus, while various projects with foreign firms may have been cancelled or terminated during the period of instability, the need for new money and loans is likely to continue for the new regime. Thus, efforts to honor existing obligations and obtain new credit are likely to be a top priority for the new regime.[5]

While the risk of a government's repudiating its debt, falling into arrears, or rescheduling can be based upon myriad factors, a distinction needs to be made between a government's *inability* to repay a loan and its *unwillingness* to do so.[6] Political and economic crises may force a government to fall into arrears on its external debt (i.e. inability to repay). On the other hand, a government may decide to repudiate its foreign debt, even though it has the capability to continue to meet its external financial obligations (i.e. unwillingness to repay). Table 6.2 depicts some of the conditions that can lead to either type of scenario.

Financial crises can be caused by a variety of political and social developments that originate within the borrowing country. Civil war and societal upheavals can disrupt key industries and plants that are vital for the country's economic well-being. Since external-debt payments are dependent upon the continual smooth functioning of various aspects of the borrowing country's economy, political instability could leave the government with little choice but to suspend or cancel its debt repayments. Mismanagement of the economy due to rigid ideological policies and widespread corruption are additional political risks that can affect a government's ability to meet its foreign-debt obligations. Developments in the international arena could also lead to the disruption of debt repayments. This includes involvement in international wars or conflicts that drain a nation's economic and financial assets (e.g. Argentina, Iraq) or economic boycotts and embargoes of the country (e.g. South Africa).

Table 6.2 Political-risk factors affecting a government's inability or unwillingness to repay a foreign loan

	Inability to repay loan	*Unwillingness to repay loan*
Internal factors	Economic crisis due to civil war, instability, domestic turmoil	Promotion of nationalist sentiments by repudiating foreign debt
	Mismanagement of economy due to particular political ideology	Susceptibility to public pressure to repudiate debt
	Widespread corruption that drains economic/ financial assets	Decision to use debt/interest payments for domestic needs
		Radical regime change
External factors	Involvement in international war/conflict that drains economic/ financial assets	Deteriorating relations with home government of international bank
	Target of economic boycotts/embargoes by other nations	Decision to use debt/interest payments for foreign-policy adventures
		Radical regime change resulting from foreign aggression

Political-risk analysts, therefore, need to be alert for those situations that can tie the hands of a government, no matter how willing it may be to repay its loans. There are also situations that can arise whereby a government has the economic and financial means to repay its debt, but chooses not to for a variety of reasons. Foremost would be the desire to promote nationalist sentiment in the country to divert attention away from other problems. Attacking foreign banks and investments is one way to achieve this objective. A radical regime change can also lead to problems for international banks as the new government renounces all obligations of the previous one. External factors that would affect a government's unwillingness to repay a loan would be deteriorating relations with the home government of the bank, or a decision that the money that is currently being allocated for debt repayment is needed for other foreign policy pursuits (e.g. support of other guerrilla movements, establishing a base of power in a region, etc.).

While political risk for international banks has particular characteristics that separate it from MNEs, both banks and MNEs face an equally uncertain future in the 1990s as the international arena undergoes rapid and fundamental changes that will affect foreign investment well into the next century. It thus becomes important to identify some of the basic characteristics of the future political-risk environment.

POLITICAL RISK IN THE 1990s

The monumental events of 1989–91, where revolution toppled longstanding regimes throughout Eastern Europe and in the Soviet Union but was crushed in China, illustrate the different outcomes that challenges to communist and authoritarian regimes can have. The successful revolutions have raised expectations among many foreign investors for a more optimistic future during the 1990s. At the same time, the government's response in Beijing led to reassessments by foreign firms as to the future investment climate in China.[7] These situations represent the dramatic nature of political and social upheavals and the varied impact they can have upon international business.

Conventional thinking about power transformation and political change has focused on the gradual nature of such developments. However, the turmoil that plagued countries as diverse as the Philippines, Burma, China, East Germany, Czechoslovakia, and Romania illustrate that change can be quite rapid and have widespread results. What distinguishes recent events from earlier periods is the growing number of revolutions without guerrillas.[8] These are efforts by diverse segments of the population to bring about rapid and fundamental change in political and social conditions. Unlike armed insurgencies, which tend to take time to evolve to the point of crisis for a government, and which hold different types of risks for foreign business (kidnapping of personnel, sabotage of facilities), revolutions without guerrillas erupt suddenly and have a contagion effect both within the target country and possibly even in other nations throughout the region.

For foreign investment, the phenomenon of revolutions without guerrillas carries both risks and opportunities. The risks lie in the disruptions of normal business activity and the impact which political and social turmoil can have on a country's economy. The potential opportunities lie in the replacement of previously authoritarian or communist regimes with more open and democratic governments receptive to foreign investment and interdependence.

For the political-risk analyst, a key issue in assessing the future investment climate in a particular country is how a government is likely to respond to popular movements for political change. When the government chooses to use force to crush demonstrations—as occurred in China—the result can be a reversal of confidence among the foreign business community which took years to build. When governments choose to adapt to demands for change—or are toppled by peaceful revolutions—the foreign-investment climate is likely to improve, at least temporarily.

The period following a revolution, whether democratic or authoritarian, can be quite uncertain for international investors. The building of a new power base after years of continual rule is an oftentimes slow and volatile experience. Groups compete for influence and power in the new political and social structure, and there are likely to be inadequate guidelines for foreign investors or lenders interested in entering the new country. Breaches of contracts, ambiguity over ownership rights, and other political risks can become more frequent as promises are made during the euphoria following a democratic revolution which the new regime subsequently finds itself incapable of keeping.

Political risk in the 1990s will also be characterized by the growing importance of subnational actors who will erode even further central authority in many developing and industrialized countries. These subnational actors include ethnic-religious and nationalist groups whose conflicts can erupt into widespread violence that threatens the stability of the country.

Finally, the repercussions of government-imposed economic austerity measures is likely to be a prominent political risk in the 1990s. The past decade witnessed several cases where food-price increases and other austerity measures led to widespread rioting. Venezuela, Algeria, and Jordan were among the countries that faced serious threats to internal order and stability as a dissatisfied public expressed anger and frustration over further economic hardships. Political-risk analysts will thus need to take account of the potential for spontaneous and sudden uprisings in debtor nations and other countries experiencing economic crises. One way to do this would be systematically and continually to assess the various moods and attitudes of different segments of the population in specific countries in order to understand better how they are likely to react to austerity measures and government-imposed hardships.

As the 1990s unfold, political-risk analysis is on the verge of its second ‘boom’ period. The first, which occurred in the late 1970s following the Iranian and Nicaraguan revolutions, was based on negative events for the international business community. Today, a sense of optimism is growing over the future prospects for investments in the newly free nations of Eastern Europe as well as in developing countries around the world. However, the nature of politics and conflicts is such that today’s optimism can be shattered by tomorrow’s unexpected events. It will therefore be important for both banks and MNEs to continue to take political risk into account as they ponder their foreign investments.

NOTES

1 Among these studies were the following: Franklin R.Root 1968:73–80; Robert B.Stobaugh 1969:100–8; Stefan H.Robock 1971:6–20; Jean Boddewyn and Etienne F.Cracco 1972:45–56; Robert T.Green 1974:28–36; Harold Knudsen 1974:51–71; Bruce Lloyd 1976; Antoine W.Van Agtmael 1976:26–30; R.J.Rummel and David A.Heenan 1978:67–76.
2 For a description of the risk services available, and the process by which firms can design risk assessment models, see Jeffrey D.Simon 1982:62–71, and 1985:132–48.
3 For examples of the application of Bayesian and Delphi methodologies to political assessments, see Richard K.Ashley 1978:149–171; Nicholas Schweitzer 1978; Olaf Helmer 1978:116–123.
4 For a further discussion of this distinction, see Simon 1982.
5 If the revolution results in a fervent anti-Western regime, such as the Islamic revolution in Iran, then suspension of debt repayment or repudiation of foreign debt becomes more likely. However, even radical regimes eventually realize the importance of foreign loans and begin seeking re-entry into the international credit market.
6 I would like to thank Ron Solberg for raising this point.
7 For example, in October 1989, an international bank syndicate terminated a $55 million credit for a property project in Shanghai. According to reports, the loan by Schroders Asia Ltd to Asia Development Corp. was cancelled due to 'nervousness about China's political turmoil'. See *The Wall Street Journal,* October 17 1989, p. A22.
8 For a discussion of this phenomenon, see Jeffrey D.Simon 1989.

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7 Systematic risk in international bank lending

Theory and estimation

Gary Dymski and Ronald L.Solberg

INTRODUCTION

This chapter uses a novel analytical framework, borrowed from the theory of finance, to reconsider two of the central questions posed by the less-developed-country (LDC) debt crisis. Did systematic-risk factors, including the behavior of the credit-supply function, significantly affect LDC creditworthiness—and hence, LDC repayments difficulties—in the 1970s and 1980s? Did international banks adequately incorporate systematic-risk factors in their lending decisions for LDCs?

In finance theory, *systematic risk* refers to the undiversifiable risk which all investors in risky assets must bear. In lending to LDCs, systematic risk consists of the probability of default or arrears for a representative portfolio of LDC debt, which arises because of common or global factors that 'systematically' affect all borrower nations; *non-systematic risk,* by contrast, consists of the additional risk of default or arrears due to country-specific factors which are borne by any lender whose portfolio of LDC debt differs from the representative portfolio. Intuitively, the systematic risk associated with any event equals its impact on the likelihood of arrears for a representative portfolio of LDC loans, where each country is weighted according to its proportionate share in this portfolio; non-systematic risk arises for that event only if a given portfolio differs from this representative portfolio.

This paper investigates whether the 'true' extent of the creditworthiness problems faced by any bank holding LDC debt can be lessened through portfolio diversification.[1]

The debt crisis of bank lending to LDCs has demonstrated anew an age-old process wherein theorists formalize what practitioners have been doing for years. For several decades the banks, especially large banks, have had sophisticated departments of country risk which analyzed non-systematic (country-specific) risk to ascertain sovereign creditworthiness in terms of both its ability and willingness to pay. Cline (1984), Solberg (1988) and Sachs (1989) are formal examples of this approach. A similar approach has been taken by recent papers which reexamine the determinants of bank lending to LDCs (Berg and Sachs 1988; Dymski and Pastor 1990; Solberg 1989). However, in most of these studies, an explicit assessment of global or systematic factors played a minor role. Most theoretical explanations of the debt crisis have also taken a non-systematic approach. For example, in one account, the problem is 'loan pushing' induced by bank myopia, wherein lenders extend more credit than borrowers are able productively to absorb and thus repay (Darity 1985); in another, the problem is 'enforceability', in that the international capital markets have set the penalties for non-payment too low to induce borrowers to repay (Eaton, Gersovitz, and Stiglitz 1986). In sum, neither practitioners nor theoreticians have fully addressed the systematic or global conditions underlying repayment.

This country-by-country approach leaves a key question unexplored: is a bank which lends to a representative set of LDC borrowers less likely to experience repayments difficulties than a bank with an undiversified portfolio of LDC debt? In effect, are the systematic factors which have caused crises for *some* LDC debtors imperfectly correlated across *all* LDC debtors, so that the net risk to a lender which holds the debt of all LDC debtors is reduced? If the net risks across all LDC debtors are less than the sum of the individual risks for each debtor considered separately, then at least some banks could reduce risk through diversification.[2]

The next section introduces systematic risk as it has been developed in the theory of efficient capital markets. The third section adapts the concept of systematic risk to the less ideal informational and market circumstances underlying lending to LDCs. The fourth section proposes specific types of systematic risk which may be pertinent in markets for LDC debt, with supporting descriptive statistics, and the fifth section contains the results of some empirical tests for the presence of systematic risk in lending to LDCs, including a novel approach to the question of whether banks have overlent to LDCs.

SYSTEMATIC RISK AND PORTFOLIO CHOICE IN EFFICIENT CAPITAL MARKETS

The idea of systematic risk arises in the literature on investment under exogenous uncertainty in efficient capital markets (ECM). Securities markets can be modeled as ECM when they are characterized by costless, homogeneous information, no transactions costs or taxes, and infinitely divisible assets. Most empirical theoretical investigations also make the restrictive assumptions that investors evaluate securities' risk and return characteristics solely on the basis of their means and variances respectively, which completely summarize these securities' stochastic behavior.[3]

Under these assumptions, strong statements can be made about optimal market behavior and relative prices in equilibrium. Specifically, each investor will hold a portfolio which is a linear combination of the risk-free asset and of the 'market portfolio'. The market portfolio, in turn, consists of the vector of all issued securities, weighted by their proportionate values at current market prices. Any security included in the market portfolio must have risk/return parameters which are less than perfectly correlated with those of the remaining securities; this imperfect correlation between return distributions implies that every security augments the risk/return characteristics of the portfolio as a whole (Fama 1976: chapter 7). When there is a risk-free asset, utility maximization causes every investor's portfolio of risky assets to be a proportionately scaled version of the market portfolio; when there is no risk-free asset, utility maximization causes every investor to choose that unique portfolio of risky assets which minimizes risk, given return. A key result in ECM theory is the separation theorem, which states that the size and risk characteristics of any investor's portfolio are independent of the mix of risky assets held.

Turning to asset pricing, the ECM has given rise to the capital-asset pricing model, whose basic result is that for any asset i,

$$1 \qquad E(R_i) - R_F = \frac{E(R_M) - R_F}{\sigma^2(R_M)} \operatorname{Cov}(R_i, R_M),$$

where R_i is the return on asset i, R_M the return on the market portfolio, and R_F is the risk-free borrowing and lending rate. Here E denotes the expectational operator, s^2 (A) the variance of A, and Cov(B,C) the covariance of B and C. Rearranging terms, equation 1 can be rewritten as:

$$2 \qquad E(R_i) = (1 - \alpha)R_F + \alpha E(R_M), \quad \text{where } \alpha = \frac{\operatorname{Cov}(R_i, R_M)}{\sigma^2(R_M)}$$

If there is no risk-free asset, then R_F is replaced in 2 by the return on the minimum-variance portfolio.

Beja (1972), following Sharpe (1964), has shown that the further assumptions that $\operatorname{Cov}(\varepsilon_i, R_M)=0$, and that the risk-free rate is known with certainty gives the expression:

$$R_i = a_i + b_i R_M + \varepsilon_i \tag{3}$$

where $E(\varepsilon_i)=0$, for all i. Here, the realized return on any asset i consists of two parts: a *systematic* component, $a_i+b_iR_M$, and a *non-systematic* component, ε_i. The terms in the expression for systematic risk, a_i and b_i, are parametric, since each is defined in terms of parameters of the exogenously-given distributions of security returns. Indeed, using equation 2 and the definition $Corr(A,B)=Cov(A,B)/\sigma(A)\sigma(B)$, the terms a_i and b_i in equation 3 equal:

$$a_i = (1 - \frac{Corr(R_i,R_M)\sigma(R_i)}{\sigma R_M})R_F \tag{4.1}$$

and

$$b_i = \frac{Corr(R_i,R_M)\sigma(R_i)}{\sigma(R_M)} \tag{4.2}$$

We can use Beja's terminology to interpret the relationship between the market portfolio, individual security returns, and risks. For any security included in the market portfolio, its risk/return parameters are not linearly dependent on the parameters of the remaining securities. This is what justifies the inclusion of each security in the market portfolio. Once so incorporated, the market portfolio then systematically reflects each security's characteristics, in the sense of 3 and 4 above.

When the assumptions underlying ECM theory hold, investing in those markets is straightforward. Each investor need decide only what combination of the risk-free asset and the market portfolio will yield an optimal risk/return profile. The (known) stochastic properties of the traded securities provide a rule for determining equilibrium ex ante returns. If returns can, in addition, be broken into systematic and non-systematic components, then investor behavior can be interpreted as a response to the overall risk/return characteristics of all securities in the market on any trading date. Given investor rationality, the *ex ante* risk/ return properties of any individual investors' asset position (and the systematic portion of outcomes for that position) can be fully characterized in terms of outcomes in the securities market as a whole.

SYSTEMATIC FACTORS IN BANK LENDING TO LDCs

Are these theorems about security pricing and investor behavior applicable to cross-border lending by banks, and specifically to bank lending to less developed countries (LDCs)? Numerous authors have extended the ECM model to banks, on the one hand, and to cross-border asset flows, on the other. Parkin (1970), Silber (1970), and Hart and Jaffee (1974) have shown that the ECM model applies to the behavior of financial intermediaries when intermediary assets and liabilities have the properties ascribed to securities in ECM models, and when intermediaries themselves have fixed, positive net worth. Willett (1967) developed a portfolio-balance model for short-term cross-border capital flows using the principles of ECM, and Haas (1971) a similiar model for long-term flows. Portfolio balance and ECM principles remain a staple feature of models of exchange-rate determination (see Lewis 1988 and the literature cited therein).

One paper on bank lending to LDCs has used the notion of systematic risk with respect to international loans (Penati and Protopapadakis 1986); however, it assumes perfect correlation in the return distributions of all LDC debt, and does not investigate the determinants of this systematic risk. A number of authors (see Dornbusch 1987 and the references therein) have discussed the role of systematic factors in the LDC debt crisis, but have done so informally, without investigating the implications of imperfectly correlated systematic risk factors in LDC lending.

Further, no authors have interpreted bank lending to LDCs using ECM models of asset pricing and portfolio composition. This neglect is due to a universal consensus that the assumptions required for ECM theorems are absent in this case.[4] The most important problem is that information on the distribution of returns for loans to LDCs is not costlessly available ex ante. In intra-border securities markets, a legal framework enforces good-faith payment of financial obligations by requiring sanctions, including, if necessary, the termination of non-viable economic enterprises. But as Eaton, Gersovitz, and Stiglitz (1986) have pointed out, the enforcement powers of this legal apparatus are inapplicable for cross-border financial claims; and as Walter Wriston observed, 'countries don't go bankrupt'. The sovereign borrower has privileged information about its intentions, and greater latitude than a domestic borrower to steer its own course.

The replacement of complete and costless information by asymmetric information has two implications. First, the parameters on which ECM theory is based—means, covariances, and variances—are not drawn from a continuous, stationary distribution of outcomes, and hence are not well-defined. Second, the behavioral relationship between bank and borrower is not an arms-length contract which is completely prespecified in a competitive market. Instead, it is a principal/agent problem, in which the bank is the 'principal', and the borrower is the 'agent'.

Principal/agent problems have two elements. First, they arise for transactions in which the behavior of the parties involved cannot be completely prespecified in the contract signed, and where the successful conclusion of the transaction depends on this ex ante indeterminate behavior. Second, the principal/agent interaction also requires that the interests of the two parties inherently conflict. For example, there is no principal/agent problem between a player and a team owner if both parties' goal is to maximize the player's output, but there is a principal/agent problem if the owner wants maximum player output, while the player's primary goal is to avoid injury.

The two parties to such a transaction are identified separately, as principal and agent, because they have different incentives. The principal achieves its goal only if the other player, the agent, is induced to behave as the principal desires. The two roles are defined not by who initiates the relationship, but by which party will benefit from good-faith performance under the contract signed. The party whose incentive is to lie or cheat is, in effect, the 'agent' whose behavior the 'principal' attempts to control. In borrower/lender contracts, lenders are principals, because recouping their loan plus interest depends on the borrowers' avoiding default. By contrast, borrowers are agents, because their optimal outcome, all else equal, is to default—to get money for nothing.

The principal's problem, then, is to elicit or force the cooperation of the agent. A simple contract between the two parties does not guarantee this cooperation; the agents may either misrepresent their innate capacity to perform (their 'type'), or perform unsatisfactorily after contractual terms are set.[5] In the bank/borrower relationship, the problem arises because the bank, when contracting with a borrower, lacks sufficient information about borrower 'type' or about ex post borrower performance. Nevertheless, in attempting to select only innately 'good' borrowers, the bank will set up screening procedures wherein borrowers must satisfy net worth, cash flow, or other criteria to establish their creditworthiness. To preclude 'bad' behavior by its borrowers, the bank can use either 'carrots', such as performance incentives, or 'sticks' such as monitoring, performance-contingent loan renewals, collateral pledging, etc.[6]

In sum, in cross-border relationships between banks and borrowers, borrowers hold privileged information about both their rescheduling intentions and about their repayment capacity. This asymmetric information affects the borrowers' probability of arrears and hence the loan's rate of return. The two elements of the borrowers' privileged information, their willingness and ability to pay, are the 'deep' determinants of the rate of return. As such, these determinants are the analogues of the parameters of securities issued in ECM.[7]

Debtors' willingness and ability to pay have been investigated at length by academics and practitioners investigating LDC creditworthiness. *Willingness to pay,* according to theorists who have developed the 'enforceability' model, depends largely on the nature of the contract into which the parties have entered, including any performance-linked inducements or punishments by multilateral agencies. It is also likely to be dynamically related to the debtors' international credit-market access. *Ability to pay,* in turn, has been regarded as a function of the debtors' social political, and economic conditions or, in 'loan pushing' explanations, as a function of bank behavior and lending cycles. Practicing country-risk analysts incorporate country-specific indicators for both willingness and ability to pay in their assessment of sovereign creditworthiness. Clearly, both willingness and ability to pay will vary with time periods, with country characteristics and type, and with contractual terms.

The next section demonstrates how systematic risk factors enter into both components of borrower creditworthiness and identifies proxy variables for empirical testing.[8]

SYSTEMATIC-RISK FACTORS AND SOVEREIGN RESCHEDULING

The global factors affecting the payments experience of the developingcountry debtors during the 1970s and 1980s took the form of several supply-side and demand-side shocks. These changed relative prices and flows of real and financial goods and services. These exogenous shocks are postulated to have influenced the willingness and ability of developing countries to repay foreign debt.[9]

Systematic-risk factors in LDC willingness to pay

As emphasized in the enforceability model of the debt crisis, lenders can respond to the threat of borrower repudiation by setting penalties for nonpayment whose present value exceeds the value of the principal lent. And, indeed, lenders and their proxies (the IMF, the US government, etc.) have imposed numerous penalties on borrower nations since the onset of the debt crisis; penalties have included IMF conditionality, fiscal austerity, foreign-exchange controls, devaluation, etc.[10]

Penalties have, on the one hand, led to substantial uniformity in debtor willingness to repay debt; the occasional exceptions to this rule, such as the Garcia regime's debt moratorium in Peru, are notable for their scarcity and ineffectiveness. On the other hand, penalties have not sufficed to end the repayments crisis; while partially successful, their primary result has been to allow for additional—if reduced—lending.

Willingness to pay is a source of non-systematic risk among borrower nations to the extent that it is imperfectly correlated across these nations. This proposition is difficult to ascertain, since willingness to pay is non-quantifiable. However, there are countries whose policies have been substantially affected by external agencies like the IMF, and countries that have avoided or even refused IMF conditionality; countries that have had to impose austerity measures frequently, and those that have largely avoided them. This is evidence of variable willingness across countries.

Further, above-mean outcomes for willingness to pay—wherein particular countries, such as Mexico in 1989, take exceptional measures to resolve debt problems—are unlikely to be perfectly correlated across all debtors. The sheer transactions costs of above-mean willingness to pay outcomes imply that they cannot be undertaken in all debtor countries. The imposition of stringent penalties in one locale may even reduce the extent of stringency elsewhere; for example, after Venezuela's compliance with an external mandate to increase prices drastically (especially energy prices) resulted in destabilizing riots in 1989, Argentina received considerably gentler handling.

Despite the unobservability problem which afflicts this dimension of creditworthiness, an admittedly imperfect empirical measure of systematic willingness to pay for LDC borrower nations is readily available: the cumulative reschedulings of LDC borrower nations as of any year (CUMRESCH). This variable captures the systematic aspect of willingness to pay in that it provides an index of the creditors' perception of LDC creditworthiness and thus LDC credit-market access. Once a country's ability to borrow is impeded by an international credit crunch, presumably its willingness to repay its existing foreign debt is eroded.

Systematic risk factors in LDC ability to pay

Borrower capacity to repay debt depends on those features of the borrower's economy which determine the foreign exchange available for repayment—its structural, adjustment, and liquidity factors. Since overseas loans must be repaid in the currency of issue, an approximate indication of ability to repay is provided by rearranging (a simplified version of) the borrower's foreign-exchange balance:

$$\mathbf{5} \qquad \Delta \mathbf{D}_i - r\mathbf{D}_i = \mathbf{X}_i - \mathbf{M}_i$$

for country i, where ΔD_i represents the net change in indebtedness, rD_i the flow of interest on outstanding debt, X_i the flow of exports, and M_i the imports of intermediate and final goods. The righthand side of equation 5, if it is defined in ex ante terms, represents the required trade balance. All factors which impinge on country ability to pay can be conceptualized as having an impact on either X_i or M_i.

Are there then systematic factors, which both affect country ability to pay—to generate foreign currency—but which are not perfectly correlated across all debtor countries? Several can be readily identified. The first factor which affects all borrowers is the 'price' of foreign borrowing which, in turn, is comprised of two elements: the banks' global-market-based cost of funds and the discretionary 'spread' or markup reflecting perceived risk. The second of these elements, the markup, does vary across borrower countries. The first, however, is uniform for all borrowers; usually, the London interbank offered rate (LIBOR) serves as the index rate in loan agreements. Hence, the real value of the LIBOR is a useful proxy for the cost of funds for all LDC borrowers.

All LDC debtor countries earn foreign exchange by exporting commodities; and, as equation 5 illustrates, these countries' net export earnings, notwithstanding new borrowing, constitute a constraint on LDC interest payments. It is natural then to think of the volume of net exports to OECD countries by all LDC debtors as a systematic factor in ability to pay. Here, we single out three variables which express this interdependence between net export flows to OECD nations and LDC-borrower ability to pay.

The first is the overall growth rate of the advanced industrial nations (OECDGDP), which is clearly a key determinant of net export flows thereto. The second is the price level of oil (OIL), since this commodity is extracted primarily in the LDC bloc and hence affects the terms of trade systematically. A third factor is the global exchange-rate regime in force: that is, the global invoice currency and its value relative to the currencies of LDC debtors. Here the value of the US dollar is used (USDOLLAR).

These three variables are all candidates for being systematic risk factors in ability to pay because they are imperfectly correlated among borrower nations. The goods exported from LDC debtors to OECD countries differ in a variety of ways—they may be necessities or luxuries, they may or may not have substitutes, etc. Thus, the price and income elasticity of net OECD export demand will vary *among* the LDC debtor nations, and the criterion for a systematic factor (imperfect cross-country correlation) is again met. Shifts in the price level of oil also clearly affect different members of the LDC borrower bloc quite differently, according to whether these members are buyers or sellers. Similarly, changes in the value of the dollar will have different effects on different borrower countries' net exports to the OECD nations, depending on the elasticities of demand and on whether the settlement currency is the dollar.

Figure 7.1 illustrates the marked difference between the trade trends for OECD nations and those for developing economies as a whole.[11] They also show the marked difference between trade trends for developing countries that do and do not export oil. So the first point suggests the possibility of systematic risk, and the second implies the existence of country-specific risks among LDC debtors; together these points support the idea that assessing creditworthiness at a country-specific level captures a borrower's overall creditworthiness only partially; an additional—systematic—dimension of risk exists to the extent that this nation is a member of an interrelated set of borrower nations.

AN EMPIRICAL SYSTEMATIC-RISK MODEL OF ARREARS AND LENDING

The analysis in the last section suggests several propositions which can be tested empirically: systematic or global economic factors affect developing-country external-debt repayment prospects; systematic-risk factors are imperfectly correlated across different country groups; and systematic-risk factors are considered in the commercial-bank decision to lend to developing countries. Specifically, this discussion suggests an empirical relation of the form:

6 SYSTRISK = F(CUMRESCH, USDOLLAR, OIL, LIBOR, OECDGDP)

Equation 6 expresses systematic risk as a function—here, assumed linear—of the global macro-economic variables presented in the last section. Obtaining stable parameter estimates and an acceptable fit for equation 6 would support the first postulate.

A stable statistical relationship between developing country creditworthiness and systematic-risk factors will allow for a test of the equality of group coefficients. In order to test for the second postulate—imperfectly correlated systematic risk amongst the three country groups—a set of Chow tests will be performed. The estimated systematic-risk series will then be used as an instrument in a second-stage regression which explains BIS bank lending to developing countries (presented in the following section).

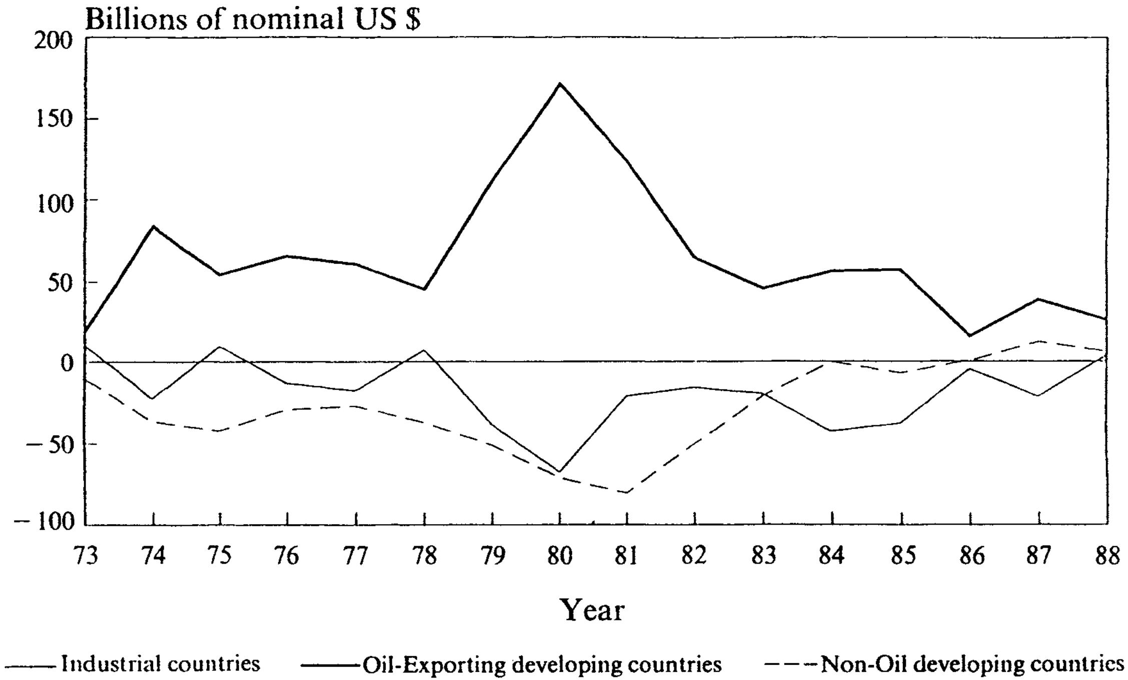

Figure 7.1 Balance of trade 1973–1988

Source International Financial Statistics

Table 7.1 Data characteristics

Cross-sectional				
	OIL	*NICs*	*PRIM*	*ALL*
Total sample countries	10	7	19	36
Total rescheduling countries	7	4	15	26
Share of rescheduling countries (%)	70	57	79	72

Time-series: country-group share of rescheduling observations (%)			
	OIL	*NICs*	*PRIM*
1973	25	25	50
1974	25	25	50
1975	25	0	75
1976	25	50	25
1977	50	25	25
1978	33	33	33
1979	0	0	100
1980	0	17	83
1981	0	0	100
1982	18	18	64
1983	21	16	63
1984	8	15	77
1985	13	18	69
1986	22	22	56
1987	19	19	62

OIL = oil exporters
NICs = newly industrialized countries or manufacturing exporters
PRIM = non-oil primary-commodity exporters

The dependent variable measuring systematic risk—SYSTRISK—is defined as the sum, in any given year, of all developing-country rescheduling observations. In a given year, any sample country can contribute only one (Y=1) rescheduling observation, even if it concluded two or more agreements in that year with one or more creditor. Thus, the dependent variable will potentially range from zero to 36, the number of countries in the total sample during the period from 1973 to 1987.[12]

As shown in table 7.1, this variable comprises three broad groups of countries distinguished by the predominance of their export commodity mix: oil exporters, manufacturing exporters (or NICs) and non-oil primary-commodity exporters.

There is a representative distribution of rescheduling observations over time for each of these three broad groups. Overall, 72 per cent of the

Table 7.2 LDC group priors for systematic risk

Country Group	*OIL*	*NICs*	*PRIM*	*ALL*
Variable				
CUMRESCH	+	+	+	+
USDOLLAR	+	+	+	+
OIL	–	+	+	+
LIBOR	+	+	+	+
OECDGDP	–	–	–	–

OIL = oil exporters
NICs = newly industrialized countries or manufacturing exporters
PRIM = non-oil primary-commodity exporters

sample countries rescheduled at least once during this period and almost 25 per cent of the overall data observations represent those of rescheduling.

For this sample of 36 developing countries, the number of annual reschedulings remained surprisingly constant during the 1970s, averaging just below four per year. Beginning in 1980, however, an increasing trend in the incidence of reschedulings occurred, reaching a peak (27) in 1983. Since then, debt-rescheduling agreements remained at a slightly lower average plateau (22), although the standard deviation is high at 4.9.

Table 7.2 presents the systematic-risk country-group priors (i.e. expected coefficients) for each of the explanatory variables described earlier and shown in equation 6.

It is possible that systematic-risk factors exhibited structural change over the past two decades. Year dummy variables are used to divide the sample period into two periods: 1973–9 and 1980–7, allowing for a test of structural change in the systematic-risk factors in the stage 1 regression.

Since time-series data are used to estimate the country-group systematic risk rescheduling models, serial correlation is likely. First-order correlation will be tested using a Durbin-Watson test statistic. An adjustment will be made to correct for the auto-correlated residuals. Preliminary testing shows that parameter estimates are relatively stable over a range of observation periods. Therefore, multicollinearity is not considered to be a serious problem. The estimated model's goodness of fit will be measured by the adjusted R^2. An F test, measuring the joint significance of all the estimated parameters, also will be computed.

First-stage empirical results

The results of the first-stage specification are generally supportive of the postulated effect of systematic factors on developing country rescheduling. As shown in table 7.3, all of the explanatory variables, with the exception of real oil prices, are highly significant and correctly signed, together explaining approximately 92 per cent (adjusted for degrees of freedom) of the entire sample's variance. The F test at 5 per cent rejected the null, suggesting the joint significance of all explanatory variables. This test result was true for the entire sample as well as for each sub-group, with the exception of the oil exporters. Figure 7.2 plots the actual level and the fitted line (with confidence interval) of annual systematic risk for the entire sample.

The insignificance and ostensibly wrong sign of the oil-price variable is likely due to the mixture of oil exporters and importers in the total sample and the fact that oil prices are not always an exogenous variable for the oil exporters.

The results for the primary-product exporters and NICs were broadly similar to those of the entire sample. For these two groups, all coefficients were highly significant and properly signed, with the exception of the oil price variable.

The estimated parameter of the oil variable for the primary producers was correctly signed but insignificant. This may be due to the high positive correlation between oil and non-oil commodity prices (78 per cent), implying a concurrent positive and negative effect on their cash flow, thus minimizing the postulated deleterious terms-of-trade effect. In addition, the smaller industrial sector and lower per capita income in these countries may result in a lower dependence on oil-import volumes and prices.

Table 7.3 shows that oil prices have a perverse effect on systematic risk for the NICs. The sign may be negative due to the fact that the industrial sector in these countries is relatively resilient and efficiently adaptive to external oil shocks. Hence, a higher oil price leads, over time, to more efficient industrial, transport and distribution sectors.

The results for the oil exporters were problematic. The goodness of fit (i.e. adjusted R^2) was low at 42 per cent compared to that for the other two groups; unlike the F test for the others, the F test did not reject the null.

The coefficients were insignificant for the real oil price variable, US dollar fluctuations, OECD GDP growth and real interest rates, although all had the appropriate sign.

Because of the immense US-dollar-denominated assets (i.e. oil reserves and financial deposits) held by the oil-exporting countries, a

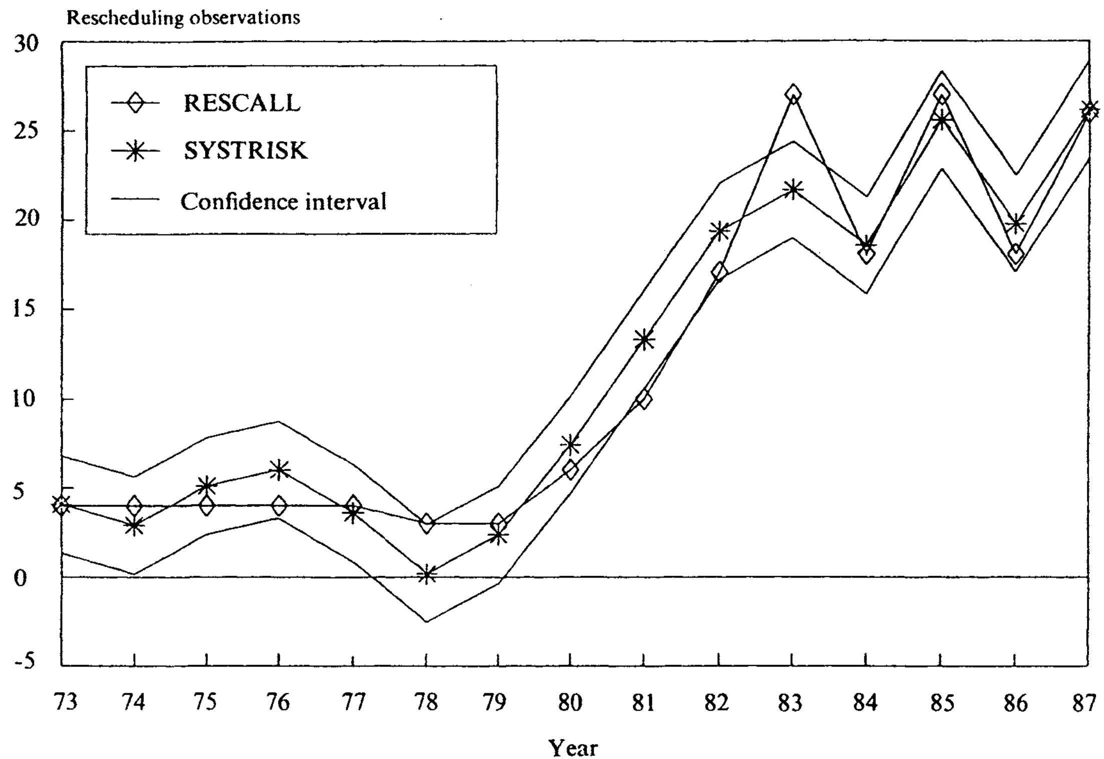

Figure 7.2 Actual and fitted reschedulings (confidence interval at 98 per cent)

Table 7.3 Empirical results of systematic-risk factors

SYSTRISK = F(CUMRESCH, USDOLLAR, OIL, LIBOR, OECDGDP)

	Total Sample	*PRIM*	*NICs*	*OIL*
Variables				
CUMRESCH	0.096	0.063	0.162	0.183
	(6.81)***	(6.53)***	(7.03)***	(2.83)***
USDOLLAR	0.092	0.045	0.029	0.019
	(3.93)***	(4.26)***	(4.10)***	(1.06)
OIL	−0.038	0.011	−0.033	−0.024
	(1.25)	(0.82)	(3.50)***	(0.95)
LIBOR	1.18	0.94	0.19	0.12
	(4.27)***	(7.32)***	(2.42)***	(0.56)
OECDGDP	−2.27	−1.11	−0.71	−0.61
	(3.83)***	(4.19)***	(3.98)***	(1.38)
$\bar{R}^2$	0.917	0.954	0.828	0.425
S.E. of regression	2.73	1.40	0.72	1.46
Durbin-Watson	2.11	1.90	2.17	2.10
Mean of dep. variable	11.67	7.67	23.1	1.87
F-statistic	32.1	59.2	14.5	3.07
ρ(AR(1))	−0.60	−0.80	−0.42	−0.10

For each variable, t-statistics are shown in parentheses below the reported coefficients
*** Significant at the 1% level.

OIL = oil exporters
NICs = newly industrialized countries or manufacturing exporters
PRIM = non-oil primary-commodity exporters

US-dollar appreciation, while increasing the real burden of the external debt, would also result in a counterbalancing windfall gain. In addition, since many oil exporters chose short-term deposit instruments in the Eurodollar market in the 1970s, a large proportion of their financial assets would have benefited from higher interest rates so that the deleterious cash-flow effect of rising interest rates on debt service was partially neutralized by greater revenue from these assets.

Stability of coefficients

The Durbin-Watson test, before first-order differencing, suggested that the residuals were distributed AR(1). The Cochrane-Orcutt procedure was used to correct for first-order auto-correlated errors and improved the efficiency of the estimated parameters. After this correction, only the Durbin-Watson test statistic for the sample of primary-product exporters was inconclusive; the other three tests at 1 per cent did not reject the null of zero autocorrelation.

The two dummy variables testing for structural change in systematic-risk determinants during the 1970s versus 1980s show the latter period to be significant for the overall group, the NICs and primary-product exporters. The greater importance of the 1980s may reflect the fact that the cumulative affect of systematic-risk factors eventually eroded the preconditions for growth. See Sachs (1989) for a further discussion of this issue. Neither time-period's dummies were significant for the oil exporters, while both were for the primary-product exporting group.

The two sets of three Chow tests across each set of country groups, when time dummy variables were both excluded or included, did not reject the null hypothesis that all the coefficients are equal. Thus, with this sample, it may not be reasonable to conclude that systematic risk was imperfectly correlated across these three country groups. (These results, however, may not be robust since the error variances for the different groups may not be equal.)

Bank lending to developing countries

The second part of the empirical work addresses the third postulate: commercial banks incorporated systematic risk in their lending decision to developing countries. This relationship is stated in equation 7.

$$L = G[\overset{-}{\text{SYSTRISK}},\ \overset{-}{\text{TR10YR}},\ \overset{+}{\text{LOANCOM}},\ \overset{-}{\text{FLOWG10}}] \tag{7}$$

L measures the dollar value of annual gross lending to all developing countries by the BIS-reporting banks. SYSTRISK is the instrument produced from equation 6. It is a proxy measure for the creditor's expected probability of rescheduling based on systematic-risk factors. If it was properly accounted for by BIS banks in lending to developing countries, this pre-determined variable would have a negative coefficient.

The average annual interest rate on ten-year US Treasury notes, TR10YR, represents the risk-free rate of return whose maturity is similar to a term loan extended by commercial banks to developing countries. As an alternative investment to developing-country lending, this exogenous variable should be negatively correlated with the dependent variable.

The dollar value of annual loan commitments, LOANCOM, represents the annual amount of committed, but undisbursed, money for developing-country borrowers. While not all of these funds represented binding commitments, most did, so that this predetermined variable is expected to be positively correlated with BIS-bank lending to developing countries. FLOWG10 measures the annual dollar amount of loan disbursements by BIS banks to all borrowers located within the Group of Ten[13] and affiliated industrial countries. Representing an alternative investment, this variable is anticipated to be negatively correlated with bank lending to developing countries.

Second-stage empirical results

The second-stage results generally are satisfactory (see table 7.4). The Durbin-Watson test statistic for all groups does not reject the null of zero autocorrelation. The first-order adjustment to the data improves the efficiency of the fit, making the US Treasury yield variable significant. All variables are properly signed and virtually all are significant. Eighty-five per cent of the total sample variance is explained when adjusted for degrees of freedom. The F test confirms that the coefficients are jointly significant.

These results show that the BIS bank-lending decision considered systematic risk only for the oil-exporting group. In fact, all explanatory variables were significant for this specification. The coefficients for systematic risk were not significant for the NICs, primary-product exporters and thus, the overall sample too. The strong preference of the BIS banks for NIC assets and their resulting concentration of exposure to this group is reflected in the insignificance of variables other than loan commitments.

Strong creditor priors on the creditworthiness of this group meant that the opportunity cost of lending within the BIS group, measured either by rate of return or lending volume, was insignificant for the NICs. By contrast, this ‘crowding-out’ effect *was* operative for the oil exporters and primary-product exporters. As would be expected, these elasticities were the largest for the primary-product exporters.

CONCLUSIONS

This concluding section first summarizes our arguments about systematic risk. It then discusses the implications of systematic risk for bank lending, and finally its implications for policy analysis.

Systematic risk

The empirical results show that systematic risk had a significant affect on debtor behavior during the 1970s and 1980s and should be included in

Table 7.4 Empirical results of bank-lending factors

L = G(SYSTRISK, TR10YR, LOANCOM, FLOWG10)

	Total Sample	*PRIM*	*NICs*	*OIL*
Variables				
TR10YR	−2.46	−2.78	−1.80	−2.50
	(2.16)*	(2.09)*	(1.42)	(3.45)**
LOANCOM	0.00079	0.00082	0.00069	0.00078
	(5.74)***	(4.99)***	(4.74)***	(8.85)**
FLOWG10	−4.3E-05	−5.0E-05	−3.1E-05	−3.8E-05
	(2.66)**	(3.10)**	(1.33)	(2.42)**
SYSTRISK	−0.66	−0.74	−4.59	−4.39
	(1.65)	(1.22)	(1.61)	(2.05)*
$\bar{R}^2$	0.85	0.75	0.88	0.93
S.E. of regression	6.68	8.52	5.93	4.60
Durbin-Watson	2.07	2.13	1.97	2.00
Mean of dep. variable	19.7	19.7	19.7	19.7
F-statistic	20.6	11.7	26.9	46.2
ρ(AR(1))	−0.06	−0.10	−0.093	−0.15

For each variable, t-statistics are shown in parentheses below the reported coefficients
*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

OIL = oil exporters
NICs = newly industrialized countries or manufacturing exporters
PRIM = non-oil primary-commodity exporters

country-risk analyses. While the fit for the NICs and primary-product exporters was adequate, the results for the oil exporters clearly suffered from specification bias.

Individual factors which were particularly significant for the entire group of debtor countries were cumulative past rescheduling performance (acting as a proxy for perceived creditworthiness and thus market access), movements in the value of the US dollar, changes in real LIBOR and the pace of OECD GDP growth.

Although the Chow test may not be robust for this sample, owing to unequal error variances across country groups, the lack of statistically significant differences between country-group coefficients suggests that systematic risk may not be imperfectly correlated across country groups. This means that the concentration of bank exposure to the NICs and oil-exporting countries and the underrepresentation of the primary-product exporting countries may not have lowered the efficiency of the commercial banks' portfolio.

The time dummies were significant during the 1970s only for the primary-product-exporting group and, except for the oil exporters, were significant for all groups during the 1980s. Time's significance for rescheduling incidence during the 1980s suggests that omitted variables were particularly important in this decade.

Further research is needed to remove the specification bias for the oil-exporting group and to conduct further tests for multicollinearity amongst the systematic variables. Once a better fit is obtained, country group differences would perhaps become significant.

Bank lending

The results of modeling bank lending to LDCs show that perceived systematic risk was important only for oil exporters. Loan commitments were highly significant for all country groups. BIS-bank lending to industrial countries was significant for all but the NICs and confirms an international trade-off for BIS-bank lending to developing countries.

The ten-year Treasury-bond rate also was significant for all but the NICs. The size of the t-statistics for the ten-year Treasury rate (i.e. the price effect) and lending within the BIS region (i.e. the volume effect) suggests that the trade-off or crowding-out impact from creditor decisions to increase lending within the BIS group was most severe for the primary-product exporters.

Figure 7.3 shows an apparent negative relationship between lending and perceived risk. This accords well with intuition and with the model of systematic risk developed in this paper. The empirical results show that the decline in net lending by the BIS banks to non-OPEC LDCs during the 1980s was consistent with a rising perception of greater systematic risk. Figure 7.4, in turn, indicates a positive relationship between net bank lending to LDCs and average spread. If average spread is interpreted as a profitability measure, the positive relationship between lending and spread follows consistently; in an alternative interpretation, however, spread is a measure of risk, so that the observed positive relationship is counterfactual. It seems likely that during the period depicted, the credit-supply curve both shifted to the left and became more inelastic; at the same time, forced LDC austerity shifted the credit-demand curve leftward as well. These dual shifts had the clear effect of reducing loan flows, but an ambiguous effect on the observed spread. Beginning in 1985, the spread has declined as perceived risk

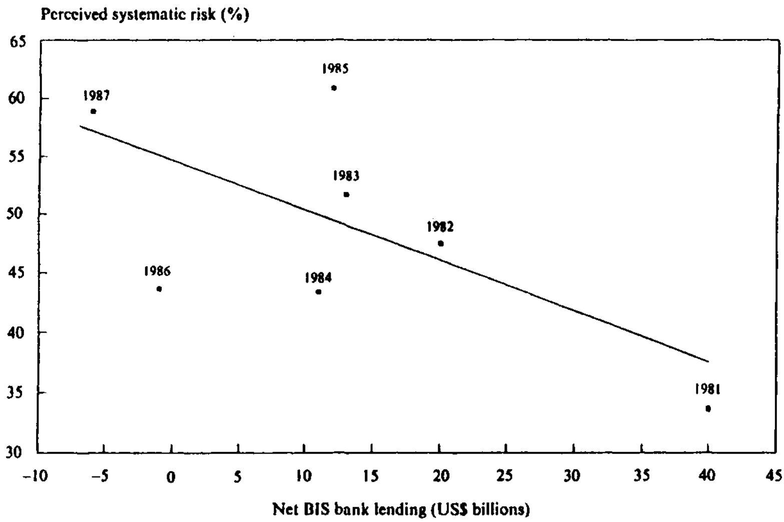

Figure 7.3 Systematic risk and bank lending to non-oil-exporting countries

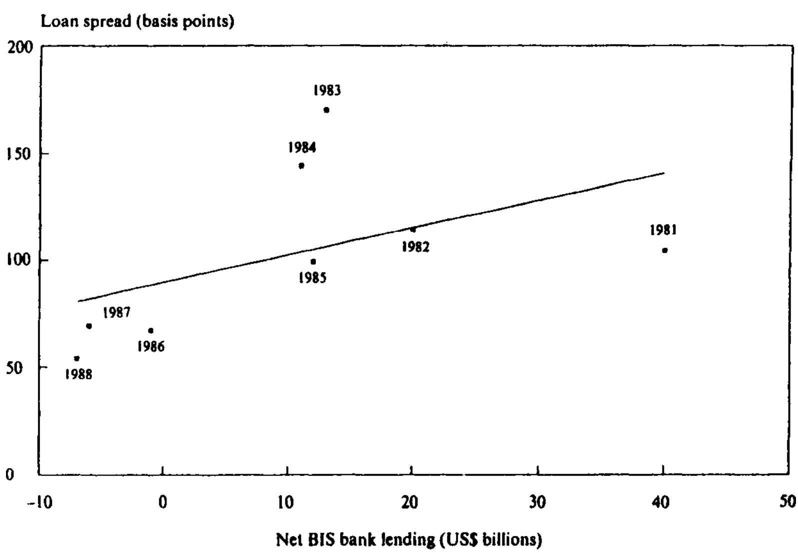

Figure 7.4 Loan spread and bank lending to non-oil-exporting countries

increased (see figure 7.5), implying that spreads were no longer set in accordance with perceived riskiness by the international private-capital markets.

Given that systematic risk can itself become a dynamic function of the level of lending, an ability to forecast the overall market's future flow of lending to developing-country borrowers is important. Although multicollinearity may be a serious problem, systematic risk can be forecast if these relationships do not change year to year.

Policy implications

This study suggests that systematic-risk factors were important influences during the 1970s and especially the 1980s on LDC debt-service capacity. The systematic-risk factors used in our analysis are best understood as measures of the global economic environment insofar as this affects cross-border borrowing and lending. This is readily illustrated by banks' experience with LDC lending in the last 20 years.

The early 1970s included some major international shocks: the advent of floating exchange rates, which created a deflationary bias in industrial countries' growth; the first oil-price shock; and a non-oil commodity-price boom. These systematic shocks were successfully managed in the short run owing to accommodative monetary policies by reserve-currency countries and a massive international recycling process, beginning a major lending cycle by BIS banks to the developing countries.

Throughout the 1970s, international banks increased financial intermediation by transferring the excess savings of the oil exporters to the oil-importing developing and developed countries. The apparent success of this recycling process was heralded widely. The commodity-price boom and easy monetary policies led to a negative (export-price adjusted) real-interest cost for developing country borrowing during the 1970s. As inflationary expectations rose toward the end of that decade, the banks began to transfer interest-rate risk to debtors by extending a higher proportion of floating-rate debt. This increased the growth of global liquidity, which had the effect of depressing spreads and, in turn, encouraging overlending and overborrowing.

When the second oil shock in 1979 accelerated both price inflation and inflationary expectations in many countries, monetary policy in the United States tightened. This restrictive policy was transmitted to other industrial economies, contributing to US and OECD recessions in 1980 and 1982. The tighter US monetary policy was sustained after 1980. This produced high real-interest rates, averaging 5 per cent, and an average

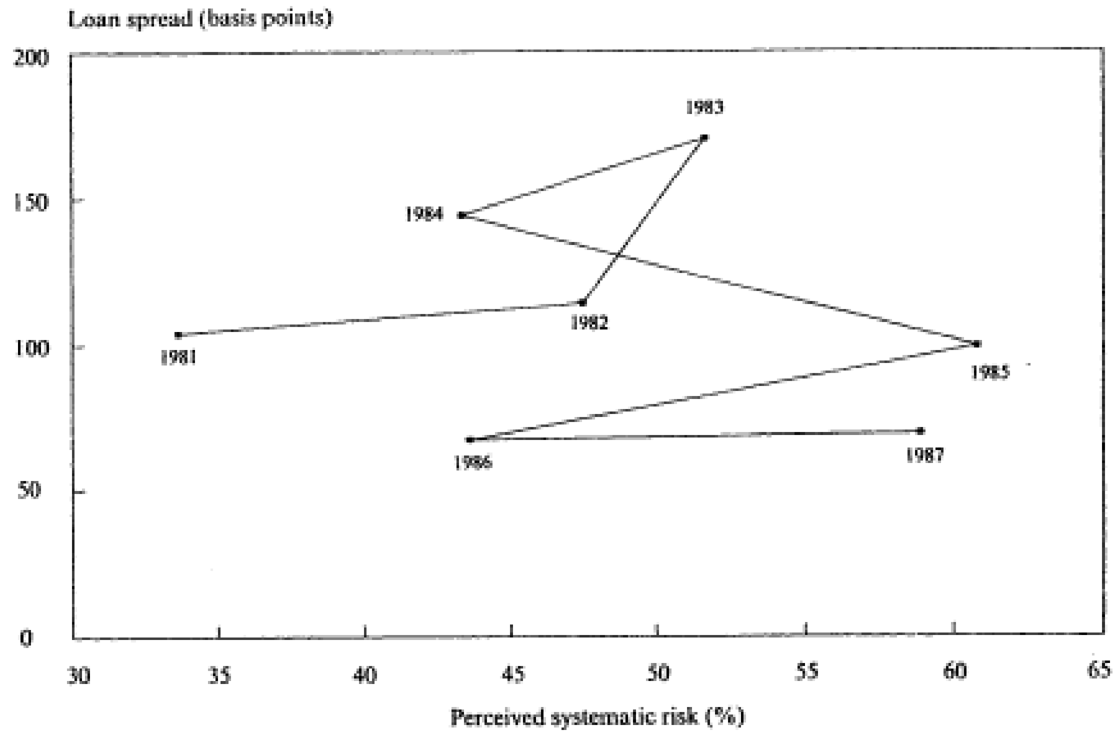

Figure 7.5 Loan spread and systematic risk: non-oil-exporting countries

rising real value of the US-dollar exchange rate. The appreciation of the real US dollar and rising real-global-interest rates were additional shocks to LDC real and nominal cash flow.

By the early 1980s, the rising real level of developing-country debt and its increasing share in banks' portfolios induced caution in bankers' lending decisions. The rising rate of return on risk-free US dollar assets and accelerated lending within the BIS-member-country group all tended to diminish new commitments to developing-country debtors. Yet the higher stock levels of LDC debt which had been accumulated by then required a substantial amount of new money simply to roll over maturing principal and to finance ongoing—albeit declining—current-account deficits. The negative net transfer to LDCs since 1982 has imposed the burden of deflationary adjustments on Third World borrowers. Declining terms of trade and slower export-market growth have also worsened the growth of export revenue, so that the real value of external debt has risen. Additionally, the new protectionism has raised non-tariff barriers in the industrial countries, further worsening the cash-flow squeeze on LDCs.

In sum, global economic trends were centrally important both in the buildup of LDC debt in the 1970s and in the crisis of LDC debt in the 1980s. Thus, improving the global environment in the 1990s is a crucial requisite to adequate debt relief and a sustainable recovery of Third World borrowers.

APPENDIX

An illustration of how systematic-risk factors affect the expected return on bank-loan commitments

This appendix uses a simple model to show how systematic-risk factors can, because of their imperfect correlation across countries, affect the expected return on bank-loan commitments.

Suppose there is a bank whose liabilities consist entirely of deposits, D, obtained at the competitive rate d. For simplicity, we ignore reserves and bank capital and assume that bank deposit-taking and loan-making are costless. The bank has three investment outlets: it can purchase a riskless security, A, and earn a certain return of a; it can make a loan to LDC country 1, L_1; it can make a loan to LDC country 2, L_2. The contract rate on all LDC loans is fixed at r. The realized return on loans to the two LDCs, R_1 and R_2, will fall below r if either borrower goes into arrears.

Define the probability of arrears as α. Suppose that for both LDCs this probability depends entirely on a single continuous variable x, and that x is a variable which affects the two borrower countries' ability to pay. The effect of x on the probability of arrears is country-specific and, for simplicity, is unaffected by any economic action either might take.[14] For example, x might equal the world price of oil. Then $\alpha_i=\alpha_i(x)$, for i =1, 2; and the expected return, ER_i, on lending to either country is given by:

$$\text{A1} \qquad ER_i = r(1 - \alpha_i(x)), \qquad i = 1, 2.$$

Here the derivative of α_i with respect to x is sign-indefinite; for an oil importer such as Peru, $\partial\alpha_i/\partial x>0$, while for an oil exporter such as Mexico, $\partial\alpha_i/\partial x<0$.

Then expected bank profit, Ep, equals:

$$\text{A2} \qquad E\pi = aA + r(1 - \alpha_1(x))L_1 + r(1- \alpha_2(x))L_2 - dD,$$

subject to the budget constraint $A+L_1+L_2=D$. Now suppose that the ability to pay—the sensitivity of α_1 and α_2 to x—is *perfectly* correlated for countries 1 and 2. Extending the above example, both countries have an identical reliance on imported oil. Then $\alpha_1=\alpha_2$. Suppose there is a shock to x—a dramatic rise in petroleum prices. This shock identically increases the probability of arrears for countries 1 and 2. Differentiating A2 gives the impact effect of dx on expected bank profits:

$$\text{A3} \qquad \left(\frac{\partial E\pi}{\partial x} \Big| \; L_1, L_2 \text{ fixed}\right) = -\left(\frac{\partial \alpha_1}{\partial x}\right)(L_1 + L_2) < 0.$$

Equation 4 suggests, in the context of ECM, that, when return distributions are perfectly correlated (and have identical variances), there are no gains from diversification. In this case, even with ECM assumptions violated, the perfectly correlated effect of dx on borrower creditworthiness implies that any portfolio of LDC debt is as good as any other. Diversification provides no cushion to shocks like dx.

Now consider the alternative hypothesis that a_1 and a_2 are not identical functions of x, so that the effects of the shock dx on the two borrower countries are *imperfectly correlated*. Then the impact effect of dx is:

$$\text{A4} \qquad \left(\frac{\partial E\pi}{\partial x} \Big| \; L_1, L_2 \text{ fixed}\right) = -\left(\frac{\partial_1}{\partial x}\right) L_1 - \left(\frac{\partial_2}{\partial x}\right) L_2.$$

The net impact of dx on expected bank profits depends on the two terms $\partial\alpha_1/\partial x$ and $\partial\alpha_2/\partial x$. If both partial derivatives are negative, expected profits will again fall; but the extent of the fall is now a weighted average which depends on the banks' relative holdings of L_1 and L_2. If one partial derivative is negative, but the other is positive—as in the Peru/Mexico case—then expected profits may fall, be unaffected, or even rise.

The systematic risks in international lending are readily characterized in terms of this example. Suppose the market portfolio consists of a vector $L_m=L_1+L_2$ such that $L_2=\beta L_1$, and that the probability of arrears for the market portfolio is given by: $\alpha_m=\alpha_m(x)$. Suppose further that a given bank, bank j, holds a portfolio of LDC loans, such that $L_2^j, \neq \beta L_1^j$. Then the impact effect on $E\pi$ of dx is given by:

$$\text{A5}\quad \left(\frac{\partial E\pi}{\partial x}\Big| L_1, L_2 \text{ fixed}\right) = -\left(\frac{\partial \alpha_m}{\partial x}\right) L_1^j(1+\beta) - \left(\frac{\partial \alpha_2}{\partial x}\right)(L_2^j - \beta L_1^j).$$

Then the impact of x on this bank's profitability will be greater as L_2^j differs from βL_1^j and as $\partial\alpha_m/\partial x$ differs from $\partial\alpha_2/\partial x$. The first term on the righthand side of A5 represents this bank's systematic risk, the second term its non-systematic or country-specific risk. The assumptions of ECM are absent, but a similiar dichotomization of bank risk into two categories is feasible.

NOTES

1 Goodman (1981) first suggested that the concepts of systematic and nonsystematic risk be used to analyze LDC debt and concluded that, although important, systematic-risk factors were less influential than non-systematic factors in determining LDC creditworthiness during the 1970s.
2 Wheτηερ ανψ γiven bank could use diversification to reduce risk depends not just on the composition of its portfolio of LDC debt, but also on the size of its LDC debt portfolio. As Devlin (1986) observes, some of the larger banks involved in lending to LDCs have asset portfolios whose scale dwarfs the size of numerous LDC borrowers; such banks could be constrained in portfolio adjustment by this scale problem.
3 Stone (1970) and Fama (1976) are standard introductions to the theory of efficient capital markets. For some theorems of ECM, behavioral restrictions are also required on investors' utility functions.
4 Many contemporary authors claim that the ECM assumption set fails to hold in credit markets; see Stiglitz's 1987 survey article for references.
5 The former problem, in which agents have different innate types which are not known ex ante by the principal, is termed one of 'adverse selection'; the latter problem, in which the principal does not know ex ante how well the agent will perform, is termed one of 'moral hazard'. Rasmusen (chapter 8 of this book) presents the fundamentals of principal/agent problems and of non-cooperative game theory for country-risk analysis.
6 This discussion illustrates why the assumptions made about the distribution of

asset returns in ECM theory fail for principal/agent relationships. The probability of success is not objectively pre-given—as, say, the parameters of securities in ECM are pre-given—but is contingent on the terms of contract and on events occurring after the contract has been signed.

7 Strong and Walker (1987:190–3) discuss the applicability of the two-parameter asset-pricing model when principal/agent relations affect the rates of return of some assets. They conclude on the basis of a number of cited papers and of their own analysis that 'moral hazard leaves the basic certainty equivalent valuation formula [equation 1 above] intact' (p. 193) provided expected returns are expressed net of agency costs.

8 In addition to the empirically oriented discussion which follows, the appendix to this chapter contains a simple model which demonstrates formally how bank net return on its loans to LDCs may be affected by systematic-risk factors.

9 These shocks also induced domestic policy shifts such as devaluations and changes in fiscal policy in borrower countries. Since these policy responses were not uniform across these countries, they cannot be accounted for as an aspect of global shocks, *per se*.

10 In a strong interpretation of the 'enforceability' model, borrower-country net worth always exceeds indebtedness, so capacity to repay is guaranteed and LDC repayments problems have no relationship to 'inherent' borrower characteristics. If this strong explanation were also a sufficient explanation, the existence of systematic risk would be precluded, and risk would depend entirely on loan terms. This strong interpretation, however, forgets that borrower governments lack discretion over all domestic assets, because national 'net worth' is typically held primarily by prior private-sector claimants.

11 These categories are reported in the *International Financial Statistics* published by the IMF.

12 SYSTRISK can be interpreted directly as a risk measure (i.e. probability) when it is deflated by total sample size (36).

13 The Group of Ten countries are Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, the United Kingdom and the United States.

14 This last assumption, while unrealistic, considerably simplifies the comparative static results which follow.

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8 The strategy of sovereign-debt renegotiation[1]

Eric B.Rasmusen

INTRODUCTION

The influence of game theory on economics has been ballooning since the 1970s because it provides a way to attack the problem of strategic behavior in economic interaction. Not only is game theory widely used in mainstream economics, it has also penetrated finance, corporate strategy, and political science. Once the preserve of mathematicians, the subject is by now well enough understood that it is beginning to be taught to undergraduates and to MBA students in the leading business schools.

Debt renegotiation is an obvious area for application of economic models of strategic behavior. As historical studies such as Aronson (1979) and Cizauskas (1979) show, debt renegotiation has always been marked by the complicated interaction of self-interest with the fear of pushing one's bargaining partner into some mutually damaging action. The basic model of standard economics is perfect competition, the market condition under which each participant is so small that he can ignore his effect on the behavior of the others. The market for sovereign debt already departs from perfect competition in its relatively small number of participants. Debt renegotiation departs even further, since the participants have no choice but to deal with each other and they must carefully decide how far to push their demands. Outside competition having become a minor force, it is bilateral bargaining between the debtor country and the rescheduling committee of the lenders that determines the outcome.

Game theory originated with Von Neumann and Morgenstern's 1944 book, *The Theory of Games and Economic Behavior,* a book mostly concerned with zero-sum games of perfect information. In zero-sum games what one player gains, another player must lose; and under 'perfect information' neither player has an informational advantage and there is no uncertainty over the future. These assumptions rule out informational asymmetry and the possibility of mutually advantageous contracting—a positive-sum outcome—which are two distinctive features of debt negotiation. Later work in game theory does address these features, especially work in the tradition of Thomas Schelling's 1960 book on precommitment and strategy, *The Strategy of Conflict*. This book is non-mathematical and remains well worth reading, but for more recent and technical treatments one may wish to consult the books by Shubik (1982) and Rasmusen (1989). More specialized treatments of game theory as applied to international economics also exist: in particular, Clifton (1982) on debt, Dixit (1987) on small countries, and McMillan (1989) on trade negotiations. McMillan has also written an excellent book (McMillan 1986) entirely on the application of game theory to international economics, and Crawford (1987) is a very clear survey of the literature on reputation and credit relationships that gives special attention to international lending.

Academic research on debt problems has been making much use of game theory in recent years. The first article to attack the problem of how reputation might prevent repudiation of sovereign debt was Eaton and Gersovitz (1981). Their work was followed by a variety of articles on reputation and the form of contracts, of which I will mention only a few. Bulow and Rogoff (1989a and b) have more recently analyzed the Eaton-Gersovitz problem of how reputations operate, and they look in detail at the renegotiation of debt agreements. Chowdhry (1991) attacks the problem from a different angle, emphasizing the syndicated nature of debt. Grossman and Van Huyck (1988) point out that borrower and lender may have an implicit contract that allows default without punishment in bad states of the world, thus shifting risk efficiently from the borrowing country to the lending banks. Most recently, Fernandez and Rosenthal (1990) apply game theory to the issue of bargaining power in debt renegotiations, where repayment improves the country's access to international markets, rather than just preventing diminished access.

Rather than surveying the academic literature of the past few years, however, this chapter will try to show how the basic ideas of game theory—concepts such as payoff-maximizing players, strict stylization of the facts, careful delineation of informational advantages, and the ability to precommit—can be used to understand debt negotiations. The approach will be to teach the tools of game theory using examples from debt strategy rather than to describe the conclusions reached by frontier game-theory models of reputation and negotiation. The aim will be to show how game theory can be used by a corporate analyst, a bank regulator, or a central banker to capture the essence of a situation when a policy must be formulated.

THE RULES OF THE GAME

One of the biggest contributions of game theory is its ability to focus the analyst's thought when he is confronted by an unorganized set of facts. The purpose of the analyst, *qua* analyst, is to simplify; he takes the data available to him, pulls out what is essential, and shows the policy-maker how to manipulate those essential forces. Complexity may be realistic, but simplicity is more useful, and it is the analyst's duty to seize upon the central features and discard the rest. The way the game theorist does this is to start by determining the relevant players, their possible actions, and the payoffs resulting from different combinations of their actions. He must also specify the order of the actions and the information available to each player. This done, he can begin to decide which actions are optimal for each of them, and how their decisions interact, but the first step is description, which requires considerable care.

The essential descriptive elements of a game are 'players', 'actions', 'information', 'outcomes', and 'payoffs'. From these, one can find 'strategies' and 'equilibria'. The players, actions, and outcomes are collectively referred to as the 'rules of the game' and the modeler's objective is to use the rules of the game to predict and perhaps to change the equilibrium.

These descriptive elements will be defined using a game called 'Mexican Debt I'. First, let us postulate a situation for the analyst to model. The year is 1990, and a group of banks are considering making loans to Mexico, whose exports of oil are sold at a high price that may or may not be sustained over the decade. Mexico may choose to pay the interest on any loan it obtains, or it may accumulate arrears. It can pay interest without great difficulty if oil remains high priced, but if the price drops, repayment would require a cutback in government spending that would have serious political consequences. If Mexico does accumulate arrears, its trade will be hampered and it will not be able to borrow again for many years.

The *players* are the individuals who make decisions.

For Mexican Debt I let us specify the players to be Mexico and a bank.

An *action* or *move* by a player is a choice he makes.

A player's *action set* is the entire set of actions available to him.

An *action combination* is a set of one action for each of the players in the game.

In Mexican Debt I, the action set of the bank will be whether to lend or not lend, and the action set of Mexico will be whether to pay the interest or accumulate arrears in each of two five-year periods following the loan.

Nature is a pseudo-player who takes random actions with specified probabilities at particular points in the game.

Often it is useful to introduce uncertainty into a model, where by 'uncertainty' is meant random changes in the environment caused by influences outside the game. Uncertainty is introduced by means of a pseudo-player called Nature ('pseudo' because Nature moves mechanically rather than strategically). In Mexican Debt I assume that the price of the oil that Mexico exports can take one of two values: *High* or *Low*. At the beginning of the game the price is *High,* but after five years it might drop to *Low*. At that point Nature randomly decides whether the price will be *High* or *Low,* assigning, let us say, probabilities of 70 and 30 per cent. This random move means that the model yields more than just one prediction, so there are different 'realizations' of a game depending on the results of random moves.

The specification of *when* particular actions are available to the players, the 'order of play' is crucial to the analysis. It is convenient to summarize the order of play by writiing it in list form.

Mexican Debt I

1 The bank decides whether to lend or to not lend.
2 Mexico decides whether to pay interest or accumulate arrears in 1990.
3 Nature chooses the price of oil to be high with probability 0.7 and low with probability 0.3.
4 Mexico decides whether to pay interest or accumulate arrears in 1995.

The information available to different players is specified as their knowledge of past moves. The order of play just given, for example, implicitly assumes that neither player knows what the future price of oil will be until after the bank has decided whether to lend and Mexico has decided whether to repay in 1990. Suppose instead that the bank has expert forecasters who can perfectly predict the price of oil, but Mexico will not know the price until later. The order of play then becomes:

Mexican Debt II

0 Nature chooses the price of oil to be high with probability 0.7, and low with probability 0.3. The price is observed only by the bank.
1 The bank decides whether to lend or not lend.
2 Mexico decides to pay interest or to accumulate arrears in 1990.

3 Mexico observes the price of oil.
4 Mexico decides to pay interest or to accumulate arrears in 1995.

Notice that the word 'observe' is used for the players' knowledge of the price of oil. Observation refers to knowledge obtained directly, rather than by deduction. If, for example, Mexico *observes* that the bank chooses *Not Lend,* then Mexico might *deduce* that the bank had observed a low price for oil. What a player can observe is part of the rules of the game, but what a player can deduce depends on the equilibrium, since it depends on what behavior is inspired by the rules.

The order of play places Nature's move at the point where it is observed by one of the players, which may not be the temporal point at which it takes place. A tree that falls unseen in the forest may or may not make a sound, but the sound cannot influence behavior, and so game theory would ignore it. In Mexican Debt I the future price of oil might have been determined by events prior to the original loan, but since neither player knows that, Nature's move is listed as move 3. Also, the order of play represents the order in which actions are taken or become known, which may be separated by widely varying lengths of time. It could be that actions 0 and 1 in Mexican Debt II take place in December 1989, action 2 takes place in January 1990, event 3 takes place in 1992 and action 4 takes place in 1995.

We now come to the final member of the trio of Players, Actions, and Payoffs.

A player's *payoff* is the utility he receives after the game has been played out.

Let us make the following assumptions on payoffs in Mexican Debt I. The payoffs are zero for each player if the bank chooses *Not Lend*. It costs the bank 160 to make a loan, but in each period that Mexico pays interest the bank receives X=100. Mexico receives a benefit of W=700 from the loan. In a period in which it pays interest, Mexico loses 100 if the price of oil is High and 300 if it is Low (the domestic discontent caused by paying X is greater when Mexico's GNP is lower). If Mexico ever chooses to accumulate arrears, it loses D=250 (the same whether it does this twice, or only once).

Each cell of the matrix shown in table 8.1 contains the payoffs for Mexico and the bank from a different action combination, given that the bank chooses to lend. The first two columns show payoffs depending on the two possible actions of Nature, *High Price,* which has probability 0.7, and *Low Price,* which has probability 0.3. A typical set of payoffs is the (350, -60) in the northwest corner. Mexico's payoff of 350 is

Table 8.1 Payoffs for Mexian Debt I if the bank lends

	Nature	
Mexico	***High price***	***Low price***
	(0.7)	(0.3)
Arrears in 1990 only	350, −60	150, −60
Arrears in 1995 only	350, −60	**350, −60**
Arrears in both years	450, −160	450, −160
Full payment	**500, 40**	300, 40

Payoffs to: Mexico, Bank. Equilibrium payoffs are boldfaced

composed of the 700 benefit from the loan minus 100 from the interest payments in 1995, minus 250 from the arrears in 1990. The bank's payoff of -60 is composed of the cost of the loan (-160) plus 100 in interest paid in 1995. At this point, the analyst does not ask whether or not it is advisable for Mexico to accumulate arrears or for the bank to make the loan; the first step is just to calculate payoffs.

While players, actions and payoffs are the basic elements of the game and jointly determine what happens, it may be that the modeler is not directly interested in any of them. Instead, he may just wish to use them to predict the value of some other variable or variables more interesting to him, a variable or set of variables that we call the *outcome*.

> The *outcome* of the game is a set of interesting elements that the modeller picks from the values of actions, payoffs, and other variables after the game is played out.

The definition of the outcome for any particular model depends on what variables are of interest to the modeler. In Mexican Debt I the interesting variable might be whether Mexico accumulates arrears, so the outcome would be one of the following:

- Arrears only in 1990–5,
- Arrears only in 1995–2000,
- Arrears in neither period,
- Arrears in both periods.

The outcome could be defined differently (for example, as to whether Mexico accumulates arrears *and* what payoff each player receives). The best definition depends on what question the analyst is trying to answer.

Another way to depict the order of play is the game's extensive form or game tree. Figure 8.1 shows the extensive form for Mexican Debt I. The decisions are called branches and the points at which decisions are taken are called *nodes*. The decisions start at the left, with the bank's choice between the branches labeled *Lend* and *Not Lend*. If the bank chooses the *Lend* branch, then Mexico in turn has a choice between two branches, and the game continues until at the right-hand side the game concludes. The numbers at the right-hand side of the diagram show the payoffs (in an extensive form) or the outcomes (in a game tree).

In trying to determine which actions are chosen, it is convenient to recast the decision set, not in terms of the particular actions, but in terms of contingent action rules called *strategies* that instruct the players on what moves to make at each node of the game tree.

A player's *strategy* is a rule that tells him which action to choose at each instant of the game, given his available information.
A player's *strategy set* or *strategy space* is the set of strategies available to him.
A *strategy combination* is an ordered set consisting of one strategy for each of the players in the game.
A game's *normal form* is a table showing the payoffs associated resulting from different strategy combinations.

Since a player's information can include the previous actions of other players, the strategy tells him how to react to their actions. The concept of the strategy is useful because only rarely can we predict a player's action unconditionally; but we can often predict how he will respond to Nature and the other players. In Mexican Debt I, the bank has no history on which to base its strategy, so its strategies are the same as its actions *Lend* or *Not Lend*. Mexico, however, can observe Nature's move before its 1995 choice of *Pay* or *Arrears*. An example of a strategy combination for Mexican Debt I is

Bank Lend
Mexico Pay in 1990.
Pay in 1995 if Nature chooses *High*.
Pay in 1995 if Nature chooses *Low*.

There are, of course, many different strategy combinations, but at this point in the analysis the modeler does not worry about whether the players' behavior makes sense; he cares only about discovering all the possible strategies and making sure that each strategy covers all contingencies.

A player's strategy is a function only of observed history, not of current actions or of another player's strategy. The bank's strategy cannot be specified to depend on Mexico's strategy. Also, a player's

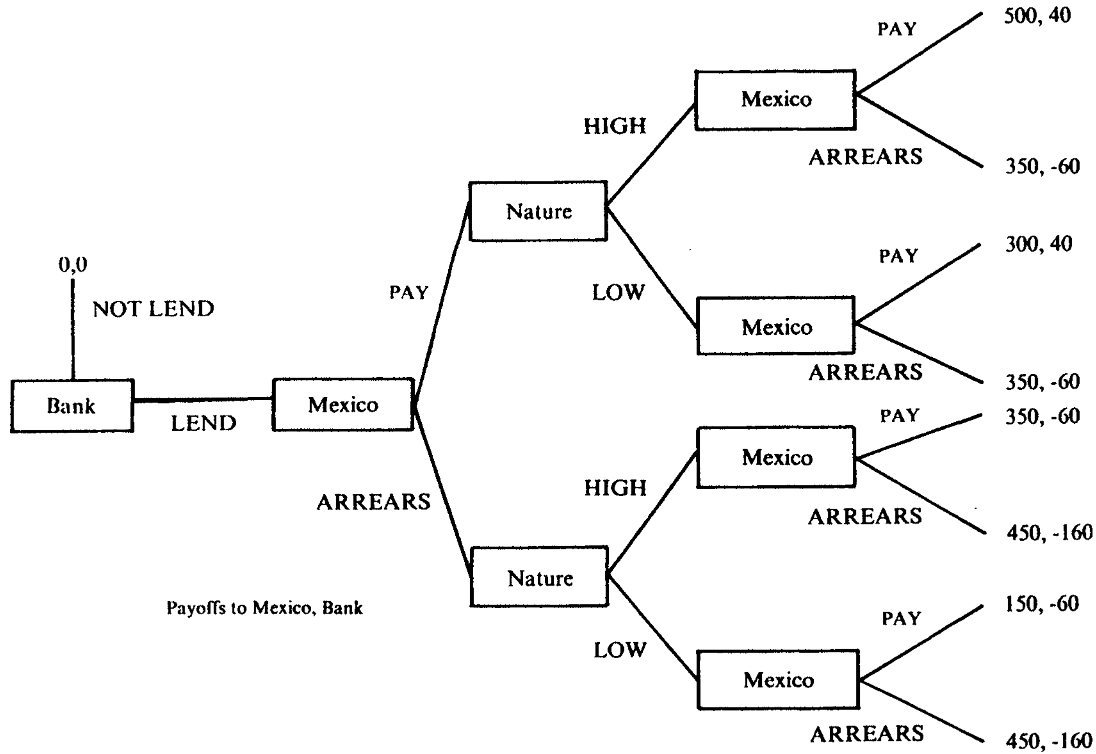

Figure 8.1 The extensive form for Mexican Debt I

strategy is a complete set of instructions for him, which tells him what action to pick in every conceivable situation, even if he expects some situations never to arise. Strictly speaking, even if a player's strategy instructs him to drop out of the game in 1995, it ought also to specify what actions to take if he is still in the game in 1996. The strategies, unlike the actions, are unobservable, because a complete description describes the world that might have been as well as the world that was. A strategy is a thought process; an action is a physical act.

The equilibrium of the game

To predict the outcome of a game, the modeler focuses on the possible strategy combinations, since it is the interaction of the different players' strategies that determines what happens. The goal of each player is to maximize his payoff by his choice of a strategy. An equilibrium is a strategy combination such that every player has chosen his strategy to maximize his payoff. Definitions of equilibrium differ in how they define 'maximize his payoff' By far the most common definition (the most common 'equilibrium concept') is Nash equilibrium.

> A Nash equilibrium is a strategy combination such that no player can raise his payoff by unilaterally altering his strategy.

The following is a Nash equilibrium for Mexican Debt I.

Bank Lend.

Mexico Pay in 1990.
Pay in 1995 if the price of oil is high and if Mexico paid in 1990; otherwise, accumulate arrears.

Notice how this strategy combination tells each player how to pick actions under every possible contingency. In particular, it tells Mexico how to behave if somehow the game reaches the node at which Mexico has accumulated arrears in 1990, even though that node is never reached in equilibrium (it is 'off the equilibrium path').

The equilibrium is a strategy combination, a set of contingent actions. What actions actually are played out? The bank lends, and Mexico pays interest in 1990. With probability 0.7, Nature picks a high price, and Mexico pays in 1995; with probability 0.3, Nature picks a low price, and Mexico accumulates arrears in 1995.

Having used the strategies to discover the probabilities of different actions, we can calculate the expected equilibrium payoffs. With probability 0.7, Nature picks a high price and Mexico pays in both periods, so the payoffs from table 8.1 (in bold type) are 500 for Mexico and 40 for the bank. With probability 0.3, Nature picks a low price, and Mexico accumulates arrears in 1995 only: then the payoffs from table 8.1 are 350 for Mexico and -60 for the bank. If we multiply each payoff by its probability, the expected payoffs are 455 for Mexico (=0.7 · 500+ 0.3 · 350) and 10 for the bank (=0.7 · 40-0.3 · 60).

To check that this strategy combination is a Nash equilibrium, it is necessary to test whether either player can gain by unilaterally deviating to another strategy. Table 8.1 shows the payoffs from different strategy combinations, and the expected payoffs can be calculated using the probabilities of Nature's two different moves.

First, test the bank. Taking Mexico's strategy as given, the bank's payoff is 10 from following the strategy *Lend,* as was calculated two paragraphs above. If the bank were to choose not to lend, it would earn 0, which is less than 10. So the bank will not deviate from the proposed equilibrium.

Second, test Mexico. In equilibrium, Mexico's payoff from following its strategy of paying interest in 1990 but paying in 1995 only if the price of oil is high is 455. Since the penalty for arrears in both periods is no greater than for just one period, it is pointless for Mexico to deviate by just running arrears in 1990. If, on the other hand, Mexico were to deviate by not paying interest in either year, regardless of the price of oil, then its payoff would be (using numbers from table 8.1)

$$p_{\text{Mexico}}=0.7(450)+0.3(450)=450.$$

If Mexico were to deviate by paying interest regardless of the price of oil, then its payoff would be

$$p_{\text{Mexico}}=0.7(500)+0.3(300)=440,$$

which is still inferior to the equilibrium payoff of 455. Finally, if Mexico were to deviate by paying interest in 1995 when the price of oil was low, but not when it was high, the payoff would be

$$p_{\text{Mexico}}=0.7(350)+0.3(100)=335.$$

Hence Mexico never has incentive to deviate from the suggested strategy combination, which is indeed a Nash equilibrium. The prediction of the model is that the bank will lend and Mexico will accumulate arrears only if the price of oil drops. This suggests that there is scope for mutually profitable lending but that the bank should consider trying to break out of the structure of this game by making the terms of lending contingent upon real exports, something not in the current strategy set of Mexican Debt I.

Note that it is the expected payoff, not the realized payoff, that is relevant for decision-making. Rational decisions demand sensible choices ex ante; what happens ex post is a matter of luck. In this example, the bank's rational choice is to make the loan, since the expected payoff is 10 from that action; but if Nature picks a low price, and the bank's realized payoff is -40 instead of the 0 it could have gotten by not lending, that says more about the bank's luck than its decision-making ability.

ASYMMETRIC INFORMATION AND THE COST OF ARREARS

Most research in game theory nowadays explores games of asymmetric information, games in which one player has an informational advantage. Mexican Debt I is a game of s*ymmetric* information, because despite the uncertainty introduced by Nature's move, both players are equally ignorant of the future price of oil. Mexican Debt II is a game of *asymmetric* information, because the bank is able to take its action having observed Nature's move, but Mexico must take its action in ignorance.

Mexican Debt I and II are just two of the many possible models of Mexican debt. Both of them focused on the effects of changes in the price of Mexico's main export. For contrast, another game representing a similar situation is presented below, Mexican Debt III, which focuses on the lenders' ignorance of the cost to the Mexican government of accumulating arrears. In the situation it models, many banks compete to lend to Mexico, but none of them know exactly how much the Mexican government would be damaged by the economic turmoil following arrears in interest payments, although the government itself knows. Competition between banks can be modeled by specifying just two banks as players, who simultaneously choose the interest rates on their loans. If there were really just two banks, this would be an unrealistic way to model them, because their decisions would interact in complicated ways; but the assumption of two sellers who simultaneously choose prices—Bertrand competition—achieves the same competitive outcome as a more complicated model of many sellers.

Mexican Debt III

Players:

Mexico. Bank A. and Bank B.

Actions and Events:

0 Nature chooses the cost of arrears for Mexico, Z, to be low ($Z=Z_1$) with probability 0.2, or high ($Z=Z_2$) with probability 0.8. Mexico observes Z but the banks do not.
1 Banks A and B simultaneously choose interest rates r_a and r_b for their offers of loans to Mexico of amount X. Each bank's cost of capital is r.
2 Mexico accepts either one or neither loan. The variable m_i equals 1 if bank i's loan is accepted and 0 if it is rejected. Mexico derives benefit $(m_a+m_b)W$ from the loan.
3 Mexico decides whether to pay interest or accumulate arrears.

Payoffs:

If Mexico refuses both loans,

$\pi_{Mexico} = 0, \pi_a = 0$, and $\pi_b = 0$.

If Mexico chooses to pay,

$\pi_{Mexico} = W - r_aXm_a - r_bXm_b, \pi_a = (r_a - r)Xm_a$, and $\pi_b = (r_b - r)Xm_b$.

If Mexico chooses to accumulate arrears,

$\pi_{Mexico} = W - Z, \pi_a = -rXm_a$, and $\pi_b = -rXm_b$.

Let us use as parameter values X=100, W=200, r=1.1, Z_1=108, and Z_2=150. The game tree is shown in figure 8.2. It is more complicated than the game tree in figure 8.1 for two reasons. First, since the banks' move consists of the choice of an interest rate from a continuous action set, rather than from just two possibilities, the move is depicted by a single branch. Second, dotted lines enclose certain nodes to indicate the banks' imprecise information. Bank A does not know how Nature moved, so it does not know exactly which node the game has reached; all it knows is that the game has reached some node within the dotted lines. Bank B is ignorant not only of how Nature moved but of how Bank A moved, which amounts to the same thing as Banks A and B moving simultaneously.

Under these parameters, the following strategy combination is a Nash equilibrium:

Bank A r_a =1.375.
Bank B r_b =1.375.
Mexico Accept the cheapest loan, at rate r_i (choose either loan if $r_a=r_b$).

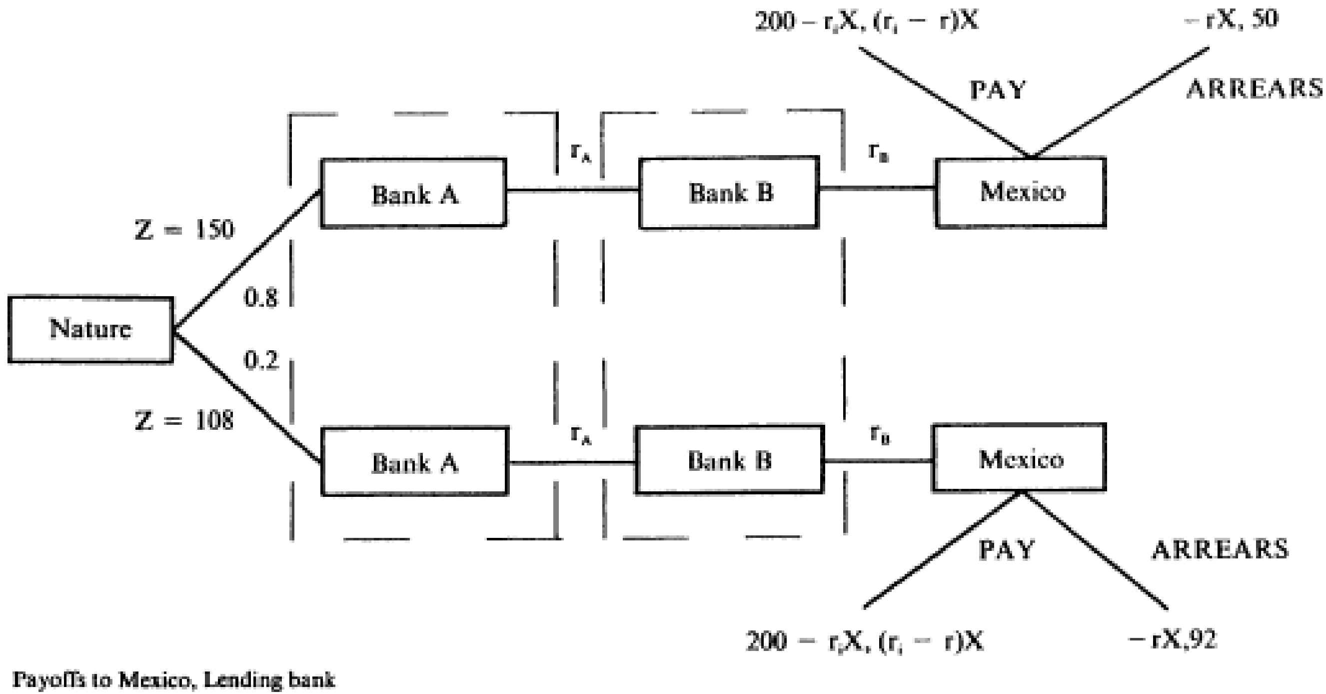

Figure 8.2 The game tree for Mexican Debt III

If Z=150, pay if r_i=1.5; otherwise, accumulate arrears.
If Z=108, pay if r_i=1.08; otherwise, accumulate arrears.

To test that this is indeed a Nash equilibrium, one must begin by checking whether Mexico has any incentive to deviate unilaterally.

Mexico ought to accept the loan regardless of the interest rate and the state of the world, because the loan brings a benefit of 200, and the greatest cost it can bring is the *High* cost of accumulating arrears, which is 150. If Z takes the value of 108, then Mexico wishes to accumulate arrears if the interest rate is anything above 1.08; the cost of doing so is 108 and the benefit is the avoidance of a payment of $100r_i$. Similarly, if Z = 150, then Mexico wishes to accumulate arrears if the interest rate is anything above 1.5.

Mexico's expected payoff from the equilibrium strategy is composed of a 20-per cent probability of $\pi_{Mexico}=W-Z$ and an 80 per cent probability of $\pi_{Mexico}=W-r_aXm_a-r_bXm_b$, resulting in

$$\pi_{Mexico}=0.2(200-108)+0.8(200-1.375 \cdot 100)=68.4.$$

If Mexico were to deviate by paying interest when the cost of accumulating arrears was low, its payoff would fall from 92 to 62.5 (= 200-1.375 · 100) in the low-cost state of the world. If Mexico were to deviate by accumulating arrears when the cost of doing so was high, its payoff would fall from 62.5 to 50 in the high-cost state of the world. So Mexico has no incentive to deviate.

The other test to perform on this equilibrium is to discover whether either bank would want to change its interest rate from 1.375. The bank whose loan is refused gets a payoff of zero, and the other bank's payoff is, if r=1.375,

$$\pi_{bank}=0.2(0-1.1)(100)+0.8(1.375-1.1)100=0.$$

A bank has no incentive to raise its interest rate above 1.375 unilaterally, because Mexico would turn to the other bank. Lowering the interest rate would also be unprofitable, because it would lower the interest payment without reducing Mexico's temptation to accumulate arrears. Hence, the banks are content to offer exactly 1.375.

The outcome changes dramatically if we specify the parameter values differently. To be sure, some parameters do not matter much—the benefit from the loan, W, could be increased from 200 to 400 without making any difference, for example. But if we raise the minimum cost of arrears, Z_1, to 110 instead of 108, the equilibrium interest rate changes drastically. The new equilibrium is

Bank A r_a=1.1
Bank B r_b=1.1
Mexico Accept the cheapest loan, at rate r_i (choose either loan if r_a=r_b).

If Z=150, pay if r_i=1.5; otherwise, accumulate arrears.
If Z=110, pay if r_i=1.1; otherwise, accumulate arrears.

Mexico's expected equilibrium payoff is now

π_{Mexico}=0.2(200-1.1 · 100)+0.8(200-1.1 · 100)=90.

The interest rate falls from 1.375 to 1.1 because Mexico is no longer tempted to accumulate arrears in the *Low* state of the world and the banks do not need to build in a premium for the risk of non-payment. The interest rate falls to the cost of capital to the banks, because the banks no longer need compensation for the risk of non-payment. The paradoxical lesson is that a small increase in Mexico's cost of arrearages can lower the interest rate dramatically. Moreover, while the increase in cost leaves the banks' expected payoffs unchanged at 0, it helps Mexico, raising its payoff from 68.4 to 90. Mexico benefits substantially from its own higher cost.

This result is counterintuitive at first, but it makes sense after some thought. Mexico benefits from the higher cost of accumulating arrears because it is only a *potential* cost, and it encourages the banks to lower their risk premia. Suppose a recently graduated MBA had the option of being publicly exempted from the laws against embezzlement. Would he take the option? He would be foolish to do so, because once he had the exemption no business would hire him. This kind of reasoning applies to institutional arrangements such as the US Foreign Sovereign Immunities Act of 1976, which exempted the commercial activities of foreign governments from sovereign immunity. Since the Act allowed banks to pursue sovereign borrowers in US courts, it helped foreign nations to obtain loans, and this was not a law passed to hurt foreigners, but to encourage trade. One of the lessons of game theory is that players often wish to commit themselves to future behavior, and public sanctions against one's own future misbehavior are a good form of precommitment.

THE PRISONER'S DILEMMA AND BANKRUPTCY

Certain games come up over and over again in analysis because their payoff structure applies to a wide variety of situations that are fundamentally the same, however different the situations may appear.

Table 8.2 The Prisoner's Dilemma

	Mr Column		
Mr Row	***Deny***		***Confess***
Deny	−1, −1	→	−10, 0
	↓		↓
Confess	0, −10	→	−8, −8

Payoffs to: Mr Row, Mr Column

Possibly the most useful of these fundamental games is the Prisoner's Dilemma. Two criminals, Mr Row and Mr Column, have been captured by the police and are being questioned separately about a crime they jointly committed. Each prisoner can either deny that he committed the crime, or confess and implicate his partner in crime. Even if both prisoners deny, enough other evidence has been obtained to send each of them to jail for one year, so their payoffs are -1 each. If both confess, they will both go to jail for eight years. But if one confesses and the other denies, the one that confesses gets off scot free, while the other receives a ten-year sentence.

This game is unusual in that each player has a dominant strategy, a strategy that is best for him, no matter what the other player does. If Column denies, Row can get a payoff of 0 from *Confess* instead of -1 from *Deny*. And if Column confesses, Row can get a payoff of -8 from *Confess* instead of -10 from *Deny*. Hence, *Confess* is a dominant strategy for Row.

The arrows in table 8.2 are a shorthand way of representing how players would deviate from different strategy combinations. The only strategy combination without an arrow pointing away from it either horizontally or vertically is the Nash equilibrium *(Confess, Confess),* because neither player would unilaterally deviate from it. But if *(Confess, Confess)* is the outcome, each prisoner gets eight years in jail, whereas the non-equilibrium strategy combination *(Deny, Deny)* gives each a sentence of only one year! Both players are strictly worse off in equilibrium (we say it is 'Pareto inferior' to *(Deny, Deny)*), despite having used their individually dominant strategies.

The prisoner's dilemma lies hidden in many real-world situations. An example is bankruptcy, and, in particular, the financial distress of a sovereign borrower. Suppose that Allied and Brydox are two banks that have lent to a financially distressed country. Each bank has a choice between being tough, demanding immediate repayment, and being easy, allowing rescheduling. If both banks are easy, then the country will

Table 8.3 Bankruptcy as a prisoner's dilemma

	Lender Brydox		
Lender Allied	*Easy*		*Tough*
Easy	$-1, -1$	→	$-10, 0$
	↓		↓
Tough	$0, -10$	→	$-8, -8$

Payoffs to: Allied, Brydox

recover, and the banks' losses will be slight. If both banks are tough, the country will collapse and pay very little to either bank. But if only one bank is tough, that bank will be able to extract all its funds, while the easy bank will lose everything in a collapse only slightly delayed. The payoffs in table 8.3 fit this story.

Just as in the original prisoner's dilemma, the strategies that are best for each player individually result in a jointly bad outcome. The banks would profit if they could somehow break the structure of the game and bind themselves both to be easy on the borrower, instead of acting independently and being tough. Lenders indeed do this, and the bank rescheduling committee, representing the syndicated banks in negotiations with troubled sovereign states, is an institution designed to eliminate the prisoner's dilemma. In its absence, however, the self-interest of each individual bank would lead to a situation in which every bank would be worse off than if the borrowing country itself chose the policy.

THE COORDINATION GAME AND BANK RUNS

A second paradigmatic game is the Coordination Game, in which a player wishes to choose the same action as the other players but he must choose independently and guess at what they have chosen. Coordination games take a number of different forms, some with conflict and some without. In the game to be described, the problem is purely one of coordination between the players, with no conflict of interest between them.

Let us suppose that a borrowing nation has fallen into short-run financial difficulties, but the nation's long-run prospects are excellent if it can borrow enough to maintain economic growth. It can do this only if all its present creditors are willing to increase the size of their loans, which they would be happy to do were they sure that the country would

Table 8.4 Coordination in runs on lenders

	Lender Brydox		
Lender Allied	***Lend More***		***Pull Out***
Lend More	**2, 2**	←	−2, −1
	↑		↓
Pull Out	−1, −2	→	**−1, −1**

Payoffs to: Allied, Brydox

recover from its current difficulties. If, however, a bank thinks that the country will fail to obtain the new loans and will therefore fail to recover, it would prefer to pull out even its old loans.

Table 8.4 represents this story. The two lenders, Allied and Brydox, each choose between lending more and pulling out. Let us take the point of view of Allied. If both lenders lend more, the debtor country will succeed in recovering from its difficulties, the loans will be repaid, and Allied will receive a high payoff (set equal to 2). If Allied alone lends more, and not Brydox, then the debtor will not recover and Allied will lose its loans, for a low payoff of -2. If Allied itself pulls out with whatever it can, it receives a payoff of -1 regardless of what Brydox does.

Note that although the payoff from *Lend More, Lend More* is represented by (2, 2), this might be the expected value of a further sequence of uncertain events. It might be, for example, that if both lenders lend more, the payoffs will be (4, 4) with probability 0.5 and (0, 0) with probability 0.5, depending on whether or not there is a world recession. We can reduce this to the expected value of (2, 2) because the uncertainty over the recession is only indirectly relevant to today's decision.

This coordination game is a two-by-two game, like the prisoner's dilemma, but its payoff structure is fundamentally different. The prisoner's dilemma has a single dominant-strategy equilibrium. The coordination game has two Nash equilibria, because each lender's optimal action depends on what the other lender does. The two equilibria are *(Lend More, Lend More)* and *(Pull Out, Pull Out)*. If Brydox chooses *Lend More,* then *Lend More* is the optimal action for Allied. But if Brydox chooses *Pull Out,* then *Pull Out* is the optimal action for Allied. What Allied prefers depends on what Brydox does, and what Brydox prefers depends on what Allied does.

Which of the two equilibria is actually played out depends on the expectations of the two players, which in turn depends on whether they communicate. If Allied assures Brydox that it will lend more, Brydox can expect that Allied will keep its promise, because deception is not in Allied's self-interest. This contrasts with Bankruptcy as a Prisoner's Dilemma, in which Allied's promise to Brydox that it will be easy on the creditor is disbelieved because Allied has a strong incentive to lie. In both situations the lenders might benefit by forming a syndicate. To avoid the prisoner's dilemma, the syndicate needs to have real power over its members to make them choose Easy. To implement the good equilibrium in the coordination game, on the other hand, the syndicate need only set up communication between them: once they announce their policies to each other, they will, if those policies match, be willing to adhere to those policies wiithout any form of compulsion.

MIXED STRATEGIES AND IMF AID

The Prisoner's Dilemma has one equilibrium, and the Coordination Game has two, but some games seem to have no strategy combination that is an equilibrium. In these games, the only mutually consistent set of strategies for the different players involves randomizing according to carefully chosen probabilities. Random strategies are known as 'mixed strategies' in game theory, in distinction to the non-random 'pure strategies'.

Random strategies may seem bizarre, but a little thought about sports will lead to the conclusion that mixed strategies are not just theoretical curiosities. In American football, the offensive team's strategies can be roughly divided into passing the ball or running with it. The most important thing is to choose the strategy that the defensive team does not expect, but this means there is no equilibrium in pure strategies. If the defensive team expects the offense to run, the offense will want to pass instead—but the defensive team is aware of this and would change its beliefs. No non-random strategy can lead to consistent beliefs. Instead, the offensive team chooses whether to pass or run by randomizing, or, equivalently, by some technique that looks random to the defensive team. But 'random' does not mean 50–50 probabilities: the offensive team will choose the proportions of passing and running in light of the possible gains and losses from each strategy. To calculate these optimal probabilities, more formal analysis is needed.

Let us suppose that the International Monetary Fund wants to help a debtor country, but only if the debtor will reform instead of pursuing wasteful policies. The debtor would reform, though reluctantly, if there were otherwise no chance of IMF aid, but if the debtor can rely on an

Table 8.5 International Monetary Fund aid

	Debtor		
IMF	***Reform***		***Waste***
Aid	**3, 2**	→	**− 1, 3**
	↑		↓
No Aid	**− 1, 1**	←	**0, 0**

Payoffs to: IMF, Debtor

IMF bail-out whether it reforms or not, it would prefer the current wasteful policies.

The payoffs for this story are shown in table 8.5. For the IMF, the best outcome is to aid a reforming debtor, for a payoff of 3, and the second best is not to aid a wasteful debtor, for a payoff of 0. The worst outcomes are to aid a wasteful debtor or not aid a reforming debtor, both of which yield -1. For the debtor, the best outcome is to receive aid and waste it, for a payoff of 3, and the second best is to receive aid and reform, for a payoff of 2. If no aid is received, the debtor wishes to reform, for a payoff of 1, in preference to being wasteful, for a payoff of 0.[2]

Each strategy combination must be examined in turn to check for Nash equilibria. The arrows in table 8.5 parallel the reasoning in the four points below.

1 The strategy combination *(Aid, Reform)* is not a Nash equilibrium, because the debtor prefers to respond with *Waste* if the IMF picks *Aid*.
2 *(Aid, Waste)* is not Nash, because the IMF prefers *No Aid*.
3 *(No Aid, Waste)* is not Nash, because the debtor prefers *Reform*.
4 *(No Aid, Reform)* is not Nash, because the IMF prefers *Aid* (which brings us back to the first strategy combination).

IMF Aid does have a mixed strategy Nash equilibrium. The debtor selects *Reform* with probability 0.2 and the IMF selects *Aid* with probability 0.5. The realization of the game could be any of the four entries in the outcome matrix, with *(No Aid, Waste)* and *(Aid, Waste)* having the highest probability of occurrence, each with probability 0.4 (=0.5[1-0.2]).

We must check that these probabilities constitute a strategy combination from which neither player wishes to deviate. Given the debtor's mixed strategy, the IMF is indifferent between selecting *Aid* with probability 100 per cent, *Aid* with probability 0 per cent, and any probability in between. That is because the IMF's expected payoff from *Aid is* 0.2 · 3+0.8 · (-1), which equals -0.2, and the expected payoff from *No Aid* is 0.2 · (-1)+0.8 · (0), which also equals -0.2. Hence, the IMF is indifferent between the two strategies, which means it is willing to pick randomly between them—and, in particular, it is willing to choose 0.5 as the probability of *Aid*. Similarly, the debtor is indifferent between *Waste* and *Reform,* and is willing to pick a probability 0.2 of *Reform,* because the expected payoff from *Reform* is 0.5 · 2+0.5 · 1=1.5 and the expected payoff from *Waste* is 0.5 · 0+0.5 · 3=1.5.

To be sure, this is a weak equilibrium: although no player wishes to deviate from the equilibrium probabilities (so the Nash test is satisfied), no player strongly wishes to play them either. But no combination of strategies except the mixed strategies do form an equilibrium, and while we cannot predict exactly which realization of the game will occur, we can at least predict the probabilities of the various outcomes. To an outsider, the players will appear to behave randomly, but a player's apparent randomness is actually the result of a carefully chosen set of probabilities that keep the other player guessing as to what will happen.

THE ORDER OF MOVES AND THE CREDIBILITY OF THREATS

An important contribution of Schelling's book, *The Strategy of Conflict,* was to point out the importance of precommitment. In many situations a player would prefer to bind himself in advance rather than have unrestricted freedom of choice. This will be seen here in the game called Idle Threats. The situation involves an indebted country which asks its creditor bank for a new loan. Assume that the new loan would be unprofitable for the bank, but the country threatens to repudiate its old loan if not granted the new one. If the country carries out the threat, however, it suffers a severe loss of reputation.

Figure 8.3 is an extensive form that fits this story. It is based on the following parameter values: the country's reputation, which is lost if it defaults, is worth 250; the new loan costs the bank 50 and benefits the country 50; and the old loan's repayment costs the country 100 and benefits the bank 100.

This game illustrates an idea that economists call *subgame perfection:* an equilibrium should not include threats that are not credible. In Idle Threats, the country's threat to repudiate the old loan if the bank refuses the new loan is not credible. Whatever threat is made, if the bank does refuse the new loan, the situation is now represented by the 'subgame' starting with the node *Country*$_2$ in figure 8.3. In this subgame, the country will choose to pay and receive 150 instead of to repudiate and

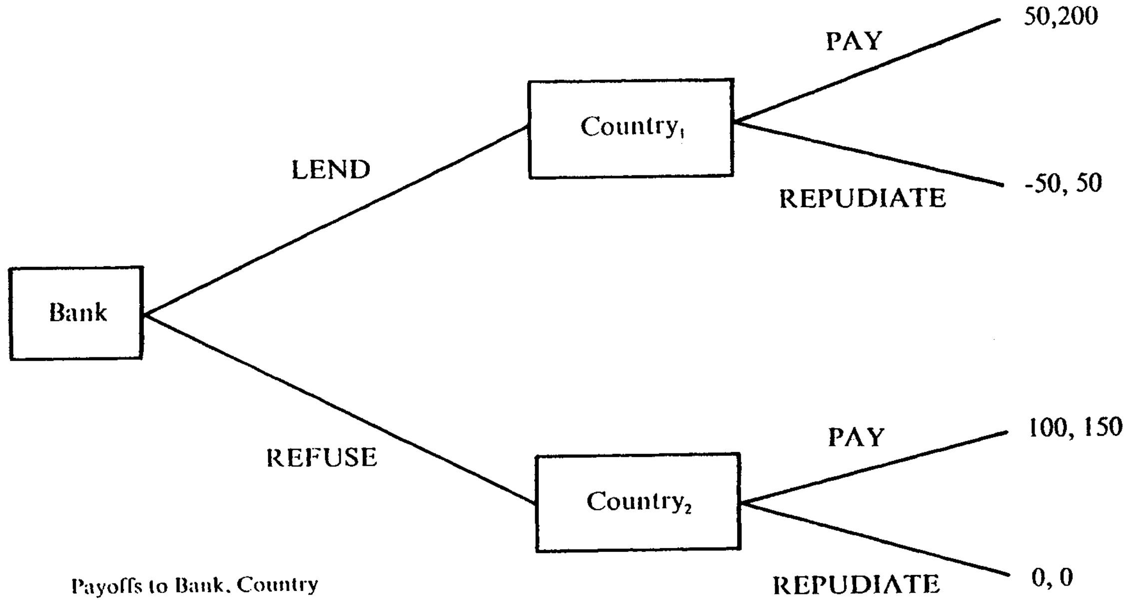

Figure 8.3 Idle threats

receive 0. The bank therefore can feel safe in refusing the new loan. The only subgame perfect equilibrium is for the bank to choose *Refuse* and the country to choose *Pay,* resulting in a payoff of 100 for the bank and 150 for the country.

The country would be better off if it could precommit to a strategy in advance. Suppose the country could bind itself to the strategy *(Pay if the bank chooses Loan; Repudiate if the bank chooses Refuse)*. The bank would then respond by choosing *Loan,* for a bank payoff of 50 instead of 0. But how can the country bind itself in this way? In the game just described, the country would wish to pay even if the bank did choose *Refuse,* because once the bank has refused the new loan, it is pointless for the country to carry out its threat. Somehow the country must change the structure of the game. The country's government might put its domestic political reputation on the line by promising voters to repudiate the debt if the bank refuses the new loan, or try purposely to push the economy to the brink of disaster so that only a new loan would make repayment of the old loans possible. By adding these moves to the game, the country could effectively bind itself to carry out its threat of repudiation if the bank refused the new loan. Thus, precommitment to disastrous policies contingent on the loan being refused can actually benefit the country.

The bank, in turn, would like to add a still earlier move to the game and bind itself not to make any new loans before the country has a chance to carry out the precommitment moves just described. The bank might secure legislation from its home country forbidding any increase in foreign-debt exposure, for example. In this kind of model it matters to the outcome not only *what* actions are available to the players but *when* they are available. Idle Threats, like many other games, has a first-mover advantage, so the bank and the country would each like to be the first to commit to a policy and force the other player to react.

CONCLUSION

The games in this chapter illustrate a number of surprising points. The analysis throughout has assumed that players try to maximize their own payoffs and do not care about those of the other players. But self-interest leads in strange directions. A nation can help itself by increasing its cost of default (Mexican Debt III). Profit-maximizing banks may end up hurting their profits by trying to enforce loans too strictly, but without any incentive for a single bank to be more lenient (Bankruptcy as a Prisoner's Dilemma). Mere promises exchanged between players can influence actions even when each player is completely selfish and there is no penalty for breaking promises (Coordination in Runs on Lenders). Debtors and relief agencies may deliberately choose policies that are to all outside appearances random (IMF Aid). A country can benefit by increasing its chances of carrying out a disastrous policy (Idle Threats). All of these paradoxes can be simply explained using the tools of game theory.

In illustrating the methods of game theory, this chapter has come to these surprising conclusions, but game theory's most important contribution to the bank negotiator and the debtor-country representative is not just a set of general conclusions, but a framework in which to conduct analysis. Describing a situation in the terminology of game theory—players, actions, information, and payoffs—is an aid to understanding it. A crucial aspect of negotiation is being able to put oneself in the position of the negotiator on the other side of the table, and game theory provides a disciplined way to do this. It also shows that simple intuition is often wrong and that a little further analysis can make a big contribution to understanding. Having learned that an increase in a player's potential costs can redound to his benefit, that independent self-interested action can lead to an outcome that is bad for all players, and that identity of interests may not be enough to guarantee agreement, the analyst will be more wary in his predictions. A good negotiator may learn these things through experience, but game theory shows how even a novice can formally analyze them and recognize what is happening while there is still time to change the rules of the game.

NOTES

1 I would like to thank Michael Kim, Emmanuel Petrakis, and Ronald Solberg for helpful comments, and the University of Chicago's Center for the Study of the Economy and the State for support.

2 The game IMF Aid is an adaptation of the Welfare Game (Rasmusen 1989: chapter 3). The game has also been called Samaritan's Dilemma, by Gordon Tullock, who credits James Buchanan as its originator (Tullock 1983:59).

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9 Loan valuation and the secondary market for developing-country debt

Vincent Dropsy and Ronald L.Solberg

INTRODUCTION

A secondary market for developing-country debt has emerged and grown rapidly since the onset of the debt crisis in 1982. Over the past eight years, this market has become deeper and broader. The number and average size of annual transactions has increased along with the number and type of market participants. Commercial banks, intent on reducing developing-country exposure and minimizing default risk, and developing countries, wishing to reduce the level of outstanding external debt, to lower debt service and attract foreign investment, have both increasingly participated. Non-bank private investors, investment banks, brokers and speculators have also been active players.

While the market has become more liquid, especially since 1987, there have been numerous claims, and some evidence, that the market remains inefficient. A key question is whether developing-country loan prices are inversely related to perceived risk. If the loan's yield does not accurately represent the discounted present value of future debt-service payments, then either the sovereign debtor or the investor is being shortchanged.

Since the developing-country debt-conversion programs are likely to persist, the secondary market will continue to play a critical role in transferring risk to those market participants more willing and/or best able to bear it. This raises anew the need to assess the efficiency of this market, the determinants of secondary-market loan-price movements, and the robustness of loan-valuation models.

This chapter begins with a brief historical survey of the turnover, price movements and participants in the secondary market for developing-country debt. The third section reviews the theoretical issues underpinning sovereign lending and repayment as they determine sovereign-loan pricing. An empirical assessment of loan-price movements for the Baker-15 countries (excluding Bolivia) is presented in the fourth section. The chapter concludes with remarks on the applicability of forecast secondary-market loan prices for various investor and developing-country objectives.

A BRIEF HISTORY OF THE SECONDARY MARKET FOR LDC DEBT

The nascent secondary market for developing-country debt has grown rapidly since its inception in 1983. The rising liquidity of this market and its expanding participants have facilitated the spreading of developing-country default risk from those less willing to those with more interest and, perhaps, greater ability to hold these assets.

When the secondary market for developing debt emerged in 1983, it was mainly driven by inter-bank swaps. One bank exchanged a certain US dollar amount of one country's debt for a different notional amount of another developing country's debt, held by another commercial bank. Bankers Trust was one of the first US banks to conduct significant transactions in this debt-swap market. In a well-known deal which signaled its potential, Bankers Trust bought $190 million of Mexican loans held by the Mexican bank, Banco Real, for Brazilian debt valued at $100 million, plus US$90 million in cash (Hector, 1983).

Commercial banks were both buyers and sellers in these *debt-for-debt swap* transactions, intending to rebalance their LDC debt portfolios to achieve greater diversity in their country-exposure mix. A few, mostly smaller regional banks, extricated themselves from non-performing LDC debt by *debt-for-cash sales*. These portfolio-adjustment transactions (both debt-debt and debt-cash swaps) dominated the initial activity in this market and still account for a substantial amount of turnover. For example, these transactions grew from only $1.2 billion in 1984 to $27.6 billion in 1988, accounting for just over 50 per cent of total market turnover during both years (see table 9.1).

Such transactions helped minimize LDC default risk for some banks, by smoothing the distribution of country exposure within their debt-troubled portfolios. Accounting and tax considerations also drove the structure and timing of such deals. Some banks used price models to establish a 'mark-to-market' price which was different from the prevailing secondary market. This enhanced the attractiveness of many deals and resulted in greater market turnover.

This portfolio adjustment procedure helped to minimize portfolio risk. Nonetheless, there were direct and indirect costs to these debt-debt swaps. Direct transaction costs of 5–10 per cent were typical. Potential indirect costs were associated with the inability to reduce certain related risks. When a bank sells the relatively expensive debt (i.e. paper with the

Table 9.1 Secondary-market characteristics for developing-country debt

	1984	*1985*	*1986*	*1987*	*1988*
Total turnover (US$ millions)	2,000	4,000	7,000	12,000	50,000
Inter-bank trading	1,227	1,912	4,764	3,812	27,642
Debt conversions	773	2,088	2,236	8,188	22,358
of which:					
	%	%	%	%	%
debt/equity	100	88	68	41	41
exit bonds	—	—	—	negl.	21
buybacks	—	—	—	—	3
informal	—	—	—	43	24
other	—	12	32	16	11
Debtor countries (cumulative)	3	4	6	10	17

Source: IBRD, *World Development Report, 1989*: 15 and 18

smallest discount), it will receive a larger notional value of debt paper for a country which the market judges to have higher default risk. Since a decline in the secondary-market price would decrease the value of this investment, a bank faces market risk on the newly acquired debt paper held in its portfolio. The bank receiving the larger notional amount could also be exposed to greater risk from new money requirements related to a new round of debt rescheduling. The risk associated with government-mandated increases in the bank's reserve requirements for LDC exposure represents a third cost, also unqualified at inception.

Once sovereign debt-conversion programs began, banks were able to alter their product exposure in addition to their country mix. This added a new dimension to the commercial bank's management of their LDC debt portfolio.

Debt-equity swaps and other conversion programs were initiated as early as 1982 in Brazil, and 1984 in Nigeria. However, it was not until 1985, when Mexico also formally allowed debt-equity conversions and Chile implemented chapters XVIII and XIX of the Compendium of Rules on International Exchange, that these programs began in earnest. From 1984 through 1989, at least seventeen different developing countries had active debt-equity or other external-debt conversion programs. The deals have remained concentrated in only four countries, however, with Argentina, Brazil, Chile and Mexico accounting for 92 per cent of the total value of transactions during this period.

Debt-equity swaps have been the most prominent form of developing-country debt conversion. This involves a non-resident or resident investor purchase, at a discount, of developing-country debt from a commercial bank or broker. The private non-bank investor would then exchange its public or private claims with the local monetary authorities for local currency. These funds would then be used to acquire equity or financial instruments in the debtor country. In virtually all cases, the eventual repatriation of income or principal would be subject to existing or specially tailored host-country legal codes regarding foreign investment and exchange controls.

These transactions brought the 'foreign investor' into the secondary market, thereby increasing the market's growth and depth. Commercial banks were able to reduce developing-country exposure and the debtor country could exchange external-debt claims for domestic-currency claims. Non-debt claims held by banks and non-banks replaced bank-held external-debt instruments in these transactions. However, they have raised numerous investment-policy questions, including their impact on domestic monetary conditions, investment performance and the balance of payments.[1] The degree of undesired monetary and fiscal consequences is dependent upon the existing depth and breadth of the domestic financial market and the original magnitude of fiscal imbalances. Many of the investment's effects on the economy are similar to those of other forms of foreign direct investment.

Other debt conversions, whether formal or informal, were conducted using public or private external debt to facilitate a public or private investment in the debt-troubled developing country. Some of these debt conversions allowed the creditor bank to hold exit bonds, secured by US zero-coupon Treasury debt, or other securitized instruments such as floating-rate notes (FRNs).

Outright *debt-for-cash buybacks* by the debtor government itself, when their foreign-exchange reserves were ample and the debt discount was severe, also resulted in lower commercial-bank exposure. These transactions have been criticized by Bulow and Rogoff (1988a) as offering few benefits to the debtor country since they result in the debtor's 'paying average sovereign debt prices to retire marginal sovereign debt'. These authors argue for collateral rather than the threat of sanctions in the terms and conditions of a loan agreement.[2]

Other even more innovative forms of debt conversions occurred, for example, involving *debt-for-nature swaps*. The structure of this swap is similar to that of the debt-equity transaction except that the 'investor' spends the acquired local currency to manage programs in forest conservation, scientific study and environmental education. *Debt-*

commodity swaps are yet another form of conversion, wherein the bank-held external-debt claim is exchanged for a claim on physical commodities which, once sold in the international market, amount to a debt-cash swap.

The rapid growth of the secondary market attracted dealers and brokers who inventoried debt paper and arranged the increasingly complex deals which would bring many market participants into one or a sequence of transactions. Large money-center banks, investment banks and independents set up brokerage units to act as intermediaries. The commercial banks set up divisions primarily to manage their own exposure. Once their total exposure was significantly reduced or eradicated, many of these departments were dismantled. In 1990, a number of merchant banks and independent brokers were continuing to operate as market intermediaries in New York or London (Fidler 1990).

Private non-bank investors, such as insurance companies, pension funds and other private investors bought and sold developing-country debt paper, intending to take advantage of short-term trading opportunities or longer-term investment strategies. While the activity associated with this group has remained small, it will grow as more country-investment funds and other *debt-securitization* programs are set up using converted developing-country debt. Some commercial and investment banks have also retained significant amounts of LDC debt paper as a part of broader portfolio management.

The broadening of market participants—both on the supply and demand side—has resulted in explosive growth in the secondary market for LDC debt. The introduction of US Treasury Secretary Brady's program and the $30–40 billion of IMF and World Bank resources committed in 1989/90 to debt-reduction transactions will bolster market turnover in 1990 and beyond. Table 9.1 shows that the total volume of secondary-market trading reached $50 billion in 1988. This included growing activity in both inter-bank trading and debt-conversion programs.

Despite growing market liquidity, the average secondary-market price for LDC debt has fallen by nearly 50 per cent since early 1986 (see figure 9.1). Concurrent with expanded market liquidity and turnover, the average market spread on secondary-market paper has narrowed, reflecting less uncertainty and, perhaps, greater market efficiency. Nonetheless, price movements in this market have continued to be quite volatile, reflecting both the great uncertainty in loan valuation for this nascent market and changes in the policies of commercial banks, creditor and debtor governments. The spread between bid and ask prices tends to widen (see figure 9.2) during periods of greater uncertainty, such

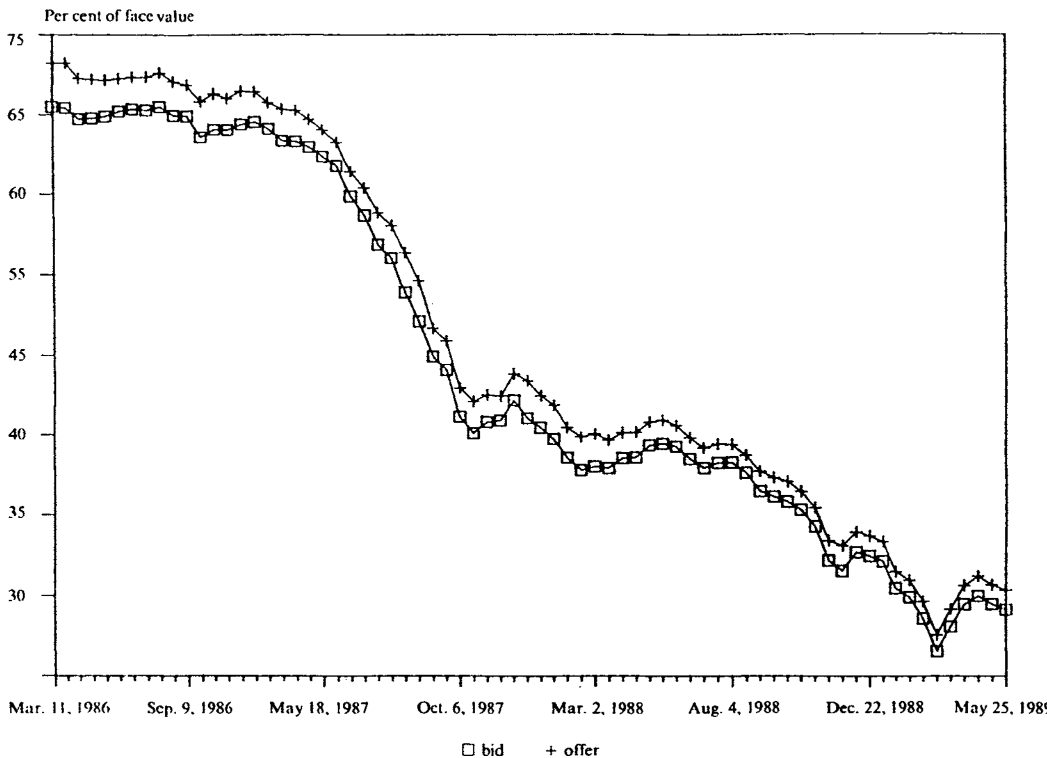

Figure 9.1 Loan price: Baker 15 (except Bolivia)

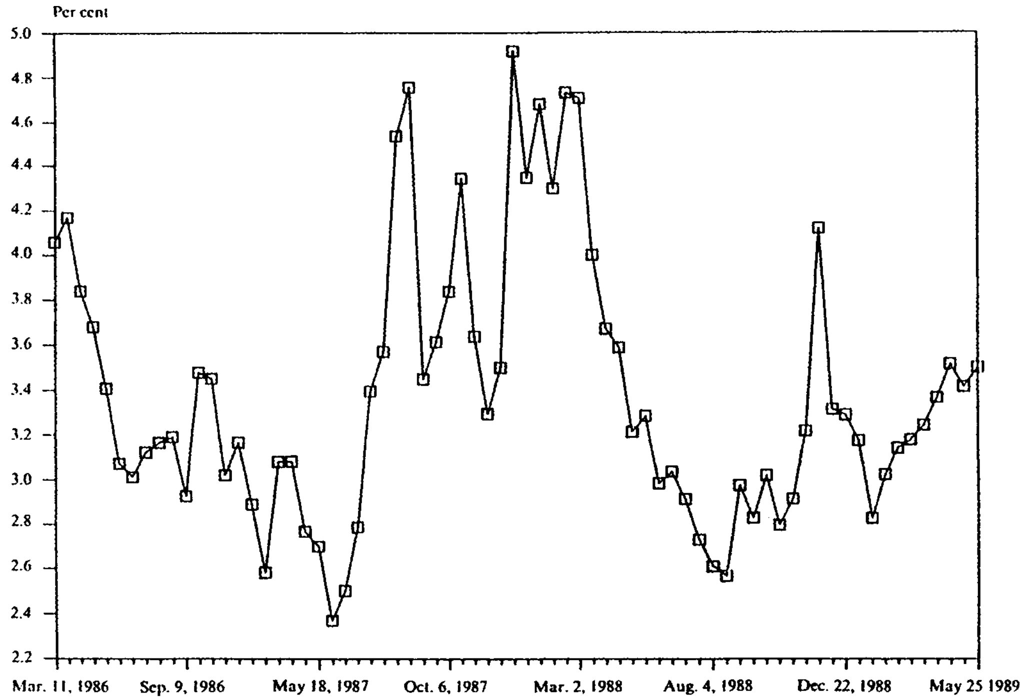

Figure 9.2 Loan price: Baker 15 (except Bolivia): The bid price less the ask price is expressed as a percentage of the average of these two.

as the first announcement of voluntary commercial-bank reserves against LDC loan losses in May 1987 and again during the Brazilian interest-payments moratorium from December 1987 to early 1988.

Reliance on the secondary market for debt-debt, debt-equity or more complex conversion transactions, raises the issue of market efficiency and appropriate loan pricing. Cohen and Portes (1990) and others have postulated, and found some evidence, that the secondary market for developing-country debt is not efficient. This perception has led to a spate of loan-pricing models to independently price LDC loan paper.[3] The theory of sovereign loan-price determination is reviewed next.

FACTORS AFFECTING SOVEREIGN LOAN-PRICE DETERMINATION

Loan discounts can be observed in a secondary market for developing country paper and are mainly associated with the perceived creditworthiness of the borrower. More precisely, most of the pricing models assume that these prices reflect the estimated probability of ongoing rescheduling or even default, in a perfect competitive market formed by risk-neutral lenders.

Yet the particular nature of the sovereign borrower requires a better understanding of the unique aspects of international lending to developing countries. The interdependence of demand and supply of LDC loans leading to credit constraints, problems of enforceability of the loan contracts, the process of negotiations and moral hazard are just some of the issues that need to be clarified and embodied in a price analysis of debt valuation.

Characteristics of international credit markets

The main task in pricing a developing-country loan resides in the evaluation of the expected future cash flows, which can be adversely affected by the risk of non-repayment. This requires the selection of indicators representing general economic performance with which to assess sovereign debt-service capacity. In particular, the sustainability of borrowing (and the quality of the lender's portfolio) can be analyzed at different time horizons.

In the short term, problems of illiquidity may arise if countries lack sufficient foreign currency to pay current obligations. This inadequacy arises due to mismanagement of the foreign-exchange asset-liability balance. These repayment difficulties should be only temporary and not too serious if the external capital borrowed has been efficiently allocated, in particular to the industries favoring exports. On the other hand, sustained medium-term borrowing requirements, witnessed by persistent current-account deficits exceeding 2 per cent of GDP, may create more worrisome financial issues and thus reduce the debtor's creditworthiness.

Sovereign borrowers become 'insolvent' when they are incapable of servicing their debts in the long run. This results from the borrower's inability to raise domestic saving rates and efficiently direct some of these surplus funds to productive investments in both import-substituting and export-related industries. Unfortunately, the distinction between a liquidity squeeze and an insolvency constraint cannot always be clearly determined, and short-run financing difficulties can sometimes be perceived as symptomatic of poor economic allocation of resources.

Debt indicators have been developed in the search for objective criteria for rating different countries according to their ability to repay via estimated rescheduling probabilities. However, these ratings by the banks, and thus estimated loan prices, also embody more subtle and most often qualitative factors, that are specifically related to sovereign-debt contracts (i.e. willingness to repay).

Borrowers consider the balance of economic advantages and disadvantages related to a postponed repayment and/or repudiation of their financial obligations. Beyond collateral, potential sanctions or penalties and the fear of tarnishing one's reputation and thus creditworthiness constitute a large opportunity cost for not repaying its debt. Few foreign governments have yet opted for repudiation, which would result in virtually complete isolation from the international credit markets.

Before going any further, we should make the distinction between the two terms usually used for non-repayment: default and rescheduling. According to Eaton, Gersowitz and Stiglitz (1986), 'default occurs whenever the lender formally declares that the borrower violated a certain condition of the loan'. Such a declaration usually signals the lender's decision to stop supplying credit. Since the cost of such a decision usually includes a large write-off and a loss of a future business, most commercial banks prefer to reschedule the loan payments, by simply extending the maturity of principal, and perhaps interest, payments. Sovereign debtors are conscious of this reticence to call for default and thus can be tempted to fall into arrears more often, since the ultimate penalty (a kind of death sentence in the borrowing markets) is less than likely to be imposed. Hence, in the discussion that follows, the term rescheduling—an elongation of the repayment schedule—will be used rather than default to describe the occurrence of payment difficulties.

Modern contract theory can also be applied to sovereign loans. The most important difference between domestic and international lending concerns contract enforcement. The enforcement of judicial sanctions against repudiation by foreign firms or governments is uneven, as are diplomatic and military interventions in the current world order. Chowdhry (1987) constructs a theoretical model capturing some dynamic aspects of these incentives both for lenders and borrowers. He shows that, under certain conditions, cross-border loan contracts become enforceable. This conclusion requires banks to remain in international lending markets for a long period of time, to follow their threat to deny future credit to the borrowers who repudiate their loans (no distinction is made between partial and total default) and not to penalize non-rescheduling borrowers. Notably, an exogenous shock that would prevent the realization of one of the last two conditions could create an incentive for several countries to default simultaneously. To date, sovereign borrowers have not formed a cartel, nor have they acted in concert, whereas banks, in the short run, seem to have followed common strategies. Loan syndication also may have altered the competitive structure and also changed the pricing mechanism. If the international credit markets are efficient, loan prices should reflect these characteristics of loan contracts, and the structure of the agents playing a role in these markets.

Moral hazard is also affected by the roles of the International Monetary Fund and the World Bank. Since their motivations differ from the private banks' objectives, their presence as a lender of last resort introduces further distortions into the markets. Adverse selection constitutes another problem. This occurs when the borrower has more information than does the lender on the project to be financed and intentions concerning repayment. However, there is no clear consensus about the direction of the distortions induced.[4]

The behavior, not only of the debtors, but also of the creditors (i.e. banks) needs to be better understood, and a game-theoretic approach to both sides of the market could be useful. For instance, Eaton and Gersovitz (1981), Sachs and Cohen (1982), and Sachs (1982) assume that borrowers can repudiate their debts and, in order to avoid that possibility, banks can constrain the supply of credit. Folkerts-Landau (1985) examines the existence of credit rationing to limit exposure to a risky country in a framework that enables demand and supply to adjust independently. He describes the changing structure of development finance using different risk classes of borrowers. Several models of supply and demand for the external loan market are developed, depending on whether the credit-rationing constraint is binding or not. Other institutional features of the market for sovereign loans are included in the analysis, but the model is not empirically tested. Bulow and Rogoff (1989) build a constant recontracting model of sovereign debt which captures more accurately the bargaining nature of international lending. All the players are assumed rational and able to fully anticipate the possibility of rescheduling. In this context, an unanticipated rise in interest rates would not only decrease the present value of future loan repayments, but also hurt the bargaining position of creditors. Future research specifying and estimating prices from this type of bargain-theoretic framework is needed.

The previous general discussion identifies some of the important theoretical characteristics of international credit markets and loan contracts. Most loan-pricing models have ignored many of these factors which influence rescheduling risk and loan prices. Thus, empirical studies lag behind theoretical research on the determinants and dynamics of demand and supply of loans to developing countries.

Sovereign rescheduling and loan-price models

Most pricing models of commercial loans to sovereign borrowers highlight rescheduling risk. Many papers make the important assumption that the spread between the interest charged to a particular country and the London inter-bank offer rate (LIBOR) reflects the borrowing country's rescheduling country-risk premium. This additional cost of borrowing over the 'risk-free' interest rate may embody some of the elements discussed earlier.

Most empirical research has focused on evaluating debt-servicing capacity and predicting rescheduling probability rather than pricing loans. However, Feder and Just (1977b) extend their logit model to explain the spread over the LIBOR as a function not only of the probability of rescheduling, but also the commitment period, the elasticity of demand, and the expected loss rate if rescheduling occurs. Analyzing government-guaranteed loans in 1973–4, they find that loan duration exerted a positive influence on the spread.

Edwards (1984) investigates the determinants of the loan spread for nineteen LDCs between 1976 and 1980. Fourteen possible explanatory variables are considered.[5] His empirical results show that two of these variables are significant and have the expected signs (debt-output ratio and reserves/GNP). Four other variables have a significant influence, but the direction of their effect is not always the one expected.

Edwards (1986) builds on his previous empirical analysis by comparing the markets for international bank lending to LDCs (26 countries) and the market for bonds issued by LDCs (13 countries). Since we are mainly interested in bank-loan prices, we focus on the author's regression of the loan spread on various macroeconomic and financial ratios.[6] Instrumental variables are used to take into account the possible endogeneity of some of the determinants. The coefficients of the debt-output ratio, gross investment to GNP, debt-service ratio are significant and correctly signed, whereas most other variables did not have a significant effect on the spread. These regressions are reproduced and updated for Mexico and Brazil only during the period from 1980 to 1985; the debt crisis is analyzed by comparing the trend of spreads with economic events. Edwards concludes that 'the international financial markets only anticipated by a few weeks—and only partially—the Mexican crisis'.

Ozler (1988) presents an empirical analysis of the effect of a borrower's repeated 'experience' in the international credit market (e.g. seven variables such as the cumulative number of loans received) on the behavior of spreads covering the period from 1968 to 1981. One of the determinants of the spread, the expected loss rate (which is an unobservable variable), is proxied by country- and time-specific dummy variables. Ozler finds the effect of experience on the spread to be highly significant in the following sense: 'spreads start at high values at low levels of experience and decrease to a rate that would be predicted by models in which default risk and deposit insurance are accounted for'.

Solberg (1988) presents a model which estimates the secondary-market price of a commercial bank loan to a sovereign borrower as a spread (s) over the risk-free rate. If the contractual rate of return is denoted by cr, and the LIBOR rate by 1r, then the discount, d, is equal to:

$$1 \qquad d = cr / (1r + s)$$

The equilibrium condition for a risk-neutral lender states that the expected rate of return of the risky asset equals the rate of return of the risk-free asset:

$$2 \qquad (1 - p) * (1 + lr + s) = 1 + lr$$

The spread is assumed to reflect fully the country-risk premium, rp, which in turn has been related to the predicted rescheduling probability, p, by the equation above. Therefore, the spread can be expressed as:

$$3 \qquad s = (1 + 1r) * p / (1 - p)$$

The next step in pricing loans is to replace the expression p/(1-p) by a function of its determinants X_j. Since forecasts of rescheduling probability are made on the basis of present and past information, it suffices to assume that their predicted values can be obtained from an historical set of values. Hence, only the functional form of p/(1-p) in terms of its main factors matters, and not the time structure of the contractual payments. A logistic specification is chosen for the rescheduling probability, p:

$$4 \qquad p = \frac{\exp(\beta_o + \Sigma_j \beta_j X_j)}{1 + \exp(\beta_o + \Sigma_j \beta_j X_j)}$$

Combining the equations giving the expressions of the spread, s, and the probability, p, we obtain:

$$5 \qquad \mathrm{Log}(s) = \beta_o + \Sigma_j \beta_j X_j + \mathrm{Log}(1 + \mathrm{lr})$$

where $ß_o$, $ß_j$ are coefficients to be estimated.

Purcell and Orlanski (1988, 1989) develop a model explaining secondary-market loan prices in order to highlight anomalies in the price of one country's loan versus another and to identify profit opportunities based on short-run trading strategies. Their statistical analysis is based on a combination of credit factors (net debt-to-export ratio, per capita income, rescheduling dummy, servicing interest) and institutional factors (debt-for-equity program) as determinants of the secondary-market price. No underlying theoretical structure is mentioned. All variables are expressed in terms of deviations from market indices (weighted by the country's total outstanding debt).

The previous research explains loan prices or spreads over LIBOR based on economic and political factors specific to sovereign borrowers. However, loan prices may reflect other factors such as institutional arrangements, size of exposure, fees and transactions costs, and/or alternative rates of return. Demand and supply conditions (e.g. credit rationing), and their interdependence in international lending, have also been addressed by a number of authors, with Eaton and Gersowitz (1981) as the pioneers.

The two authors built a disequilibrium model to estimate the probability of a country's being credit-supply constrained. Factors specifying this potential supply constraint are the variability of exports, the ratio of imports to GNP, the growth rate of GNP, total real GNP, total population, the level of debt from public creditors and time dummy variables. They find that 80 per cent of the countries were credit constrained in 1970 and 1974. Morgan (1987) updates their results for 1977 and 1981 and concluded that the estimated percentage decreased in the late 1970s.

A different direction of research has focused on possible solutions to the debt problems, such as buy-backs or simply a debt write-off. Cohen (1989) calculates the maximum discounted present value of the repayments that banks can obtain. He suggests that scaling down future interest repayments would be preferable to writing off the face value of the debt, under certain conditions. Cohen points out that the market value of the debt used to reduce servicing should be different than the price observed in the secondary market. Finally, he provides an econometric analysis to estimate the elasticity of the nominal price of the debt (divided by exports) to the impact of a debt write-off. His empirical results tend to support these recommendations. However, this study does not focus on the search for determinants of the secondary-market prices, although the three explanatory variables chosen (the debt-service ratio, the ratio of arrears to debt, and rescheduling incidence) all have significant effects. His results suggest that the secondary market is not efficient.

Model specification and econometric issues

Experience and theory of sovereign debt-rescheduling risk and loan prices highlight the importance of the debtor's ability to repay, the debtor's willingness to repay, and the creditors' behavior (i.e. their perception of the debtor's creditworthiness and their decision about new lending). Since the debtor and creditor formulate policy, in part, based on each other's past and anticipated future moves, there is likely to be interaction or game theoretic behavior embedded in these decisions. Negotiations and hence loan prices are further affected by asymmetric information, the role of the lender of last resort, and other forms of actual or perceived penalties and sanctions.

The most fundamental influence on loan prices involves the debtor's ability and willingness to repay its obligations. Debtor policy and performance, in turn, affect banks' perception of repayment risk and its prospects, although perhaps less so once problems appear. Thus, banks' perception of risk and its impact on lending and loan-loss reserving policy is another important determinant of loan prices. The investment criteria of the third-party investor in debt/equity programs is another factor which influences the movement of sovereign-loan prices. Not all of these elements are *directly* related to sovereign ability and/or willingness to repay, but they can affect secondary-market loan prices, and are likely to be determined simultaneously. Thus, the estimation of loan prices will proceed as a two-stage procedure.

The first-stage equation, 6, estimates sovereign rescheduling risk $\mathbf{Y}_t^p$.

$$6 \qquad Y_t^p = \alpha_1{*}(A_t - A_{t-1}) + \alpha_2{*}\mathrm{Log}(D_t) + \alpha_3{*}\mathrm{Log}(M_t) + \alpha_4{*}(I_t - I_{t-1})$$

where: $A_t = \text{Arrears}_t$
$D_t = (\text{Debt/GDP})_t$
$M_t = (\text{Imports/GDP})_t$
$I_t = \text{IMF program}_t$

The major influences from debtor behavior on loan prices can be aggregated in this estimated probability of debt rescheduling. This likelihood of 'partial default' can, in turn, be estimated from a range of economic and financial variables intended to capture both ability and willingness to repay. By definition, the countries examined here have already sustained debt-repayment difficulties and are likely to be credit constrained. Thus, these characteristics of this limited sample will alter the priors for some of the explanatory variables.

Arrears is a ready sign of ongoing payment difficulties, whether resulting from illiquidity or insolvency. A proxy variable A_t, valued at unity during the quarters in which arrears exist and zero otherwise, is created. A change in status from full payment to arrears is expected to be positively correlated with rescheduling incidence.

A heavier debt burden is usually associated with a higher risk of rescheduling (as measured by total disbursed debt relative to GDP, named D_t). However, once debtors have already signalled their nonperformance, rationing of new loans by the external creditors follows. In this situation, the ratio of debt-to-GDP also measures the degree of credit rationing: if this ratio rises, the country has been given new net resources. Once credit is constrained, this inflow should help normalize the sovereign cash flow and real economic performance, contributing to improved creditworthiness. Hence, in the short run, this variable is anticipated to be negatively correlated with debt-rescheduling risk.

During periods of sustainable borrowing, the ratio of imports to GDP, M_t, measures the opportunity cost of rescheduling; financial nonperformance would result in the reduction of credit-based imports, thus disrupting development goals. In that context, it measures a disincentive to reschedule. With the onset of arrears and rescheduling, however, the debtor country, because of its funding constraint, must stabilize its balance of payments by reducing its borrowing requirements. Most debt-troubled countries willing to continue to pay debt service must achieve this, in the short run, by lowering import expenditures. Thus, within this sample, imports-to-GDP, a proxy for the debtor's willingness to make costly adjustments, is anticipated to be positively correlated with debt-rescheduling risk.

In its role as lender of last resort, the International Monetary Fund must negotiate a loan contract with the troubled debtor country in a manner which violates the assumptions of a competitive creditor/debtor market; principal/agent issues are more acute and assymetric information is at a premium. Since the debtor will perceive higher costs related to the proposed IMF stabilization program, and weigh these against those resulting from threatened market sanctions (which would follow unilateral default), the risk of rescheduling necessarily increases. Thus, participation in an IMF program, I_t, should be positively correlated with rescheduling risk.

The second-stage equation 7, regresses loan-price movements on supply and demand-related variables.[7] Given the presence of 'unit roots', all of the variables except one are first-differenced to improve the robustness of test statistics.[8]

$$7 \quad (\mathrm{Log}(P_t) - \mathrm{Log}(P_{t-1})) = \delta_1{*}(Y^p_t - Y^p_{t-1}) + \delta_2{*}(\mathrm{Log}(RX_t) - \mathrm{Log}(RX_{t-1})) + \delta_3{*}(PI_t - PI_{t-1}) + \delta_4{*}B_t$$

The supply-related variables include the instrumental variable, , from equation 6 and bank reserves, B_t. The instrument is a composite indicator for expected rescheduling risk. As would be expected from an efficient market, the instrument for rescheduling risk is anticipated to have a negative relationship with loan-price movements. The greater the expected risk, the more willing are the banks to sell LDC debt paper, thus depressing its prices.

In the mid-1980s, after the LDC problem was recognized as being more than one of sovereign illiquidity, banks' risk aversion rose. Hence, a dummy variable, signaling the onset of US commercial-bank charge-offs of LDC debt in May 1987, is used in the second stage regression. Loan-loss reserves, B_t, which are increased concurrently with a charge-off, are also expected to be negatively correlated with loan prices.

The other two variables in equation 7—political instability, PI_t, and the real effective exchange rate, RX_t,—are the demand proxies for secondary-market debt paper.

When the debtor has full access to external borrowing, a competitive real devaluation of the currency (i.e. a decrease in the real effective exchange rate) signals that economic policies, based on trade and price fundamentals, support export-led growth. This should improve the real trade balance and lower rescheduling risk, resulting in a negative coefficient. However, once a country has rescheduled, the real value of the currency is determined more by capital flows resulting from supply-side policies (such as a debt-equity program), than it is by demand-related trade policies or fundamentals. Thus, for a problem debtor, a real appreciation of its currency results from capital inflow and foreign-investor confidence in the country's prospects. Hence, the real effective exchange rate, RX_t, is anticipated to be positively correlated with loan price.

A basic precondition for any investor contemplating an off-shore equity investment is the host country's political stability. The advent of debt-equity programs in the debtor countries brought the resident and non-resident non-bank investor increasingly into the secondary market for LDC debt as buyers of debt paper. Hence, the demand for LDC debt paper (and its price) is postulated to be negatively conditioned on an index for political instability, PI_t; greater political instability results in lower demand for LDC debt paper, thus depressing its price.

In addition to the two-stage estimation strategy, a reduced form equation, 8, was estimated. A single variable acting as proxy for rescheduling risk—debt/GDP—was included directly with the second-stage determinants of loan-price movements, replacing the composite indicator.

8 $$(\mathrm{Log}(P_t) - \mathrm{Log}(P_{t-1})) = \pi_1{*}(\mathrm{Log}(D_t) - \mathrm{Log}(D_{t-1})) + \pi_2{*}(\mathrm{Log}(RX_t) - \mathrm{Log}(RX_{t-1})) + \pi_3{*}(PI_t - PI_{t-1}) + \pi_4{*}B_t$$

In examining the movement of secondary-market loan prices, the Baker 15 countries were chosen. Data on Bolivia was excluded as an outlier due to excessive price fluctuations, so that the sample covers fourteen countries (Argentina, Brazil, Chile, Colombia, Ecuador, Ivory Coast, Mexico, Morocco, Nigeria, Peru, Philippines, Uruguay, Venezuela, and Yugoslavia). There are fourteen quarterly observations beginning in the first quarter of 1986 and ending with the second quarter of 1989 for each country.

By 'stacking' each national series of fourteen observations, we obtain 196 observations: sufficient degrees of freedom for the inclusion of the postulated explanatory variables. Whether estimated as a two-stage or reduced-form equation, the main shortcoming of the 'stacked' regression approach to panel data (i.e. pooled cross-section time-series) is the restriction of equality between the coefficients for different countries.

Alternative estimation strategies such as random coefficients would provide only a partial solution. The seemingly unrelated regression (SUR) technique was chosen to address this problem. Fourteen separate equations (one for each country) are estimated, allowing unconstrained individual country coefficients, while still accounting for common components.

The SUR method reduces the number of observations to fourteen (time periods) and thus considerably limits the freedom of model specification. It also eliminates the possibility of using the logit functional form in the first stage to estimate rescheduling risk. The first-stage equation is altered to become equation 9. Since the dummy variables that proxy for arrears and for the use of IMF programs are simultaneously equal to zero for some countries, only one of these variables—IMF programs—is employed.

$$9 \qquad Y^i_t = \alpha^i{}_1{*}\mathrm{Log}(M^i_t) + \alpha^i{}_2{*}\mathrm{Log}(D^i_t) + \alpha^i{}_3{*}(I^i{}_t - I^i{}_{t-1})$$

The same SUR method can be used to estimate the reduced-form equations, identical to the specification found in the stacked-equations method. Due to multicollinearity problems, Yugoslavia was taken out of the sample.

EMPIRICAL ESTIMATION OF SOVEREIGN-LOAN PRICES

The first-stage equation, 6, assuming a logit functional form and using the pooled cross-section time-series sample, yields the following regression results:

$$10 \quad \underset{}{Y_t} = \underset{(5.19)}{0.37{*}\mathrm{Log}(M_t)} - \underset{(-1.45)}{0.53{*}\mathrm{Log}(D_t)} + \underset{(2.30)}{1.00{*}(I_t - I_{t-1})} + \underset{(2.26)}{2.04{*}(A_t - A_{t-1})}$$

(T-statistics are in parentheses)

A higher ratio of imports over GDP is positively and significantly correlated with the probability of rescheduling. In effect, developing countries that are not willing to reduce their share of imports tend to let their trade-related borrowing requirements increase beyond their means of repayment, and thus repeatedly reschedule their loans. In contrast, a higher ratio of debt over GDP, signalling a net inflow of financial resources, tends to reduce this probability, although the corresponding coefficient's level of significance does not reach 10 per cent. This result can be interpreted as the need for more loans to developing countries to promote their growth and facilitate their repayments, as stressed by the Baker Plan. For the opposite reason, the sudden need for IMF programs (i.e. a short-term increase in compensatory loans) means a more precarious financial situation for LDCs and translates into a higher probability of rescheduling, as indicated by the positive and significant coefficient of IMF programs. Also as expected, new arrears is a clear indicator of financial illiquidity, and thus significantly raises rescheduling probabilities. Hence, the Brady Plan favored debt

Table 9.2 Logit probability thresholds and error rates

Probability threshold:	10 %	15 %	20 %	25 %	30 %
Errors of type I	0 (0%)	1 (0.5%)	1 (0.5%)	15 (7.5%)	32 (16%)
Errors of type II	123 (61.5%)	119 (59.5%)	118 (59%)	84 (42%)	42 (21%)

forgiveness in order to partially free LDCs from their heavy financial burden, and facilitate the repayment of their remaining debt and interest. No consensus has yet emerged about the optimal solution for international indebtness of developing countries.

The logit model provides important information about the probability threshold ('ceiling') above which rescheduling should be feared, in order to minimize policy errors. Table 9.2 indicates the errors of type I (i.e. the number of false non-rescheduling predictions) and of type II (i.e. the number of false rescheduling predictions); of which the latter carry a lower cost for a commercial bank than do errors of type I. There are 196 observations and 56 rescheduling cases (i.e. 28 per cent). As presented in Solberg (1988), individual country thresholds vary widely, suggesting that bank-lending policy should be set according to country-specific probabilities and their trends.

We obtain the following estimates for the second-stage equation 7 (i.e. the cross-section time-series pooled method):

11 $$(\mathrm{Log}(P_t) - \mathrm{Log}(P_{t-1})) = \underset{(0.18)}{0.003}*(Y^p_t - Y^p_{t-1}) + \underset{(29.0)}{0.91}*(\mathrm{Log}(RX_t) - \mathrm{Log}(RX_{t-1})) - \underset{(-1.48)}{0.049}*(PI_t - PI_{t-1}) - \underset{(-5.75)}{0.089}*(B_t)$$

(T-statistics are in parenthesis)
R^2 (adjusted) =.918 Durbin-Watson = 2.03

The goodness of fit R^2 (adjusted for degrees of freedom) is quite high at 91.8 per cent, and appears to be dominated by the highly significant foreign-exchange rate indicator. Indeed, a 10 per cent real effective depreciation tends to correspond to a decrease of loan prices by about 9 per cent. On the other hand, a higher predicted probability of rescheduling does not seem to significantly affect the bid prices of the LDCs' loans in the secondary market; evidence of an inefficient market. An increase in political instability tends to reduce these prices, as expected, though not very significantly. Finally, risk aversion of commercial banks, and their perception of the escalating riskiness in international lending which caused them to write off part of their loans after May 1987 is significantly and negatively correlated with loan prices.

Since the instrument variable did not perform as well as anticipated, we examine a pseudo-reduced-form model, where the probability of

12 $$(\mathrm{Log}(P_t) - \mathrm{Log}(P_{t-1})) = \underset{(2.10)}{0.20}*(\mathrm{Log}(D_t) - \mathrm{Log}(D_{t-1})) + \underset{(31.7)}{0.89}*(\mathrm{Log}(RX_t) - \mathrm{Log}(RX_{t-1})) - \underset{(-1.17)}{0.034}*(PI_t - PI_{t-1}) - \underset{(-5.95)}{0.092}*(B_t)$$

R^2 (adjusted) = .921 Durbin-Watson = 2.05

rescheduling is replaced by the ratio of debt to GDP (other determinants of rescheduling risk were not significant in this model):
The debt to GDP ratio (in logarithmic change), as a replacement for the composite indicator, now becomes a significant variable. An increase in relative indebtness raises loan prices, which is consistent with the first-stage result of a negative correlation between the same ratio and the probability of rescheduling. The goodness of fit is virtually unchanged relative to the second-stage equation 11, as are the values and levels of significance of the other coefficients.

A second econometric method, the seemingly unrelated regression (SUR) technique, allows us to investigate whether the previous coefficients exhibit stability across countries. We report the results of equation 13 for the first stage in table 9.3:

13 $$Y^i_t = \alpha^i_1*\mathrm{Log}(M^i_t) + \alpha^i_2*\mathrm{Log}(D^i_t) + \alpha^i_3*(I^i_t - I^i_{t-1})$$

The R^2 (adjusted for degrees of freedom) for the fourteen equations, estimated with the SUR method are all greater than 99.5 per cent, with most of the Durbin-Watson statistics reasonably close to 2.

As in the earlier results, a high ratio of imports to GDP significantly increases the probability of rescheduling for 11 of the 14 countries, but reduces it significantly only for Colombia (a country that was less credit-constrained than its peers). Thus, balance-of-payments problems and a country's willingness to adjust to them should be closely monitored. Participation in IMF stabilization program is strongly and significantly correlated with the probability of rescheduling. In many cases the implementation of an austerity program, sponsored by the IMF as lender-of-last-resort, has been a prerequisite for a successful rescheduling of debt owed to commercial banks.

Table 9.3 First-stage separate equations (SUR): 1986:1 to 1989:2

$\text{Rescheduling}_t = \alpha_1 * \text{Log(Imports/GDP)}_t + \alpha_2 * \text{Log(Debt/GDP)}_t + \alpha_3 * (\text{IMF program}_t - \text{IMF program}_{t-1})$

Country	*Rbar**2*	*DW*	*Imp/GDP*	*Debt/GDP*	*d(IMFpgm)*
Argentina	0.9966	2.798	0.35	−2.32	1.02
			(10.50)	(34.52)	(119.83)
Brazil	0.9984	1.954	0.29	−0.87	1.00
			(8.67)	(18.66)	(108.07)
Chile	0.9986	2.204	0.22	0.61	0.98
			(5.84)	(2.47)	(116.73)
Colombia	0.9987	1.614	−0.42	2.52	1.02
			(4.21)	(6.54)	(124.52)
Ecuador	0.9982	2.078	0.22	−0.30	1.02
			(5.28)	(0.88)	(143.76)
Ivory Coast	0.9981	2.522	0.24	1.19	1.02
			(4.31)	(1.56)	(97.87)
Mexico	0.9971	2.689	0.02	1.26	0.98
			(0.52)	(10.20)	(83.83)
Morocco	0.9978	3.171	0.34	1.12	1.00
			(6.56)	(1.28)	(98.07)
Nigeria	0.9954	1.908	0.28	−0.03	1.00
			(3.23)	(0.12)	(68.28)
Peru	0.9987	1.837	0.26	−0.06	1.02
			(8.07)	(0.43)	(125.62)
Philippines	0.9971	2.679	0.85	0.47	0.97
			(13.32)	(5.37)	(109.65)
Uruguay	0.9983	1.854	0.10	0.60	1.02
			(1.51)	(1.86)	(118.11)
Venezuela	0.9986	2.183	0.16	0.65	1.02
			(5.05)	(6.37)	(126.01)
Yugoslavia	0.9985	2.537	0.39	−0.54	1.00
			(10.43)	(7.47)	(121.10)

revealed a significant coefficient, and of these, only three were of the expected negative sign: Argentina, Brazil and Yugoslavia. Those countries that received significant non-debt-related inflows during the period (such as Chile, Colombia and the Philippines) had a significant positive coefficient. The two large oil exporters (Mexico and Venezuela)

The performance of the debt to GDP ratio was less consistent across countries than were the other two variables. Only 8 of the 14 countries also had an unanticipated sign. The sharp decline in the price of oil may have biased the expected effect on sovereign creditworthiness.

The SUR method could not be satisfactorily used to estimate the second-stage equation; instead, we estimated the reduced-form equations, identical to the specification found in the stacked-equations method. Due to problems of multicollinearity, Yugoslavia had to be taken out of this sample. For the remaining thirteen equations, we report the following results in table 9.4. Except for Peru, the goodness-of-fit measure (adjusted R^2) was greater than 95 per cent for all countries.

The principal determinant of loan prices in the secondary market appears to be the real effective exchange rate, which is always and very significantly positively correlated; the real exchange-rate elasticity of loan prices varies between 0.57 and 1.1, if we exclude Peru.

The sign of the parameter estimate for the ratio of debt to GDP seems again to depend on the country's status regarding oil: an increase significantly raises loan prices for Ecuador, Nigeria, and Venezuela, and decreases them for Morocco and Uruguay. The increase in political instability tends to reduce loan prices for Brazil, Ecuador and Uruguay significantly, but, a puzzlement, raises them for Argentina, Colombia and the Philippines. Finally, the loan-loss reserve program implemented by commercial banks after May 1987 (a proxy for banks' risk aversion or perceived increased riskiness) is significantly correlated with a decrease in prices for 8 out of the 13 countries. Hence, most of our conclusions obtained with panel data are confirmed, albeit with (sometimes significant) exceptions, by the SUR method.

CONCLUSIONS

This empirical study of the determinants of secondary LDC loan prices suggests that only a small number of variables are needed to explain loan-price fluctuations. The most influential indicator seems to be the real effective exchange rate: overall, when the real value of a currency depreciates by 10 per cent, loan prices decline by 9 per cent. The two econometric methods used (a stacked-equations regression and seemingly unrelated regressions) yield reasonably similar results, but the latter technique enables us to differentiate the various influences among countries. A common downward trend seems to be another important factor explaining these prices during the period beginning the first quarter of 1986 and ending the second quarter of 1989, probably associated with a general loss of confidence by foreign investors.

Table 9.4 Reduced-form separate equations (SUR): 1986:1 to 1989:2 (contd.)

Country	*Rbar**2*	*DW*	*Debt/GDP*	*EffRXR*	*Pol.Inst*	*Bank.Res*
Morocco	0.9987	1.883	−1.111	0.807	0.003	−0.078
			(8.85)	(130.27)	(1.86)	(7.33)
Nigeria	0.95	2.2	0.852	1.107	−0.046	0.004
			(15.22)	(27.93)	(1.31)	(0.06)
Peru	0.7205	2.359	0.512	0.171	−0.014	−0.218
			(1.62)	(6.81)	(0.67)	(4.38)
Philippines	0.978	2.841	0.012	0.846	0.057	−0.106
			(0.13)	(23.68)	(3.78)	(2.37)
Uruguay	0.9954	1.44	−1.900	0.600	−0.048	0.040
			(15.44)	(39.34)	(2.22)	(1.35)
Venezuela	0.954	2.375	0.126	0.818	0.000	−0.098
			(1.94)	(22.59)	(0.01)	(1.55)

Table 9.4 Reduced-form separate equations (SUR): 1986:1 to 1989:2

$$(\mathrm{Log}(P_t) - \mathrm{Log}(P_{t-1})) = \pi_1{*}(\mathrm{Log}(\mathrm{Debt/GDP})_t - \mathrm{Log}(\mathrm{Debt/GDP})_{t-1}) + \pi_2{*}(\mathrm{Log}(RX)_t - \mathrm{Log}(RX)_{t-1}) + \pi_3{*}(PI_t - PI_{t-1}) + \pi_4{*}(B_t)$$

Country	*Rbar**2*	*DW*	*Debt/GDP*	*EffRXR*	*Pol.Inst*	*Bank.Res*
Argentina	0.9438	2.99	−0.106	0.590	0.025	−0.169
			(1.57)	(24.90)	(2.63)	(3.71)
Brazil	0.9521	2.697	−0.026	0.662	−0.081	−0.029
			(1.85)	(23.63)	(7.43)	(0.53)
Chile	0.9931	2.74	−0.260	0.893	−0.017	−0.011
			(1.05)	(30.01)	(1.78)	(0.36)
Colombia	0.9926	2.65	−0.237	0.876	0.031	−0.07
			(0.48)	(7.78)	(2.45)	(2.64)
Ecuador	0.9283	2.197	0.923	0.575	−0.054	−0.144
			(2.37)	(27.66)	(4.02)	(2.81)
Ivory Coast	0.9482	2.561	−2.027	0.629	0.017	−0.165
			(1.89)	(9.27)	(1.11)	(3.10)
Mexico	0.9798	3.236	0.006	0.790	0.012	−0.086
			(0.18)	(37.16)	(0.90)	(2.16)

Like other recent studies, we do not find evidence of a link between actual and/or perceived creditworthiness of a debtor country (proxied by the predicted probability of rescheduling) and the secondary-market price of its loans. This observation tends to negate the hypothesis of efficency in the secondary market for LDC loans. The limited, if growing liquidity of the market, the absence of regulatory supervision of this over-the-counter market, and the game-theoretic aspects of rescheduling risk, are just some of the reasons for the possible inefficiency of this market. Nevertheless, for the purpose of forecasting and international debt-portfolio management (whether by the creditor or the debtor), the empirical models show sufficiently high goodness-of-fit and stability of coefficients to be considered useful. There is also no doubt that, as time goes by, this model should be adjusted to account for further structural change in the international financial markets.

NOTES

1 A debt-equity swap directly reduces the external claims of the debtor country, lowering its ongoing debt-service obligations. The equity-related increase in foreign-currency-denominated foreign claims can increase domestic monetary liquidity, affect the government's fiscal deficit and its financing requirements, and alter the institutional obligor in the debt-conversion country. These and other complicating issues such as 'roundtripping', 'additionality' and 'transparency' have diminished debtor-country enthusiasm for debt-equity programs and resulted in program suspensions or amendments. Despite these issues, increasing numbers of developing countries have implemented conversion programs, numbering at least 17 through 1989, according to the IBRD (1989). The interested reader should refer to Lehara (1987) and Helpman (1989) for further discussion.

2 See Bulow and Rogoff (1988b) and Sachs (1988) for further discussion of this issue.

3 Salomon Brothers, Libra Bank, Security Pacific Bank, Bankers Trust and other investment and commercial banks developed and used loan-pricing models for strategic investment and short-term trading during this period.

4 See Corden (1988), Eaton and Taylor (1986) for more on these issues.

5 The debt-output ratio, the ratio of debt service to exports, the ratio of international reserves to GNP, loan duration and volume, the average propensity to invest (i.e. Gross Domestic Investment/GDP), the ratio of the current account to GDP, the average propensity to import (i.e. imports/ GDP), per capita GDP growth, the level of development (proxied by GNP per capita), the rate of inflation, the variability of international reserves, the rate of devaluation and the ratio of government expenditures over GNP.

6 In this study, he uses the following ten determinants: debt-output ratio, ratio of international reserves to GNP, investment to GNP ratio, ratio of the current account to GNP, debt-service ratio, imports/GNP ratio, growth of per capita GDP, index of real effective exchange rate, loan maturity and volume.

7 Preliminary testing shows that offer prices follow the path of bid prices very

closely. The spread between bid and ask correlates strongly with the speed of loan-price movements rather than risk characteristics. Therefore, only bid prices were chosen for the dependent variable in the second-stage regression.

8 The Dickey-Fuller test for unit roots (i.e a coefficient of unity for first-order autocorrelation) rejects the null hypothesis for bid (and also offer) prices at a 1 per cent confidence level (and for their spread at a 5 per cent level), both in nominal and logarithmic terms. For example:

$$\underset{}{\mathrm{Log}(bid_t/bid_{t-1})} = \underset{(-5.72)}{-\,0.015^{*}\mathrm{Log}(bid_{t-1})} + \underset{(-0.38)}{0.042^{*}\mathrm{Log}(bid_{t-1}/bid_{t-2})} + \underset{(1.56)}{0.135^{*}\mathrm{Log}(bid_{t-2}/bid_{t-3})}$$

(T-statistics are in parenthesis)

Lags have been also taken into account by introducing a 'NA' (nonavailable) observation between each country, because of their stacked structure in the pooled time-series cross-section sample. However, the first-order autocorrelation is very close to unity for bid (and offer) prices, which allows us simply to estimate the corresponding equations after having differenced all variables, prices as well as their determinants. The fact that our data is comprised of a pooled time-series cross-section sample provides another reason to be cautious about the stationarity tests on prices, and to choose to estimate the equations in differenced form.

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10 Managing non-performing sovereign assets

Charles A.Semones and Ronald L.Solberg

INTRODUCTION

Into the 1990s, international banking is pursuing significantly different strategies from those held during the 1970s, and even as recently as the early 1980s. Regulatory changes, intensified competition, technological progress and financial innovation have each contributed to this shift. However, none have had greater impact than the altered financial performance of many developing-country (LDC) debtors and the state of the international economic environment itself.

Two important financial trends emerged during the decade of the 1980s. The first, in 1982, was the breakdown of 'petrodollar' recycling, beginning a series of 'stages' in the LDC debt crisis which is discussed in the next section. Lessons from BIS-reporting banks' management of their non-performing LDC loans are offered in the third section.

The second important trend in international financial markets during the 1980s was a shift in the way banks do business in industrial countries. The move to 'merchant banking' meant a de-emphasis of balance-sheet asset creation and a proliferation of new financial products. These new instruments included floating-rate agreements (FRAs), note-issuance facilities (NIFs), revolving underwriting facilities (RUFs) and other securitized debt instruments, as well as hedging products like interest rate and currency swaps, and other derivative instruments.[1] This shift created off-balance-sheet exposure and enhanced fee income, requiring little or no additional risk-based capital per the 1987 Basle agreement.

These instruments, while they have not yet been offered to most LDC debtors, nevertheless, hold the promise of better LDC foreign-exchange asset-liability management. Actual and perceived improvements in the *ability* of LDCs to manage international reserves and debt could lead to the diversification of external creditors, particularly by securitizing LDC-loan exposure. This, in turn, would contribute to more stability in LDC external-credit access. Thus, some of these new products could play major roles in the resolution of the LDC-debt crisis.

The fourth section identifies a bank strategy using 'merchant- bank' products to manage non-performing LDC-loan exposure. This strategy is based on the objectives of both minimizing the private creditor's vulnerability to involuntary lending and maximizing the likelihood of recouping the original principal. It recommends greater differentiation of country-debt prospects which underpin a more discriminating yet more active lending policy.

There is nothing in private-bank lending to sovereign governments which *inherently* precludes good debtor behavior. Examples during the 1980s of successful LDC external-debt management include Kenya, South Korea and Paraguay. Indonesia, Turkey and Romania are others that successfully recovered from prior episodes of payments difficulties. Hence, the arguments that the pre-debt-crisis situation cannot be restored in the 1990s seem too strong.[2] A sovereign debtor's structural and counter-cyclical economic policies and the many times uncontrollable and even unforeseeable international financial environment underpin its *ability to pay*. Key determinants affecting sovereign *willingness to pay* include elements of international relations, domestic politics and contractual risk, which can be reinforced by better differentiation among LDC debtors and consistent lending practices. 'Moral hazard' exists, and it will continue to have a varied effect on sovereign debt performance. Therefore, the market-related penalties for 'bad' and the incentives for 'good' behavior should be strengthened.

The final section concludes that the debt crisis, while continuing into the early 1990s, is unlikely to last another decade. The next stage of the debt crisis will be to identify countries which will be among the first to regain access to international bank-lending and capital markets.

THE LDC DEBT SHOCK

The LDC debt crisis was a major catalyst for changes in: bank lending to LDCs, particularly in terms of products, maturities and geographic patterns; bank funding strategies; and bank loan-loss reserve practices for LDCs. All these developments created ongoing pressure on the ability of banks to maximize profit performance. For that reason, it is appropriate to review the various phases of the LDC debt crisis during which the volume of new commercial bank lending to LDCs has been greatly reduced.

The crisis struck in August 1982, when Mexico's then Finance Minister, J.Silva Herzog, went to Washington and announced that his country was unable to service its external debt. The next months, which can arbitrarily be called ‘Phase I’, were spent wrestling with the origins and implications of the crisis. Although governments and multilateral agencies provided ‘bridge’ assistance to LDCs experiencing debt problems, the debtor countries received little actual relief from banks until early 1983.

A major uncertainty concerned whether the problem was the result of ‘illiquidity’ (meaning a *temporary* shortage of foreign exchange because of high interest rates, slow world growth and weak export demand) which increased the real debt-service payment burden, or whether it was caused by what debt-management practitioners referred to as ‘insolvency’. The latter alluded to the existence of deep structural problems, such as overdependence on a limited number of exports, inadequate savings and weak investment, extensive government regulation or intervention, high effective protection of domestic industry and financial repression, resulting in greater exchange-rate uncertainty and capital flight. Some combination of the preceding factors would make an early recovery of creditworthiness impossible.

Another issue not resolved during Phase I, was whether governments seeking debt relief from banks were assuming appropriate responsibility for debt owned by private borrowers. This concern was, however, addressed in Phase II through a variety of government schemes such as Mexico’s FICORCA, under which Mexico provided foreign-exchange cover to indebted private-sector firms. Similarly, Argentina’s early debt-rescheduling initiatives were limited to public-sector borrowers. However, the 1984–5 Financing Plan (the one finally approved) included provisions for exchanging private debt for government and/or central bank notes.

During Phase II (1983–4) illiquidity arguments were ascendent, voiced mainly by US money-center banks, which were also the institutions to which the LDCs owed the most money. For example, during this period one major money-center bank published remarks by four of its senior executives stressing the importance of external shocks in precipitating the debt crisis and the progress that had already taken place in rectifying the problem. As Guenther (1983) states:

> the creditworthiness of a well run country is based on confidence that economic authorities will do a good job in adjusting to whatever world environment they encounter…the world has not yet recognized the considerable economic strengthening now taking place…if I am right, we have passed through the worst of the present financial crisis.

Since the consensus view held that the debt crisis would be short-lived, debt management followed an *ad hoc* approach. Principal restructuring was generally done year by year, and interest rates were non-concessionary. One of the highest priorities was maintaining the 'critical mass', assuring the ongoing participation in rescheduling and 'new money' packages of all commercial-bank lenders that were prior syndicate members.

During 1985–6 (Phase III), commercial banks began to reexamine the nature of the debt problem. Just as importantly, the critical mass began to dissolve as regionals became more eager than money-center banks to exit the process. By this time, interest rates had fallen, and a strong world economic recovery—albeit an uneven one across OECD countries—was under way. Although the cash flow of oil-importing countries had improved at the expense of oil exporters, due to oil-price declines, overall global factors underpinning illiquidity had clearly lessened. Nevertheless, the debt problem persisted. 'Debt fatigue' was born. Banks were tiring of endless new money requirements. The LDCs were tiring of 'transferring financial resources' to industrial countries. Proposed debt solutions, as the 'initiative' proposed at the 1985 IMF meeting by US Treasury Secretary, James A.Baker III, took note of the LDCs' concern and emphasized both elements of debt reduction and lending increases by all creditors, appropriately tied to the debtors' progress regarding structural reforms. Debt management during this phase came to incorporate multi-year principal rescheduling and concessionary, that is below-market, interest rates.

Debt fatigue crested in Phase IV, 1987–8. Moratoria by Brazil and Ecuador during early 1987 resulted in the May-June 1987 establishment of large loan-loss reserves by US banks. While few of the financial innovations that transformed international banking worldwide during the 1980s were made available to developing-country debtors, Phase IV offered glimpses of a long-run 'market' solution. Beyond debt fatigue, two factors enhanced the change. One was the compositional shift in lenders that began in Phase III, which allowed a broader range of strategies for the remaining larger banks. The other was the strong US economy and its financial-market boom. Altering the country composition of a bank's debt-troubled portfolio using debt/debt swaps and outright debt sales (necessitating charge-offs in some cases), became commonplace. At the same time, other market solutions more related to merchant-banking activities gained ground. The most celebrated vehicle was that of debt/equity-swap programs established at various times by many major debtors, most notably Chile.

From May-June 1987 until year-end 1988, numerous debt accords were concluded between LDCs and banks, but, from among the Baker 15, only four involved actual new lending (totaling about $8 billion). Of all remaining debt-problem countries, only three were able to negotiate new money facilities (for a total of only $227 million) during the same period, signaling the continuance of debt fatigue. Meanwhile, through various debt-reduction schemes, commercial banks in G-10 countries reduced their claims on the Baker 15 by $23.3 billion in 1987 and 1988. Of this amount, $13.2 billion of the reductions in Baker 15 outstandings were made by US banks alone.

Current trends indicate that Phase V (1989–?) of the debt-management process will be one of large-scale, albeit case-by-case, debt relief and reduction, leading to selected countries' returning to voluntary borrowing. The list of proposals to normalize international financial intermediation is very long; however, that proffered in 1989 by US Treasury Secretary, Nicholas F.Brady, has had the most impact. Within months, debt-reduction options consistent with this approach were incorporated into a package negotiated between Mexico and its advisory group of banks in 1989 and signed in early 1990. Shortly thereafter, the Philippines also concluded a debt buy-back agreement, including long-term exit bonds, with its creditor banks.

As of 1992, commercial bankers are more determined than ever to remove these non-performing assets from their balance sheets to help boost profitability, while debtor countries desire further debt reduction and renewed voluntary lending. What remains is to find mutually consistent strategies and vehicles for reestablishing LDC creditworthiness that would contribute to such objectives.

LESSONS FROM COMMERCIAL-BANK MANAGEMENT OF LDC EXPOSURE

For LDCs, the current era of international banking, beginning in 1982, meant an end to the unlimited issuance of large syndicated-debt notes underwritten by international private banks. For many LDCs, the new era signaled the emergence of a process of negotiated debt management, protracted austerity and structural reform which, despite a case-by-case approach, took on some measure of consistency across countries. Given the altered economic performance of many LDCs, it is not surprising that they could not benefit from the new products and techniques of international banking that came into use primarily in industrialized countries in the 1980s.

Table 10.1 Growth of BIS-reported bank claims (% changes, per annum)

	1980–2	*1982–9*
Baker 15 Countries[1]		
All G10 banks	15.1	−1.0
US banks	15.9	−4.5
LDC Financial Centers[2]		
All G10 banks	16.6	5.7
US banks	18.5	−7.8
Other LDCs[3]		
All G10 banks	7.0	4.3
US banks	11.1	−5.7
Industrial Countries outside reporting group[4]		
All G10 banks	12.1	6.2
US banks	17.7	1.7
Industrial countries inside the reporting group		
All G10 banks	12.7	24.7
US banks	6.4	−2.4

[1]'Baker 15' countries are those chosen by US Treasury Secretary, James A.Baker III, to be beneficiaries of his debt 'initiative' proposed at the IMF meeting in September 1985, namely Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Ivory Coast, Mexico, Morocco, Nigeria, Peru, Philippines, Uruguay, Venezuela and Yugoslavia.
[2]LDC financial centers as reported by the BIS are Bahamas, Bahrain, Barbados, Bermuda, Cayman Islands, Hong Kong, Lebanon, Liberia, Netherlands Antilles, Panama, Singapore, Vanuatu and British West Indies.
[3]Includes all LDCs which report to the BIS, excluding those listed above as Baker-15 or financial-center countries, respectively.
[4]Industrial countries outside the BIS-reporting group are: Albania, Andorra, Australia, Bulgaria, Czechoslovakia, Gibraltar, German Democratic Republic, Iceland, Liechtenstein, Malta, Monaco, New Zealand, Norway, South Africa, Soviet Union, and the Vatican.

Sources: BIS, *Annual Reports* and *Maturity Distribution of International Bank Lending,* various issues; Federal Reserve Bank, *Bulletin,* various issues

The end of commercial-bank voluntary lending to the debt-troubled LDCs was a worldwide phenomenon. BIS-reported data shown in table 10.1 reveal that the growth of claims held by all banks with headquarters in Group of Ten (G10) and other reporting countries slowed significantly after 1982.[3] This trend was most pronounced for banks based in the United States. Federal Reserve Bank (Fed) data show that after the onset of the debt shock US bank claims on LDCs actually declined, as did their claims on many industrial countries, and, indeed, their aggregate foreign claims. In addition to having a higher exposure

Table 10.2 The exposure of US banks to selected LDC debtor groups (percentages of equity capital)

	1982	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*
Baker 15	71.7	67.5	62.3	54.6	49.7	48.2	39.7	32.2
Other LDCs	39.3	35.3	31.6	24.7	19.2	18.3	15.0	16.1
Financial centers	51.2	49.0	42.5	37.8	33.7	30.0	22.6	18.0

Source: Federal Reserve Bank, *Bulletin*, various issues

relative to capital than other international banks, US banks' higher cost of capital at that time also tended to contribute to this sharper decline.

During the 1980s, the vulnerability of US bank earnings to LDC-payments arrears declined as claims fell, capital increased and reserves grew to more adequate levels. Table 10.2 shows the significant decline in US bank asset-capital ratios to selected LDC-debtor groups.

Table 10.3 Concerted (involuntary) loan disbursements by banks to LDCs (US$ billions)

1982	*1983*	*1984*	*1984*	*1986*	*1987*	*1988*	*1989e*	*Total*
0.0	12.4	10.9	4.9	2.9	5.3	6.0	0.7	43.1

e = estimate
Source: IBRD, *World Debt Tables, 1989–90*, vol. I: 60

Despite these improvements, it remains evident that the 'debt overhang' (the existence of a large stock of debt which is not repayable under current market conditions) continues to hinder one crucial element for the resolution of the debt crisis: the re-emergence of voluntary bank lending. Although involuntary lending by BIS banks totalled $43 billion between 1982 and 1989, the amounts have exhibited a declining trend (see table 10.3). The continued unwillingness of banks to lend to debt-troubled LDCs is related to several factors, including lack of adequate LDC structural reform, the periodic resurgence of interest arrears owed by some, and the impact of new BIS risk-based capital requirements on rate-of-return criteria. Moreover, commercial banks are now more wary of systematic risk in cross-border lending, as well as more cognizant of moral hazard. In other words, the intentions of the sovereign borrower in acting responsibly with regards to the letter and intent of the loan contract (and all this means for responsible economic policy) remains difficult to assess.

Both the encumbrance of rescheduled LDC exposure and the dearth of new LDC lending have contributed to lackluster bank earnings.Evidence

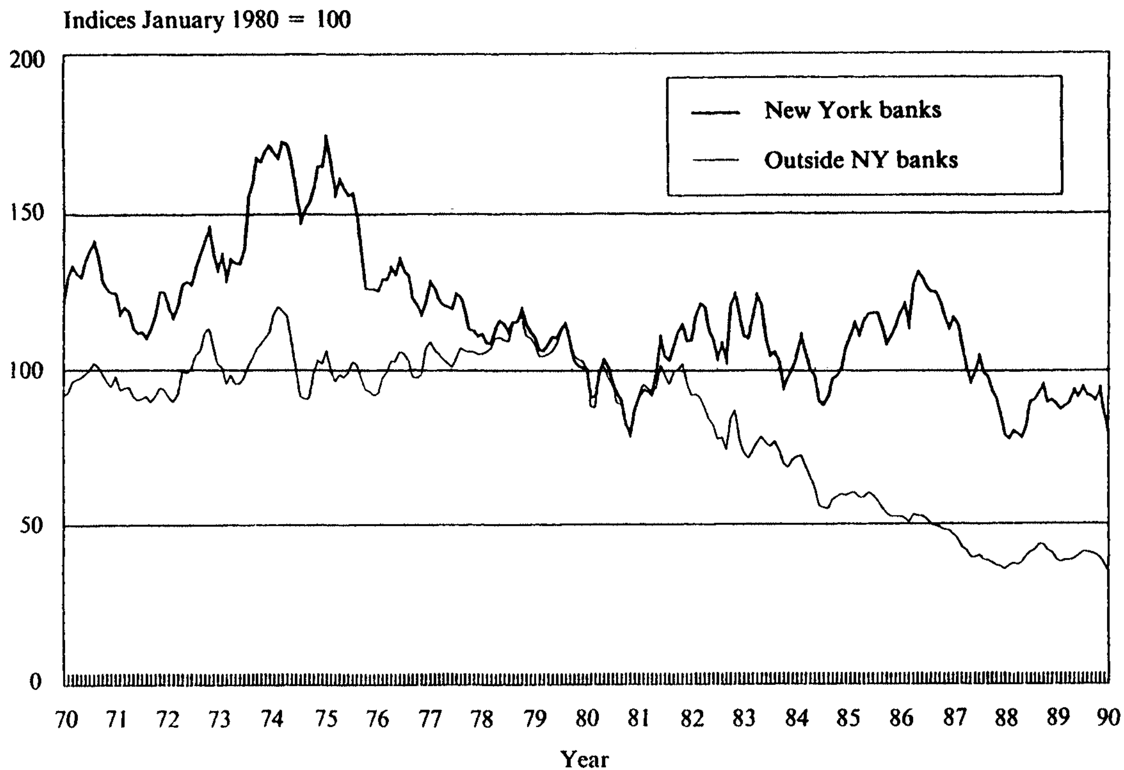

Figure 10.1 Stock prices of New York and non-NY banks relative to the S&P 500

of 'drag' on the banking industry can be seen in the performance of bank stocks. Figure 10.1 measures long-term price trends of Standard and Poor's (S&P) indices of stock prices for both banks based in and outside New York and compares these trends to the entire S&P composite common-stock index. During most of the 1970s, the stock prices of money-center banks, as represented by those in New York, were generally stronger than the broader index of common stocks. Despite the onset of the LDC debt crisis, this overall strength persisted, even during 1982–4 (Phases I and II), when the problem was widely perceived to be related to liquidity factors and, hence, temporary.

By contrast, stock prices for banks outside New York tended to track closely with the overall S&P index in the 1970s, but quickly began to underperform it significantly at the onset of the crisis. In the mid-1980s, falling interest rates helped sustain the prices of New York bank stocks relative to the overall market, but, beginning in mid-1986, over a year before the stock market crash, they began a slide from which they have not yet recovered. When the market crashed in October 1987, bank-stock prices dropped even more sharply and have still not recovered, especially since during 1990 they were further depressed by factors not related to LDC debt, such as impending recession, real-estate losses and fallout from the savings and loan crisis.

To be sure, the packaging of large sovereign loans has continued for some developing countries and banks. For example, developing countries that, during the 1980s, continued to issue long-term debt through multi-bank syndicates or by floating bonds included Colombia, Venezuela, many Middle East oil exporters, Turkey, all Asian NICs, and most middle and low-income Asian countries such as Malaysia, Thailand, Indonesia, India and the People's Republic of China.

Nonetheless, experience also shows that the manner in which banks and LDCs have managed the debt crisis has precluded a strong economic recovery for the LDC debtors. IMF estimates show that the decline in the borrowing requirements of countries was partially achieved by a reduction in import volume. In 1990 the merchandise imports of the 15 most seriously-troubled LDCs were 5.1 per cent below the 1981 level. The ratio of capital formation to GDP had commensurately fallen from 24.7 to 18.4 per cent. Real per capita GDP declined by 0.7 per cent a year during this period.

Thus, as LDC exports have recovered since 1981, the incremental revenue gain has been matched virtually dollar for dollar by a decline in new borrowing. This has kept the total amount of LDC foreign-exchange receipts virtually constant, eliminating the possibility of raising imports (of energy, raw materials and capital equipment) required to establish new investment and reestablish positive per capita GDP growth.

Ironically, this international 'credit crunch', which in 1992 is entering its eleventh year, is not only precluding the *de facto* recovery of LDC creditworthiness, but also hurting bank earnings. Regulatory changes to separate the legal and tax treatment and, thus, financial management of 'old' versus 'new' debt would help facilitate renewed private lending to LDCs. However, even if a change in LDC and/or US government policy does not occur, the weight of domestic-market limitations and requirements to properly diversify a large loan portfolio are likely to result eventually in a return of commercial bank lending to LDCs.

By the early 1990s, the LDC debt-management process had gone through several phases, including an expanded 'menu of options' for non-performing loan exposure. Nevertheless, it has become increasingly apparent that its overall impact has fallen short of achieving the legitimate goals and aspirations of both banks and LDCs.

For LDCs this inconsistency relates to their need to resume economic growth strong enough to ensure improving living standards. As of 1992, this goal is still constrained by the LDCs' inability to reduce adequately the payments burden of current liabilities, repatriate former capital flight and secure adequate inflows of new long-term foreign capital. For banks, recouping the original principal and gaining insulation from additional *involuntary lending* continue to be priority objectives.

BANK STRATEGY FOR MANAGING NON-PERFORMING LDC LOAN PORTFOLIO

Both banks and developing countries have become convinced by the experience of the 1980s that most debt-troubled LDCs will be unable to amortize their debts under current global trade and payments conditions. This was acknowledged *de facto* during Phase III (1985–6) by the Baker LDC Debt Initiative's emphasis on new net inflows rather than repayment and again in 1987 when banks began an aggressive loan-loss provisioning strategy. Many debt-troubled LDCs still cannot even fully meet interest obligations, as evidenced by mounting payments arrears by particular countries at periods when the debt-management process has temporarily stalled. An example of such a juncture would be Argentina at several times during the 1980s and again in early 1990.

The entry into Phase V during 1989 probably means that the *ad hoc* variety of debt management (i.e. successive rescheduling and involuntary new money only when a country has been in desperate need) is generally over. It will, however, remain largely case by case and there will doubtless be individual exceptions to this outlook.

It is also probable that the next stage will include some generalized debt forgiveness, perhaps under the Brady Plan, or a subsequent scheme to reduce the LDC debt-repayment burden. While implementation of the Brady Plan has lightened the debt burden for some LDCs, it has not and, perhaps cannot of itself, evoke adequate amounts of voluntary new money, both of which are equally important. In the early 1990s, a decade after the onset of the debt crisis, banks still do not have the appetite for LDC assets they had in the 1970s. As a result, given that renewed commercial-bank voluntary lending is a necessary prerequisite to the creditworthiness of debt-problem LDCs, this remains impaired as we enter the 1990s.

Lack of ultimate resolution of the debt crisis over the past decade has resulted in debt fatigue, raising the specter of financial brinksmanship. As former Finance Minister of Mexico, Silva Herzog, reportedly warned, when Secretary Brady unveiled his plan at the Bretton Woods Committee conference on Third World Debt in March 1989, LDC expectations could be overly heightened, but not fulfilled, leading to frustration on their part. The result could be an impasse in debt negotiations and some form of 'self-administered' debt relief (i.e. unilateral actions by LDCs). Indeed, either Mexico or Venezuela or both were alleged to be close to such action when Secretary Brady unveiled his plan.

This being the case, prudent bank objectives in managing a cross-border debt-troubled portfolio should include two important goals: first, to minimize exposure to debt-troubled LDCs which will necessitate significant involuntary lending in the future; and, second, to maximize the risk-adjusted present value of principal recapture by altering both the country mix and product type in the bank's debt-troubled LDC portfolio.

Pursuit of these objectives is not only prudent for banks, but it is also a crucial element to help restore LDC creditworthiness. The debt overhang continues and, for a variety of reasons, existing options have not been fully utilized. The primary drawback among bank practices, to date, has been the absence of recognition by both banks and debt-troubled LDCs that some options are mutually beneficial. As a result, lender aversion to *any* variety of voluntary new business in *most* debt-troubled countries has continued.

Country tiering

Since 1982 the G10 reporting banks' management of LDC debttroubled exposure has represented severe *de facto* credit rationing. Table 10.4

Table 10.4 Actual changes in G10 bank claims on Baker 15 countries, 1982–9 (cumulative percentage change)

Uruguay	+67.1%
Morocco	+18.4%
Argentina	+5.3%
Brazil	+0.8%
Colombia	−0.2%
Ivory Coast	−4.0%
Mexico	−5.0%
Ecuador	−9.2%
Nigeria	−14.4%
Venezuela	−15.9%
Chile	−19.6%
Yugoslavia	−21.9%
Philippines	−23.0%
Peru	−41.6%
Bolivia	−70.4%

Source: BIS, *The Maturity and Sectoral Distribution of International Bank Lending*, various issues

shows that while their response to the credit needs of the Baker-15 countries was an apparent continuum, all but a handful of countries saw declines in their outstandings.

A first step towards reaching the objectives stated on page 222 should be for banks to *differentiate better* among debt-troubled LDCs *and* to alter exposure appropriately based on these results. For any particular bank, the results of their tiering could be significantly different from the *de facto* response by the market as a whole that took place during 1982–9. This differentiation could be based on a kind of 'Triage' analysis, leading to the assignment of a particular country to one of three categories:

Tier I: exposure should be increased.
Tier II: exposure should be maintained or moderately reduced.
Tier III: exposure should be significantly reduced or eradicated.

The assignment of a particular country to one of these tiers should not be based on the *de facto* common response of banks which occurred during the 1980s. Rather, it should be based on the debtor's fundamental outlook for *overcoming* its debt difficulties, incorporating such country-specific factors as willingness and ability to repay. That outlook must, in turn, take into account:

- the debtor's prospects for political stability.
- the commitment of its (current or successive) leaders to implement structural economic adjustment.

- its macro-economic policy mix.
- the nation's ability to garner external financial support from official or private non-bank sources.
- the scope of the menu of options available for that country.
- the likelihood that the country would participate (were it to occur) in generalized debt relief or engage in unilateral debt relief.

Principal/agent problems and moral-hazard issues are clearly not universal or absolute constraints because some large LDC debtors in the 1980s did not reschedule (e.g. Republic of Korea). Asymmetric information and adverse selection may not matter as relative constraints either, because creditors have classified, and will continue to attempt to classify, countries by their willingness and ability to service foreign debt. Better differentiation and consistent creditor-lending policy should tend to reduce the risk of LDC moral hazard by reinforcing rewards for good behavior and penalizing other sovereign debtors for bad behavior.

Product options

The second step for accomplishing the two bank objectives stated above is to decide which among the list of currently available options are appropriate for use in each of the three country tiers. Keeping in mind that each financial product itself possesses a different risk profile relative to the goals, it becomes apparent that only selected products are appropriate for each of the three country tiers (see table 10.5).

According to a fundamental country-risk assessment based on the criteria previously listed, Tier I countries have a high probability of eventually overcoming their current debt problems. As a result, table 10.5 lists options and products for this group which are consistent with this outlook: a mixture of continued loan exposure and new (fixed and financial) investment.

Continued term-loan exposure to Tier I countries is appropriate given that involuntary new lending to clear interest arrears is considered unlikely to be required. Nonetheless, other forms of exposure such as fixed-equity investments and financial equity are also advisable, not only to diversify the creditor's exposure by product type, but, importantly, also to lighten the burden of loan repayment for the debtor itself. All these factors increase the likelihood of principal recapture.

Properly structured bank lending to finance trade transactions also appears appropriate for Tier I countries and perhaps for Tier II countries. By contrast, trade-finance exposure to Tier-III countries, without a developed-country government guarantee or private-agency insurance, is deemed inappropriate.

Table 10.5 Product categorization based on country tiering

Tier I countries	**Tier II countries**	**Tier III countries**
Debt/equity swap	Swap into Tier I	Swap into Tiers I, II
Recapitalize equity investment	Exit bonds	Debt/commodity swap
Convert to stock fund	Debt/equity swap	Donate to charity
Exit bonds	Recapitalize equity investment	Cash sale
Status quo	Convert to stock fund	Charge-off
Interest capitalization	Debt/commodity swap	
Trade finance	Securitize (public/private placement)	
	Cash sale	
	Trade finance	

Supplemental list

Tier I countries	**Tier II countries**	**Tier III countries**
Project finance	None	None
General BOP loans		
On-lending provisions		
New money bonds		
NIFs, RUFs, FRAs		
Swaps and hedging products		
Other derivatives		

Even though it is less attractive than others in the first tier of options, interest capitalization could be appropriate for Tier-I countries as an element of near-term debt relief. This is because it does compare favorably with large-scale debt forgiveness or other more harmful forms of debt relief.

The list of options for Tier II countries places greater emphasis on portfolio immunization because of greater uncertainty surrounding these countries' willingness and/or ability to recover from the debt crisis. A debt/debt swap which shifts the country exposure to Tier I, a debt/commodity swap and a straight cash sale are options which help reduce exposure to this country tier. Given a degree of confidence in economic recovery, however, other options in the tier do not reduce exposure. Rather, they simply alter exposure type, attempting to both lower the risk of new involuntary lending and increase the likelihood of principal recapture.

Severe doubts about a country's potential ability to recover quickly from the debt crisis or its willingness to honor loan contracts (or pursue difficult policies which would allow for repayment), will place it in the Tier III group. Prospects for debt repayment are low and the likelihood of occasional new involuntary lending to clear interest arrears is high. Thus, quickly reducing and ultimately eliminating exposure is the key strategic response to this group. Thus, all of the options in Tier III are directed at either swapping loan exposure to either Tier I or II or, after a reserve and charge-off, simply converting it to cash, given the prevailing discount in the secondary market.

Supplemental options

Beyond fully utilizing the options within the menus that have become available since Phase IV of the debt-management process, bank strategy should also include adapting other financial products and services to aid solution of the LDC-debt problem. These would range from time-worn instruments such as fixed-interest bonds to the myriad merchant-banking products developed during the 1980s.

Some of the items on the supplemental list in table 10.5 are currently available to LDC market borrowers (i.e. sovereign nations which have avoided arrears and rescheduling). These items are destined to be implemented gradually for the debt-troubled borrowers as their sovereign creditworthiness is restored, beginning with debt-troubled countries judged to be in Tier I and later extended to countries which, through structural reform, eventually achieve such status. The most important of these supplemental options are project finance, general balance-of-payments lending by banks and on-lending provisions within balance-of-payments loans.

The supplemental list of options in table 10.5 also comprises products which are currently in widespread use elsewhere in international banking, but have not been widely made available to LDC debtors: either market or debt-troubled borrowers. These include the extension of capital-raising services to creditworthy borrowers through such vehicles as fixed-interest bonds, NIFs, FRAs and RUFs. They also include the intermediation of risk-hedging vehicles, such as interest rate and currency swaps. Finally, as existing and new options enhance the debt-servicing capacities of former problem LDCs, securitization of loan paper has the potential of spreading remaining debt to a broader group of investors.

The spread of such products and activities to LDCs presently experiencing debt problems would, of course, necessarily be gradual, expanding concurrently with the reestablishment of national creditworthiness; both requiring improved performance and contributing to it. Of course, a thorough assessment of individual clients, whether sovereign governments, financial institutions or firms would also be required.

However difficult and/or protracted the implementation of voluntary lending, especially involving new products to a wider group of debt-troubled LDCs may be, the substitution of these types of business relationships for the jumbo syndicated lending of the past could be extremely important to both banks and LDCs. Such a shift would reduce the costs and uncertainties which LDCs face when funding imports for economic development, thereby helping to avoid the resurgence of a new debt problem in the future.

CONCLUSIONS

During the 1980s, bank management of LDC debt had the objective of maintaining the short-term stability of the world financial system, rather than facilitating the long-term economic development of LDCs. New bank lending to debt-troubled LDCs was adequate for clearing arrears, but not in excess of that requirement. The strategies of the 1980s successfully helped most banks get past a dangerous period of undercapitalization resulting directly from the LDC debt crisis. In that respect, this indiscriminate policy focusing exclusively on troubled-asset management has been successful and, having served its purpose, will be replaced with selective new voluntary lending in certain country and product tiers.

The 1983–90 record shows that while all LDCs borrowers—whether debt-troubled or not—are not the same, the world banking community was not always able or willing to take into account their differences. First of all, fundamental situations, or initial conditions for sovereign borrowers, vary greatly. For example, Colombia is one of the least financially troubled countries in the Baker 15, while Argentina is one of the heaviest debtors (on a per capita basis or when compared to its exports). Yet during this period, the claims of all G10 reporting banks on Argentina actually increased, while those on Colombia contracted.

Commitment to structural reform and continued debt-servicing also varied considerably among Baker-15 countries during the 1980s; Chile was one of the most committed, while Peru was one of the least. G10 and US claims on each fell in 1982–9. Similarly, Mexico has been making strides towards meaningful economic reform, but US bank claims are well below the 1982 level and voluntary lending remains small, as indicated by the poor reception accorded to the new lending option under the Brady Plan package of 1989/90.

The banking industry's LDC lending policy of the 1980s precluded a sufficient degree of tiering and reintegration of selected 'model' sovereign debtors back into the international capital markets, resulting in virtually uniform penalties for troubled debtors. The resulting lack of incentives for good behavior has reinforced the risk of moral hazard.

The strategies of the 1990s should find ways to consolidate the successes of the 1980s and resume the mutually beneficial relationships between the banks, their domestic clients and the LDCs that characterized most of the 1970s. The basic LDC goal of regaining capital importer status is not in inherent conflict with the interests of the international private creditors.

The international private creditor should strengthen the country-risk function to differentiate better between sovereign credits and to become more active and discriminating in the management of international exposure. Improving the efficiency and consistency of sovereign-risk classification and policy will reinforce good sovereign behavior and dampen bad, thereby lowering the risk of moral hazard in international LDC lending. A less indiscriminate bank policy with greater emphasis on tiering both country and product risks places greater pressure on debtor countries to pursue meaningful structural reform.

Some additional features of the Brady Plan, including a proposed change in the regulatory treatment of LDC assets to differentiate old, discounted debt from new bank lending, would contribute positively to renewed voluntary lending. Closer involvement of multilateral agencies in LDC-debt reduction would help restore LDC creditworthiness.

In the 1990s, prospects for further menu expansion appear brighter. The eventual spread to the developing world of old standards such as fixed-interest bonds, other securitized debt instruments or hedging products would contribute to better LDC-debt management. As of 1992, few debt-troubled LDC borrowers have realized the benefits from today's more sophisticated international banking environment. Even most currently creditworthy LDCs have not utilized these instruments to their fullest extent. Securitization of 'old' LDC loan paper will help expand 'menu options', thereby spreading LDC exposure to a more diverse group of creditors. This may be critical to the restoration and maintenance of voluntary lending to developing countries.

For LDCs, menu options offer the promise of restoring creditworthiness through debt reduction, attracting additional capital inflows, improving their external financial image and reinforcing incentives to pursue lower-risk economic policies, political options and business strategies.

For banks, the pro-active strategy would improve portfolio efficiency by exiting selected countries and business activities where hindsight shows rates of return were sub-par, either due to market conditions or regulatory changes. This strategy also identifies LDCs where the bank strategy of the

1980s so far has resulted in undue market neglect. The menu process represents a potentially rewarding course whereby the exposure to non-performing LDC debt is reduced, improving the bank's balance sheet and reducing drag on profits, thereby improving investor perception of stock value.

NOTES

1 Note-issuance facilities (NIFs) became popular with banking institutions in the 1980s. These are medium-term, legally binding commitments from the financial institutions to underwrite funding instruments (short-term certificates of deposit or promissory notes) to be issued by high-grade borrowers. Thus, NIFs enable such borrowers to raise funds cheaply in a growing Euro-commercial-paper market. A floating-rate agreement (FRA) is analogous to an interest-rate future. A revolving underwriting facility (RUF) is one of a variety of off-balance-sheet back-up facilities, through which banks can enhance a borrower's access to funds, either by improving the credit rating of the instrument or assuring the availability of direct funding. Despite the proliferation of new securitized instruments, international fixed-interest bonds continued to account for the bulk of securitized lending during the 1980s. See BIS (1986), OECD (1988) and Solberg (1989) for more detail on these and other related products.

2 Eaton (1990) and Bulow and Rogoff (1990) state that it will be difficult, if not impossible, to restore commercial-bank lending to LDCs to the pre-debt-crisis situation. By contrast, Sachs (1990) believes it not only possible, but preferable, to allow LDC access to international bank lending. The interested reader may refer to the *Journal of Economic Perspectives* (vol. 4, no. 1, Winter 1990) for articles which represent the range of orthodox academic views on this issue.

3 The G10 reporting countries consist of Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, the United Kingdom, and the United States, plus Austria, Denmark, Finland, Ireland, Luxembourg, Spain and Switzerland.

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11 Foreign direct investment

The upstream[1] petroleum industry

Mikkal E.Herberg

It is axiomatic that international firms must increasingly take into account the offshore local business-operating environment if they are to be successful over the long haul. Major changes in host-country political, economic, social, and financial conditions frequently have a major impact on the profitability and success of foreign investment. This fact inevitably challenges managers to try to anticipate (forecast) the potential for major changes in the countries in which they are considering doing business.

Whether they are aware of it or not, all companies do this in the course of making decisions about new foreign investments. The real difference between companies is whether the assessment is done explicitly through an organized analytical process, sometimes called 'political-risk analysis', or whether, at the other end of the spectrum, it is based on a senior manager's *ad hoc* 'seat-of-the-pants' judgement about the investment outlook in the host country. Political forecasting of one sort or another, therefore, is inevitable for all companies, large and small, pursuing international business.

Few boards of directors would endure a management which did not pay close attention to the political outlook in countries where they are proposing major investments. The real difference is the style, organization, quality, and analytical skill behind the judgements.

This chapter discusses the use of political-risk analysis in cross-border investment decisions in the upstream petroleum industry. It relies partly on experience at ARCO, a major American petroleum company.[2] It begins by defining the scope and objectives of political-risk analysis. Next, the analytics of political risk are discussed, both generally and specifically, using some of ARCO's recent experiences in upstream petroleum investments for illustration. Major risk factors are outlined as they pertain to upstream petroleum investments. The chapter concludes with a discussion of some ways to manage and reduce risk in uncertain environments.

POLITICAL RISK: CONCEPTIONS AND MISCONCEPTIONS

'Political-risk analysis' involves an effort to bring into focus the political, economic, social, and investment risks of a specific cross-border business or investment decision. Political-risk analysis requires the analyst to evaluate the probability that political, economic, social, or governmental policy developments in or affecting a particular country during a specified period of time will significantly affect the profitability or autonomy of a proposed investment. Since it is not really possible entirely to separate political, economic, financial, and investment issues, the analyst estimates the probability of occurrence and potential impact of 'non-commercial' factors on potential investments (i.e. 'investment-climate analysis').

The analysis should focus both on risks and opportunities. An insightful analysis of a country's prospects where poor operating conditions are improving can give a company the edge on its competitors by enabling it to invest earlier than others in the same industry who have not yet recognized this rising potential. For example, the time is here to understand which of the Eastern European countries is more likely to succeed in making the transition to democratic and market-oriented systems. Recognizing where opportunities will come from is particularly crucial in a business such as international exploration where competition for exploration rights on highly prospective tracts is extremely intense. Being in the door early can often determine the difference between success and failure.

There is a general misperception that political-risk analysis leads to a 'go-no-go' decision. This is inaccurate. The real value of the analysis is to permit the decision-maker to make a better assessment of the risk-reward trade-off. Business is in business to take risks. The goal is to make sure the project's financial or strategic value justifies the risks being assumed. The more financially rewarding the project, the more risk management is willing to take. An average or marginal project requires a relatively low-risk environment. Political risk adds value by improving the accuracy of the risk-reward assessment.

Another common misconception about political-risk analysis is that political issues are somehow different from other business factors in project evaluation. It is sometimes felt that these are inherently more uncertain than financial, marketing, engineering, geological, and pricing issues. There is probably at least as much uncertainty in forecasting these variables, however, as in forecasting politics and economics. Senior management in the oil and gas business usually recognizes the great uncertainty in long-term forecasts of any of these variables. The nature of this business is inherently uncertain. Geologic estimates are highly judgemental and subject to conflicting interpretations. Success chance-factors in wildcat oil and gas drilling frequently are no higher than 2–5 per cent. Market and price assumptions projected far into the future are frequently subject to substantial revisions. Engineering-cost estimates often can be off by magnitudes of up to 50 per cent or more. In an industry like this, good management is typically quite comfortable with the judgemental nature of political-risk analysis.

The distinction between risk and uncertainty is essential to understanding the role of political-risk analysis in decision-making. Political-risk analysis identifies risks and, thereby, reduces uncertainty. Risk is the potential for loss resulting from an event's occurrence that can be identified and assigned a probability, such as the risk of being nationalized or of having profit remittances cut off due to foreign-exchange constraints. These risks can be weighed against potential rewards. Uncertainty is another matter. A situation is uncertain when a decision must be made but the risks are unclear. This comes up regularly in analyzing developing countries where political and economic institutions are constantly changing. Major risks can be identified and given a rough probability. But this always leaves a residual of irreducible uncertainty which is greater in some countries than in others. This needs to be understood in a major project decision.

POLITICAL-RISK ANALYSIS

There is an old adage in the political-risk profession which says: 'There are no "country risks", there are only "project risks"'. This highlights the importance of thinking about risk in terms of specific industry and project requirements, rather than as simply a general forecast about political stability or instability. At ARCO this is regularly driven home by the fact that we are involved in several different international businesses, each with its own range of political-risk issues, vulnerabilities, and constraints. We are in the upstream petroleum exploration and production business, but we are also very active in chemicals manufacturing abroad, as well as the coal-mining business. Each industry has a different 'risk profile', i.e. a different combination of factors relevant to a specific investment decision.

Nevertheless, in a generic sense, any cross-border investment evaluation starts with the same basic four-step process:

1) develop a good understanding of the country's current political/economic situation and operating conditions;

2) construct a political/economic forecast composed of a base-case scenario along with scenarios describing major potential variants in the outlook;
3) summarize the key operating implications for each scenario;
4) formulate practical risk-management strategies derived from the implications of the political forecast.

As shown in figure 11.1, the initial picture can be divided analytically into four types of variables. These groups of variables are depicted by a set of concentric circles, with each level dependent on and interactive with the outer levels. The outer circle which envelops the others is the political environment; a whole series of issues related to the political dynamics of a country, its institutions, culture, geographic location, and border security. Developing a good understanding of the basic political relationships in a society and how they are linked to other issues such as governmental and economic performance, social structure, and ideology requires an in-depth look into the country's history and recent political development. The analyst must focus on a panoply of political issues: the type of government system; key characteristics of the social and class structure; major political forces; regional or provincial political authority; regional issues; border security; and potential war threats. The challenge for the political analyst is to understand in each country how the political system works and to develop a good sense for both the common and unique patterns of political interaction and outcomes. This part of the analysis is basic to all investments, from offshore bank-lending decisions to upstream petroleum investments.

Often there is a misunderstanding about the real purpose of this type of political analysis. A tendency exists to focus on the old shiboleth of political 'stability or instability'. While this distinction is not irrelevant, it does not usually provide sufficient information. There are relatively 'unstable' countries where conditions are generally favorable for investment, depending on the type of business. For example, Italy is a case where governments change with alarming frequency but where there is an underlying equilibrium in political forces which provides a great deal of stability and predictability for an investor. Despite the fact that Angola, another example, has been wracked by virtual civil war for years, a number of oil companies have been able to establish very successful oil exploration and production businesses over the years. There are also very 'stable' countries, such as those in Northern Europe, which are in fact not very attractive for many kinds of investment. There is no easy relationship between stability and attractiveness.

As part of the overall analysis, it is important to examine the economic situation as an important adjunct to political conditions and the political

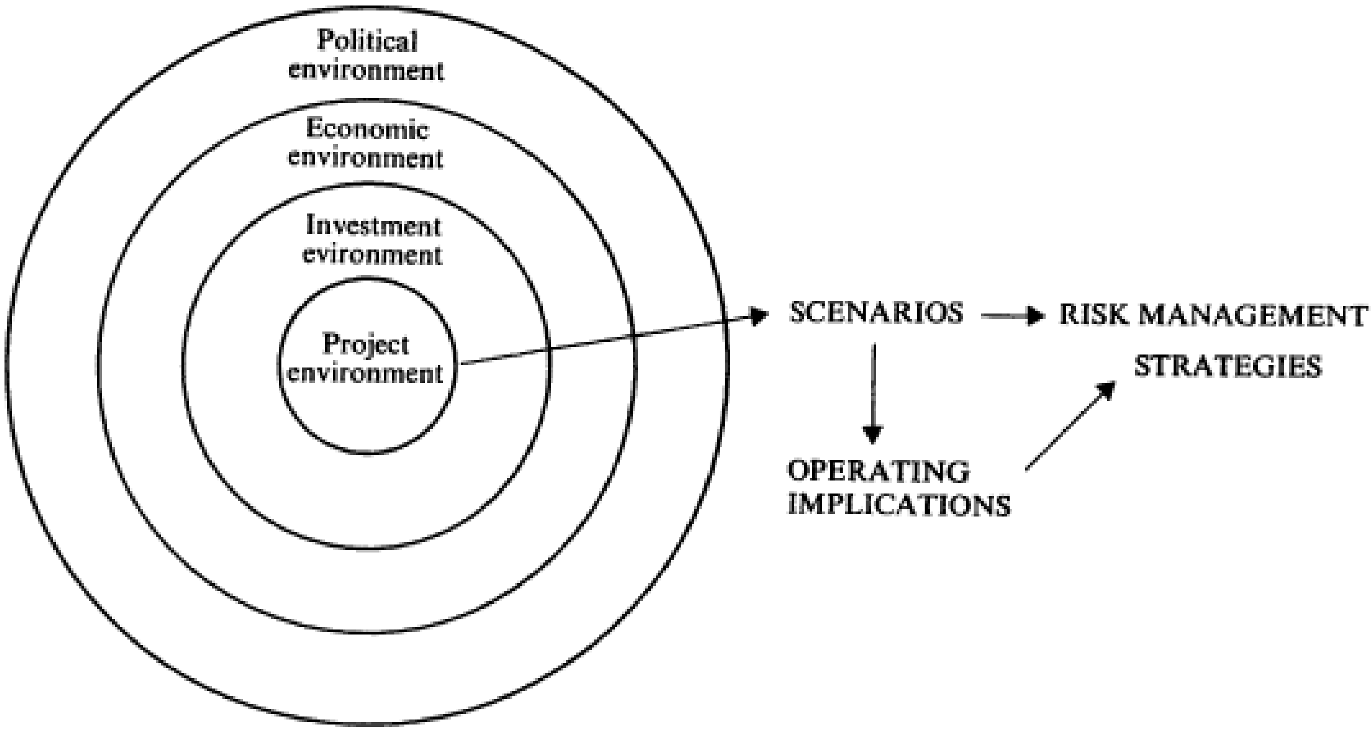

Figure 11.1 Political-risk evaluation

outlook. It is not only a matter of forecasting the standard economic statistics (e.g. GNP and inflation), although this data is important. The key is to determine how economic conditions interact with the political situation and outlook. Economic performance is an acid test of a government's political longevity.

With a political-economic analysis as the foundation, the next step is to ascertain the current foreign-investment and operating environment in the country; in effect, a snapshot of current business conditions. This involves understanding how the political environment affects the local business environment. A review of current government policies toward foreign investment in a specific industry as well as actual operating and regulatory conditions is appropriate. Foreign-investment policies include general attitudes towards private investment and foreign investment, the role of government ownership in the economy, policies toward joint-venture and foreign-ownership shares, local content requirements, local supply requirements, financial restrictions on foreign investors, etc. Operating conditions cover those issues raised by actually conducting business in a country, whether the investor's status is domestic or foreign. Price controls, commercial law, quality of infrastructure, the effectiveness and efficiency of decision-making, and trade restrictions all affect the project's profitability, regardless of ownership class.

Next, a set of scenarios is developed to describe the most likely political outlook, including the main plausible alternatives. These focus heavily on the longevity of the current government and possible changes in leadership. There are no absolute rules as to how many scenarios should be developed. Usually a 'base case' (i.e. most likely) scenario is developed along with one or two alternatives. These are used to put 'boundaries' on the outlook, reducing the level of uncertainty about the country's future. The scenarios represent a 'road-map' for the future; not necessarily a precise forecast as much as a set of coherent, internally consistent alternatives. This analysis should identify the factors which would alter the country's future and move it from one scenario to another. Optimistic or pessimistic boundary cases are not necessarily used. In one instance, the base case may be a relatively optimistic scenario, while the main alternatives are more negative. In another, the base case may be pessimistic but with relatively more positive alternatives.

The impact which these various scenarios would have on key elements of the operating environment is assessed. Some scenarios may have no real major impact on planned operations. Others may range from having a positive impact to those which hold major downside implications for business operations. Finally, risk-management strategies which could minimize the potential downside impact of possible future events are developed. Some risks are not manageable: for instance, possible major macro-political shifts and real sea-changes in the environment. Other risks may be mitigated by structuring a project in such a way as to avoid a major vulnerability.

Using scenarios to help structure a project and minimize risk is dependent on linking potential political change to specific characteristics of the investment environment. This requires a clear understanding of those operating issues which are crucial to the particular business investment. While this is the most difficult step, it is crucial for the usefulness and credibility of the analysis.

POLITICAL RISK IN THE UPSTREAM PETROLEUM INDUSTRY

As suggested earlier, each industry has its own individual characteristics and vulnerabilities to political risk. ARCO is internationally active in three industries; however, this section will emphasize the upstream petroleum business. To understand the particular vulnerabilities in the upstream petroleum business, some background on the recent history of the industry, its relationship with host governments and position in the host economy is needed. The upstream petroleum business, in general, is probably less vulnerable to political risk today than most other major industries. This may sound surprising. A review of some of the characteristics of the upstream petroleum business should suggest why this is the case.

By its very nature petroleum exploration and production is a high-risk, high-reward business. This is especially true at the international level where exploration success rates in new areas are low, front-end capital requirements are huge, and competition is fierce. Few industries have been so heavily impacted by international politics as the international E&P business. Since the early 1960s and the rise of OPEC, nationalizations of foreign-owned oil concessions in the Middle East and elsewhere have put more than 90 per cent of the world's proven crude oil reserves under the ownership of state-owned oil companies. ARCO's assets were nationalized in recent decades by Venezuela, Libya, and Iran. Almost every country outside the OECD group has now made hydrocarbon resources the exclusive property of the state.

Despite ownership of the petroleum resources, most countries found that they lacked the technology, capital, and expertise to develop, produce, and market them economically. From this need, a new system of international contracting and production has developed which combines the state's underlying ownership of the resources with the private commercial companies' capital, exploration, production, and marketing skills.

In effect, a worldwide competitive market for exploration and development rights has evolved. The primary contract form is the production-sharing contract, although there are other types such as service contracts and risk-service contracts.[3] They all have the basic characteristic that the resource is owned by the state and administered by the national oil company which is owned by the government. The risk capital and technology are supplied largely by the private commercial company. Both the state and the commercial company share in the eventual production set by long-term contracts. This gives the government basic control over the resource and its development but offers the private company an upside financial potential depending on the size of the discovery and eventual rates of production.

The historical developments in the upstream petroleum business have delimited the types of political risk faced by the industry. For example, the risk of nationalization or expropriation, usually a major concern of any businessman, is in fact relatively low because the petroleum, in effect, has already been nationalized. Due to the standardization of contracts, the international competition for investment by countries and competition among companies for exploration rights, most political risk arises from the likelihood of incremental changes in specific terms of contracts, taxation, environmental requirements, pricing restrictions, and other micro-issues. This is not to say that macro-risks such as abrupt changes in government are not important. The point is that the preponderance of issues are increasingly micro rather than macro.

Other characteristics of the industry also insulate upstream E&P from some types of risks. The industry, especially in the case of offshore operations, usually operates in an isolated enclave with relatively few linkages to the local economy. This reduces the general impact of problems resulting from economic instability, mismanagement or urban social unrest. The capital-intensive nature of the business means that labor issues generally are not very significant, beyond narrower issues such as local workforce requirements. These kinds of risk are low compared to those for coal mining or large-scale chemical manufacturing which involve major construction projects where huge labor requirements draw these businesses into national and regional labor-management issues.

Upstream petroleum E&P also frequently faces lower financial risks concerning dividend repatriation or the conversion of domestic income into foreign exchange. Profits can frequently be repatriated in the form

Table 11.1 Political-risk factors in the upstream petroleum industry

Political environment	
	Civil unrest
	War risk
	Relations with USA
	Terrorism
	Territorial disputes
	Nationalization
	Quality of economic/financial management
	Industrial policies
Foreign investment environment	
	Government ownership
	Foreign investment policy/attitude
	Decision-making structure
	Bureaucratic efficiency
	Government attitude toward ARCO
Contract environment	
	Government tax take
	Depreciation/cost recovery
	Contract disruption
	Acreage relinquishment
	Carried interests
	Collateral investment requirements
Regulatory or operating environment	
	Pricing restrictions
	Profit repatriation restrictions
	Domestic supply requirements
	Environmental regulations
	Indigenization requirements
	Commercial development decision
	Local procurement requirements

of crude oil exports rather than through currency transfers. This eliminates some of the foreign-exchange risk associated with doing business abroad and is one of the reasons that upstream petroleum operations can often be found in some of the most unstable and risk-prone areas of the world. These are just some of the general-risk characteristics of upstream E&P.

Table 11.1 contains a more comprehensive list of potential political-risk factors relevant to the upstream petroleum business. While not exhaustive, this list should suffice to show the basic areas where the political system comes into contact with the upstream petroleum business. The first stage of analysis described earlier provides an assessment of the current state of affairs for each of these factors. Second, based on the political-economic scenarios, the analysis should provide guidance on the likely direction and magnitude of their change. Thus, an overall picture of the most likely political risk environment along with an understanding of the range of possible business environments under various scenarios, is presented. Although the list of possible factors is long, usually a relatively small number of major relevant issues emerge for any particular case. Many of the first two groups in table 1 are relevant to all types of investments, from sovereign lending to E&P. The contract and regulatory issues are largely specific to upstream petroleum; abrupt changes frequently can make or break an investment.

Political environment

Civil unrest is an obvious risk for all investors and is usually very difficult to predict accurately. The remote enclave nature of upstream petroleum investment, such as the previously cited example in Angola, helps isolate these operations from such strife. The Sudan, however, is a case where civil unrest has had a disastrous impact on E&P investments, forcing foreign investors to take major financial write-offs against their investments there.

War risk is an obvious hazard to all investors but in fact is a relatively rare occurrence. It has been a more frequent problem in Africa and the Middle East than elsewhere over the past few decades. Considering upstream investments in many Middle East countries, such as Syria, Jordan, Egypt, or in the Persian Gulf, requires accepting very real war risks. Southern and Eastern Africa also are frequently affected by regional wars.

The host country's *relations with the United States* are another important consideration. This refers to the risk of getting caught in the middle of political disputes between governments which lead to formal requirements or informal pressure from the US government to cease business operations in a particular country. This issue is becoming more prevalent, particularly in some Middle East countries where sponsorship of terrorism has caused rifts in relations with the US. Several US companies were forced to abandon operations in both Libya and Syria in recent years in the wake of diplomatic struggles with the United States. Many companies saw their business in China deteriorate rapidly after the chill in US-PRC relations, following the Tien-An-Mien Square incident. In the case of the former USSR, as the republics become increasingly independent in the context of economic dislocation and rising social unrest, companies will need to weigh the risks of the rise of new authoritarian leaders in the republics, potentially backed by republican military forces.

The risk of *terrorism* is also an increasingly common problem for all companies. Colombia is a case where guerillas have engaged in a systematic effort to sabotage oil pipelines running from the interior to the coast, thereby disrupting upstream operations. Terrorism in Peru by the Sendero Luminoso has made exploration in many areas virtually impossible. This is now exacerbated by narco-terrorism in which narcotics traffickers in central Peru's jungle have allied with the Senderos to hamper exploration in the Upper Huallaga Valley: a region with promising oil potential.

A multitude of border and *territorial disputes,* active and latent, around the world have on occasion impinged on upstream petroleum operations. For example, the territorial dispute between Japan and the former USSR over control of the Kurile Islands has been a factor in holding up development of an offshore oil and gas deposit. A number of unresolved border demarcations between countries in the Arabian Peninsula have the potential to affect upstream investments. For example, borders between Yemen, Saudi Arabia, and Oman have never been fully recognized and a number of attractive exploration tracts which straddle the border now are being opened up by Yemen. Although these borders are not being contested at present, these issues could be reopened if sizable quantities of oil or gas are found.

Nationalization is an obvious risk but, as suggested earlier, it has not been a common problem in recent years. Recent cases include Iran (1979) and Peru (1986). The more salient issue is 'creeping' nationalization manifested by the gradual tightening of operating terms until effective control over an operation is largely lost. Analytically, these concerns should be covered by focusing on likely changes in specific operating conditions.

Weak *economic and financial management* by the host-country government may produce severe market and financial instability affecting business performance or the repatriation of profit. This has frequently been a problem in Latin American countries in the wake of the debt crisis, and comes in the form of severe inflation, boom-bust economic cycles and severe foreign-exchange problems. Many oil companies have experienced chronic problems of this nature in many of their Latin American operations. As suggested earlier, upstream petroleum operations are not typically as vulnerable to these risks as many other types of businesses because of limited linkages to the domestic economy and the ability to remit profits in kind. However, upstream petroleum operations sometimes are vulnerable where contracts require profits to be remitted in currency rather than product; and/or where petroleum production is sold into the domestic market. This is often the case in the growing number of natural-gas projects aimed at supplying domestic host-country markets.

Industrial policies have become an important issue in natural-gas projects in developing countries where the gas is destined for domestic markets yet to be developed. It refers to the risk that a government may fail, for whatever reason, to meet commitments to build the industrial plants that are to provide the demand for natural-gas fuel. If the government's industrial plans fail to materialize, the upstream company is left with an unprofitable project. This has been an important consideration for ARCO in several recent decisions concerning natural-gas development in several developing countries.

Foreign investment environment

Government ownership refers to the risks of arbitrary government intervention and political pressure on the foreign investor. Situations can range from governments which operate on an almost totally *laissez-faire* basis with little intervention and no state ownership in the petroleum sector such as the United States, to others which are strongly interventionist, with 100 per cent state-ownership of the petroleum industry, such as Algeria.

Foreign investment policy/attitude involves the risk of host-government policies discriminating between foreign investors and domestically owned companies, either in terms of ownership share or in terms of business opportunities. In some countries, special taxes or financial obligations are imposed on foreign investors. In many countries, the allowed foreign-ownership share is limited to a minority interest. In other cases, state-owned or domestically owned companies get preferred access to exploration acreage or are favored in operatorship, partnership, or project-control decisions. For example, in 1980, Canada imposed special taxes on foreign-owned oil companies, limited the share of foreign ownership allowed in Canadian oil companies, and gave Canadian-owned companies favored access to exploration areas. These policies were almost entirely reversed with the election of the Conservative Mulroney government in 1984, although some limits still exist on foreign acquisitions of Canadian-owned petroleum companies. In many oil-producing countries, state-owned oil companies get preferential treatment in many aspects of the business.

Decision-making structure involves the risk of unclear, contradictory, or inconsistent government policies directed toward the petroleum industry, due to the structure of government authority or conflicting objectives among different levels of government. For example, as power in the former USSR has devolved away from All-Union government authorities and towards Republic and local officials, companies have been forced to negotiate simultaneously with several separate governmental levels with no clear lines of authority and no agreement on respective powers and re- sponsibilities. In some other countries, although power is centralized in the national government, there are several major authorities which must give their approval, complicating the process of getting decisions made.

Bureaucratic efficiency and effectiveness refers to the potential problems in getting effective, timely decisions made by government authorities. At one end of the spectrum, risks are lower in those governments where there is clearly demarcated bureaucratic authority, decision-making criteria and where decisions turn on technical merit rather than politics. Where the opposite is true, a project is more likely to be negatively affected by slow, contradictory, arbitrary, unpredictable, or heavily politicized decisions. Typically, developed countries have more efficient, effective bureaucratic structures than most developing countries, where these kinds of problems tend to be endemic.

Long-standing government/company relationships or specific company expertise can result in a more or less favorable position in dealing with a host government. For example, ARCO is well-known for its Arctic technology and operations due to experience gained from activities in the North Slope of Alaska. This probably gives ARCO an additional edge in negotiating deals for these kinds of exploration situations. Alternatively, British and French companies frequently have an edge over US companies in many African countries due to longstanding political ties established during the colonial period.

Contractual environment

There is a constellation of basic issues which sets the overall contractual environment; the following outlines the basic items. The *government tax take* of producing revenue varies widely among countries. It can be in the range 45–50 per cent in some of the developed OECD countries and up to nearly 90 per cent in some countries, such as Indonesia. In most production-sharing contracts, the marginal rate rises as production from the field rises. Rates frequently vary in the same country according to the type of upstream project. For example, rates are usually much lower for natural-gas projects than for oil projects because each has a very different cost and risk structure. Rates will be lower on contracts for exploration in high-risk, previously unexplored areas, than on contracts for exploration near proven petroleum-producing areas. Rates frequently will vary for each exploration contract depending on the perceived attraction of a particular piece of acreage.

Depreciation/cost recovery rates are typically specified in E&P contracts and are critical to present value calculations of project return. Changes in depreciation rates can have a major financial impact. Rates vary widely from accelerated depreciation over five years to straight-line depreciation over fifteen years or longer depending on the life of a field.

Contract disruption involves an assessment of how stable and predictable contract terms have been for previous contractors operating in the country. Frequent unilateral changes in contracts imposed by the government imply more changes are likely in the future.

Acreage relinquishment refers to the risk of arbitrary changes in requirements to relinquish unexplored or partially explored acreage. Typically, an exploration timetable is set along with certain sequential approvals and/or financial penalties related to actual performance. Companies look for longer periods to explore with minimal government approval requirements or financial penalties, while most governments prefer shorter relinquishment periods. Abrupt changes which shorten this period can undercut exploration plans and programs.

Carried interests refers to the practice whereby the foreign-company partner pays the financial obligations of the state-owned company partner during the exploration and/or development phase of a project. The risk, of course, is that the foreign company may or may not be reimbursed out of the production proceeds of the project. Abrupt changes in terms for carried interests can have a major financial impact on project profitability.

Collateral investment requirements can be made part of an exploration or production contract. They require the foreign investor to allocate funds to projects outside the company's normal business lines in order to serve more general host-government economic-development goals. These mandated investments might include agricultural projects, public-health services, or road building and infrastructural development. The key issues here are the size of the investment required and whether the investment is economically justifiable on its own merits.

Regulatory and operating environment

The government regulatory environment is another important set of factors in a political-risk evaluation of the operating environment for the upstream petroleum industry. *Petroleum-pricing restrictions* involve possible requirements to sell petroleum production to the government at controlled prices, potentially below actual world-market prices. This can range from no controls at all, to a situation where part or all production must be sold to the government at below market prices. Obviously this can severely impact project economics. This is particularly an issue in developing natural-gas projects where production is destined for the domestic market of the host country. There is no world natural-gas market with corresponding prices comparable to the world oil market because of the high transportation costs of shipping natural gas long distances. International trade of Liquified Natural Gas (LNG) occurs but it is a limited business with very different economics. Consequently, negotiating the price for natural gas to be delivered to the host country's domestic market is a highly judgemental exercise. Governments generally prefer low prices and strong pricing restrictions to reduce the uncertainty about the future price of this fuel to their industries and consumers. Companies would rather leave prices, as much as possible, to supply and demand conditions or, alternatively, link gas prices to some other fuel price more closely linked to world energy markets.

A related restriction involves *domestic-supply requirements* wherein a company is contractually obliged to supply a certain share of oil production for domestic consumption, frequently, as stated, at below market prices. For example, one country in which ARCO operates has required that a certain share of oil produced locally be sold to domestic authorities at approximately US$1.00 per barrel.

Profit-repatriation restrictions may or may not impact upstream petroleum investors. In cases where contracts allow profits to be exported in the form of crude oil (or LNG), there is no direct risk of repatriating income through a foreign currency. However, in some countries where production must be sold to domestic authorities in domestic currency, there is a direct foreign-exchange risk. In this case, it is necessary to assess the international-debt situation of the host government and the quality of the government's financial management.

Environmental regulations are an increasingly important issue in the upstream petroleum industry. Typically, environmental issues have been important in the developed countries, such as the United States, but this concern is now spreading to the developing world. For example, concern about damage to tropical rain forests in Ecuador has caused companies to make changes in their drilling operations to minimize the detrimental impact. For many developing countries, this pressure is being exerted more by private international organizations than directly from the government.

The *indigenization requirement* is the major labor-relation issue that arises in the upstream petroleum business. In most developing countries, companies now are required to develop a plan to hire, train, and promote host-country nationals into increasingly responsible positions and more important technical jobs. Indonesia, where ARCO has major operations, has been a pioneer of this concept.

Another potential restriction relates to which party has authority to decide whether a newly discovered field is sufficiently large to be developed (i.e. commercially viable). There is no firm rule concerning the size of a field which is commercially viable. It depends on the size of a field and the costs and logistics of producing the field in its specific location and environment. For example, in a hostile and remote Arctic environment distant from any transportation infrastructure, a massive field size in excess of two billion barrels of reserves may be needed to make a field commercially viable. With more favorable climatic and terrain conditions, a field found closer to transportation infrastructure might be economical with just 30 million barrels of reserves. From the point of view of political risk, companies are most exposed where these decisions are dominated or controlled by government authorities who may want to develop a field which is thought to be uneconomic by the company.

Local procurement requirements are a common problem for companies in many industries and refer to government demands to source, as much as possible, needed equipment and services from host-country companies. For example, in many oil-producing countries foreign companies usually are required to hire host-country companies for well drilling and servicing.

Despite this long list of potential issues, usually only a small number are salient in any given case. Most contractual conditions will not vary greatly, even with changing political circumstances or scenarios. It is important for the analyst to discover those issues which are most salient and most sensitive to changes in the political scenario.

RISK-MANAGEMENT STRATEGIES IN UPSTREAM PETROLEUM

Political scenarios are linked to upstream petroleum-specific risk factors to highlight aspects of a project that are most vulnerable to disruptive change. With this analysis completed, risk management becomes the central management issue. This means an action-oriented guide to structuring an overseas petroleum project.

While the contours of every project differ, a number of risk-management strategies are available to reduce the potential impact of political change. The mix of strategies is designed to fit the project risks.

In cases where the risk of unanticipated political developments is high, more risk-controlling efforts are needed. The object is to structure a project, insofar as it is possible, to be able to remain profitable despite major changes in the political and economic situation. Below is a discussion of some of the essential risk-management tools available to management.

Geographic diversification of overseas petroleum projects is the first rule of political-risk management. Given the inherent uncertainty in forecasting something as complex as a country's political and economic future, the analyst can only hope to be partially or directionally correct. Unanticipated developments and trends are inevitable. Diversification prevents a company from being overly dependent on correctly forecasting political trends in one or a few countries. It also allows a company to take on higher risks in specific cases where there are special opportunities, something which geographically undiversified companies can ill afford.

Incremental investment is an important way to manage risk. In highly uncertain environments, it makes sense to start investments small and build them over time as the environment warrants. This allows the company to get up the 'learning curve' of local conditions and to grow as your ability to understand, anticipate, and influence the environment improves. This is often a difficult trade-off in upstream petroleum projects because, in the case of large petroleum discoveries, the most economic investment path is generally a large integrated project with the bulk of capital costs up front. An incremental approach may sometimes reduce profitability at the margin, but compensates by allowing management to control its risk exposure better.

Solid project economics are critical to managing risk in difficult environments. Unexpected developments almost inevitably undermine project profitability through delays, higher capital costs, and higher operating costs. Projects that start with mediocre profitability are very likely to underperform in a rapidly changing environment. The higher the uncertainty and risk, the more robust the economics need to be in order to survive profitably.

Good contract design also is vital to risk management in highly uncertain environments in two important senses. The contract obviously needs to be structured to anticipate, insofar as possible, the foreign investor's recourse in the event of the most likely changes identified by the political-risk analysis. This means anticipating obvious contingencies in operations or financial structure. But the contract must also be mutually beneficial to both parties, including the host-country partner, generally the state-owned petroleum company. This increases the chances that, if the government changes hands, the new leaders will see it in their interests to maintain the existing contractual relationship.

Use of aggressive *financial strategies* also can help control risk in difficult environments by reducing exposure to financial disturbances in the host country. This is important when many developing countries face severe foreign-exchange and foreign-debt problems. In many cases the foreign investor's profit share can be taken out of the country in the form of physical crude oil or product rather than depending on foreign-exchange availabilities at the central bank. It may be possible, through negotiation, to hold early capital investments in escrow accounts outside the host country for a period of time until the project is up and running on a small scale and cash flows are available. Hard-currency export earnings can be channeled through a bank account outside the host country to avoid the risk of foreign-exchange bottlenecks at the central bank. Where export earnings must go through the central bank, contractual arrangements for alternative payment methods need to be agreed in case foreign exchange is not available for some period of time. Political-risk insurance to cover foreign-exchange and capital exposure is also available through the US government's Overseas Private Investment Corporation (OPIC) as well as the World Bank's Multilateral Investment Guarantee Agency (MIGA).

The choice of *project logistics* is essential to controlling risk in an uncertain environment. This means emphasizing projects geographically where political and social disturbances are least likely to disrupt operations and/or transporting of product to export points. In the former USSR, for example, worsening economic and political balkanization among the increasingly independent republics makes it important to locate projects according to geographic location. This includes consideration of potential future political jurisdiction, possible business disruption due to local or regional ethnic conflicts, and potential disruption of export pipeline-transport routes caused by interrepublic conflicts or border disputes.

Selection of *strong partners* is a key risk-control strategy in uncertain situations. One method is to seek partners able to understand, anticipate, or influence a potentially fluid local environment in case of significant political change. For example, partnerships with companies having strong historical or cultural ties to the host country can be important, such as French companies in French-speaking West Africa, or British companies in British Commonwealth countries. In the Middle East, risk can be reduced somewhat with partners possessing strong regional, national, clan, or family ties to the host country. Alternatively, involving outside international or multilateral partners can reduce risk by raising the potential costs to host governments of unilateral behavior. For example, including the World Bank's International Finance Corporation (IFC) as an equity partner in a project exposes a host government to major financial sanctions in the event of reneging on a contract. Financing from OECD country export-import financing agencies can also help provide a buffer against unilateral contract changes.

Good government relations is vital to controlling risk in petroleum investments. This requires building strong relationships and developing effective communication with government leaders as well as other important political leaders. Increasingly, in much of the world, this also means developing relationships with important regional, local and tribal leaders as well. Power in many host countries is devolving outward toward regional or local officials and political groups. It is also important to build strong ties with senior government technocrats in the petroleum ministries, agencies, and the national oil company. When governments change, senior technocrats frequently remain in place since the new leadership is generally dependent on them for technical knowledge of the petroleum sector.

Finally, in today's world of rising environmental concerns, risk can be reduced by being involved only in environmentally sound projects. Petroleum development inevitably has significant physical and environmental impacts and this issue has become more acute as the search for petroleum extends to more remote and undeveloped parts of the world. The use of sound technology and active management of environmental impacts avoids creating an issue which could eventually mobilize opposition to project development.

CONCLUSIONS

Political risk analysis provides an important management decisionmaking tool. First, it is an important means of reducing the level of uncertainty in cross-border investment decisions concerning the host country business environment. Second, it contributes to management's ability to make an accurate risk-reward assessment in foreign investments. Third, it can provide an important edge over competitors who fail to evaluate new opportunities in previously unattractive countries. Finally, it can help management develop ways to manage and control risks in uncertain environments.

Nevertheless, in order to be effective, there are several criteria that must be met in the analysis. The analysis must be tailored to specific investment decisions of concern to management. It must be action oriented, meaning it must identify specific operational strategies which can be taken to reduce the foreign investor's vulnerability to risks. It must be integrated into a company's decision-making process at the right stage of the evaluation procedure to impact the views of senior management appropriately. Management must use the analysis properly, i.e. as a guide or road-map, rather than as a simple prediction. Used in these ways, political-risk analysis can be an effective and valued tool in formulating foreign-investment strategies, thus contributing to a firm's competitiveness, profitability and growth.

NOTES

1 The international *upstream* petroleum business refers to the exploration, development, and production of crude oil or natural gas, also known as the international E&P (Exploration and Production) business. This chapter ignores the *downstream* end of the business—transportation, refining, and marketing of oil products—which is more akin to manufacturing than to an extractive industry investment.

2 ARCO, formerly known as Atlantic Richfield Company, has had a fairly organized approach to political-risk analysis since the early 1970s. It was started, as in many other multinational companies, by the wave of nationalizations that swept the oil and mining industries during that period. At ARCO this function has been situated organizationally in the Corporate Planning group and currently is part of the Economics and Environmental Analysis group of Corporate Planning. This is also the group which is responsible for world oil-market analysis for ARCO, including the outlook for world oil supplies, demand, and prices. This allows the political-risk function to be coordinated with analysis of the broader direction of the world oil industry and the underlying environmental assumptions supporting ARCO's long-term capital-budgeting decisions.

3 The three prevalent types of petroleum exploration and production contracts in use today are the concession, production-sharing contract and the service contract. The concession is used mainly in the more developed countries. The concessionaire is granted exclusive right to explore for, produce and sell all hydrocarbons within the concession area in return for payment to the sovereign of a fixed percentage royalty on the value of each unit produced, an income tax and a rental fee for acreage over which he is given rights. The production-sharing contract is most prevalent in the developing countries. A national government- owned oil company receives a concession from the host government and has title to all petroleum which may be produced. The national oil company then contracts with a foreign oil company (contractor) to carry out an exploration program, in return for which the contractor is granted a share of production. The foreign company usually pays income taxes on its share of production. It generally does not provide for royalties or rentals. Service contracts are similar to production-sharing contracts, with the exception that the contractor's remuneration (in petroleum or money) may be tied to the amount of money invested, assuming the contractor finds and develops petroleum. In some cases it may be tied to the volume of production resulting from his efforts.

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12 US regulatory supervision ofcommercial banks with international operations

Edwin H.Clock[1]

This chapter provides an overview of the work undertaken by United States government policy-makers and regulators involving the worldwide activities of US banking institutions. It starts by explaining supervision of the largest multinational banking institutions in the US and analyzes the trend toward global supervisory convergence. The Bank for International Settlements' Basle Committee and the Interagency Country Exposure Review Committee are reviewed along with the US legislative underpinnings for international banking and capital-markets supervision and US government support for debt reduction in the developing countries. While much progress toward coordination and harmonization have taken place, considerable work remains to be accomplished. The development of positive structural policies and international forums to bring about future cooperation, however, should pave the way for continued progress in the next decade.

SUPERVISION OF MULTINATIONAL BANKS

In an era of expanding financial products and services, widespread consolidation and growing government accountability for bank performance, regulatory supervision increasingly focuses on anticipating areas of systemic risk.[2] As US regulatory authorities have authorized banking institutions to offer bank customers a wider variety of new products and services in recent years, such as commercial paper, securitized mortgage financing and debt and equity underwriting, the increased scope and sophistication of regulatory oversight has necessarily led to a global perspective on much of the business now being conducted. Similarly, the growing presence and importance of foreign banking institutions in the United States has broadened the mandate for supervisory knowledge to cover overseas market practices and products previously unfamiliar to US regulators.

At the Office of the Comptroller of the Currency (OCC), the eight largest US multinational banking institutions, together with all foreign branches and agencies, are separately supervised and examined. These eight largest US institutions account for about 30 per cent of the $1.85 trillion in assets held by the entire national banking system.[3] Some 81 foreign branches and agencies, licensed by the OCC, held $28.6 billion in assets as of June 30, 1989.

To assure informed supervision, managers have established working relationships with counterparts in the developed and developing countries responsible for bank supervision as well as economic and financial policy, capital markets activity and debt reschedulings. In addition, OCC examiners travel frequently to foreign countries to conduct on-site examinations of affiliates, subsidiaries and branches of US banking institutions and to participate in overseas missions conducted by the International Monetary Fund (IMF) and the World Bank.[4] The OCC works closely with the Federal Deposit Insurance Corporation (FDIC), the Board of Governors of the Federal Reserve System (FRB) and the Federal Reserve Bank of New York (FRBNY) to coordinate both overseas examinations and supervisory policies in general. Annually, more than one hundred national bank examiners each spend an average of three weeks assessing asset quality, capital markets activities, systems and operations and local management capability of 30–40 branches and operating subsidiaries of US banks in Latin America, Europe and Asia/Pacific. FRB and FRBNY examiners totaling approximately the same numbers also conduct overseas examinations of banks and bank holding companies.

Due to the fragmented regulatory scheme in the US, the OCC is responsible for supervising nationally chartered banks and their subsidiaries, plus federally licensed branches and agencies of foreign banking institutions. The FRB has jurisdiction over bank holding companies and their non-bank subsidiaries, as well as state-chartered banks that are members of the Federal Reserve System. The FRB also exercises broad jurisdictional authority over the establishment of foreign bank branches, agencies and subsidiaries doing business in the US.[5] And, finally, the FDIC supervises state-chartered banks and savings and loans that are insured by the FDIC without being members of the Federal Reserve System. Interagency coordination takes place in a variety of forums and is especially necessary to avoid duplicative and inconsistent efforts. In the management of domestic and overseas examinations, all three regulatory agencies communicate with one another in the planning stages, both on site and in preparation of the final report of examination. Depending on jurisdiction, as discussed above, the primary regulator could be OCC, FRB or FDIC; the primary regulator is responsible for overall coordination of the examination and will typically lead the discussion of examination findings with bank management and the board of directors.

In general, the three agencies combine an ongoing and anticipatory approach to bank examination. Resident examiners dedicated to looking after a single institution are often officed at the large multinational banks, with supporting analysis and policy recommendations supplied by management and staff located in Washington, DC. OCC management develops and revises supervisory strategy for each large multinational bank at least annually, often addressing two or three key areas of regulatory concern, such as highly leveraged transactions, regional real estate concentration or inadequate reserving for developing country debt (OCC 1988a). On-site examinations then target specific areas of identified risk or perceived concern at each individual institution. Recent OCC examination efforts have been directed toward interest rate risk, funding and liquidity; capital markets; trading and foreign exchange and treasury activities; strategic and business planning; and control functions such as asset-liability management, loan review and management-information systems. Asset quality and comprehensive compliance examinations, including trust and electronics data processing, are generally conducted every year or every other year at the multinational banks. All three agencies—OCC, FRB and FDIC—are responsive to justified concerns raised by Congress and the Administration relating to bank supervisory issues. In 1989, Congress held hearings and the Administration recommended policy initiatives in the areas of money laundering and additional reserving for troubled developing-country debt. Representatives of the three agencies participated as witnesses before Congressional committees and subcommittees considering both of these issues and later assisted in drafting legislation and/or regulations aimed at establishing new policy direction and procedures for lessening systemic risk to the banking industry as well as the costs borne by US taxpayers.

As US banks continue to reduce their medium- and long-term lending exposure to financially troubled developing countries, bank regulators are increasingly turning their attention to the international banking activities that have replaced developing country term lending.[6] For a number of money-center and regional US institutions, securities activities and merchant banking have become important businesses, offering such products as asset sales, foreign exchange, rate-risk management, merger and acquisition advisory services, and securities underwriting (Clock 1990; also OCC 1987a). This recent emphasis on fee-based and advisory-service businesses is replacing medium- and long-term financing as the preferred business abroad. When joined with trade finance and collateralized short-term lending, US banks can become relatively full-service product providers for both developed- and developing-country customers whose need for longer-term borrowing can be satisfied either through the capital markets, local domestic borrowing or may be provided by one of the international financial institutions.[7]

Toward global supervisory convergence

Following enactment of the International Lending Supervision Act of 1983, calling upon banking institutions 'to achieve and maintain adequate capital by establishing minimum levels of capital', the three US banking agencies have steadily increased capital requirements for commercial banks.[8] As a result of multilateral negotiations leading to an historic agreement in December 1987, bank supervisors from the G10 countries plus Switzerland, meeting under a framework laid down by the Bank for International Settlements' Basle Committee on Banking Regulations and Supervisory Practices ('the Basle Committee') announced an international convergence of capital measurement and capital standards on July 15, 1988.[9]

Although technically applicable only to banking institutions established in one of the 11 signatory countries, the risk-based capital standards announced by the Basle Committee represented a true milestone: it was the first time a single accord had been proposed to apply multilaterally to the leading developed countries. Implementation will occur in stages and is intended to be fully complete by December 31, 1992. In the meantime, a number of other countries, such as Mexico, South Korea and Saudi Arabia, are anticipated to conform their banking institutions' capital standards to those set forth by the Basle Committee.

In essence, risk-based capital quantifies the risk of all financial assets (including most off-balance-sheet assets) held by a banking institution and thereby establishes the level of capital that must be maintained in order to comply with minimum capital-adequacy standards. Capital, in turn, is divided into two tiers, with minimum levels required for each, depending in large part on the risk weightings of portfolio assets. Risk-based capital does not attempt to address asset trading or investment management, interest-rate risk, foreign exchange or competition with non-bank financial institutions. The Basle Committee has established several special-purpose task forces to analyze some of these areas and make recommendations that may eventually result in further accords. However, the several trillion dollars in bank assets held by financial institutions in the wealthiest developed countries now covered by risk-based capital standards are a profound recognition of the reality of global convergence in bank supervision.

Other steps under way to provide further harmonization of financial services and bank supervision are taking place in other forums. In the Uruguayan Round of GATT negotiations, the inclusion of financial services has occurred on a pilot basis and may well lead to agreements being reached in one or more areas affecting international bank supervision. Another forum, the OECD Committee on Financial Markets, likewise is no stranger to bank supervisory issues. In 1987 a subcommittee of this group issued a lengthy report discussing convergence and regulatory practices in a number of areas (OECD 1987).

Bank of Japan governor, Satoshi Sumita, recognized the reality of global banking, coupled with the need for coordination among countries, in remarks delivered in late 1989:

> International coordination is no longer confined to the realm of macroeconomic and foreign exchange policies, but now embraces banking activities and supervision, efforts to solve debt problems in developing countries, as well as funds transfer and settlement systems.
>
> (Sumita 1989:20)

If a truly global approach to bank supervision is desired by banks and bank regulators, the most effective way to bring that about would be for one body to act as the primary arbiter and implementor. Though representing more than one hundred countries and with a history of notable successes, the GATT is a limited-life entity with many members whose banking systems have little in common with the United States, Japan or the European Community members. Likewise, the mission of OECD is to promote economic development, growth and improved living conditions among its 25 member countries as well as other less developed countries of the world. Hence, a group like the Basle Committee is best suited to focus exclusively on supervisory issues and should be encouraged to move beyond risk-based capital to other important areas that would benefit from convergence, such as bank accounting standards, asset-liability and rate-risk management, capital-markets regulation and provisioning for troubled developing-country debt. At the same time, recommendations developed by GATT or the OECD Committee on Financial Markets should be channelled to the Basle Committee for consideration. Decisions of the Basle Committee should also be made applicable on a voluntary basis to any country of the world that wishes to harmonize its bank supervisory system with the 11 countries represented on the Basle Committee, recognizing the inevitably global implications of its work.

INTERAGENCY COUNTRY EXPOSURE REVIEW COMMITTEE

Within the United States over the last decade, the Interagency Country Exposure Review Committee (ICERC), comprising a total of nine voting members (three each from the OCC, FRB and FDIC), has established credit classifications for all private and public sector loans held by US banks to some 80 developed, developing and newly industrialized countries.

Prior to 1979 the process for reviewing and categorizing foreign lending was largely uncoordinated among the regulatory agencies. Although overseas examinations took place on a regular basis and federal bank examiners from the three agencies cooperated with one another, no single body in the United States rated sovereign-credit risk or private lending in a concerted fashion designed to include the views of all three regulatory agencies. In the years preceding formation of ICERC, individual examiners, using their best judgement, had discretion to decide when and how to warn banks of problem foreign exposures. In 1974 the OCC established a structured approach for assessing foreign-government loans in national bank portfolios by creating a Foreign Public Sector Review Committee (FPSCRC). However, FPSCRC lacked representatives of the other two bank regulatory agencies and suffered from an inability to collect data consistently from national banks relating to their international exposures.[10]

Cognizant of the increasing exposure of US banks to foreign borrowers, both private and governmental, and the deficiencies of the regulatory scheme then existing, representatives of the OCC, FRB and FDIC joined during 1978 in an effort to develop a common approach to international bank supervision. All worked toward an objective of creating an effective supervisory system to ensure that foreign exposures would not adversely affect the safety and soundness of the US banking system. By agreement reached in early 1979, ICERC was born. Its essential features, since supplemented, refined and updated, initially included the following:

- A common reporting form to measure overall international exposure, and its components, for each US banking institution.
- Written comments provided by federal bank examiners regarding large

exposures to individual countries, based on the country's economic and financial condition and on the relation of the bank's exposure to its total capital.

- A mechanism for identifying and categorizing exposures to countries experiencing debt service problems. With the advent of ICERC, the supervisory focus shifted from categorizing only banks' specific foreign public-sector borrowings to evaluating overall cross-border transfer risk, which includes both public and private borrowing.
- Evaluation by federal bank examiners of the risk-management systems used by US banks in appraising and controlling foreign exposures.

In the new interagency process, the three regulatory agencies agreed that ICERC should convene meetings at least three times each calendar year in Washington, DC. The chairmanship rotates annually between the three agencies (e.g. OCC in 1988, FDIC in 1989, FRB in 1990). Each agency's three voting members consist of two senior field examiners and one representative from management, with the latter normally serving as chairman in the appropriate year. In addition, each agency invites certain supporting staff, such as economists and other examiners skilled in international banking and finance, to attend meetings. All meetings, however, are closed to the general public to prevent the unauthorized dissemination of confidential information.[11]

The universe of countries reviewed by ICERC is circumscribed by a minimum dollar value of credits outstanding by US banking institutions. At present, ICERC regularly reviews approximately 80 countries, with $50 million in aggregate borrowing from all US creditors (private, public and quasi-public) setting the floor as the criteria for review. As a non-voting participant, the FRBNY attends ICERC meetings and works closely with the International Finance Division of the FRB to produce comprehensive analyses of the countries under review prior to each ICERC meeting. Part of the FRBNY's analysis is a risk-assessment screen, ranking countries from low to high risk based on a number of well-considered factors. Two important factors in ranking a country are, first, the existence or non-existence of debt-servicing problems, including steps being taken by the country to deal with any such problems; and, second, fundamental economic and socio-political conditions as they relate to the likelihood and willingness of the debtor FRBNY provide elaboration and commentary to ICERC members before and during meetings on the country-risk rankings and also on general macro-economic trends and developments affecting each debtor country's ability to service its obligations in a timely fashion.

Country specialists from the US Treasury Department also provide valuable information during ICERC meetings through briefings for individual countries under review. Treasury Department briefings take the form of verbal overviews of major developments internally and the status of any ongoing negotiations with international financial institutions and/or creditor committees. The briefings also offer ICERC members an opportunity to ask questions of recognized experts regarding any issue raised in the briefing, in the FRBNY analysis or that may arise from current developments reported outside the ICERC process. Finally, field examiners present the Committee with a report on the status of loans extended by all major US banking institutions to borrowers in each of the debtor countries under review. Included in the field examiners' commentary are the private assessments and observations of bank management on each debtor country generally and the prospects for resolving any debt-service problems the bank may be experiencing. Field examiners routinely meet with bank economists and management prior to each ICERC meeting to obtain a candid view from the lender of the business and economic environment in debtor countries. No other members of the government or the general public are invited to attend ICERC meetings, and the voting portion of ICERC meetings takes place at the end of the session after all information from outside experts and field examiners has been heard and considered by ICERC members. As explained below, the country ratings determined in these meetings can result in mandatory reserving practices by the regulated financial institutions.

International Lending Supervision Act of 1983 (ILSA)

ILSA followed by just one year the onset of the current international debt crisis, when, in August 1982, the Mexican Government unilaterally announced a suspension in payments of principal and interest on external debt owed to foreign commercial and official creditors. The legislation's declared policy is 'to assure that the economic health and stability of the U.S. and other nations of the world shall not be adversely affected or threatened in the future by imprudent lending practices or inadequate supervision…'[12]

ILSA directed the three federal banking agencies to issue regulations to implement several defined policy objectives. Section 904 requires each of the agencies to evaluate transfer risk and foreign-country exposure and establish procedures to ensure capital adequacy is determined in light of the relevant findings. Section 906 requires banks to create a special reserve whenever the agencies determine that an asset is impaired by protracted nonpayment or no definite prospects exist to bring about an orderly restoration of debt service. The special reserve is excluded from a bank's capital when computing its adequacy for lending limits and other purposes. Section 907 provides for banks to submit information regarding foreign-debt exposure at least four times annually to the regulatory agencies and to make public material information regarding such exposure. Responsive to this legislation, the three banking agencies joined together in early 1984 and promulgated regulations.[13]

Several tangible results from ILSA and the 1984 regulations now govern ICERC and affect the Committee's deliberative and fact-finding processes. Definitionally, international assets for reporting purposes *exclude:* (1) assets guaranteed by a resident of a foreign country different from that of the direct obligor; (2) certain collateralized assets; (3) commitments; and (4) assets of a foreign office of the banking institution *payable in local currency* for which the foreign office has *equivalent local currency liabilities*. To implement ILSA's new reporting requirements, the agencies developed a Country Exposure Report form that must be completed and returned to the primary regulator by all US banking institutions (with at least one foreign branch and foreign assets exceeding $30 million) no later than the forty-fifth day of each calendar quarter.[14] The report requires banks to disclose information on exposure to any country that exceeds the lesser of 0.75 per cent of capital of total assets or 15 per cent of primary capital.

Moreover, the regulations define transfer risk as 'the possibility that an asset cannot be serviced in the currency of payment because of a lack of, or restraints on the availability of, needed foreign exchange in the country of the obligor'.[15] To measure transfer risk, ICERC will consider balance-of-payment trends, external debt structure and debt-service requirements (especially important for trade and short-term credits) as well as foreign-investment trends, international reserve levels, socio-political developments, and the existence of IMF, World Bank or any other multilateral development financing programs (which are more important for medium- and longer-term repayment obligations).

Interagency Statement on Loan Classification

On December 15, 1983, the three regulatory agencies adopted an Interagency Statement on Examination Treatment of International Loans

('Interagency Statement') that relied upon ILSA's legislative history, statutory language and went on to set forth seven distinct categories for future use by ICERC in classifying international loans, as follows:[16]

> *Strong*—Countries experiencing no perceivable economic, social or political problems of significance or none which are mitigated by other factors.
>
> *Moderately Strong*—Countries experiencing a limited number of identifiable economic, social or political problems which are not yet of major concern.
>
> *Weak*—Countries experiencing a number of economic, social or political problems, or a significant problem deemed correctible if remedial managerial actions are, or can be, taken in the near term.
>
> *Other Transfer Risk Problems (OTRP)*—Category applies when:
>
> (1) A country is not complying with its external debt service obligations, as evidenced by arrearages, forced restructuring, or rollovers; however, the country is taking positive actions to restore debt service through economic adjustment measures, generally as part of an IMF program.
> (2) A country is meeting its debt obligations, but non-compliance appears imminent.
> (3) A country has been classified previously, but recent debt service performance indicates classification no longer is warranted. For instance, the country is complying with the terms of IMF and rescheduling programs. However, sustained resumption of orderly debt service needs to be demonstrated.

Substandard—Category applies when:

> (1) A country is not complying with its external service obligations, as evidenced by arrearages, forced restructurings, or rollovers;
> (2) The country is not in the process of adopting an IMF or other suitable economic adjustment program, or is not adequately adhering to such a program; or
> (3) The country and its bank creditors have not negotiated a viable rescheduling and are unlikely to do so in the near future.

Value-Impaired—Category applies when a country has protracted arrearages as indicated by more than one of the following:

(1) The country has not fully paid its interest for six months;
(2) The country has not complied with IMF programs (and there is no immediate prospect for compliance);
(3) The country has not met rescheduling terms for over one year;
(4) The country shows no definite prospects for an orderly restoration of debt service in the near future.

Loss—This category applies when the loan is considered uncollectible and of such little value that its continuance as a bankable asset is not warranted. An example would be an outright statement by a country which repudiates obligations to banks, the IMF, or other lenders.

ILSA's requirement for the creation of a *special reserve* took form in the Interagency Statement and when the three regulatory agencies issued regulations on February 13, 1984.[17] ILSA and the regulations combine to provide criteria for the imposition of an allocated transfer risk reserve (ATRR).[18] Certain criteria spelled out in ILSA must be met in order for the ATRR to apply.[19] Historically, ICERC has voted ATRRs against countries that fell into the Value Impaired and Loss categories, in accordance with the definitions set forth above. However, nothing contained in ILSA or the regulations would prevent the imposition of ATRRs for countries rated Substandard; as of 1990, interagency practice restricted ATRRs only to Value Impaired and Loss categorized countries.

In determining the appropriate ATRR level, ICERC takes into account a number of factors, including:

- The duration of payment delinquencies and amount of arrearages.
- Prospects for return to timely debt service capability, both from internally generated funds and outside sources (e.g. IMF, World Bank, creditor government funding).
- Overall economic, social and political conditions in the debtor country and prospects for improvement or deterioration in the future.
- Actions taken by US banks in establishing or increasing reserves against credits outstanding to the debtor country.

As a matter of interagency policy, all countries carrying an ATRR are reviewed at least annually by ICERC. Countries with an ATRR and more than $5 billion owed to US banks are reviewed by ICERC at every other meeting. The immediate effect from imposition of an ATRR is to cause banks to charge current income by the amount of the ATRR (e.g. 20 per cent ATRR x $100 million outstanding = $20 million charge to current income) and to deduct the amount of the

ATRR from the bank's current income) and to deduct the amount of the ATRR from the bank's total capital. Hence, the banking system will experience a loss of capital by the amount of ATRR imposed against total US bank loans outstanding to the country. For example, an ATRR of 40 per cent against a country whose borrowers (public and private) owe US banks a total of $5 billion would result in a $2 billion deduction (loss) of capital from the US banking system. For accounting purposes, each banking institution and bank holding company will establish a separate ATRR account on a consolidated basis and maintain the ATRR account independently of the institution's allowance for loan and lease losses (ALLL).[20] Alternatively, a banking institution need not establish an ATRR account if it has previously written down, or writes down in the period in which the ATRR is required, the amount of ATRR imposed by charging the ALLL the principal amount of ATRR.[21] In all cases, the ALLL must be 'replenished in such amount necessary to restore it to a level which adequately provides for the estimated losses inherent in the banking institution's loan portfolio.'[22] For income-tax purposes, banking institutions may deduct the amount of an ATRR from their tax bill in accordance with IRS deference to ICERC as the exclusive decision-maker with regard to country credit classifications (OCC 1988c).

ICERC holds three regularly scheduled meetings each calendar year in March, June and October. Special meetings are called whenever appropriate, by consensus of the Committee members, to decide issues unrelated to country credit classification or if a major country's creditworthiness changes dramatically. Field examiners rely upon ICERC's evaluations and classifications in determining the overall quality of a bank's portfolio. Examiners will add together foreign assets classified or criticized by ICERC with classified and criticized domestic assets to assess the capital adequacy of a banking institution. ICERC distinguishes between the type of credits extended, normally categorizing short-term and trade credits separately from medium- and long-term loans. In addition, bonded indebtedness and any other collateralized forms of financing are usually reviewed separately.

Following each ICERC meeting, the three agencies distribute to the banking institutions for which each serves as primary regulator two documents: first, comprehensive loan write-ups prepared by economics and supervision staff members of all three agencies and the FRBNY for all of the countries reviewed at the prior meeting; and, second, an ATRR letter setting forth the applicable reserve percentages and the assets subject to ATRR for which the recipient bank has any outstanding credit exposure.

ICERC's impact on bank lending

Three separate reports issued by the General Accounting Office (GAO) in recent years address the continued high indebtedness of developing countries, the generally low reserves required of US banks by ICERC, and desirability of more rigorous bank-examination procedures to identify risk in lending- and capital-markets activities engaged in by US banks in both developed and developing countries.[23] Some Congressional observers agree with the GAO and criticize ICERC for moving too slowly in downgrading countries and imposing ATRR levels to reflect deteriorating credits, while a number of banks and other private parties believe ICERC should adhere to the existing definitions of classified and criticized credits (i.e. OTRP, Substandard, Value Impaired and Loss) and impose ATRR levels only when little or no prospect exists that a country will eventually repay its outstanding debt.

ICERC walks a tightrope in the maelstrom of political action involving United States' foreign relations with the G7, the developed world (OECD) and the economies of the developing and newly industrialized countries of Asia, Latin America and Africa. The primary function of the Committee is to judge and decide upon the creditworthiness of public- and private-sector borrowers in some 80 separate countries that owe between $50 million and $20 billion in outstanding indebtedness to US banking institutions. As nearly as possible, ICERC attempts to make decisions without regard to political or social events extraneous to the ability of a foreign borrower to repay its debt. Inevitably, though, elections where candidates proclaim the virtues of a debt moratorium or, conversely, the urgency of debt reduction through privatization of state enterprise and adherence to an IMF structural-adjustment program cannot be overlooked without losing sight of ICERC's overall mission of assessing the debtor's current ability and future prospect for servicing its outstanding obligations.

During the decade of the 1980s, a more free-market orientation in the US Administration has coincided with the long-standing policy of bank regulators to allow bank managers the discretion to make their own business decisions, barring fraud or serious mismanagement. Congress, through ILSA, and the three regulatory agencies, through comprehensive regulations issued in 1984, clearly defined the framework for what the US government was willing to do in monitoring and supervising US bank lending to the financially troubled developing countries. ICERC has executed this mandate for the last six years by consistently downgrading country-credit classifications when appropriate, by adding nearly two dozen countries to the list of classified or criticized assets, and by steadily increasing ATRR levels for *Value Impaired* countries. As countries improve in their ability to service external debt, ICERC also has responded by upgrading the credit ratings for certain developing and newly industrialized countries.

Any linkage between ICERC ratings and voluntary reserving by US banking institutions is difficult to establish. For example, the announcement by Citicorp in May 1987 creating a $3 billion reserve for developing-country debt, followed by similar decisions by virtually all other US banks in short order, scarcely related to any action taken by ICERC. ICERC operates by judging countries individually and does not use any type of 'basket reserve' concept as the Citicorp and other US bank announcements suggested. Likewise, the sudden increase in reserving that took place in the third and fourth quarters of 1989 by many US banks hardly could be traced to any action taken by ICERC, which held only one regularly scheduled meeting during the time this reserving occurred and was announced to shareholders.

Perhaps the most significant role that ICERC plays is to balance the actions or intended actions of individual banks with the macro-economic and socio-political reality of a given country to reach a credit judgement that will have profound accounting, tax and regulatory impact for both the country and the banks involved in making lending decisions. In coming years, ICERC may be expected to continue this approach to regulation, seeking to retain the discretion necessary to act prudentially and take into account the wide range of factors that should be considered in making important credit determinations.

Foreign Debt Reserving Act of 1989

In December 1989, President Bush signed new legislation amending and supplementing ILSA. The legislation addresses a number of areas involving international banking and finance. First, it expresses the intent of Congress that agreements designed to reduce debt and debt-service obligations owed by developing countries should be accompanied by trade-liberalizing steps taken by these same debtor countries. Second, the new legislation requires the US Executive Director of the IMF to conduct 'a study on multilateral means by which the banking industry might help reverse capital flight'[24] in debt-restructuring developing countries. Third, the US Executive Directors of the IMF, World Bank, IADB and the Asian and African Development Banks are instructed to show preference in voting for debt reduction to countries that 'show marked improvement in reducing the volume of cultivation, processing, trafficking and export to the United States of illegal drugs.'[25] Finally, the ILSA amendments in the legislation encourage the three banking agencies to look favorably on debt reduction in the developing countries and the higher loan-loss reserve levels established by US banking institutions in the second half of 1989. No major changes in the structure or efficacy of ICERC are anticipated as a result of the 1989 amendments to ILSA. US banking institutions, however, may justifiably interpret the legislation as a clear signal from both the Administration and Congress that higher loan-loss reserves are desirable to offset future losses from credits extended to developing countries.

In accompanying legislation, also signed into law by President Bush in December 1989, US financial institutions and other creditors are encouraged to engage in debt-for-development swaps[26] and debt-for-nature exchanges[27] aimed at reducing the amount of outstanding debt owed by heavily indebted developing countries.

REGULATORY SUPPORT FOR DEBT REDUCTION

Starting as early as 1987, the OCC and the FRB acted upon applications from banking institutions that sought to reduce the amount of developing country debt held in their portfolios through a series of proposed debt-reduction transactions. Through a combination of debt-equity swaps, debt buybacks, private-sector restructurings and local currency conversions, voluntary reduction of commercial bank debt equaled $26 billion through year-end 1988, or approximately 10 per cent of total outstanding debt to the 15 most highly indebted developing countries (Institute of International Finance 1989; 21–3).

As figure 12.1 illustrates, the debt-reduction process began immediately after then-Secretary of the Treasury James Baker III announced the 'Sustained Plan for Economic Growth' in late 1985.[28] Debt reduction, however, picked up momentum a year or so later when some of the larger debtor countries (e.g. Chile, Brazil and Mexico) began to allow foreign creditors to convert debt for equity ownership interests in real estate and securities. Further, the rise of a secondary trading market for developing-country debt, led by such firms as Salomon Brothers, Inc., Nederlandsche Middenstandsbank NC (NMB), Libra Bank and Merrill Lynch introduced liquidity into the system and has facilitated a growing market for transactions that often results in debt buybacks and debt-for-bonds conversions at negotiated rates that enable the debtor country to reduce the value of outstanding debt owed. From a non-existent market in the mid-1980s, the annual turnover of developing-country debt is estimated to have reached $60–80 billion by 1989 (Fidler 1989).

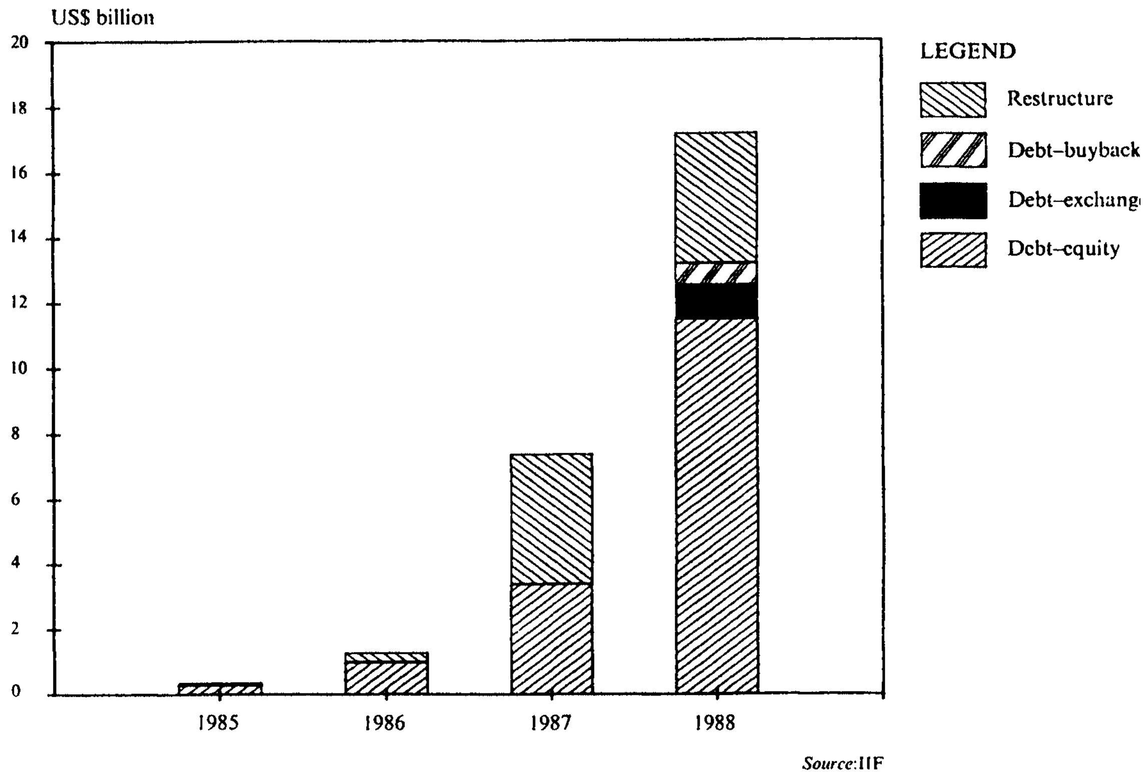

Figure 12.1 Baker Plan countries: estimated face amount of voluntary bank-debt reduction.

Regulatory actions

In 1987, and again in 1988, the FRB amended Regulation K[29] to permit bank holding companies to acquire larger percentage interests in non-financial firms in connection with debt-equity swaps in financially troubled debtor countries. Under the amended rules, bank holding companies may acquire from governments of such countries up to 100 per cent of any firm being privatized and up to 40 per cent of the equity of already private firms, provided that another shareholding group retains a larger voting position. Bank holding companies may also acquire ownership interests in non-financial firms in excess of 20 per cent of voting equity and hold the shares for a maximum of 15 years, two years longer than the 13 year period normally allowed for repatriation of investment under Regulation K.

Debt-equity swaps

Relying upon the authority of Civil War-era legislation, the OCC has supported bank applications for debt-equity swaps through use of the 'debts previously contracted' (DPC) doctrine.[30] In November 1987 the OCC issued the first of three no-objection letters to permit a national bank to exchange $2 million of Mexican sovereign debt for a 60 per cent interest in a holding company, the sole asset of which was a resort hotel.[31] A Swiss management group agreed to hold the remaining 40 per cent. *Bank of Miami I* established two rules. First, loans exchanged by the bank for pesos need not be in actual default. Consistent with precedent, prior payment interruptions combined with an anticipated future rescheduling of the loans provided sufficient evidence of change in the borrower's financial capacity to invoke use of DPC authority. Second, none of the loans was secured by collateral. However, the bank's acquisition of the hotel arguably placed it in a better position to recover amounts previously lent and did not appear to be for speculative purposes. Hence, the bank properly used pesos obtained from the Mexican Central Bank in exchange for loans tendered to acquire a third property, namely the resort hotel. Provided the Mexican sovereign loans were extinguished (accomplishing debt reduction), the OCC was willing to allow unrelated collateral (the hotel) as the equity part of this transaction.

Bank of Miami II, decided in May 1988, involved a three-step procedure whereby the bank's operating subsidiary exchanged its holdings of Brazilian debt ($1 million face value) and Venezuelan debt ($723,326 face value) for an equivalent amount of Chilean debt. The bank then obtained local currency from the Chilean Central Bank and used the proceeds to acquire a 19–24 per cent interest in a publicly traded Chilean insurance company. The bank invested no new money and proposed to limit its involvement in the operation of the company to designation of one member of the insurance company's board of directors.

Building on the transactional structures *of Bank of Miami I and II,* the OCC in January 1989 issued a no-objection letter to *Miami National Bank*. This transaction involved privatization of a Honduran steel plant, with the bank initially exchanging its Argentine external debt for Honduran external debt through an intermediary, with the Honduran Central Bank then allowing conversion of its external debt for local currency (lempiras) at 100 per cent of face value. Under the bank's agreement with Honduras, the bank would receive 100 per cent of the preferred non-voting stock ($2 million par value) in a Honduran corporation to be held by a wholly owned operating subsidiary of the bank. *Miami National Bank,* like its predecessor no-objection letters, allowed a national bank to accept unrelated third-party property in satisfaction of unsecured sovereign debt with a history of rescheduling or payment interruptions. Further, the OCC accepted the banks' business judgement that participating in local investment projects is superior to the continued holding of nonperforming or rescheduled debt.

Debt buybacks, another Baker Plan 'menu option' and form of debt reduction also endorsed by Treasury Secretary Nicholas Brady in his Bretton Woods address on March 10, 1989, have contributed to net debt reduction in several highly indebted developing countries, including Bolivia (1988), Chile (1988 and 1989), Costa Rica (1990) and the Philippines (1990).[32] Moreover, debt-buyback negotiations ongoing in 1990–91 between foreign creditor banks and other countries hold the prospect for further debt-reduction transactions in the future.

Debt securitization can lead to debt reduction when a lender is willing to exchange an existing loan for less than its face value in exchange for a new securitized instrument. To date, successful debt-securitization transactions have taken place between creditor banks and the governments of Mexico and Brazil.[33] To facilitate three separate transactions, the OCC issued interpretative letters or rulings that allowed US banking institutions to hold bonds issued by the debtor countries in exchange for old loans, as securities or pursuant to statutory lending authority.[34] As a result of these securitized financings, Mexico and Brazil achieved debt reduction equivalent to billions of dollars while creditor banks received collateralized and/or marketable securities for loans tendered to, and extinguished by, the central banks of each nation.

Accounting and tax policy emanating from the Treasury Department, the Securities and Exchange Commission (SEC) and the three bank-regulatory agencies are consistently supportive of foreign-debt reduction by US banking institutions. Indeed, a report delivered to the Congress in early 1989 stated that, 'Current regulatory and accounting policies have not prevented banks, that were otherwise inclined to do so, from participating in a wide range of negotiated debt reduction transactions with borrowing countries. This conclusion is supported by the fact that a wide range of options, that have the effect of reducing contractual debt service to banks, have already been implemented' (FDIC, OCC and FRB 1989a:1). Financial Accounting Standard No. 15 (FAS 15) is the GAAP (generally accepted accounting principles) directive on accounting for troubled debt restructurings issued by the Financial Accounting Standards Board in 1977. It provides that a restructured loan may be carried by a bank at its previously recorded (typically, face) value provided the sum of interest and principal payments anticipated to be received over the life of the restructured loan is at least equal to the bank's carrying amount. Hence, a bank need recognize no loss under FAS 15 if restructured loan terms provide full recovery of the loan's carrying value, with future interest and principal payments calculated at their undiscounted present value amounts. As part of the 1988–9 Brazilian refinancing program, exit bonds in an amount up to $5 billion issued by the Government of Brazil qualified for FAS 15 treatment. Similarly, in the 1989–90 debt refinancing for Mexico, the SEC confirmed in a letter addressed to Treasury Undersecretary David Mulford[35] that FAS 15 accounting treatment applied to both the discount and par bonds to be issued by Mexico in exchange for old term loans. In late 1989 the Internal Revenue Service issued Revenue Ruling 89–122 providing that banks accepting either discount bonds or par bonds would be allowed income-tax deductions despite nonrecognition of loss for accounting purposes. The Treasury's ruling on its face extends to all debt-for-bond transactions that result in reduced principal and/or interest payments by a debtor.

CONCLUSION

From a systematic risk perspective, US bankers and bank regulators may take some pride in their joint accomplishments over the last nine years, since the onset of the current foreign-debt crisis. Moreover, the harmonization of global bank supervision appears well along and destined to address a variety of issues beyond risk-based capital in coming years.

The world's economy, however, does not necessarily benefit from decreased trade and investment occasioned by institutions and governments understandably wary of risks considered beyond their control. Developing countries, like the developed and newly industrialized, must realize that their ability to sustain growth and achieve prosperity is fundamentally dependent on adherence to sound domestic programs calculated to bring about economic adjustment and reform, elimination of inefficient tariffs and subsidies, privatization of inefficient state-controlled enterprises, and acceptance of market-oriented programs and policies. These realities find support in the 1990 *Economic Report of the President* (Council of Economic Advisers 1990:96) and in a recent regulatory report to Congress:

> One important influence the U.S. government can have on encouraging additional bank lending for any purpose, including lending that finances U.S. exports, is to encourage borrowing countries to implement policies contributing to needed macro-economic and structural adjustment. Appropriate economic policies could make substantial contributions toward making a country an attractive credit risk to banks.
>
> (FDIC, OCC and FRB 1989b:23)

In the final analysis, the regulatory actions of governments are circumscribed by economic and political realities. While the US government, alone and in cooperation with other nations, has taken the lead in recent years to streamline and eliminate unnecessary regulation and to aim at harmonization of global supervision in appropriate areas, it rests with the policy-makers in each country of the world to support and maintain constructive economic and socio-political policies designed to make their countries attractive places to live and to do business.

NOTES

1 Deputy Comptroller of the Currency, US Department of the Treasury, 1988–90; Chairman, Interagency Country Exposure Review Committee, 1988; Member, State Bar of California and Business Law Section, American Bar Association. The views expressed herein are not necessarily those of the United States government.

2 In the context of banking supervision, systemic risk involves a significant

economic, political or regulatory development that may be expected to affect the safety and/or soundness of the banking industry with possible consequences for the entire US economy. An example would be the dramatic fall in Texas real-estate, oil and gas prices starting in the mid-1980s. See generally Richard Dale 1985:73–140.

3 BankAmerica Corporation, Bank of Boston Corporation, Chase Manhattan Corporation, Citicorp, First Chicago Corporation, Marine Midland Bank Inc., NCNB Corporation, and Security Pacific Corporation.

4 Industry trade groups provide another excellent source for coordination and information sharing on multinational and foreign banking activities. Four trade groups that share information regularly with US banking regulators: Bankers' Association for Foreign Trade, Institute of International Bankers, Inc., Institute of International Finance, Inc., and the US Council on International Banking, Inc.

5 Foreign Bank Supervision Enhancement Act of 1991; International Banking Act of 1978 (12 U.S.C. 3105).

6 As of June 30, 1989, US commercial banks reported holding $71 billion in cross-border, non-local currency claims on foreign borrowers in financially troubled developing countries. This figure represents a $31 billion reduction in aggregate exposure to such debtor countries since year-end 1982, when total exposure stood at $102 billion.

7 International Monetary Fund (IMF), International Bank for Reconstruction and Development, International Development Association, International Finance Corporation, Multilateral Investment Guarantee Agency, African Development Bank, Asian Development Bank, Inter-American Development Bank (IADB), and Inter-American Investment Corporation.

8 International Lending Supervision Act of 1983, Pub. L. No. 98–181, 97 Stat. 1153, 1278 (1983), 12 U.S.C. Section 3907(a)(1).

9 See Committee on Banking Regulations and Supervisory Practices 1988. The 11 countries are Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States.

10 For a discussion of the regulatory approach to sovereign lending prior to the creation of ICERC, see Bench 1977.

11 12 C.F.R. [Case of Federal Regulations] Parts 4.16 & 4.18 (1988).

12 International Lending Supervision Act of 1983, Public Law No. 98–181, 97 Stat. 1153, 1278 (1983), 12 U.S.C. Sections 3901–13. For an analysis of regulatory and other developments leading up to enactment of ILSA, see Ongman, 1985:679.

13 These regulations appear at 12 C.F.R. Part 20 (1988) (OCC), 12 C.F.R. Part 211 (1988) (FRB), and 12 C.F.R. Part 351 (1988) (FDIC). Unless otherwise indicated, subsequent citations will be to the OCC regulations.

14 Federal Financial Institutions Executive Council, Form No. 009 (1990).

15 12 C.F.R. Part 20.7 (h) (1990) (OCC).

16 Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, Office of the Comptroller of the Currency, 'Statement on Examination Treatment of International Loans', December 15. 1983.

17 *Supra* note 13.

18 International Lending Supervision Act of 1983, Public Law No. 98–181, 97

Stat. 1153, 1278 (1983), 12 U.S.C. Section 3904(a)(1); 12 C.F.R. Part 20.8(b)(2).

19 Section 905 of ILSA provides in pertinent part that:

> (a)(1) Each appropriate Federal banking agency shall require a banking institution to establish and maintain a special reserve whenever, in the judgment of such appropriate Federal banking agency—
>
> (A) the quality of such banking institution's assets has been impaired by a protracted inability of public or private borrowers in a foreign country to make payments of their external indebtedness as indicated by such factors, among others, as—
>
> (i) a failure by such public or private borrowers to make full interest payments on external indebtedness;
>
> (ii) a failure to comply with the terms of any restructured indebtedness; or
>
> (iii) a failure by the foreign country to comply with any International Monetary Fund or other suitable adjustment program; or
>
> (B) no definite prospects exist for the orderly restoration of debt service.

20 12 C.F.R. Part 20.8(c)(2) & (3) (1990) (OCC).

21 12 C.F.R. Part 20.8(c)(4) (1990) (OCC).

22 Ibid.

23 See GAO 1989, 1988 and 1977; see also Ongman 1985:691–4.

24 Foreign Debt Reserving Act of 1989, Pub. Law 101–240, 103 Stat. 2503.

25 Ibid., 103 Stat. 2505.

26 International Development and Finance Act of 1989, Pub. Law 101–240, 12 USC 3901.

27 Global Environmental Protection Assistance Act of 1989, Pub. Law 101–240, 22 USC 2151.

28 Treasury Secretary Baker addressed an annual meeting of the IMF and World Bank in Seoul, South Korea, in October 1985, at which he launched the 'Sustained Plan for Economic Growth'. Secretary Baker subsequently announced a list of 'menu options' designed to facilitate debt restructurings and debt reduction, including new money bonds, notes or bonds convertible into local equity, exit bonds to relieve purchasers of new money obligations, debt-equity swaps to help reduce both debt principal and debt-service burdens, voluntary interest capitalization, and donation of debt paper to charitable organizations for social, educational and environmental uses in debtor nations.

29 12 C.F.R. Part 211 (1988) (OCC); see also J.H.Rubinstein 1988.

30 National Currency Act of 1863, ch. 58, 12 Stat. 665 & 669; see also J.M. Shepherd & E.H.Clock 1988:43.

31 The three letters affirming debt-equity swap transactions were OCC 1987b

(Bank of Miami I); OCC 1988d *(Bank of Miami II);* and OCC 1989b *(Miami National Bank).*

32 See remarks by Secretary of the Treasury, Nicholas F.Brady, to the Brookings Institution and the Bretton Woods Conference on Third World Debt, March 10. 1989.

33 Mexico 1987–8: OCC 1988b. Brazil 1988–9: Republica Federativa do Brasil, *Financing Plan* 1988; see also OCC 1989a Mexico 1989–90: The United Mexican States *1989–92 Refinancing Plan* (1989); see also Department of the Treasury and OCC 1990.

34 Ibid. See also 12 U.S.C. Sections 24 (Seventh) and 84.

35 Letter dated July 5, 1989 addressed to Treasury Under Secretary David Mulford from U.S. Securities and Exchange Commission.

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——(1988c) Interpretive Letter No. 455, *Fed. Banking Law Rep.* (CCH) at 85,679, Washington, DC.
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13 The decision-making process

A changing role for country-risk analysis

Lawrence J.Brainard

The eruption of the LDC debt crisis in the early 1980s brought substantial changes in banks' views of sovereign risk. Faced with substantial potential losses and illiquid portfolios of rescheduled LDC credits, banks adopted new business strategies which de-emphasized sovereign lending. These changes, in turn, have led to major changes in the role of country-risk analysis in bank decision-making.[1]

Many medium- and smaller-sized institutions returned to a concentration on domestic banking businesses, exiting from international lending altogether. Other banks, particularly the larger regional banks, sought to restrict their international banking activities to traditional trade finance, which even in most rescheduling countries had escaped major losses.

The large money-center banks reflected a more diverse set of changes. Although these banks reined in LDC lending as the others did, they also pushed expansion in new banking activities with the more creditworthy sovereigns in Europe and Asia. These new initiatives, though, often did not produce significant balance-sheet exposure for the banks. These initiatives were not focused on lending, but on merchant-banking activities such as securities underwriting and derivative products, such as interest rate and currency swaps. Bond and other securities issues by creditworthy developed countries expanded, thus reducing the share of syndicated bank loans in total borrowings. For developing countries, however, syndicated bank loans which were the mainstay of lending expansion in the 1970s had become a relic of the past.

DECISION-MAKING STRUCTURES DIVERSIFY

Although the techniques and methods of country-risk analysis reflect many common features from institution to institution, bank decision-making structures have always shown considerable diversity. The character and organization of each institution differ and the structure of each country-risk-assessment system must be geared to the specific needs of a given bank. This diversity has always marked individual banks' approaches to country-risk analysis, even during the earlier boom periods of international lending.

What is different today, though, is that there is much greater diversity in banks' strategic goals than during the 1970s lending boom. This factor is a major cause of a growing diversity in decision-making structures observed today in major banks.

These changes have been driven in part by regulatory changes in the major developed countries, which have focused bank management attention on the issue of capital adequacy. The key regulatory changes have emerged from the Bank for International Settlements' Committee on Banking Regulation and Supervisory Practices. This Committee, representing the central banks and regulatory authorities of twelve industrialized countries, developed a new set of international regulatory guidelines during the mid-1980s.

The Committee's guidelines, formally released in December 1987, set out a uniform framework for measuring risk and bank capital in all twelve countries.[2] A specific list of risk weights were applied to various bank assets and off-balance-sheet exposures to quantify risk. Such risk-adjusted exposures were then compared with bank capital—defined in a uniform way across countries—to derive a measure of capital adequacy. Finally, the regulatory authorities agreed on minimum standards of capital adequacy, to be met on a phased basis by year-end 1992.

The implementation of the new risk-based capital guidelines has had a substantial effect on banks' portfolio decisions, including those relating to country risk. Banks have responded by reassessing the internal allocation of capital and associated returns by line of business in light of the new risk guidelines. Those business lines that do not meet such risk-adjusted standards are obvious candidates for divestiture or exit, particularly for those banks whose subpar capital levels have acted to constrain their growth.

This process of strategic reassessment has led banks to exit international lending activities where the risk-adjusted returns failed to measure up to the required guidelines. This was particularly true for any type of lending to developing countries, even standard trade financing. For example, the Basle Committee's recommended risk weights for loans with maturities over one year to domestic banks was set at 20 per cent, but the risk weighting for similar loans to foreign banks was set at 100 per cent. Contingent exposure to foreign banks under confirmed letters of credit had a risk weighting of 20 per cent, identical to that for direct balance-sheet exposure of under one year to domestic or foreign banks. Many banks also reduced the size of their Eurocurrency deposit lending to banks in the major industrialized countries, since returns fell short of the guidelines (a 20 per cent risk weighting), despite the low level of risk.

Such fundamental strategic decisions have had important effects on banks' country-risk decision-making. In many cases, banks have reduced staffing levels in country-risk assessment units along with the reduced priorities accorded LDC lending. Even where banks continued active in international activities, the focus tended to shift toward the industrialized OECD countries. Here the issue of country risk was less important to portfolio management than new concerns, for example, the quantification of risk exposure in derivative products such as swaps and options.

THE DECISION-MAKING PROCESS: COMMITTEES VS. CZARS

In searching for common threads in the recent evolution of country-risk decision structures, I find it useful to introduce the distinction between the *committee* and *czar* approaches to country risk. These two approaches form opposite ends of a spectrum ranging from an interactive, differentiated committee-driven process to a deterministic, centralized framework for country-risk decisions.

The committee approach to country-risk decision-making enjoyed wide popularity during the 1970s and early 1980s. The country-risk committee provided the needed flexibility in handling subjective and qualitative judgements about countries. A committee structure could easily encompass a desirable set of checks and balances by incorporating a diversity of views of the line management, credit-policy staff and economic and political analysts. There was wide-spread agreement that country-risk assessment ultimately rested on the qualitative judgements of the professional analysts and bankers, rather than on quantitative ranking systems. Indeed, the main advantage of the committee approach was seen to be its effectiveness in getting the various qualitative judgements on to the table for examination and discussion.

By contrast, a country-risk czar was often seen to be too removed from the 'action', and too little interested in the competitive pressures that line officers faced every day. Such a centralized decision-making structure was seen to put a bank at a competitive disadvantage in the marketplace.

With the benefit of hindsight, it is clear that the committee structure in many banks was seriously skewed toward the marketing concerns of the line management. The system of checks and balances within the committee structure frequently broke down; some analysts with views contrary to the line management were too intimidated to express themselves and, even when they did, they were often ignored.

In the wake of the LDC debt crisis, many banks have moved toward a more centralized system, i.e. in the direction of what I have called the czar system. The reason is not necessarily because a centralized system is better able to make the difficult subjective country assessments. Rather, it is because the committee approach was focused excessively on country-specific information as inputs to the decision-making process. The result was that the committee approaches failed to address the larger issue of the banks' overall portfolio management policies. Although the committees were well suited to weighing country by country information and comparing one country with another, it was easy for the committee to lose sight of the growing concentration of sovereign risks in the portfolio and the risks they posed for the bank's capital.

The trend toward more centralized structures for country-risk decision-making reflects banks' attempts to impose a framework of corporate, portfolio guidelines on the decision-making process. Although many banks still retain country-risk committees, the scope and authority of such groups is generally much more circumscribed than in the past by credit-policy guidelines regarding the type and size of exposure that may be considered. The introduction of the Basle supervisory framework based on risk-based capital has helped accelerate this trend.

A second factor encouraging a more centralized structure for country-risk decision-making has been the decentralization of many banks' business management along functional lines. Few banks retain a single international department as the locus of decision-making concerning sovereign risks. Instead, decisions on sovereign underwritings may be taken in one department, those concerning swaps in another and decisions on trade financing in yet another department. A centralized structure for setting and monitoring country-risk limits is essential for coordinating the diverse sovereign-risk activities that many large banks now engage in.

COUNTRY RISK AND PORTFOLIO MANAGEMENT

Although the growing divergence in decision-making structures regarding country risk among US banks has already been emphasized, it is interesting to note that the decline in international lending by US banks is quite marked among banks of all sizes.

Table 13.1 Decline in exposure of US banks December 1989 compared with June 1982 (declines in million dollars and percentage of June 1982 level)

	9 largest banks	*Other banks*	*All US banks*
G-10 and Switzerland	−$18,268	−$4,011	−$22,279
	−20.7%	−5.6%	−13.9%
Non-G-10 developed countries	−$11,442	−$4,098	−$15,550
	−49.1%	−32.3%	−42.6%
Eastern Europe	−$2,025	−$1,633	−$3,658
	−51.2%	−66.9%	−57.2%
OPEC	−$7,182	−$4,628	−$11,810
	−44.3%	−66.8%	−51.0%
Latin America and Caribbean	−$6,489	−$18,951	−$25,440
	−16.0%	−65.4%	−36.5%
Developing countries − Asia	−$8,067	−$3,916	−$11,983
	−46.7%	−37.4%	−43.2%
Africa	−$2,598	−$677	−$3.275
	−72.5%	−72.3%	−72.5%

Note: OPEC member countries, excluded from geographical areas, exposure reported net of write-offs

Source: Federal Reserve Board, Statistical Release, E.16

Table 13.1 presents data on changes in country exposures of US banks during the period June 1982 (before the Mexican debt crisis) up to the end of 1989. These data, which are published by the Federal Reserve on a quarterly basis, provide separate groupings for the nine largest banks. Exposure is defined net of charge-offs taken by the banks.

What is striking about the data is the consistent pattern of declines in exposure, measured in percentage terms. The large divergences between the two groups of banks come with exposure to developed countries and the Latin American and Caribbean countries.

The larger banks allowed a proportionately larger share of their claims on developed countries to run off than did the smaller banks. This trend was largely due to the effects of the new Basle guidelines on capital adequacy. The larger banks were more active in various Eurocurrency deposit activities; with the introduction of the Basle guidelines, most banks reduced such deposit placements. The smaller banks exhibited a larger decline in exposure to Latin American and Caribbean countries. This was due largely to more aggressive approaches taken by such banks to write-offs and sales of Latin debt.

In searching for evidence on the changing role of country-risk decision-making which lie behind such data, one must focus on those banks which continue active in international activities. There is, of course, little to learn from banks which have exited the field of country lending. The more interesting cases in this regard are presented by the major US money-center banks. While one must recognize that there is significant diversity among this relatively homogeneous group, there are also many similar trends.

The driving force behind many of the changes in decision-making structures regarding country risk may be traced to the precarious capital position which these banks found themselves in after the onset of the 1982 LDC debt crisis. With exposures in rescheduling countries that measured over 100 per cent of equity, these banks faced a critical priority of rationalizing their balance-sheet structures by identifying and reducing risk concentrations and by increasing equity. At the same time, however, most of these banks faced far fewer opportunities to turn back to domestic businesses than did their regional bank competition. Most of the money-center banks still had to make money in international; the challenge was how to do this while managing the risks.

INTEGRATING RISKS ACROSS THE PORTFOLIO

The management challenge for the credit staff after the LDC debt shock was to find a way to integrate risk across business lines—both domestic and international—and to relate such risk to the bank's capital. The Basle Committee was pursuing a similar supervisory approach at this time for precisely the same reasons—to implement a more realistic measure of risk and the capital needed to support it.

All the banks faced similar tasks in responding to the Basle guidelines, while addressing many of their own bank-specific risk-management needs. Rather than discuss such issues in general terms, an individual case study—that of Bankers Trust Company—will serve to highlight the common threads that run through each banks' response to the changing risk and regulatory environment. The discussion focuses on the conceptual framework for portfolio management, rather than on specific details of the Bankers Trust system.

The portfolio-management challenge is to find a way to aggregate risks in the portfolio—including country risks—and relate them to capital. Any ratio of portfolio risk to capital is designed to give a bank's management a static measure of the adequacy of its capital. But it can also be turned into a tool for assessing changes in the portfolio by using the bank's return on equity targets.

The BIS guidelines, for example, may be viewed as setting minimum return on equity targets. Any increase in a bank's portfolio requires a given amount of capital—following the guidelines—which comes from the net profit associated with these same loans. This, of course, assumes that the bank does not possess excess capital. Most banks would have return on equity targets that exceed the minimum BIS guidelines. These return-on-equity targets may be used to screen new loans to ensure that the projected returns meet or surpass the target after taking account of risk.

The approach developed by Bankers Trust uses risk-adjusted capital as the integrating measure of risk. The premise of risk-adjusted capital is very simple—riskier transactions are allocated more capital. They account for relatively more equity capital than transactions with lower risk, therefore they must bring higher returns to meet the bank's overall return-on-equity target. The basic approach is similar to the BIS guidelines, but it provides for greater differentiation in the determination of relative risk rankings and in the effect of duration (maturity of exposure) on risk.

Bankers Trust's system, called risk-adjusted return on capital (RAROC), incorporates three specific components: risk amount, duration of risk (i.e. maturity of exposure), risk factor.

The *risk amount* of a loan is simply the amount of the exposure. Percentages, similar to the BIS guidelines, are applied to measure the risk amount in the cases of off-balance exposures, such as contractual commitments to lend and confirmations of letters of credit. Special formulae that generate a distribution of probable outcomes are used for swaps and other derivative products. These formulae are based on such factors as the volatility of interest rates, currency rates and prices of options or the product in question.

The *duration* component adjusts risk to a common one-year time horizon. Since long-term exposures are riskier than short-term ones, the duration-formula adjustment increases the risk-adjusted capital for exposures over one year and reduces them for exposures less than one year. The formula penalizes longer-term risks more than would be reflected in market interest-rate spreads on different maturities for the same borrower. It was felt that a premium for shorter maturities would act to increase the liquidity of the bank's overall portfolio.

The *risk factor* represents the traditional credit rating—similar to Standard and Poor's or Moody's, summarized in a scale of 1 to 8, ranging from the best quality risks (e.g. equivalent to AAA) to doubtful credits (e.g. C).

Each of the 1-to-8 ratings are assigned a specific risk factor, expressed as a percentage spread over the risk-free sovereign rate, e.g. US treasuries. These risk factors are based on actual observations of periodic changes in credit premia for a large sample of US corporate bonds over a five-year period. All risk factors have a one-year time horizon.

For example, the risk factor for a 4-rated credit risk (equivalent to a BBB bond rating) was set at 2.41 per cent at end-1989. Put in other words, the risk premium for a 4-rated credit risk was 2.41 per cent over the risk-free rate. A prospective one-year loan to a 4-rated credit must return at least 2.41 per cent—measured as interest-rate spread plus fees—of the loan amount. This amount is called RAROC capital. Duration risk is incorporated into the calculation by adjusting RAROC capital, rather than adjusting the risk factor. A longer-term loan would have to meet a higher hurdle rate; because of duration risk RAROC capital is increased. Short-term credits, in turn, face a lower effective limit, since RAROC capital is reduced.

The application of the risk factor is more complicated, especially for international exposures. The credit-policy department assigns country-risk ratings on the same 1-to-8 scale used for domestic exposures. These country-risk ratings represent risk estimates for equivalent risk in the US corporate bond market for the sovereign borrower only. Obviously, a key assumption is that the measured-risk premia in the US corporate-bond market approximate the risk premia applicable for international exposures.

Non-sovereign borrowers outside the United States are also rated, producing a customer rating within the relevant local market, relative to the risk-free sovereign. For example, a UK private company would be rated on a 1-to-8 scale relative to the market's best quality risk, i.e. the UK treasury. The customer and country ratings are combined to produce a blended portfolio-risk rating. In general, the final rating cannot be higher than the lower of the customer or country rating. For example, a one-rated customer in a three-rated country would receive a final rating of three; a three-rated customer in a three-rated country would receive a final rating of five.

PORTFOLIO MANAGEMENT AND COUNTRY RISKS

The RAROC system provides a quantification of risk in the bank's portfolio, in effect marking the portfolio to market over the assumed one-year, prospective time horizon. The portfolio's RAROC capital is calculated monthly and all new deals are screened by comparing expected profitability to RAROC capital. The basic task of portfolio management is to increase the risk-adjusted return on the portfolio of risks, either by increasing return or by reducing risk. In this regard, country-risk management may be seen as one part of the overall portfolio-management process.

One way of reducing portfolio risk directly relevant to country-risk management is credit diversification. But the measurement of exposures on a country-by-country basis is not sufficient by itself to tell one whether the desired diversification has been achieved. Further analysis is needed of the vulnerability of country risks to specific economic factors, such as swings in world commodity prices or a high sensitivity to the business cycle in key countries.

Managing the economic vulnerabilities in a portfolio requires a global view of the economic environment in addition to in-depth analysis of specific countries. The RAROC system provides a structure and a quantification of portfolio risk; it is up to the credit-policy staff to supply the overall goals for the portfolio management. Once desirable changes in the portfolio have been identified, it should be possible to rebalance the portfolio by selling off loans and by controlling the origination of new transactions.

One way to manage the origination of new international transactions is by means of adjustments in country limits. This is done by means of annual country reviews with the relevant area's line management. During the year, additional changes in country limits may be introduced by the credit-policy staff in response to economic or political developments in the relevant countries. New exposures within existing country limits are controlled by application of the RAROC guidelines.

CONCLUSIONS

Country-risk decision-making must be both appropriate to an institution's strategic focus and flexible to meet its multiple needs. The current overriding priority today for most large US banks is capital adequacy for future growth. It is, therefore, not surprising that country-risk decision-making for such banks is increasingly seen as part of the larger issue of portfolio-risk management, rather than as a special, stand-alone category of risk management. The future evolution of country-risk decision structures will likely reflect continuing efforts to improve the process of integrating such risks into banks' overall portfolio-risk management.

NOTES

1 The discussion here focuses on the experience of US banks. Many of the changes described here, though, are also relevant to differing degrees for non-US institutions.

2 Bank for International Settlements (1987). Details of the Basle Committee's proposals with an assessment of their implications for bank behavior may be found in Salomon Brothers (1988).

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14 Efficient allocation of an international loan portfolio

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INTRODUCTION

Modern portfolio theory (MPT) provides a useful framework for both developing quantitative measures of loan attributes and using these measures to construct and efficiently manage the loan portfolio. MPT characterizes an investment by an expected return coupled with a measure of the variation in that return, i.e. risk.[1] By viewing loans from this perspective a considerable array of techniques can be applied to the problems of designing and managing an international portfolio.

This approach requires a methodology for translating the features of these loans into variables consistent with MPT. As stated above, the basic elements in the characterization of an asset are its expected return and risk. Those familiar with MPT and the structure of international loans will immediately recognize the difficulties in quantifying these variables.[2] In some manner such an assignment, however informal or implicit, must take place whenever a bank agrees to make a loan. This may be, and often is, a largely subjective assessment. However, here what is required is that this estimate be made explicit and with the benefit of a formal, quantitative analysis.[3]

Defining and classifying foreign loans by their expected returns and risk (volatility of return) is a necessary but insufficient requirement for the application of MPT to international lending. For example, assume that a loan to Chile has an expected (annualized) return of 12 per cent with a standard deviation of 8 per cent, while a loan to the Philippines is expected to return 14 per cent with a standard deviation of 10 per cent. This information is still inadequate to assess these investment alternatives fully. Ideally, the full range of opportunities—in some sense, a complete characterization of the 'market'—should be similarly analyzed along with an understanding of how the performance of all of the various alternatives might be related. More generally, the analysis should be extended to include those factors which are important in explaining the risk inherent in these assets beyond their responsiveness to the market just defined.

Consider a creditor faced with the decision to lend either to Venezuela or to Costa Rica. This hypothetical creditor already holds a portfolio with substantial exposure to borrowers in Mexico. Now the Venezuelan economy might reasonably be characterized as an oil-based economy, while that of Costa Rica depends in large measure on the price of coffee. Finally, one might argue that the prices of coffee and oil are largely uncorrelated; hence, the performance of these two economies might reasonably be expected to be uncorrelated. If identical risk and return possibilities in each of these countries are assumed, what is the best choice for our hypothetical bank?

Since both loans offer the same risk/return opportunities, there is no immediate reason for choosing one over the other; a coin toss might yield the selection. However, when taken in the broader context of the bank's overall foreign-loan exposure, the diversification offered by the Costa Rican alternative may indeed be a compelling reason for its addition to the portfolio. Since Mexico is arguably an oil-based economy, the returns on loans to Mexico are likely to be highly dependent on oil prices—just as would returns on loans to Venezuela. However, depending on the co-movement of the price of coffee and that of oil, returns on the Costa Rican loan are likely to be uncorrelated with those of either the Venezuelan or the Mexican loans, thus providing diversification which would lower the overall risk of the loan portfolio.

This example highlights the importance of 'common factors' of risk beyond those that can be attributed to the overall market factor.[4] To the extent that such common factors can be identified and each individual country's (more correctly, loan's) exposure to them quantified, the techniques of MPT can usefully be applied to the problem at hand. An obvious factor is a country's export concentration by commodity or geography. Other factors might include the debt-service ratio, growth in per capita income, level of international reserves, etc. The importance of each of these factors is an empirical question which, given appropriate data, can be tested.

Total risk cannot be fully explained by the combination of the market factor and common factors just described. There will be additional risks linked only to the country in question. MPT terms these risks as specific or non-systematic risks which, by definition, are risks unique to a particular asset. As such they are diversifiable risks that will, in reasonably large portfolios, tend to cancel one another.

By adopting this MPT framework for analyzing international loans, the problem of asset allocation can now be addressed. The goal of asset allocation is to identify and achieve the 'optimal' portfolio of loan exposures, given the available set of choices. Optimality is defined as achieving a targeted expected return while minimizing risk. This is simply an application of the Markowitz mean-variance concept of portfolio efficiency.

In sum, to manage an international loan portfolio efficiently using this technique, several steps are required. First, a list of all available assets (loan prospects in this context) which spans the complete set of possible loans is needed. Next, measures of the expected returns and risks associated with each asset are required. Further, some estimate of the relationships, or covariances, of returns across asset choices is needed. This is the critical step in the process and essentially quantifies the earlier example. Only after the relationships among the available return possibilities are understood can a portfolio with minimum risk for a given expected return be constructed. The final requirement is a measure of the bank's willingness to take on risk. Short of this parameter, all possible (mean-variance) efficient portfolios can be identified. By specifying the risk tolerance, and given the available asset choices, the optimal portfolio for a particular bank can be determined.

The following section describes the bank portfolio of assets (loans) including differential treatment of domestic and foreign exposures. Some of the difficulties in mapping bank loans into well-defined asset classes are discussed here and the range of risks relevant to these assets is described. The third section introduces the asset-allocation problem and employs a hypothetical bank's international-loan portfolio as an example. The fourth section discusses modern portfolio theory with emphasis on the use of common factors in the analysis of non-market risks. The fifth section returns to the asset allocation issue with a discussion of how to recast the problem when choices are limited to a subset of the institution's total portfolio. Essentially the following question is addressed: 'How can the international portfolio be structured efficiently, given knowledge of the domestic portfolio?' The final section provides summary comments.

INTERNATIONAL LOANS AS ASSETS

Modern portfolio theory and the capital-asset-pricing model (CAPM) approach to asset allocation have been applied most successfully to portfolios of marketable securities (e.g. cash equivalents, equities, and bonds). When applied to bank loans, particularly those extended to counterparties across sovereign borders (i.e. those domiciled in countries other than that of the parent lender), many additional issues—both practical and theoretical—arise.

Restricting the discussion first to domestic bank assets, the expected return and risk (or volatility of returns) typically are not readily available, ex ante. While it is usually possible to measure directly the historical return (and hence the *de facto* risk) of traded securities, such an exercise is not straightforward for loans. The expected returns on a loan are dependent upon the estimates of timely repayment of principal, contractual interest and related fees. In addition, non-pecuniary benefits may accrue to the creditor from the perceived importance of the customer relationship. This intangible return is not directly included in the terms and conditions of the loan documentation itself and may not even be quantifiable. Thus, internalizing them in the calculation of the expected return becomes even more problematic.

Another measurement problem arises from the fact that real economic losses are not always accurately reflected in the accounting treatment of bank-asset valuation. For example, since bank assets are not typically 'marked-to-market', the contractual return, under certain circumstances, will overstate the actual return on the asset. This will lead to inaccuracies in the tabulation of an asset's expected return, thus, impeding portfolio decisions.

As a result of these anomalies in the profile of bank loans as compared to traded securities, accurately quantifying the historical return of a domestic bank loan is more challenging than that for marketable securities.

Defining an operational opportunity set of bank assets also requires compromise, given the myriad hybrids and variants of actual bank products. Clearly some simplification of bank-asset types is required in order to obtain a manageable set of assets to analyze. Cash equivalents, sovereign term assets, quasi-sovereign assets, placements with other banks, loans, swaps and contingent liabilities to the non-bank private corporate sector and household sector, respectively, already represent a gross simplification of the array of products in a large bank's portfolio. The sheer task of addressing the internal reporting requirements, as well as the accounting issues, in order to obtain expected returns and risk measures on this simplified list would be monumental.

This is not to say that asset allocation with respect to classes of marketable securities does not itself involve substantial simplification and aggregation of arguably distinct asset groups. However, the relative difficulty in grouping assets into sensible classes with similar risk and return prospects is arguably greater in the case of bank assets. Besides these practical problems, there are conceptual and theoretical limitations in applying modern portfolio theory to international bank loans.

On the measurement issue, the lack of costless and complete data on historic returns means that the borrower may hold privileged information on its willingness and ability to service the loan. Asymmetric information, wherein the borrower may withhold relevant data or intentions, means that the estimated expected returns, variances and covariances are unlikely to be accurately modeled by continuous and stationary distributions. Thus, the robustness of model results will be suspect due to the likelihood of inaccurate classification of the counterparty when the loan terms are set (i.e. adverse selection).

Another problem arises because the creditor cannot be certain that the borrower will exhibit good faith in meeting the performance criteria of the loan contract. While the terms and conditions of the original loan contract can significantly influence the debtor's 'good behavior', this cannot be guaranteed at the outset. Given that the objectives of the two parties in this commercial relationship may diverge and that incentives may not be adequate to maintain a good faith relationship, the borrower may become unwilling to perform according to the terms of the contract. This is the risk of moral hazard. Beyond the contractual terms of the loan itself, the commonly accepted domestic legal and bankruptcy codes, creating the ultimate threat of forced insolvency, are meant to ensure the enforceability of loan contracts, thus minimizing the risk of moral hazard.

The existence of adverse selection and moral hazard means that the estimation of expected return and volatility and covariance of returns will suffer from omitted (unobservable) variables. As a result, the estimated asset parameters will be biased so that risk (volatility) and diversification potential (covariance) will be unreliable.

Another problem arises from the contractual differences between a marketable security and a bank loan. In a portfolio of marketable securities in which non-systematic risk has been hedged away, an exogenous shock (e.g. an oil-price increase) will lower the portfolio's return only to the extent that the entire market's return has been reduced. The deleterious impact on the earnings of one asset class will be offset by the enhanced earnings (which are in part captured by the investor) for another asset class. Unlike marketable securities, the 'upside' on the potential return of bank loans is contractually limited. In this case the asymmetry of returns on bank loans may diminish the ability of the portfolio manager to hedge non-systematic risk completely. However, the diversification of a bank portfolio is still beneficial in that, by holding a broad range of loans differentially exposed to unanticipated shocks, overall portfolio performance will be less volatile.

During the 1980s banks began securitizing a number of bank-asset classes, making them tradable and creating the option to remove them from their balance sheet. This has improved the ability of banks to buy and sell assets in a manner more analogous to that of a portfolio manager of marketable securities. However, beyond short-term assets and long-term securitized assets, a significant portion of a bank's long-term assets remain indivisible and difficult to 'trade'. This limits the response options when the perceived risk of such an asset changes due to events subsequent to origination. This lumpiness of the portfolio makes it difficult to make the adjustments at the margin, further impeding the construction and management of an efficient portfolio.

With some bank assets, unlike that with publicly traded securities, the investor/lender's behavior may not be independent of all of the factors which determine the assets' expected return, risk and covariance. For example, credit rationing can alter the borrower's economic performance and negatively effect the likelihood of repayment and the expected return of the asset. Similar situations could arise in the private-placement bond market in the US. Major insurance companies are key lenders to corporations in this market and often require particular covenants when agreeing to lend. To the extent they may have outstanding loans to a given borrower, their decision to lend additional capital potentially would effect the performance of prior loans. Thus the expected returns and risks of both pre-existing and prospective commitments may not be independent. This is yet another complicating factor in the analysis of bank loans in the context of CAPM and MPT.

Apart from those difficulties already mentioned, there are additional risks encountered when applying MPT and CAPM to the management of an international-loan portfolio. The expected return on a cross-border asset is subject to political and transfer risks which are nonexistent in the context of domestic counterparties. Sudden regime changes or shifts in the policies of an existing government may result in the country's unwillingness to repay cross-border obligations. This can also affect expected returns of the private sector when the government rations the country's foreign-exchange flows. The normal safeguards used in domestic lending to ensure 'good faith' performance of the borrower are also less effective when applied to the international arena, eroding contractual enforceability. Thus the risk of moral hazard is heightened in international lending.

A country can also become unable to repay simply due to a shortage of foreign exchange. This can arise from structural problems or macroeconomic imbalances which, in turn, can result from external or internal shocks, domestic-policy errors or domestic or international constraints to adjustment. This dislocation can also reduce the expected return on bank loans to that country's private sector that otherwise would have performed satisfactorily. Due to the complexity of assessment and in some cases insufficient or inappropriate analysis, the risk of adverse selection—the inaccurate classification of the borrower's repayment capacity—is substantially increased in cross-border lending.

Numerous issues have been raised about the appropriateness of directly applying MPT and CAPM analysis to the management of a bank portfolio of domestic and international loans. While the direct application of this approach may be precluded by these problems, the goal of efficient asset allocation based on the broad principles of MPT and CAPM remains attractive. The most fundamental relevant tenet is that, given a targeted rate of return and the risk tolerance of the lender, efficient portfolio diversification will reduce overall portfolio risk. The value of an additional asset to an existing portfolio is measured not only by its expected contribution to portfolio return but also by its expected impact on total portfolio risk. Thus, potential changes in cross-border exposure should be based on estimates of both return contribution and potential risk reduction.

ASSET ALLOCATION—THE BASICS

The asset allocation problem is essentially an analysis of the relative merits of alternative investment opportunities. Of critical importance to this assessment is a clear understanding and accurate quantification of (i) investment goals; (ii) the (opportunity) set of assets available to the investor; (iii) the expected returns and risks associated with each investment in the opportunity set; and (iv) the relationships or covariances among these alternative asset risk/return profiles. Accurate and complete information in each of these dimensions is necessary for attaining an optimal portfolio structure for the investor/lender. This section will focus on the last three informational requirements.

The investment goal will be taken as the construction of an efficient portfolio of international loans, where efficiency is used here in the classic Markowitz sense.[5] Constraints limiting the achievement of the mean-variance efficient portfolio such as institutional, regulatory or tax considerations are not explicitly addressed here.

Before the asset-allocation problem can be directly addressed, a listing of alternative international investment opportunities must be compiled. Such a list would include loans to offshore sovereign borrowers, foreign banks and private non-bank firms. The list should be exhaustive in the sense that the full spectrum of plausible investments is identified. The compilation of such a list should incorporate any regulatory (e.g. risk-based capital) and institutional (e.g. capital adequacy or size) constraints relevant to the lender. These should be employed to exclude any unacceptable investments from consideration.

A detailed information base covering each investment is required to build an efficient portfolio. Perhaps the most important piece of information is an estimate of the expected return for each loan opportunity. In international lending obtaining a reliable estimate is often difficult. Since this estimate must incorporate forecasts of a variety of relevant variables, each with the usual degree of measurement error, the uncertainty in the forecast of overall expected return is often quite large.

Lack of reliable historical-return information is a second factor complicating the development of accurate expected-return forecasts. While in recent years a secondary market in international loans has begun to develop, the range of loans traded has been limited and the reliability of the pricing (and therefore return) information is open to question. Institutions are left with their own, often limited, experience in developing forecasts for new cross-border loan opportunities. As a result, *ad hoc* forecasts of expected returns are developed subjectively by the lending officer.

The second piece of required, quantitative information is an estimate of the risk inherent in each loan opportunity. Much has been written on this topic in the past decade. Although there is reasonable agreement as to the range of factors which must be taken into account, the relative importance of each factor often is loan specific and highly subjective. Political risk is an obvious example of a factor with a large forecast variance.

The nature of the mean-variance efficiency criterion demands a measure of risk for each potential loan. However, a further requirement is an assessment of the degree to which the returns of the various candidate assets move together. Recall the example of the hypothetical bank considering the extension of a loan either to Venezuela or to Costa Rica. Although the risks and returns of these loans were deemed equal in that example, the structure of the bank's existing loan portfolio suggested the Costa Rican option was preferable. The existing loan portfolio was already exposed to Mexico, an oil-based economy like that of Venezuela. By extending credit to Venezuela, the bank would be increasing its exposure to the vicissitudes of the oil market, whereas the Costa Rican loan would diversify that risk by adding exposure to the coffee market.

A formal statement of the problem

The arguments embodied in this example can now be formalized. As noted above, three sets of information for each asset category—loans to Mexico, Costa Rica and Venezuela—are required. These are the expected returns for each possible investment, the risk inherent in each alternative asset and the relationships (covariances) between the risks already extant in the existing portfolio and those of the prospective assets. To simplify the example, the risks and covariances of and among our three asset classes are assumed to be stable and reasonably predictable from historical data. Table 14.1 provides data on the hypothetical returns and the implicit risks as measured by the standard deviations of the asset returns. In addition, table 14.2 represents the covariance and correlation matrices of the asset returns which quantify the degree to which the asset returns are linked.

These example data might be viewed as the (hypothetical) experience of banks over the past eleven years, combined with their expectations regarding current lending opportunities. For the purposes of this example, the relative magnitudes of the rates-of-return data are of secondary importance. The average historical figures are considered to be the forecast rates of return for particular loans to each country. What is of primary importance is the risk information, both the standard deviation for each alternative asset and the respective covariances with

Table 14.1 Matrix of historical returns and risk (annualized percentage returns)[1]

	Mexico	*Costa Rica*	*Venezuela*
Period 1	8	6	9
Period 2	10	9	11
Period 3	9	4	8
Period 4	12	7	13
Period 5	14	11	15
Period 6	6	7	5
Period 7	11	9	9
Period 8	3	6	4
Period 9	7	12	6
Period 10	11	5	11
Period 11	15	7	13
	Mexico	*Costa Rica*	*Venezuela*
Expected Return	10.0%	7.0%	9.5%
Risk	3.529	2.464	3.532

[1]Annualized standard deviation of return

Table 14.2 Matrices of return of comovements

Matrix of return covariances

	Mexico	*Costa Rica*	*Venezuela*
Mexico	12.454		
Costa Rica	1.38	6.073	
Venezuela	10.62	1.30	12.473

Matrix of return correlations

	Mexico	*Costa Rica*	*Venezuela*
Mexico	1.000		
Costa Rica	0.159	1.000	
Venezuela	0.852	0.149	1.000

the remaining asset classes. With these data, the asset allocation problem can be solved.

Recall that the goal of asset allocation is to construct an efficient portfolio in terms of return and risk. Formally, the problem is:

1 $\mathrm{Max}\{E(R)-\lambda*\mathrm{Variance}(R)\}$

where, E = mathematical expectations operator
R = return on the assets in the portfolio
λ = the investor's coefficient of risk aversion[6]

The total expected return is given by the sum of the expected returns on each asset weighted by their respective shares in the entire portfolio. The risk term or variance of the portfolio return is somewhat more complicated. If the portfolio consists of a single asset, then the risk is given by the variance of the asset's expected return. With more than one asset, however, the risk term includes the covariance terms which account for the degree to which asset returns move together or in opposition.

With the three asset categories mentioned above, the optimization problem becomes:

2 $\mathbf{Max}\ \{E(\Sigma_i x_i * R_i) - \lambda * \Sigma_i\Sigma_j x_i * x_j * COV(R_i, R_j)\}$

where, x_i = portfolio holding in asset i
R_i = return on asset i
E, λ = as in 1 above
COV = covariance operator.

This optimization problem can easily be solved with standard mathematical techniques. In this simple example the solution can be easily obtained by mere inspection. The first term in equation 2 is simply the expected return on the portfolio. It is the weighted average of the expected returns of each component asset (loan) in the portfolio. The respective weights are the proportion of the portfolio allocated to each asset. Of course, the key input data here are the forecasts of expected return, R_i, for each of the assets under consideration.

The second term describes the 'penalty' for adding the risk inherent in each asset to the portfolio. It also includes three covariance terms which capture the degree to which asset returns move in tandem. Looking back at the correlation information in table 14.2, the similarity between the Mexico and Venezuela alternatives is immediately apparent. There are really only two distinct alternatives available. The return prospects for Costa Rica are largely independent of those for Mexico and Venezuela, as evidenced by the very small correlations. On the other hand, the correlation between the two oil-based economies is very high.

Due to the large covariance term, adding more loan exposure to either Mexico or Venezuela in the portfolio imposes a large (risk) penalty. Alternatively, by increasing exposure to Costa Rica, the portfolio does not suffer a large penalty because of the small covariance. Essentially this is the power of diversification. When assets are not closely linked in terms of their performance, or when performances are negatively correlated, then a portfolio of such assets will exhibit lower overall risk than will the individual assets themselves.

The investor's willingness to bear risk, ? in the objective function, requires further discussion. This term converts units of risk into units of return, thus allowing for a meaningful tradeoff between the two quantities. In the extreme case of ? = O, the investor has no regard for risk and the problem reduces to maximizing expected return. The solution would obviously be a portfolio with holdings only in that asset with the highest forecast return. This, of course, would be a highly risky portfolio.[7] The other extreme case, ? ? 8, occurs when the investor truly abhors risk and will sacrifice everything to avoid it. Here the investor focuses exclusively on minimizing risk and would invest only in risk-free assets.[8] Less extreme levels of risk aversion would result in portfolios with holdings in most, if not all, of the available asset classes; the result, of course, being minimum-risk portfolios for the chosen expected return and corresponding to the investor's risk tolerance.

With this framework for asset allocation, the problem is generalized to incorporate asset features which will provide a better characterization of the risk in international loans. To this end, a modeling approach is used which has proven to be quite robust in identifying important risk factors in a wide range of market contexts: modern portfolio theory.

LESSONS FROM MODERN PORTFOLIO THEORY

Modern portfolio theory (MPT) is an extension of the capital-assetpricing Model (CAPM). The CAPM states that the expected excess return, that is the return above the risk-free rate, for an asset is equal to the market-excess return scaled by the responsiveness of the asset to market movements, plus the return that is unique to the asset itself. The first component of return is called systematic return, while the second is non-systematic or specific return. It is important to remember that the model focuses on excess return, that is return net of the risk-free return. This is expressed algebraically in equation 3:

$$3 \quad (R_i - R_f) = \beta_i * (R_M - R_f) + \varepsilon_i$$

where, R_i = return on asset i
R_f = risk free return
R_M = return on the market
β_i = responsiveness (beta) of asset i to market moves
e_i = specific return of asset i

The market is traditionally defined as that for all securities, including stocks, bonds, cash equivalents, real estate, etc. However, experience indicates that this framework holds remarkably well in the more narrowly defined context of markets such as equities combined with a risk-free instrument[9].

The CAPM framework holds several interesting implications for attributes of asset return. First, it says that only systematic risk, that is risk stemming from market exposure (beta), is compensated. Thus, the expected specific return (compensating non-systematic risk) on each asset is zero. This is evidenced by the fact that all assets are held in the market portfolio in proportion to their total market value or capitalization. Further, market return is simply the capitalization-weighted average return of all component assets. Hence if an asset were to have positive expected specific return, then the return to the market would not be counting all of the return contributed by the asset in question. This cannot be the case, however, since it contradicts the definition of market return.

While the expected specific return is zero, the *risk* in the specific return is greater than zero. To avoid this problem of specific risk, all available assets can be held in the portfolio in the same proportions as their market capitalization. This *perfect replication strategy* guarantees that all specific risks are diversified away; the portfolio will have a beta of 1; and the total risk of the portfolio is equal to market risk. Anything short of perfect replication necessarily implies that the portfolio is composed of assets in larger and smaller proportions than their market capitalizations. Thus the portfolio will be exposed to specific risks and, unless the beta is kept equal to 1, asymmetrically exposed to market risk. Since all other risks associated with an asset—that is the specific risk—are on average uncompensated, then holding any asset in a proportion that diverges from its market share requires justification.[10]

A couple of examples from the Japanese and US equity markets will emphasize the point. On November 30, 1990, the predicted beta of Obayashi with respect to the TSE1 was 1.00.[11] The predicted (annualized) total risk for this company was 41.40 per cent as of this date. The predicted specific risk, again the risk independent of the market, was 37.07 per cent.[12] The predicted risk of the TSE1 for this date was 13.6 per cent. This clearly shows the dominance of specific risk in the single-asset case. Holding a position in this stock which differs significantly from its market share implies taking on a great deal of specific risk. Of course, the larger the portfolio, the more that diversification will reduce the specific risk of the portfolio.

An example from the US market makes a similar point. For the same date, the predicted beta with respect to the S&P500 index for Halliburton Co. was 1.00. At that date Halliburton was capitalized at $5.08 billion and involved in the construction, oil-services and insurance industries. The predicted total and specific risks of this company were 29.50 per cent and 16.62 per cent, respectively. In contrast, the predicted risk of the S&P500 was 24.37 per cent for that date. As in the previous example, specific risk is quite large, although considerably less than in the Obayashi case.

MPT’s contribution to the CAPM analysis shown in equation 3 is that, for certain groups of assets, the specific returns, e_i, are correlated. That is, returns on assets which share common attributes (e.g. industry, earnings, oil dependency, capitalization, etc.) behave similarly, after accounting for systematic or market-related return. This common relationship in excess returns, net of the market or systematic return, is known as ‘extra-market covariance’.[13] By understanding which asset attributes are important in terms of extra-market covariance, asset returns and risks can be better explained.[14]

One example of an asset attribute proven to be a useful predictor of risk beyond systematic risk is industry classification. For example, in the fixed-income markets, publicly traded debt instruments are priced

Table 14.3 Risk analysis of FT Europe index portfolio

Standard deviation of annual portfolio return					**18.21**
Standard deviation of portfolio systematic return				**18.12**	
Predicted Beta with respect to FT EUR			**0.99**		
Standard deviation of annual benchmark return			**18.31**		
Standard deviation of portfolio residual return				**1.79**	
Sources of risk (variance terms)					
Common-factor block variances					
Countries	**0.37**				
Industries	**0.44**				
Risk indices	**1.10**				
Currencies	**0.10**				
2*(Sum of interblock covs)	**−0.54**				
Residual-factor subtotal		**1.48**			
Residual specific		**1.71**			
Total residual risk			**3.19**		
Total systematic risk			**328.40**		

differently according to the industry of the borrower. This explains the positive yield spread of utility bonds, for example, over a similar maturity Treasury issue. This spread is simply a market response to the economic fact that firms in a given industry are subject to many of the same risks (common factors). Therefore, the risk premium demanded by the market—the yield spread—is a measure of the sum of the effects of these common factors.

If this line of reasoning is continued, it is clear that the CAPM approach can be usefully extended by identifying those factors which explain an asset's 'extra-market' performance, that is its performance after accounting for the market factor. In the equity market, industry membership has been shown to be helpful in explaining this component of performance. Additionally, 'fundamental' or balance-sheet information from the individual firms has also been shown to be a useful predictor of risk. This approach to modeling risk in equity markets has been successfully applied in eight of the world's most important equity markets.[15] Of course, the factors which prove useful in explaining risk vary from market to market. But certain types of factors, such as industry, size (a measure incorporating market capitalization, value of assets, etc.), yield, and recent performance have proven useful in explaining risk not only within individual markets but also in a multi-market framework.[16]

It is instructive to present an example of this risk analysis on a sample portfolio. Table 14.3 provides a summary of the analysis of a portfolio originally constructed by an optimizer to track the performance of the Financial Times European index. The resulting portfolio was composed of 70 assets with an approximate value of $83 million as of November 30, 1990. Note also that the second portion of the table is given in variance terms. The residual common-factor variances add up to the residual-factor subtotal. This, in turn, adds to the residual-specific variance to give the total residual variance of the portfolio. As expected, the total residual variance contributes only about 1 per cent of the total variance of the portfolio.

This analysis shows that the portfolio does indeed match the benchmark quite closely. Not only is the predicted beta coefficient close to unity (0.99), but also nearly all of the predicted total risk, 18.21 per cent, is due to market exposure, 18.12 per cent.[17] The risk beyond that of market exposure, termed residual risk, is only 1.79 per cent. It is this component of total risk that the MPT approach analyzes further.

In the bottom portion of the table the attribution of risk to the model's common factors is presented. These risk values stem from the differences between the portfolio's exposures to the common factors and the benchmark's exposures. Each of the four groups of common factors accounts for some of the residual risk in the portfolio. After accounting for the covariances among the factors themselves, 1.48 per cent^2 of the residual variance in return has been explained, leaving just 1.71 per cent^2 unexplained. Thus in this example the common factors explain almost 43 per cent of the residual variance in portfolio return.

The importance of risk factors beyond those related to the market is underlined not only by this empirical evidence but also by investor sentiment. Ask any portfolio manager, whether for equity or debt instruments, what they consider in evaluating an asset and you will hear industry classification, recent performance, yield, etc. These items of interest are thought to contain clues as to the likely future performance of the asset. Given knowledge of these factors and the investor's own views as to how the market will evolve, they make decisions regarding the composition of their portfolios.

Of course, the specification and development of a workable model depend on several important issues. First and foremost is the availability of reliable data. Depending on the particular market, these data can be more or less difficult to obtain. Given a reasonable database spanning perhaps five years of history, one must attempt to identify those factors which market participants view as important in determining asset values and returns. It is at this stage that the real art in the modeling process begins.

The next section returns to the topic of asset allocation and addresses how one would make use of common factors to enhance the efficiency of a portfolio of international loans.

ASSET ALLOCATION: THE INTERNATIONAL-LOAN PORTFOLIO

There are two issues addressed in this section. First, the focus will be how to develop measures of the covariances of performance for classes of loan exposures. As noted earlier, this is a key input in the determination of an efficient portfolio. Second, the analysis is extended to the case where the international portfolio is a component in the bank's overall loan portfolio. While decisions concerning international loans do not effect the domestic portfolio, proper accounting for the covariance in performance of the domestic portfolio with the international component can lead to an improved risk/return profile of the overall portfolio.

To begin the discussion of measuring covariances among asset returns, consider the following example. Suppose the lender's set of potential cross-border loans consists of commitments to countries which can be classified as non-oil primary-commodity exporters, oil exporters or exporters of manufactured goods. For the purposes of this example all other borrower attributes, or common-risk factors, are ignored.[18] Given these classes of borrowers, how might their performances be linked? Table 14.4 provides a hypothetical characterization of likely qualitative performance linkages between these economic groups, given price changes for various broad product categories.

The table can be interpreted as saying that the economic growth performance of the non-oil primary commodity based economies (which should be correlated with the risk-adjusted asset return) is positively affected by an increase in the price of these outputs. Alternatively, the impact of an increase in the price of output from manufacturing is

Table 14.4 Effect of increase in output price on performance

	Output price to increase		
Economy	*Non-oil primary commodities*	*Oil*	*Manufactures*
Non-oil	+	+/−	−
Oil-based	−	+	+
Manufacturing	−	−	+

positive for the oil-based economies due to the economic benefit accruing from increased demand from manufacturing countries for their oil output. The precise nature of these relationships is an empirical question, but one which can be addressed, given widely available data.

An important point emerges from this example. In the context of these groups of borrowing countries, economic performance may be correlated with observable variables such as commodity-price indexes and therefore provide a tractable means of generating viable covariance measures of performance. These covariances could then be used in the asset-allocation framework described in the third section. Of course, developing a complete covariance model would require addressing all relevant risk parameters. However, short of this, even a simple characterization of the linkages among borrowers' prospects can improve the efficiency of the overall portfolio.

Another issue which must be addressed is the exposure a given borrower may have to the risk factors—common factors in the discussion above. It is conceivable that loans to sovereign borrowers may, in some cases, be exposed only to a single factor. However, as economies mature and diversify, the identification of the exposure to several risk factors becomes more problematic. Again, estimates of the degree to which a borrower is exposed to common-factor risks can be made, given historical information on the borrower's performance and on the performance of the factor. As experience is gained in estimating borrower exposures, the estimates of the risk contribution of a given loan to total portfolio risk will improve through better analysis of these covariances.

Before leaving this point of discussion it should be pointed out that certain other factors, not strictly linked to past or, more importantly, prospective economic performance of borrowers, have been important in lending decisions. Perhaps the best example of this is the experience of Latin American borrowers in the 1980s. Institutions, faced with a poorly performing asset in this region, often curtailed future lending not only to the borrower in question but also to other prospective borrowers in the region. More perversely, an incentive developed which promoted additional lending to the borrower experiencing difficulties while excluding other, often more viable, lending opportunities. Thus, a complete covariance model must address 'non-economic' common factors such as geographic location, in this instance, capturing lender perceptions.[19]

Another important topic is that of generalizing the asset-allocation problem to incorporate assets which lie outside the control of the decision-maker, yet are part of the overall portfolio. The obvious example in the context studied here is the bank's domestic loan portfolio. Clearly, for the bank as a whole, the performance of the total portfolio, domestic plus foreign exposures, is the item of interest. The question, then, is how to generalize the framework introduced here to account for the impact of a decision concerning the international portfolio on the bank's total loan portfolio.

To answer this, consider a slight modification to the original example offered at the beginning of the article. In that case a bank was contemplating loans to Costa Rica and Venezuela. Already in its international portfolio were loans to Mexico, an oil-based economy. The analysis showed that lending to Venezuela would increase exposure to the oil market, while lending to Costa Rica afforded significant diversification as the main factor driving the economy was the price of coffee—largely independent of oil prices.

Suppose that rather than having exposure to the Mexican economy in the international portfolio, the lender has substantial exposure to borrowers in Louisiana, Texas and Oklahoma in the domestic-loan portfolio. These assets lie beyond the control of those responsible for the international portfolio. However, knowledge of this exposure to the oil sector can be incorporated into the analysis of the effects of alternative international loans on the overall portfolio.

To see this, consider the following reformulation of the asset allocation problem specified in equation 2:

$$4 \qquad \mathbf{Max}\ \{E(\Sigma_i x_i * R_i) - \lambda * \Sigma_j \Sigma_k x_j * x_k * \mathrm{COV}(R_j, R_k)\}$$

where,	i	= subscript referencing international assets
	j, k	= subscripts referencing all bank assets
	x_i	= portfolio holding in asset i
	R_i	= return on asset i
	E, λ	= as in (1) above
	COV	= covariance operator

Equation 4 differs from 2 only in that the expected-return term is limited to international assets, while the risk-penalty term explicitly takes into account the relationships among the returns of all bank assets, domestic and foreign. Assuming that the domestic portfolio is beyond the control of the officer managing international assets, the only risks which must be considered are those among international assets and between domestic and international assets. The covariances among domestic-asset returns do not affect the problem and can be ignored.

This exposition is an application of the approach developed by Sharpe and Tint (1990). In their paper, the analysis of the covariance between international- and domestic-asset returns is termed the 'Other Asset Covariance Penalty' and is based on the positive sign associated with the term in the objective function.[20] Should the foreign and domestic assets have negative covariance, then the overall portfolio benefits from this diversification.

By adopting this approach to the problem of allocating assets internationally, the lender can achieve an improved risk/return tradeoff for the overall loan portfolio. This is accomplished by recognizing fully the risk implications of each loan on the overall portfolio. Funds allocated on this basis will accurately reflect the risks involved, both for individual loans and for the portfolio as a whole.

SUMMARY

A key lesson from this paper is that the quality of a particular portfolio of international bank loans is not only determined by the underlying performance of the assets themselves but also by the composition of these assets within the portfolio. Thus, the selection of any international banking asset should be conditioned not only on the assessment of its expected risk-reward profile but, potentially more importantly, on its contribution to the overall risk and return of the portfolio. Most of the published work on country-risk analysis has ignored this issue, focusing instead on the expected (non-systematic) risk and return of individual assets in cross-border lending.

By reviewing the elements of modern portfolio theory and the capital-asset-pricing model in the context of international bank lending, this paper provides the beginnings of a portfolio-theoretic approach to country-risk analysis. This methodology allows the portfolio manager to identify asset attributes, including common risk factors which facilitate the measurement of the correlations in returns between assets. This is essential information in improving the efficiency of an international asset allocation strategy.

As discussed in this paper, there are many compromises which must be made in applying this framework to the management of international bank loans. The application of this framework to international asset allocation is complicated by the myriad bank-asset classes, limitations on comprehensive market data and theoretical and accounting differences between marketable securities and international bank assets. Nonetheless, the concept of portfolio efficiency—maximizing the benefits of diversification—remains robust even in this context and several approximate methods are available to lower the total risk of a portfolio of international loans.

APPENDIX: GLOSSARY OF TERMS

Beta

The systematic-risk or beta coefficient expresses the expected response of asset—or portfolio-excess return to excess return on a market portfolio. For example, a beta of 1.5 implies that if the excess return on the market portfolio is positive, 1.5 times this positive return can be expected, while if the excess return on the market portfolio is negative, 1.5 times this negative return can be expected. The concept of a beta coefficient can be applied to an asset, to a portfolio, or even to one 'market portfolio' when compared to another. Various surrogates for the market portfolio can be used when computing the beta coefficient, and, for equity markets, it is now the general practice to use the S&P500 as a surrogate. For a strictly correct definition, the beta coefficient would have to be computed relative to the true portfolio of all assets (both financial and non-financial). The beta coefficient can also be viewed as the regression coefficient of the security return upon the market return.

Common factor

This is an element of return that influences many securities and hence is a 'common factor' in the returns on those securities. Common factors can be associated with relevant features of assets that cause them to be exposed. Important features that acquire associated common factors are industry groupings and risk indices (in the case of equities, measures derived from balance sheet or fundamental data thought by investors to be indicative of future performance). By virtue of their pervasive but asymmetric influence on assets, common factors are ingredients in the market return as well as ingredients in the residual returns of the assets that they influence.

Covariance

The tendency of different random investment returns to have similar outcomes, or to 'covary' is captured by the covariance measure of elementary statistics. When two uncertain outcomes are positively related, covariance is positive, and conversely. The magnitude of covariance measures the strength of the common movement. For the special case of a return's covariance with itself, the simplified name of variance is used. Covariance can be scaled to obtain the pure number, correlation, that measures the closeness of the relationship without its magnitude.

Extra-market covariance (XMC)

This element of risk in investment returns arises from common factors net of the market or, in brief, from extra-market factors. XMC is one of the four elements of portfolio risk, along with systematic risk, risk from market timing, and specific risk.

Residual return

The component of return that is uncorrelated with the return on the market portfolio or benchmark portfolio is termed 'residual return'. Residual return is also called nonsystematic or diversifiable return. All components of active management, except market timing, contribute to residual return at one point in time.

Residual risk

The component of risk associated with residual return is known as residual risk. Residual risk is composed of extra-market covariance and specific risk.

Risk

Risk is simply the uncertainty of investment outcomes. Technically, the term 'risk' is used to define all uncertainty about the mean outcome, including both upside and downside possibilities. Thus, in contrast to the lay view which would interpret the downside outcome as risk and of the upside outcome as potential, a measure of total variability in both directions is typically used to summarize risk. The more intuitive concept for risk measurement is the standard deviation of the distribution, a natural measure of spread. Variance, the square of the standard deviation, must be used in comparing independent elements of risk.

Risk-free return (risk-free rate)

The certain return promised on the purely 'risk-free' investment is commonly referred to as risk-free return. Conceptually, such an investment should have guaranteed purchasing power at its termination. In practice, the construct is usually defined by the rate of return on US Treasury securities for the investment period. These securities have no risk in nominal returns but substantial risk in real purchasing power.

Specific returns

Specific returns are those returns that are uniquely associated with an asset and are uncorrelated (or negligibly correlated) with the specific returns on other assets. Specific returns are also called 'unique', 'idiosyncratic', or 'independent' returns. The risk and reward arising from these specific company factors are also called 'specific risk' and 'specific reward'.

Systematic return

The component of return that is associated with the broad-based market or sector portfolio is the systematic return of an asset or portfolio. Also the reward expected from the market portfolio, and the risk of that reward, are referred to as 'systematic reward' and 'systematic risk'. More generally, the risk and reward of any asset that can be associated with that asset's exposure to the market are termed 'systematic'. Systematic reward generally refers to the excess return (i.e. return above the risk-free rate), rather than to total return, associated with the market.

NOTES

1 For the purposes of this chapter international loans will be viewed as assets in a certain well-defined sense. As assets they will be assumed to possess estimable expected returns and risks. Traditionally the annualized standard deviation of return is used as the measure of risk in holding an asset. This definition will be used here. A glossary of terms is provided in the Appendix.

2 See Goodman (1981), Walter (1983), as well as other chapters in this volume for discussions concerning the difficulties in quantifying this type of risk. The second section of this chapter also addresses these difficulties.

3 This is not to say that we require a once-and-for-all assessment of the investment in terms of expected return and risk. Some risks, such as political risk, are extremely difficult to quantify. As is discussed in the second section, these risks may require frequent revisions in the risk assessment and, further, may require the exercise of judgemental overrides to protect the lender's interests adequately.

4 Here we might view the overall market to be driven by the developed countries whose demand for the output of developing economies is an important factor in their performance. The performance of international loans generally is strongly linked to that of OECD countries, whereas the performance of any single loan would be more highly exposed to, say, commodity-price movements.

5 As noted elsewhere, efficiency is defined as minimum risk for a given expected return. The interested reader should refer to Markowitz (1959), Sharpe (1970) and Sharpe and Alexander (1990) for further discussion of this issue.

6 The coefficient of risk aversion is a measure indicating the willingness of the investor to take on additional risk, given an expectation of higher return. Alternatively the reciprocal of ?, the investor's risk tolerance, could be used.

7 In fact, if markets are (strictly) efficient and expectations accurate, this portfolio would exhibit maximal risk, given the opportunity set.
8 It is important to note that in this particular example the risk aversion is given with respect to total portfolio risk. In the more usual context of relative risk, the investor with very high risk aversion will choose a portfolio that, as closely as possible, mirrors the risk of the benchmark (market) portfolio.
9 BARRA, a prominent financial consulting firm supplying equity-risk models, has successfully applied the approaches described here to individual markets as diverse as the USA and Japanese equity markets as well as in multi-country cases focusing on well-established equity markets and on newly emerging equity markets. Similar approaches also have been applied in the fixed-income area, again with excellent results.
10 Of course, not holding a particular asset implies a negative exposure. Such exposure can only be justified on the basis of an expectation of underperformance or negative specific return.
11 All statistics cited in these examples are derived from BARRA risk models for the relevant markets. The TSE1 index is made up of the first section of stocks traded on the Tokyo Stock Exchange. It is a capitalization-weighted index. Obayashi is a construction firm with a market capitalization of Y782 billion (approximately $5.9 billion).
12 These risk figures are expressed in terms of annualized standard deviation of returns. To determine the market component of risk one should subtract the square of specific risk from the square of total risk and take the square root of the resulting figure. Since beta = 1.0, no adjustment for market exposure is required.
13 See Rosenberg and Marathe (1975) for a detailed development of the concept of extra-market covariance and indeed of MPT generally.
14 The subsequent discussion focuses on application of MPT in the equity-market context. However, the arguments developed with regard to the usefulness of MPT in explaining asset risk are not limited to this setting. Rather, with appropriate definition of common factors, this approach could be applied in the context of bank-loan portfolios.
15 The markets for which equity-risk models have been developed by BARRA include the USA, UK, Japan, Canada, Australia, Germany, France and Sweden.
16 For a detailed discussion of the application of MPT to the multi-market framework see Grinold, Rudd and Stefek (1989).
17 The product of the portfolio beta (exposure to market risk) and the predicted market risk (standard deviation of benchmark return) gives the portfolio systematic-risk level. Here we have 0.99*18.31=18.12.
18 This classification scheme follows that of Dymski and Solberg, chapter 7 of this volume. However, in this instance, it is used to illustrate linkages in borrower performance, and no argument is made as to the importance of these factors in distinguishing the true risk profile of alternative loans.
19 A number of sovereign borrowers will be concurrently rationed when a major shock (e.g. large oil-price increase) sharply raises the perceived default probability or reduces the bank's capital adequacy. This condition may become more likely if the subjective probability of a major market disturbance (and the default premium set by banks) falls over time, while the actual probability of its occurrence does not. The interested reader is referred to Guttentag and

Herring (1984) for a model which describes the conditions under which sovereign borrowers will be credit-rationed by international banks.

20 Recall that the risk (variance) term, appropriately scaled by the risk-aversion parameter ?, is deducted from the expected-return term in the objective function.

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