UNIVERSITY OF SOUTHAMPTON

MODELLING THE INFORMATION CONTENT OF SOVEREIGN CREDIT RATINGS

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A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

Faculty of Social Sciences
Department of Management

September 1999

UNIVERSITY OF SOUTHAMPTON
ABSTRACT

FACULTY OF SOCIAL SCIENCES
MANAGEMENT

Doctor of Philosophy

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This study examines the information content of the sovereign credit ratings assigned by 11 international credit rating agencies to 55 countries for the period from 1989 to 1997. The empirical work is divided into three parts, which separately investigate the determinants of: (1) foreign currency sovereign ratings; (2) local currency sovereign ratings; and, (3) transfer risk -as proxied by the difference between local and foreign currency ratings. In particular, the study explores the extent to which these determinants can be explained by: quantitative and qualitative variables; by macroeconomic and balance-sheet variables; and, by average and lagged values of macroeconomic variables. It also examines the systematic differences across rating agencies and across geographic regions. It compares the robustness of ordered probit analysis and OLS regression to explain sovereign credit ratings; and, it quantifies the impact of the preferred model of sovereign creditworthiness indicators on credit ratings and on transfer risk.

With respect to the analysis of foreign currency sovereign ratings, this empirical work differs from previous studies in the following ways: it uses a larger sample and more recent data than any study to date; it expands the set of explanatory variables to include balance-sheet variables; it pays attention, for the first time, to the lagged structures of explanatory variables; it utilises a more appropriate statistical model, ordered probit, given the ordinal, discrete nature of credit ratings; and, it provides accuracy measures at the rating notch level for the models while comparing ordered probit and OLS performance. Additionally, this study expands the existing literature by presenting the first systematic analyses of the determinants of local currency sovereign ratings and the determinants of transfer risk. Finally, this study comprises the first attempt to quantify the impact of the determinants of sovereign credit ratings and transfer risk.

The findings reveal that there are significant differences in the determinants of foreign and local currency sovereign ratings and, that the agency assessing the sovereign's creditworthiness and the sovereign's geographic region play an important role in the determination of credit ratings. The results also suggest that uses of ratings which presuppose comparability may prove inadequate, and that differences across agencies may provide sovereigns with an incentive to select those which will provide potentially more favourable ratings. Further, ordered probit analysis proved more successful at modelling sovereign ratings than the linear specification. Important differences are also found regarding the statistical and quantitative significance of the explanatory variables.

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Acknowledgements

Words cannot express my gratitude to my beloved family for their unconditional support. I am eternally indebted to my mother, my father, Mine, Arturo and Cecy.

I would like to thank my supervisors Prof. Richard Dale and Prof. Stephen Thomas for their guidance and encouragement during the course of this project.

My thanks also to all those in the Department of Management and the Department of Economics of the University of Southampton who kindly provided my with advice and help for this research.

I gratefully acknowledge financial support from Consejo Nacional de Ciencia y Tecnología (CONACYT) (Studentship 110757/110868).

And last, but not least, I am also grateful to all my relatives and friends who inspired me to attain this goal through their encouragement and love.

Por los momentos dulces y amargos,

Por el valor y el temor,

Por la sonrisa y el llanto,

Por la compañía y la soledad,

Por lo ganado... y por lo perdido,

Por los sueños hechos realidad,

Por el privilegio de vivir...y por el suelo que me vió nacer.

Gracias Dios mío!

-Mary

1. Introduction

Credit rating agencies produce information about both the overall default risk of issuers and the default risk of specific debt issues. They charge the issuers a fee for rating their credit quality and sell the information to investors. These agencies provide market participants with a system of relative creditworthiness of issuers or issues by incorporating all the elements of default risk into a single code.

The past few years have witnessed a dramatic increase in the demand for credit ratings, being the growth of the rating industry characterised by several developments, such as the geographic expansion of rating agencies, the globalisation of the rating activity, and the increase in the number and variety of issues and issuers rated. As a result, from rating predominantly domestic debt of US issuers in their beginnings, rating agencies have expanded their coverage to rate both domestically and internationally placed debt of non-US issuers in more than 35 different types of industries and about 100 countries around the world. As markets have developed, rating agencies have also expanded into more complex securities, such as collateralised bonds, and are looking at different classes of debt.

Several factors have been identified as leading to the global expansion of the rating industry. These include: the growth of cross-border capital flows; the increasing reliance of borrowers on securitisation as a source of funding; the investor concern with credit risk heightened by financial crises; the increasing use of credit ratings in regulation, the syndicated loan market, and the assessment of counterparty risk; and, more importantly, the effect of credit ratings on borrowing costs.

One of the fastest growing components of the issuer-rated universe are the emerging market countries, including sovereign governments. In fact, the rapid growth of sovereign credit ratings has been spurred by the increasing number of emerging market sovereigns securing credit ratings. Since most emerging market issuers carry speculative-grade ratings, this growth has had a significant impact on the rating composition which reflects a deterioration in the overall sovereign credit quality.

Notwithstanding the sustained growth of the rating business -and perhaps because of it-, credit ratings, and, in particular, issues related to their accuracy and incremental information content, have been the focal point of policy debates on the functioning of a nation's capital markets. Corporate executives and government administrators issuing bonds have invariably shown great concern over credit ratings, financial institutions have found their investment portfolios influenced by these ratings, and economists have considered ratings important enough to generate a voluminous literature on the subject. But, although there are concerns about how the rating agencies assess corporate debt, most of the criticisms involve their shortcomings in rating sovereign borrowers. As the recent Mexican and Asian crises demonstrated, rating countries is far more difficult than rating companies. A country's rating is as influenced by its willingness to pay its debt as by its ability to do so. Politics can be as important as economics.

In addition to the growing number of sovereign issuers tapping international capital markets and the greater difficulty in assessing sovereign creditworthiness, the key role played by sovereign credit ratings in financial markets is grounded on several further important features. These features comprise: the distinctive risks associated with sovereign governments, which differentiate them from other types of borrowers; the impact of the ratings on the sovereign's borrowing terms; the implications of the sovereign ceiling for other domestic borrowers; and the greater disagreement between agencies regarding sovereign rating assignments as compared to the disagreement shown for other types of ratings.

The exploration of the information content of sovereign ratings is important given that, due partly to the newness of the sovereign rating business, previous research attempting to shed light on the determinants of credit ratings and to ascertain the extent to which ratings can be correctly predicted using publicly available financial statistics is largely confined to non-sovereign credit ratings. Several aspects heighten the importance of the information conveyed by sovereign ratings: the frequent occurrence of split ratings which creates uncertainty about the credit risk of the sovereign in dispute and questions the reasons for such agency disagreements; the lack of consensus on whether credit ratings reveal new information or only summarise that already available in the market; the extent to which subjective elements are included in assessments of sovereign creditworthiness as suggested by the lack of success of statistical models in fully explaining credit ratings; and, the regulatory uses of credit ratings which presuppose that the ratings of different agencies contain identical information and, therefore, represent similar default risks. On the other hand, the agencies' failure to provide accurate sovereign credit ratings imposes heavy costs on financial markets, such as the misallocation of resources caused by the provision of misleading information to market participants; the elimination of warning signals about the possible deterioration of a borrower's credit standing, which may deter the borrower from taking preventive or corrective actions; the losses imposed on creditors attributable to less-than-optimal decisions based on inaccurate information; and, in general, the dislocation of financial markets, including, in the extreme, exacerbation of systemic risk. It appears, therefore, that many interest groups would be well served by an improved understanding of the criteria underlying the sovereign risk assessment undertaken by rating agencies.

For the above reasons, this study attempts to provide insights into the information content of sovereign credit ratings. The empirical work is divided into three parts: (1) the determinants of foreign currency sovereign ratings; (2) the determinants of local currency sovereign ratings; and, (3) the determinants of transfer risk as proxied by the difference between these two types of ratings. In particular, the study addresses the following issues: (1) it explores the extent to which these determinants can be explained by quantitative and qualitative variables, while examining the relative importance of macroeconomic and balance-sheet variables; (2) it analyses the extent to which average and lagged values of macroeconomic variables are included as determinants of sovereign credit ratings and transfer risk; (3) it examines the systematic differences in the credit ratings of different agencies and in the information conveyed by such ratings; it also examines the differences in the agencies' perceptions of transfer risk; (4) it investigates the effect of the geographic region and the economic development classification of the sovereign on its credit ratings and perceived transfer risk; (5) it tests for the robustness of ordered probit analysis to explain sovereign credit ratings as compared to ordinary least squares regression; and, (6) it quantifies the impact on credit ratings and on transfer risk of the preferred model of sovereign creditworthiness indicators.

With respect to the analysis of foreign currency sovereign ratings, this empirical work differs from previous studies in the following ways: (1) it uses a larger sample in terms of the number of countries, the number of rating agencies, and the number of total observations; (2) it uses more recent data; (3) it expands the set of explanatory variables to include balance-sheet variables; (4) it pays attention, for the first time, to the lagged structures of explanatory variables; (5) it utilises a more appropriate statistical model, ordered probit, given the ordinal, discrete nature of credit ratings; and, (6) it measures the accuracy of the ordered probit models in terms of the correctly classified ratings and compares this performance with ordinary least squares estimation. Additionally, this study expands the existing literature by presenting the first systematic analyses of the determinants of local currency sovereign ratings and the determinants of transfer risk -proxied by the difference between local and foreign currency ratings, as mentioned before. Finally, this study comprises the first attempt to quantify the impact of the determinants of sovereign credit ratings and transfer risk, as well as the impact of the rating agency and the geographic region of the sovereign.

This study, however, is limited in that not all possible explanatory variables have been included. The direct effect of political variables on perceived country creditworthiness has been excluded on the grounds of previous research findings which suggest that country creditworthiness perceptions are largely based on a country's economic performance, and that the exclusion of political variables does not bias the parameter estimates for the effects of economic variables. Hence, political stability variables have been considered in the present work to the extent that they are reflected in the economic variables included in the analyses.

It is found that economic fundamentals have played a key role in determining a sovereign's credit rating, for both local and foreign currency debt, although there are significant differences in the determinants of the two types of ratings. The findings also show that rating agencies rely largely on average historical values of economic indicators to assess sovereign credit risk. On the other hand, while financial balance-sheet variables have a significant effect on foreign currency sovereign ratings over and above macroeconomic variables, this effect is not significant for local currency ratings. Further, the study demonstrates that there are systematic differences in sovereign credit ratings across rating agencies and across geographic regions. The higher accuracy of ordered probit models to correctly classify ratings, particularly at the rating-notch level, leads to tentatively conclude that this technique is more robust than OLS due to its greater compatibility with the structure of the rating process. The quantitative analysis suggests that not all the statistically significant variables have a significant quantitative impact on sovereign credit ratings and that there are important differences between the quantitatively significant determinants of foreign and local currency ratings.

With regard to transfer risk, it is found that both macroeconomic and balance-sheet variables, which reflect that resources are or will be available to honour debt obligations, help to explain this kind of risk as perceived by the rating agencies. Moreover, the results indicate that transfer risk is assessed similarly by the different rating agencies, whereas it varies systematically across geographic regions. Contrary to the above findings, however, OLS seems to be robust and not to bias the equations in comparison to ordered probit. Finally, it is found that, on the whole, the determinants of transfer risk which proved quantitatively significant are not statistically significant.

The remainder of this work is organised as follows. Chapter 2 provides an overview of the evolution and operation of the rating industry in the international capital markets, including a description of the different rating categories and their definitions. It also recapitulates the scope of this research and its importance. Chapter 3 examines the aspects of sovereign credit ratings which underscore the study of their information content. Chapter 4 addresses the research methodology and presents the empirical results of the analysis of the determinants of foreign currency sovereign ratings. The findings regarding the information content of local currency sovereign ratings are given in Chapter 5, while Chapter 6 contains the results of the empirical analysis of transfer risk. Chapter 7 discusses the implications of the empirical results, identifies possible courses of future research, and concludes the study.

2. The Credit Rating Industry: An Analytical Overview

Among the diversity of analytical instruments which attempt to measure the risks associated with financial instruments of debtors, credit ratings are becoming increasingly important in domestic and international capital markets. As an expanding universe of issuers attempts to raise funds in external markets, the investors who provide these funds are focusing more attention on credit quality when making their investment decisions. This process has been given further impetus by growing investor interest in emerging markets. In fact, from 1990 to 1997 total capital flows to emerging markets -direct and portfolio investment, and official borrowing- more than tripled, reflecting global investors' search for more attractive yields and undervalued securities (IMF, 1998b).

This chapter focuses on the importance gained recently by credit ratings in international financial markets. Sections one through four describe the rating industry and its operation in international capital markets. These include a brief definition of credit ratings, an examination of the evolution of the rating industry and the driving forces behind its expansion, together with a breakdown of the rating categories and their definitions. Section five highlights the increasing importance of emerging markets in cross-border financial flows and discusses the special features of the role played by credit ratings in these markets. Section six emphasises the importance of understanding the rating process and the information conveyed in rating agency assessments. Finally, section seven concludes with a description of the scope of this research, namely the exploration of the information content of sovereign credit ratings.

2.1 What is a Credit Rating?

A rating is an analytical instrument which is used by investors to assess the relative capacity of an issuer to meet its obligations -principal and interest- on time, in accordance with the terms and conditions of a specific debt issue. Although this definition of rating has traditionally corresponded to individual *issues*, there is a tendency to shift from the use of issue ratings to the use of *issuer* ratings as described below (2.4.4).

Ratings reflect the opinion of the credit rating agency concerned. This opinion is based on the analysis of both qualitative and quantitative elements. Ratings are not buy, sell or hold recommendations, however. They are credit risk assessments and normally, credit risk is only one among several considerations which are taken into account by an investor when making investment decisions.

Typically, credit ratings incorporate assessments of both the likelihood and the severity of default. That is, the credit risk implicit in credit ratings comprises two factors: the probability that the issuer might default and the expected recovery in the event such default occurs (IBCA, 1997a; Brand and Bahar, 1998; and, Keenan, Shtogrin and Sobehart, 1999).

Credit ratings apply to a variety of entities and issues, including but not limited to sovereign, state and municipal governments, corporations, and counterparties; debt, preferred stock, bank loans, and structured financings; as well as the claims-paying ability of insurance companies and financial guarantors (see 2.4).

2.2 The Evolution of the Credit Rating Industry

The evolution of the credit rating industry has been characterised by several factors, such as the geographic expansion of rating agencies, the globalisation of rating activity, and the increase in the number and variety of both issues and issuers rated. In an attempt to explain the rating industry's response to changes in financial markets, this section describes the factors in the evolution of the credit rating industry.

2.2.1 Geographic Expansion

The credit rating industry has evolved since its inception in the early 1840s, with the first mercantile credit agency in New York. The expansion of the rating business to cover debt issues began in the early part of this century when John Moody started to rate U.S. railroad bonds, in 1909. A year later Moody extended his rating activity to utility and industrial bonds. Corporate bonds and U.S. commercial paper (CP) were incorporated into the rating process later, in the 1920s and 1970s, respectively. Credit rating agencies developed only in the U.S. and in 1970 all agencies continued to be American. Since then, the gradual liberalisation and growth of the capital markets outside the U.S. have led to the formation of new rating agencies: in the late 1970s and early 1980s rating agencies appeared in Canada, Europe and Japan. This growth in the credit rating industry was followed by a period of consolidation. The 13 major agencies currently active are described in Table 2-1. By the end of 1997 these agencies assigned ratings to issuers in about 100 countries around the world.(1)

Since the mid-1980s, rating agencies have also started to operate in the emerging markets of East Asia, Latin America and Eastern Europe, induced by the growth of local corporate bond markets and, often, by encouragement from the government. By the end of 1997 there were 27 local rating agencies in emerging markets which together with the international rating agencies assigned more than 7000 ratings in over 60 emerging markets. Appendix I (Tables I-1 and I-2) shows the expansion of some of the major rating agencies and details of the local rating agencies in emerging markets.

Rating agencies' credibility depends on the accuracy with which their ratings can predict the issuer's likelihood of default. This credibility depends, in part, on the rating agency's independence, that is, the ownership structure of the rating agency should be such, that it does not present conflict of interest problems. In the U.S. the major agencies -Moody's, Standard and Poor's, Fitch, and Duff and Phelps- are all either independent or owned by non-financial companies. Most non-U.S. firms are also independent. The London-based agency, IBCA, is independently owned, as are

(1) As noted in the table, three major changes have occurred ever since. FitchIBCA was launched on January 1998 by the merger of Fitch and IBCA, while R&I was launched on April 1, 1998 by the merger of NIS and JBRI. Additionally, Thomson BankWatch changed its name to Thomson

the two Canadian rating agencies. Two of the Japan rating agencies, JCRA and NIS, however, are owned by consortia or financial institutions, which include some for which credit ratings are issued. However, it is the local agencies whose ownership structure gives rise to questions about the impartiality of their ratings, as shown in Table I-2 in Appendix I (Dallas, 1993; Lyons, 1996; and Hirai and Tomita, 1996). The rapid proliferation of rating agencies in recent years has in this context raised some concern.

Table 2-1. Major International Rating Agencies

NAME	Home Country	Year of Foundation	No. of Ratings	Ownership	Companies rated	Regions Covered	Users (investors, issuers)
Moody's	U.S.	1900	4,860	Dun & Bradstreet	All industries	Global	Global
S&P	U.S.	1860	4,129	McGraw Hill	All industries	Global	Global
Duff & Phelps	U.S.	1932	830	Duff & Phelps Corp.	All industries (esp. utilities)	Global	Global
Fitch[1]	U.S.	1913	427	Individual investors	All industries (esp. utilities)	Global	Global
JBRI[2]	Japan	1979	775	Nihon Keizai Shinbun Corp.	All industries	Mainly domestic	Mainly domestic
JCRA	Japan	1985	501	Financial institutions	All industries	Mainly domestic	Mainly domestic
NIS[2]	Japan	1985	587	Financial institutions	All industries	Mainly domestic	Mainly domestic
CBRS	Canada	1972	395	Individual investors	All industries	Mainly domestic	Mainly domestic
DBRS	Canada	1976	378	Individual investors	All industries	Mainly domestic	Mainly domestic
IBCA[1]	U.K.	1978	531	Individual investors	Financial institutions	Global	Global
Thomson BankWatch[3]	U.S.	1974	592	Thomson Corp.	Financial institutions	Global	Global
S&P/ADEF	France	1986	153	S&P	All industries	Domestic	Domestic
Mikuni	Japan	1983	1,300	Individual investors	All industries	Domestic	Global

Source: Nomura Research Institute, 1996.

[1] Fitch and IBCA merged in January 1998 to become FitchIBCA. In line with the period analysed in this research (from 1989 to 1997) they are reported here separately.

[2] Japan Rating and Investment Information, Inc (R&I) was launched on April 1, 1998 by the merger of NIS and JBRI. This research studies these two agencies individually and, therefore, they are reported here separately.

[3] In early 1999, this agency changed its name to Thomson Financial BankWatch. Since the period of study is prior to the change, the agency is referred to as Thomson BankWatch throughout this work.

Financial BankWatch in early 1999. Since these changes occurred after the period analysed by this study, rating agencies are described and referred to as they appear in Table 2-1.

2.2.2 Globalisation

As the financial markets evolved and became more integrated so did the rating industry. In domestic capital markets, independent agencies, such as Moody's and Standard and Poor's, have long rated the creditworthiness of borrowers. But it was during the growth years of international bank lending and international bonds that credit rating agencies came to assume a much higher profile in business circles. They became crucial for private and public enterprises seeking access to rapidly growing financial markets such as the Eurocurrency markets. It was also a time when a range of new financial investment opportunities were made available to local and international investors. The rating agencies provided information that was of use both to borrowers and lenders. In 1989, over 50% of the volume of actively traded Eurocommercial paper was rated, while almost 70% of the volume on the Eurobond market carried at least one major agency's rating (Dale and Thomas, 1991). By 1994, more than two thirds of the instruments traded in these two markets were rated (Moody's Investors Service, 1995). At the present time rating agencies operate in markets all around the world. As mentioned earlier, credit rating agencies have penetrated the domestic markets of more than a hundred countries around the world and are also being increasingly introduced in the capital markets of developing countries.

2.2.3 Increasing Number of Debt Issue Categories

Over time, the agencies have expanded the depth and frequency of their coverage. During the 1980s, as the complexity and diversity of financial products increased, rating agencies greatly broadened the range of information they provided. Rating agencies today do much more than make judgements about the credit risk of corporate bonds, sovereign bonds and municipal bonds. They also rate the quality of commercial paper, mortgage- and asset-backed securities, preferred stocks, medium-term note programmes, bank certificates of deposit, mutual funds, syndicated loans and many other financial instruments.

2.2.4 Increasing Variety of Issuers

The range of rated issuers has also broadened. From being an industry originally dominated by utilities and industrial issuers, the rating industry has expanded its activities to issuers in more than 35 different types of industries. In addition to rating companies in industries such as energy, utilities, real state, transportation, textiles, communication, retail trade, wholesale trade, aerospace and defence, rating agencies have expanded their coverage to include, *inter alia*, municipal and state governments and their agencies, sovereign governments, financial institutions -including commercial banks, finance companies, thrift institutions, brokerage companies and insurance companies-, and supranational organisations.

Rating agencies differ greatly in their business strategy and size of operation. Standard and Poor's, Moody's and three Japanese agencies (JBRI, JCRA and NIS) are generalists that cover all industries. IBCA and Thomson BankWatch are more specialised and concentrate on particular industries such as financial services. Some agencies, such as Duff and Phelps and Fitch Investors Service, cover a broad range of industries, but also focus on specific fields such as public entities or structured finance (see Table I-3 in Appendix I).

2.3 Reasons for the Expansion of the Rating Industry

The previous section described the different ways in which the rating industry has expanded its coverage and activities. This section identifies the main factors leading to the global expansion of the rating industry, which include: the growth of cross-border capital flows; the increasing reliance of borrowers on securitisation as a source of funding; the investor concern with credit risk heightened by financial crises; the increasing use of credit ratings in regulation, the syndicated loan market, and the assessment of counterparty risk; and, more importantly, the effect of credit ratings on borrowing costs. Each of these factors is discussed in detail below.

2.3.1 Cross-border Flows[2]

The advantages of international portfolio diversification for both investors and borrowers have contributed to the growth of cross-border flows. In turn, the need to assess the credit risk of foreign borrowers has increased the demand for credit ratings.

Investor Diversification

If national financial markets are not perfectly -positively- correlated, investors should be able to reduce their portfolio-variance-risk without sacrificing return by international diversification, because part of what would be a nondiversifiable risk domestically might be diversifiable internationally. This insight has given rise to a series of studies surveyed by Adler and Dumas (1983), which concluded that the low correlation between national financial markets allows for possible gains from international portfolio diversification.[3] More recently, studies carried out by Challerton, Pieraerts and Solnik (1986), Solnik (1988), Eun and Resnik (1988), and Elton and Gruber (1995), among others, have shown that the low correlation across markets for stocks, bonds and T-bills provides the strongest argument for international diversification.[4]

Even for countries whose economies are relatively highly integrated -for instance, Canada and the United States, the Benelux countries, and the Scandinavian countries- the correlation of investment returns are significantly lower than intra-country returns. As Europe integrates its markets and EU member countries tend towards greater integration, the correlation of investment returns is likely to rise.[5] However, as in the mentioned cases, they are still likely to be low relative to intra-

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[2] The term cross-border is applied throughout this work to denote that the borrower and the lender who participate in a transaction are domiciled in different countries.

[3] Similarly, Choi (1988) argues that international diversification gains affect corporate international investment significantly. Corporate foreign investment will increase the greater the variability of domestic returns and/or the lower the correlation between domestic and foreign returns.

[4] Nevertheless, risk depends not only on correlation coefficients but also on other factors such as the standard deviation of return, foreign exchange risk and country risks. Eun and Resnick (1987), for instance, find significant empirical differences between the potential and actual gains from international diversification.

[5] In particular, exchanges rates between European currencies will be fixed. Although European currencies will continue to fluctuate with the U.S. currency, any advantage in diversifying across currencies will be eliminated. However, they are currently fixed within narrow limits with occasional devaluations so that the change will not be a major change.

country correlations. Thus, international diversification is likely to continue to lead to risk reduction in the foreseeable future.

For investors who diversify internationally, assessing the risk of their investments is crucial. Traditional measures of credit quality -such as the issuer's reputation- have become less reliable. With so many issuers in the world's markets, investors cannot always determine whether a company's reputation is indicative of its credit quality. Conversely, highly creditworthy companies may not be widely known outside their home country.

Demand for rating services exists because gaps in information exist between issuers and investors, because of the uncertainty inherent in all investments, and because rating agencies can acquire and analyse information for many investors more credibly and cost effectively than investors or issuers on their own, as discussed in 2.3.4. Therefore, investors may make use of ratings as a source of accurate and updated information in order to make their investment decisions.

Borrower diversification

Another factor influencing the growth of credit ratings has been the diversification of sources of funding undertaken by borrowers in an attempt to minimise risk and costs. It is generally accepted that international diversification lowers the cost of capital for foreign projects, as compared to otherwise-identical domestic projects, assuming the risk and the cost of international investment can be diversified (Stanley, 1981; Fatemi, 1984; and, Choi and Severn, 1991).(6) In line with this, Remmers (1980) has shown that local currency loans are more costly than Eurocurrency loans.(7)

Credit ratings enable borrowers -governments or corporations- to broaden their access to financial markets in search of more favourable conditions when issuing debt. The cost advantage is typically derived from the "wholesale" nature and an absence of government interference in the cross-border market .(8)

(6) Nevertheless, Choi and Severn (1991) argue that the cost of capital is not necessarily lower for foreign projects than for domestic projects because exchange and country risks may offset the benefits of international diversification.

(7) Eurocurrency loans are loans extended by banks in countries other than the country in whose currency the loan is denominated.

(8) The retail sector has also been attractive to issuers because yields are typically substantially lower on retail issues than on professionally targeted issues. For example, highly rated issues can often be brought to the retail market at a negative spread to sovereign issues and many developing

Although global capital markets have grown dramatically in recent years, the cross-border share of this market has grown even faster. It is this cross-border share of global capital markets which is of prime interest to multinational firms and sovereign governments. Their financing needs have become increasingly sophisticated with respect to country source, maturity, interest rate and servicing structures, currency of denomination, collateral and type of instrument.

For small or medium issuers who enter the capital markets for the first time, a credit rating would be indispensable to compensate for the lack of name recognition. Ten years ago, only the largest and strongest companies sought credit ratings - usually a way to access the Yankee bond market(9) or to improve funding costs in the high-quality oriented Euromarket. Since then, the range and number of corporate credit ratings has widened dramatically. A key reason for this development is the global access provided to issuers with an 'A', 'BBB' or even a 'BB' rating (Kranenburg, 1996b).

Table 2-2. Institutional Investors' Holdings of Securities Issued by Non-Residents
(In percent of total assets) [1]

	1980	1988	1990	1991	1992	1993	1994	1995
Pension Funds	3.43	7.00	8.02	9.24	9.40	10.16	12.57	17.00
Life Insurance Companies	2.27	3.64	5.98	6.10	7.05	7.60	20.70	23.50
Mutual Funds	18.90[2]	20.50	15.75	21.13	18.05	26.87	26.90	26.43

Source: IMF, *International Capital Markets*, September 1998.
[1]Average of all or some of the following industrial countries: United States, Japan, Germany, United Kingdom and Canada.
[2]Average of United States and Canada only.

Table 2-2 illustrates the growth of international diversification. As institutional investors have grown in size, they have diversified their portfolios internationally. In 1980, institutional investors in most countries had less than 5 percent of their assets invested in foreign securities. By the mid-1990s, the share of

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countries have been able to reduce their funding costs more than 100 basis points with retail issues. See Irvine, 1995.
(9) Yankee bonds are US-dollar-denominated bonds issued in the US by a foreign issuer.

foreign assets in their portfolios had increased to roughly 20 percent on average. This shows that borrowers and investors have increasingly engaged in international lending/investment activities in an attempt to diversify risks. Since investors regard credit ratings as a valuable tool for making informed decisions and borrowers use ratings to gain access to international funding sources, global diversification has been a major driving force in the expansion of the rating industry.

2.3.2 Securitisation

Securitisation has also played an important role in the expansion of ratings. It should be emphasised that there are two sources of securitisation, namely (1) the shift of borrowers from bank loans to bond and/or commercial paper issuance -i.e., securities issuance- to finance their funding needs; and (2) the repackaging of loans and reissuance of securities undertaken by banks. In this section both sources of securitisation and their relationship with credit ratings are discussed.

Securities Issuance

The issuance of securities offers significant opportunities and benefits to issuers and investors. For issuers, it offers an efficient, diversified source of financing,[10] often at a lower execution cost than is available through traditional bank loans, or debt or equity financing. The securitisation sector permits investors to diversify their investment portfolios and corresponding risks, while offering a variety and flexibility of credit, maturity and payment structures and terms.

The growing importance of bonds versus bank loans as the main source of external financing for borrowers in past years has fostered the use of credit ratings.[11] The shift of sovereign borrowing from the syndicated loan market to the bond and commercial paper markets, where there is an established tradition of using opinions provided by independent rating agencies, has done much to increase the growth of

[10] The benefits of borrower and investor diversification are discussed in 2.3.1.

[11] McCauley and Zimmer (1989) provide some evidence in favour of securitisation. They show that a higher corporate leverage ratio (debt-equity ratio) resulting from either an increase in bond or bank debt -or both- lowers a firm's cost of capital. Additionally, Diamond (1991) argues that new borrowers borrow from banks initially, but once a reputation for timely loan repayment has been acquired, borrowers will be able to issue debt directly (publicly traded bonds or commercial paper) without monitoring.

ratings. For instance, sovereign borrowing through the commercial banking sector in the 1970s and 1980s has migrated to the Eurobond, Yankee bond and Samurai bond sectors in the 1990s (see Table 2-3).(12) Moreover, a notable appetite for high-yield investments remains in the U.S. and has also emerged in Japan, Germany and Switzerland. This demand, in turn, is encouraging lower-rated issuers, who often hesitated in the past, to seek finance in the public debt markets and to request ratings for this purpose. However, this growth has produced a dramatic change in the distribution of ratings. In 1985, only the strongest credits from Western Europe and Japan had ratings -outside the U.S. Now, rating agencies' coverage across all regions represents a much broader spectrum of credits, and medium-grade ratings - ranging from 'BBB' to 'A'- account for the majority of the issuer credit ratings (Kranenburg, 1996b). Moreover, while part of the overall decline in the rating composition of bond issuers since the late 1980s reflects the continued outpacing of investment-grade new issuance by speculative-grade new issuance, part of it reflects the negative rating drift for existent issuers -i.e., downgrades have outnumbered upgrades (Keenan, Shtogrin and Sobehart, 1999).

Table 2-3. Recourse to International Financial Markets (billions of US dollars)

Year	Syndicated Loans	International Bonds[1]
1986	124.7	227.1
1987	65.9	180.8
1988	84.7	227.1
1989	121.1	255.7
1990	124.5	229.9
1991	116.0	308.7
1992	117.9	333.7
1993	136.7	481.0
1994	236.2	428.6
1995	370.2	467.3
1996	345.2	708.8
1997	390.4	831.6

Source: OECD, *Financial Market Trends.*
[1] Includes both euro- and foreign-bond issues

(12) Eurobonds are bonds denominated in one country's currency but issued in markets outside that country. Foreign bonds such as Yankee and Samurai bonds are bonds denominated in one country's currency and issued in that country by a foreign issuer. Eurobonds and foreign bonds are both considered international bonds. Global bonds are bonds traded simultaneously in the markets of different countries.

An active secondary market for corporate bonds increases the need to use ratings. By way of contrast, Hirai and Tomita (1996) attribute the relatively minor role played by ratings in investor decisions in Japan by 1996, in part, to the fact that trading on the secondary market had not been active and bond defaults had been rare.

Repackaging of Securities

It has been recognised that asset securitisation can serve as an efficient way to redistribute credit risks of a bank to other banks or non-bank investors. For banks, securitisation provides a vehicle that can be used to transform illiquid financial assets into tradable capital market instruments. In this respect, securitisation is providing better risk diversification and is enhancing financial stability. For investors, securitised instruments generally offer an attractive yield premium over sovereign issues of comparable credit quality and maturity.

The Basle Committee on Banking Supervision of the Bank for International Settlements has proposed a revision to the current capital adequacy framework that makes use of credit ratings for setting capital charges for asset securitisations. As a result, banks would maintain capital commensurate with their risk exposures. Furthermore, it is expected that since asset-backed securities issued in the international market typically have a credit rating, the use of such ratings for assessing capital against risks arising from securitisation transactions would further promote the objective of ensuring competitive equality.

Credit ratings are used in the securitisation market to assess the credit quality of the obligations that are securitised. The European Securitisation Forum, whose mission is to promote the continued growth and development of securitisation throughout Europe has recognised that rating agency involvement is one of the basic elements of a uniform framework for European securitisation (European Securitisation Forum, 1998).

2.3.3 Financial Crises

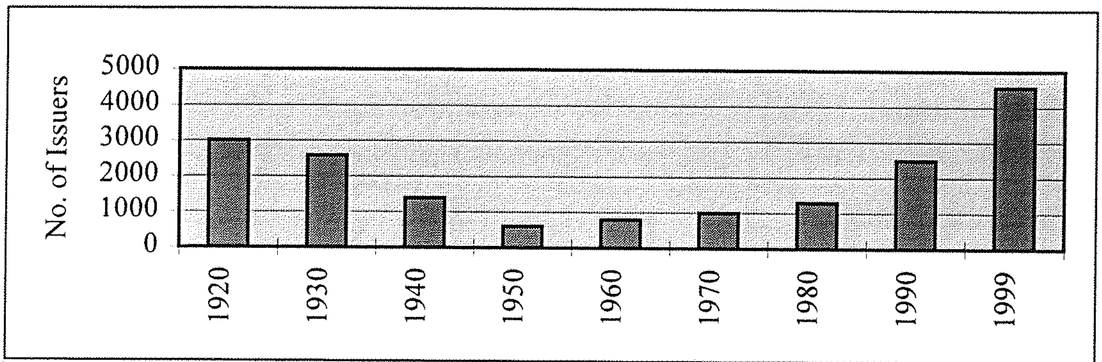
Although the development of the rating industry dates from the beginning of this century, the last 30 years have witnessed the most dramatic expansion of rating activity (Charlton and Prescott, 1993). Evidence suggests that this expansion has been triggered in part by default events, the increase in demand for credit ratings coinciding with high bond default rates and associated investor concern with credit risk (McGuire, 1995; and Keenan, Shtogrin and Sobehart, 1999). Figures 2-1 and 2-2 show the growth of corporate bond issuer ratings and the default rates of both rated and unrated corporate bond issuers since 1920. The figures illustrate that, on the whole, increases in demand for corporate ratings closely correspond to periods of high default rates. Low levels of default rates persisted after World War II and until 1970, when Penn Central Transportation Co. defaulted on 82 millions US dollars in commercial paper. As a result, investors began to question the financial condition of many companies and refused to roll over their commercial paper. To reassure nervous investors, issuers actively sought credit ratings and it became established market practice that new debt issues coming to market had at least one credit rating. After 1970, default risk again ebbed and was moderate-to-low by historical standards until 1982, when Mexico's default marked the beginning of the modern period of relatively high default risk, thereby raising the demand for credit ratings. The most recent event contributing to the demand for ratings was the East Asian crisis in the second half of 1997, which made evident the effects of massive reversals in foreign capital inflows and which preceded the currency and financial crises in the Russian Federation in August 1998 (World Bank, 1998a,b).

It can be noted from figure 2-1 that, since 1970, the number of rated firms has increased steadily, with sharp increases during the 1980s and 1990s, reflecting, in addition to high default rates, the development of the junk bond market(13) in the US and the rating agencies' expansion into non-US markets.

One deficiency is noteworthy, however. The period from mid-1929 through December 1939 produced the heaviest default activity of this century, in the aftermath of the Great Depression. Despite the fact that default incidence was high during these years, the number of corporate bond issuers rated decreased. Nevertheless, the downward trend does not imply a loss of market confidence in credit ratings, but rather reflects the public bond market's retrenchment following the

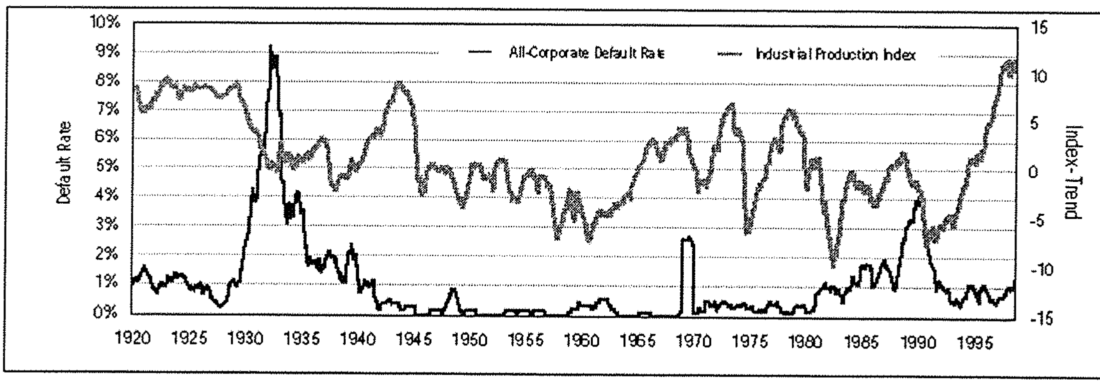
Great Depression and World War II, increasing financial intermediation, and consolidation in the railroad and utilities industries. In fact, the number of ratings of non-US securities and companies in 1929 exceeded those outstanding in any year after the Great Depression until 1990 (Pinkes, 1997).

Figure 2-1. Growth of Rated Corporate Bond Issuers, 1920-1999[1]



[1]Number of rated issuers as of the start of each decade
Source: Moody's Investors Service

Figure 2-2. Corporate Issuer Default Rate, 1920-1998



Source: Moody's Investors Service

A direct impact of the increase in the demand for ratings has been the transition to charging issuers. With an increasing demand for rating services, the

[13] Junk bonds are speculative debt securities issued by companies which have no ratings from the international credit rating agencies or which are rated below investment grade (i.e., BB+/Ba1 or lower). See Iskandar and Luce, 1997.

agencies found they were able to impose charges on issuers. Agencies initially provided public ratings free of charge, and financed their obligations solely through the sale of publications and related materials, which did not yield sufficient returns to justify intensive coverage. As the demand for a faster and more comprehensive ratings service increased, the agencies began to charge issuers for ratings. They then used these revenues to expand services and products and to compete with private sector analysts. For instance, Fitch and Moody's started to charge corporate issuers for ratings in 1970, and Standard and Poor's started to charge municipal bond issuers for ratings in 1968 (Cantor and Packer, 1994).

2.3.4 Regulation

The authorities in the United States first began to use ratings in regulations during the depression years of the 1930s in order to help protect the asset quality of financial institutions. Their use has since spread to other areas of SEC regulation, to other US regulators and to regulatory authorities and legislatures throughout the world. Ratings have come to be used in regulation in a variety of ways (Baron, 1989; Dale and Thomas, 1991; Cantor and Packer, 1994; and Groenfeldt, 1995). Several uses of ratings in regulation are described below.

Market Efficiency

Credit ratings are used by regulators with the rationale that ratings contribute to market efficiency by reducing information asymmetries between investors/lenders and borrowers. Within this framework, issuers use credit ratings to convey the market the credit quality of their debt issues and investors use a rating to infer the true quality of a security and price it accordingly. Hence, regulatory authorities have frequently incorporated credit ratings into their rules, such as those which substitute a requirement to be rated for certain disclosure requirements.

An efficient capital market is one in which security prices fully reflect all available information (Fama, 1991). A number of studies have examined whether or not markets are efficient.(14) In general, these studies find that market security prices seem to adjust rapidly to new public information and conclude that this is the most supportive evidence on market efficiency. While most of the research on market efficiency has centred on the major foreign markets -US, Japan, Europe- Lee, Sung and Urrutia (1996) have expanded this research to financial markets of lesser-developed-countries (LDCs) and have shown that these markets have become more efficient over time.

This sub-section argues that both the revelation and the certification functions of credit ratings reduce information asymmetries and contribute to market efficiency, thereby justifying the regulatory use of ratings. The revelation function results from credit ratings providing previously unknown information about a security's credit quality. This new information is in turn reflected in the adjustment of market security prices to changes in credit ratings. The certification function attributes the value of credit ratings to the ability of rating agencies to acquire and process information for the purpose of certifying credit quality. Specifically, the rating agency uses its reputation for correctly and independently assessing credit quality to guarantee the credit rating assigned. Furthermore, even if ratings do not bring new information to the market, decreased investor uncertainty resulting from the certification of the information already available may enhance market efficiency.

Research shows that the information provided by the rating agencies, either new or certified, is reflected in market security prices. If capital markets are efficient and if credit ratings convey no new information there should be no market reaction to rating changes or reviews.(15) On the other hand, the adjustment of market prices to changes in ratings suggests the revelation of new information. Market-based empirical studies have examined both the bond price and the stock price reaction to a bond rating review or actual change. The evidence is mixed on whether credit ratings contain additional information not already embedded in market yields.(16) But even if ratings do not contain independent information about credit risk, the use

(14) Fama (1970 and 1991) provides an extensive review of the market efficiency literature.

(15) The rating is put on review for a possible downgrade or upgrade.

(16) Section 2.3.7 provides a review of these market-based empirical studies. Additionally, Clark, Foster and Ghani (1997) have researched the information effect of bond rating changes by examining financial analysts' reactions rather than the market reaction. They have found that ratings communicate valuable information to the market about firms.

of ratings by investors and regulators may still make sense if ratings offer an efficient summary of the publicly available information -the certification function.[17]

In a perfect (efficient) market environment, intermediaries could perform no unique financial service that investors would not be able to reproduce as easily. In contrast, in any market with asymmetric information the production of information that leads to the identification of the true value of assets will not be done efficiently or at least cost (Campbell and Kracaw, 1980). It is argued, therefore, that intermediation has developed as a response to costly market imperfections. In their intermediary role, rating agencies enhance the flow of information, thus correcting for the information asymmetries that characterise the direct finance markets (Holthausen and Leftwich, 1986).[18]

Within the frameworks discussed above, credit ratings are used by regulators with the rationale that capital markets function more efficiently if investors have accurate assessments of each issuer's credit risk (Dale and Thomas, 1991; and Selzer, 1997). Ratings contribute towards market efficiency either by revealing new information or by certifying that already available. Here the emphasis is on disclosure requirements rather than the application of eligibility standards for bond issuance. Disclosure issues are important from the vantage point of investors and companies. In the context of international capital markets, lack of comparable disclosure can hinder the capital decisions of investors (Choi and Levich, 1990). For companies seeking to raise capital in foreign countries, complying with different foreign disclosure requirements is an arduous and costly process (Saudagaran and Biddle, 1992). Thus, harmonisation initiatives targeting disclosure requirements, such as the use of credit ratings, are of interest to many groups.

Researchers have identified some further benefits of disclosure. For example, Diamond (1985) shows that disclosure reduces duplication in investors' investigation expenditures and has risk-sharing benefits. Fishman and Hagerty (1989) show that

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(17) Section 2.3.7 reviews some of the work which shows the value of the certification function of credit ratings.

(18) Grossman (1976) and Grossman and Stiglitz (1976) have shown, however, that in markets where asymmetries in information about the quality of assets exist, the market price may instantaneously and efficiently aggregate and summarise all available information about the quality of the asset. Under these conditions, information may be characterised as a public good (the value or usefulness of information is undiminished as it becomes available to other investors) which cannot be protected so as to extract excess profits from the market.

disclosure can improve stock price efficiency and investment decisions, and Diamond and Verrecchia (1991) show that disclosure can improve liquidity and reduce the firm's cost of capital. Nobes (1991), and Adhikari and Tondkar (1995) point out that harmonisation of accounting reporting and disclosure requirements for companies listed on stock exchanges would not only facilitate investment decisions for international investors but also would make it easier for these companies to raise money in foreign capital markets. Critics of mandatory disclosure have argued, however, that regulation is unnecessary because firms have an adequate incentive to disclose voluntarily. For example, Ross (1979), Grossman (1981) and Milgrom (1981) suggest that unless disclosure costs are prohibitively high, firms are forced by investor scepticism about nondisclosers to disclose voluntarily.

For all the above stated reasons, regulatory uses of ratings aimed at enhancing market efficiency have become widespread. Under New Zealand's new banking law, for instance, every bank must prominently display the credit rating given to its long-term senior unsecured liabilities payable in New Zealand (Goldstein and Turner, 1996). Additionally, a series of regulatory actions in the domestic financial markets of several emerging markets has increased the demand for credit ratings. The governments' main intention is to use ratings to ensure transparency and to help enforce market discipline (Black, Bates and Petit, 1998). Table 2-4 lists those countries whose regulatory authorities require the use of credit ratings for various financial activities in 12 major emerging markets.[19]

Investor Protection

In addition to enhancing the flow of information between investors and borrowers, thereby correcting for information asymmetries, and to contributing to market efficiency by increasing awareness of the risk characteristics of particular securities through disclosure procedures encouraged by regulators, financial authorities may use credit ratings to protect investors. In some cases this objective is achieved by imposing minimum gradings on the issuance of debt securities. The rationale here is that since market regulators have a mission to guarantee the smooth operation of capital markets, quoted securities should offer minimum standards of protection. For

[19] See 2.4.1 for a description of national and international scale ratings.

instance, in 1993, the SEC adopted Rule 3a-7, which made the investment grade rating a criterion for easing the public issuance of certain asset-backed securities (Cantor and Packer, 1994).

Table 2-4. Regulatory Uses of Credit Ratings in Major Emerging Markets

Country	Bonds	Commercial Paper	Other Activity[1]
Argentina	X	X	X
Chile	X	X	X
Colombia			X
India	X	X	X
Indonesia	X	X	
Korea	X	X	
Malaysia	X	X	
Mexico	X	X	X
Philippines		X	
Taiwan	X		X
Thailand	X	X	
Turkey	X	X	

[1] Includes bank certificates of deposit, pension and mutual funds, insurance companies, financial guarantees, and other financial activities.
Source: Standard and Poor's.

Furthermore, some regulatory authorities impose direct restrictions on the kind of securities that certain categories of investors may purchase. For example, in most U.S. states, ratings are used as criteria for investment eligibility and valuation of securities held by fiduciaries and state regulated entities such as insurance companies, public retirement funds and state-chartered banks and thrift institutions. Many states permit banks to invest only in bonds rated in the three or four highest rating categories of a major rating service. Similarly, two Australian provinces, New South Wales and Victoria, make use of ratings in determining what investment fiduciaries may make (Baron, 1989).

Prudential Regulation

Regulators may also use ratings for prudential purposes -aimed at financial soundness- to restrict or prohibit institutional purchases of low-grade securities. For instance, in the U.S., the Office of the Comptroller of the Currency ruled that banks were not allowed to purchase securities with a rating below BBB. The rationale here is that the purchase of sub-investment quality securities could threaten a bank's solvency and thereby destabilise the financial system.

International financial regulators have also incorporated credit ratings as a basis for applying risk weightings in order to determine capital adequacy requirements.[20] As an example of this practice, the Council of the European Communities (1993) has incorporated credit ratings into its directive 93/6/EEC of 15 March 1993 on the Capital Adequacy of Investment Firms and Credit Institutions. Article 2(12) requires the default risk associated with *qualifying instruments* be evaluated by at least two credit rating agencies recognised by the competent authorities or by only one such credit rating agency so long as these instruments are not rated below the level of the assets referred to in Article 6(1)(b) of Directive 89/647/EEC by any other credit rating agency recognised by the competent authorities. Such qualifying items receive a more favourable treatment when calculating their capital requirement against specific risks for they are deemed to be of better quality than *other items.*

Similarly, in June 1999, the Basle Committee on Banking Supervision of the Bank for International Settlements proposed a new capital adequacy framework to replace the 1988 Accord (Basle Committee on Banking Supervision, 1999). With regard to minimum regulatory capital requirements, the Committee has proposed a new standardised approach for determining the risk weighting of banking book assets -e.g., claims on sovereigns, banks, certain corporates, and certain asset securitisations- which would place a greater reliance on external credit assessments, such as credit ratings. Within this approach, the use of such assessments could provide a means of adequately differentiating between borrowers' differing default risks. The weightings proposed for claims on sovereigns, banks and corporates are shown in Table 2-5.

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[20] For fixed-interest securities extended by the banks, such as bonds, the presumption is that the price volatility is inversely related to the issuer's credit standing. However, McEnnally and Ferri (1982) and Stock and Schrems (1984) have shown that bonds may have different price volatilities within the investment grade category.

Table 2-5. Proposed Risk Weightings in the New Capital Adequacy Framework Based on Credit Ratings

Issuer		Credit Rating					
		AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Sovereigns		0%	20%	50%	100%	150%	100%
Banks	Option 1[1]	20%	50%	100%	100%	150%	100%
	Option 2[2]	20%	50%[3]	50%[3]	100%[3]	150%	50%[3]
Corporates		20%	100%	100%	100%	150%	100%

[1] Risk weighting based on risk weighting of sovereign in which the bank is incorporated.
[2] Risk weighting based on assessment of the individual bank.
[3] Claims on banks of a short original maturity, for example less than six months, would receive a weighting that is one category more favourable than the usual risk weight on the bank's claim.
Source: Bank for International Settlements, June 1999.

Other Regulatory Uses

Credit ratings are used by regulators for a number of other purposes apart from those previously mentioned. Fungibility of a security has provided the rationale to permit reduced registration disclosures for high-grade securities, to lift the prohibition on investment companies purchasing certain rated municipal securities from an affiliated underwriter, and to permit underwriters to engage in stabilisation transactions for investment grade debt. For instance, for certain types of securities and certain types of issuers, obtaining a rating results in the relaxation of the rules. US regulatory authorities require that in order to qualify for exemption from registration, domestic CP must be "prime quality negotiable paper". In France, non-banks with a current published rating wishing to issue short-term or medium-term notes are exempted from the approval of the disclosure document and receive, instead, post-facto supervision. In a different context, ratings may affect the method of valuation of securities held by institutional investors.

Although regulation has enhanced the acceptance of credit ratings in the financial markets and, therefore, contributed to the growth of the rating firms, the use of rating-based regulations and official recognition of rating agencies have become the focus of growing debate. Appendix II identifies some of the issues that have raised questions about the suitability of credit ratings for regulatory uses.

2.3.5 Syndicated Loans

During the 1970s, the syndicated-loan market was primarily devoted to sovereign lending (Sachs and Huizinga, 1987; Ajami and Khambata, 1986; Lessard and Williamson, 1985). However, the Mexican debt moratorium in 1982, which marked the start of the international debt crisis of that decade, suppressed sovereign lending to lesser-developed-countries (LDCs) and brought credit or default risk to the forefront. Ever since, the Eurobond has become a major competitor of the syndicated Eurocurrency loan as shown above (Table 2-3). Nevertheless, the syndicated Eurocurrency loan has managed to survive and prosper. This is because syndicated credits offer certain unique advantages. In general, the arguments for the existence of syndications in sovereign lending appear to rely on: (1) the reduction of information asymmetries between lenders and borrowers; and, (2) the collective ability of lenders in renegotiation situations (Sundaram, 1989). From the lender's viewpoint, syndication of public credits allows banks to reduce risk in two ways. First, it allows banks to diversify their loans to the public sector, which is more essential than with loans to the private sector due to the bank's lack of control over and protection against default by sovereign entities. Second, it provides more protection against selective defaults due to the presence of certain interbank agreements -broadly called "protective clauses"- that members of a syndicate enter into among themselves.(21) From the borrower's viewpoint syndication allows for the efficient arrangement of a larger amount of funds than any single lender can feasibly supply.

Syndicated loans have given access to many firms and institutions that are too small, unknown, or too risky to have an investment grade rating and, therefore, to appeal to most segments of the international capital markets. Institutional investors who dominate many of these markets, for example, prefer investment grade securities with low default risk and a large and liquid secondary market. They have neither the means nor the expertise to evaluate the securities of most firms and institutions that do not fulfil these criteria. Banks, on the other hand, because of the nature of their role as intermediary with many agents in a wide range of transactions, have the expertise and means of evaluating and managing risks and maturities that are unattractive to other segments of the international markets. Although the syndicated Eurocurrency credit market has been, to some extent, informationally efficient (Doukas, 1989), it has been argued that asymmetric information is still a prevalent feature of bank lending (Banerjee and Cadot, 1996). This information asymmetry is present at two levels: between borrowers and creditors, and between lenders themselves. Furthermore, empirical results provided by Megginson, Poulsen and Sinkey (1995) suggest that during the 1970s and 1980s Western banks mispriced loans to LDC sovereign borrowers. This mispricing is attributed to the lack of banks' monitoring technology to generate reliable information about these borrowers and to the lack of legal/economic power to control borrowers' behaviour towards the assets and loan proceeds.

Credit ratings are used by banks in order to assess the risk associated with the borrower involved in a syndicated loan and, thereby, reduce these information asymmetries. Goodman (1980), Ahmad (1989), and Doukas (1989) point out the importance of the perceived risk associated with a borrower in the determination of spreads for syndicated Eurocredits.(22) The higher the perceived risk, the greater the debt service difficulties anticipated by the lenders, hence the wider the spread that would be required. In line with this, variable interest rates, usually used in Eurocurrency credit facilities, have advantages for both borrower and lender. They insulate the banks from interest rate risk while they give the borrower access to medium- to long-term money at short-term rates. The disadvantage is that variable rates make borrowers more vulnerable to default when interest rates rise. Consequently, by laying the interest rate off on the borrower, banks have effectively exchanged interest rate risk for increased default risk (Grabbe, 1991). Hence, banks attach special importance to credit risk assessment and they make use of credit ratings to assess this kind of risk. While ratings have been more typically applied to bond issues, the resumption of syndicated lending as a source of sovereign funding

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(21) Protective clauses include, for instance, the sharing clause, the *pari passu* clause, the negative pledge covenant, and the cross default clause. See Sundaram (1989) for a review of these clauses and further references.

(22) Furthermore, Ahmad (1989) suggests that creditworthiness has a greater impact on the spreads charged on syndicated Eurocurrency credits to developing countries than on the spreads charged

has resulted in an increasing role of ratings in assessing the creditworthiness of borrowers in syndicated credits.

2.3.6 Counterparty Risk Assessment

Counterparty risk is the potential exposure any individual firm bears that the second party to any financial contract will be unable to fulfil their obligations under the contract's specifications. Thus, a counterparty credit rating is a type of issuer credit rating which is intended to convey to participants in the counterparty markets that these ratings benchmark the general credit strength of obligors in various derivatives, settlement and other financial obligations.[23] These obligations include, *inter alia*, swaps, forwards, futures, options, letters of credit and similar products.

Large-scale derivatives activity has added a new dimension to the transparency problem in financial markets -although here the difficulty arises from the speed and complexity of risk transformation. Derivatives activity fundamentally decreases the transparency of participants' operations, which makes it more difficult to assess the impact of their derivatives activity. As a result, financial markets have been relying more heavily on credit assessments by rating agencies, thereby contributing to the growth in ratings for measuring counterparty risk (Kriz, McGuire and Hilderman, 1994; and Dale, 1995).

Typically, many counterparties in derivatives transactions do not deal with banks rated less than double-A.[24] In order to fulfil this requirement, the concept of Derivatives Product Companies (DPC) was developed,[25] and, although until early 1994 counterparty ratings were virtually limited to DPCs, rating agencies have been expanding counterparty ratings to encompass all appropriate entities which engage in derivatives activities, as intermediaries and/or as end-users (Kriz, McDaniel and Young, 1994). These entities include, for instance, banks, bank holding companies,

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to industrial countries; and Doukas (1989) shows that, during financial crises, contagion effects also determine syndicated Eurocurrency credit spreads for developing countries.

(23) See 2.4.4 for a description of issuer and issue credit ratings.

(24) For instance sovereign governments, supranational agencies and very large corporations.

(25) A Derivatives Product Company (DPC) is a separately capitalised subsidiary of a major financial institution, established to transact a variety of derivatives instruments in the credit-sensitive over-the-counter market. It is a special purpose vehicle structured to achieve a rating, typically a triple-A rating, higher than that of its sponsoring company, mainly by insulating itself from the credit risk of the parent company and by minimising market risk. See Ratti ,1993 and Maggioni, 1995.

securities firms, commodities-related companies, central governments, insurers, pension funds, finance companies, and industrial firms.

2.3.7 Interdependence Between Borrowing Terms and Creditworthiness

Undoubtedly, none of the above mentioned factors would have contributed to the growth of the credit rating industry unless there were a significant relationship between credit ratings and yield spreads. The interdependence between a borrower's credit rating and the terms at which funds can be raised internationally has been the reason underpinning the growth in the demand for credit ratings. This relationship has been suggested by research findings. The correlation between debt-security ratings and debt-security yields is well established -the lower the debt rating, the higher the average yield to maturity of that category. However, the evidence of a causal relationship -i.e., the yield on a debt security is a function of its rating- is mixed. The empirical studies that attempt to prove this relationship can be grouped into two categories depending on whether ratings affect market security prices by revealing or by certifying information about the security's credit (see 2.3.4). The first set of studies attributes the effect of ratings on bond and stock prices to the fact that credit ratings provide a quality revelation function which is of value to borrowers in a market with asymmetric information -i.e., ratings bring information to the market above and beyond that already available. The second group of studies suggests that the value of credit ratings stems from the certification function provided by the reputation of the private rating agencies. According to this, ratings affect the yields of publicly traded securities by certifying the available information rather than revealing new data.

Literature on the revelation function of ratings is mixed, as mentioned earlier. Katz (1974), Grier and Katz (1976), and Hettenhouse and Sartoris (1976) all report some evidence of bond price adjustment to the announcement of a rating change. More recently, Ederington, Yawitz and Roberts (1987), and Altman (1989) found for their samples of US industrial and corporate bonds, respectively, that yield spreads are significantly correlated with credit ratings. Similarly, Cantor and Packer (1996a) have shown that sovereign bond ratings effectively summarise and supplement the information contained in macroeconomic indicators. They found evidence which suggests that the rating agencies' opinions independently affect market spreads. Contradicting these findings, Weinstein (1977), Wakeman (1978), Feeney (1988), and Artus, Garrigues and Sassenou (1993) failed to find a bond price effect at the time of the rating change. Controversial results have also been found. For instance, Larrain, Reisen and von Maltzan (1997) report impact of rating announcements for only emerging market sovereign bonds, whereas they found no significant effect on sovereign bonds of developed countries. Wansley, Glascock and Clauretie (1992) found that only bond rating downgrades affect a firm's bond price. Rating upgrades, on the other hand, produce no significant impact.

The stock price response to the announcement of bond rating changes has also been examined. Once more, no consensus has emerged. Despite the inconsistencies of their results, Hand, Holthausen and Leftwich (1992) conclude that there are both bond and stock price effects associated with announcements of possible or actual rating changes. Schweitzer, Szewczyk and Varma (1992) show that the stock-price reaction to changes of bank debt ratings indicates that rating agencies provide the market with valuable new information regarding the risk exposure of bank holding companies. Goh and Ederington (1993) report mixed reaction of common stock returns to bond rating changes. In contrast with these findings, Pinches and Singleton (1978), and Griffin and Sanvicente (1982) show that stock returns fully anticipate bond rating changes.

The effect of the certification function of ratings has been tested by examining the differences between the yields of: (1) rated and non-rated securities of similar quality; and, (2) securities with two identical or two different ratings and securities with only one such ratings. However, evidence of this certification function is not conclusive either. Hsueh and Liu (1993) show that general obligation rated bonds sell at a lower interest cost than comparable non-rated bonds with similar quality. Nayar and Rozeff (1994) present evidence that the initial ratings of commercial paper influence common stock returns by verifying publicly available information. Wakeman (1990) argues that the rating agencies summarise existing public information and that they lower information costs even though they do not provide new data. Moon and Stotsky (1993) found that municipalities have an incentive to request a second rating because they view two ratings as complements - as opposed to substitutes. This evidence is consistent with that in Hsueh and Kidwell (1988), which suggests that two ratings, either identical or different, may lower municipal bond interest cost in comparison to municipal bonds with only one rating. Thompson and Vaz (1990) report results which indicate that industrial bonds with two identical ratings have yields significantly lower than issues receiving that rating from only one agency. By contrast, Cantor and Packer (1996b) have examined the factors affecting a firm's decision to secure an additional rating and have found no supportive evidence for the certification role of credit rating agencies.

Credit ratings not only influence the spreads an issuer must pay in the financial markets, but also the maturities of the issues. Goldstein and Turner (1996) have shown that both interest rate spreads and maturities on international bond issues have differed markedly across developing countries during the past years. They have also suggested that this difference is attributable to the perceived creditworthiness of the borrower. For example, in 1995, East Asian borrowers enjoyed maturities almost three times longer than borrowers in Latin America. Moreover, the average spreads of Asian borrowers were about half as large as those of their contemporaries in Latin America. At that time East Asian borrowers enjoyed investment-grade ratings - 'AA/Aa'- whereas the Latin American borrowers were assigned ratings within the speculative-grade spectrum -'BB/Ba' and 'B'.

The above review has illustrated the influence of credit ratings on borrowers' credit terms. It has been suggested that spreads on publicly traded securities are partly determined by credit ratings -either through the revelation of new information or through the certification of information already available in financial capital markets. Most importantly, the demand for ratings has been underpinned by the relationship between credit ratings and borrowing costs.

2.3.8 Instantaneous Access to Credit Assessment

Finally, it should be emphasised that the growth of the rating industry has also reflected the advantages of credit ratings in terms of simplicity, comparability, and instantaneous access. First, credit ratings provide an easily recognisable, simple tool that couples a possible unknown issuer with an informative and meaningful symbol of credit quality. Each rating category is clearly defined and represents a different level of creditworthiness. Therefore, market participants obtain the issue/issuer's credit information summarised in a rating which is simple and readily understandable. Second, credit ratings provide a tool which allows for comparisons between issues and issuers within a country and across countries.[26] All relevant credit risk factors are thoroughly examined in the rating process. The default risk of an issuer or a specific issue is assessed relative to the universe of rated issuers or issues and ratings are assigned accordingly. Identical ratings, therefore, should represent identical degrees of credit risk.[27] In this way, ratings ease investors' choice for investment decisions. Third, ratings are normally communicated through publications and electronic means -e.g. Bloomberg and Reuters-, which make them instantaneously available for market participants.

2.4 Rating Categories

Sections 2.2 and 2.3 identified the increasing number and variety of both issuers and issues rated as two important features of the expansion of the credit rating industry. This section describes the different categories of ratings assigned by the agencies.

2.4.1 National and International Rating Scales

National scale credit ratings provide an opinion of the relative credit standing of entities and specific financial obligations within a particular country. More specifically, national credit ratings are current opinions of an obligor's creditworthiness with respect to a specific obligation or its overall capacity to meet its financial obligations, relative to the credit standing of other obligors in the same country. Therefore, national scale ratings are measures of relative credit risk tailored to the needs of specific national financial markets. International scale credit ratings, on the other hand, fully incorporate international comparative risk factors and allow comparison between countries and debt instruments world-wide.

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[26] See 2.4.1 for differences between national and international rating scales.

[27] However, it has been suggested that the informational content of ratings is not comparable across agencies. See Appendix II and Chapters 4, 5 and 6.

National scale credit ratings differ from international scale ratings in two important respects: (1) national scale credit risk opinions are based on comparative credit risk analysis of obligors in one country, instead of the broad international comparisons utilised for international scale ratings, and; (2) unlike international scale credit risk opinions, national scale ratings do not address direct sovereign risks, such as the possible imposition of foreign exchange controls, and only address country risk factors to the extent that they differ among sectors and obligors within the country. Reflecting the focus on relative creditworthiness and the exclusion of sovereign risk, the sovereign government will, almost invariably, receive the highest rating -"triple-A"- on the national scale. For the same reasons, national scale ratings cannot be compared with one another -i.e., between countries-, nor are they directly comparable with the ratings provided on the international scale.

In most instances, national scale credit ratings only take the form of local currency credit risk opinions. However, foreign currency credit opinions are provided on a national scale basis in highly dollarised economies[28], and, in such cases, the foreign currency credit opinion is identical to the national scale local currency credit opinion. National scale ratings are conveyed by symbols that distinguish them from international scale ratings including, sometimes, the addition of a prefix to identify the country for which the national rating scale applies.

National rating scales are valuable under various circumstances. Local participants in the national financial markets find national scale ratings useful in providing a more precise ranking of relative credit risk available for obligors within their country. In addition, national scales offer enhanced differentiation of credit quality, where the typical credit attributes of most active obligors tend to concentrate international scale ratings in the medium- to low-grade categories. Another factor influencing the usefulness of national rating scales is the presence of national financial markets that are dominated by domestic issuers and investors where the attractiveness of a national scale for assessing the relative credit risk of local issuers is enhanced. Finally, international market participants look upon national scale ratings as useful complements to international scale ratings. National scale ratings

[28] A dollarised economy is that where a substantial proportion of broad money is denominated in US dollars or another foreign currency.

are used in the domestic financial markets of countries such as Argentina, Mexico, Sweden and Finland.

2.4.2 Classification of the Issuer

Sovereign Credit Ratings

A sovereign rating reflects a government's ability and willingness to repay publicly issued debt in a timely manner, and is based on the country's overall creditworthiness. Sovereign ratings are not "country ratings" for they address the credit risks of national governments, but not the specific default risks of other issuers.[29] The analysis to determine sovereign ratings considers global systemic factors which may influence both the timing and magnitude of sovereign defaults, as well as the credit fundamentals affecting each government. Ratings indicate future debt servicing capacity and, therefore, the credit rating agency methodology must be forward looking.

The focus of sovereign ratings is nevertheless default, and the definition of default is important: an entity need not be declared in default by a court for a default to be registered by the rating agencies. Any breach in the terms of the original contract -e.g., a rescheduling-, which could ultimately inflict capital losses on the creditor, is regarded as a default.

Although the assessment of a sovereign's willingness to repay is highly subjective, several factors can be examined in order to determine a government's economic and political self-interest in honouring its obligations. The likelihood of a sovereign refusing to repay its obligations is a function of the country's political and economic risk. Political risk addresses willingness of a sovereign to repay debt on time. Willingness to repay is a factor that distinguishes sovereign credit from most other types of credits. As a result of political considerations, sovereign governments may choose not to repay their debt in a timely fashion even though they possess the economic capacity to do so. Economic risk addresses the government's capacity to support its current and anticipated level of total debt. Table III-1 in Appendix III summarises the factors repeatedly cited by the rating agencies as the criteria used to assess a country's overall creditworthiness, and Table III-2 lists some of the indicators used to quantify these criteria.(30)

Sovereigns are assigned both local and foreign currency ratings as described later in section 2.4.3.

Sovereign ceiling. For domestic obligations, the government has virtually unlimited taxing authority and the right to issue local currency. For these reasons the sovereign rating establishes a rating ceiling for all debt issued by entities domiciled in that country. The ceiling concept reflects the government's wide range of powers and resources that render its credit standing superior to any other debtor in the nation.

In the case of external obligations, the sovereign government has first claim on the country's foreign exchange reserves and controls the ability of any person in that country to obtain and send funds abroad to repay foreign obligations. Thus, sovereign debt generally benefits from the least "transfer risk" -the risk of transferring local currency debt service into foreign currency-, for non-resident foreign currency denominated debt holders. Moreover, a national government, through its ability to mobilise foreign currency assets within its own domain, has almost by definition the best ability to obtain foreign exchange of any issuer within the country. Given these considerations, a borrower's ability to repay a foreign currency loan may be constrained by its sovereign government.

Since an issuer's risk of default -for both domestic and foreign currency obligations- would not be better than the sovereign ceiling, the debt of other issuers domiciled in the country would not normally be assigned a rating higher than the sovereign rating. In general, only highly creditworthy or sovereign-supported entities will have a credit rating as high as the sovereign. When the sovereign is rated "triple-A", other entities domiciled in that country may also be rated "triple-A" because this rating has a 'floor' but not a 'ceiling'.

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(29) See 3.1.1 in Chapter 3 for a description of sovereign and country risks.

(30) While the agencies cite a large number of criteria in their assignment of sovereign ratings, this and previous research (Cantor and Packer, 1996a) suggests that sovereign credit ratings are broadly consistent with a small number of macroeconomic fundamentals.

Exceptions to the policy of the sovereign ceiling are possible for issuers under certain other circumstances such as substantial offshore earnings and assets or a strong foreign parent company.[31] Recently, however, Standard and Poor's has adopted a new approach for the sovereign ceiling. The agency has considered that sovereign credit risk is now less of a factor affecting the ratings of issuers in certain dollarised economies with the rationale that once dollarisation passes a certain threshold -40 per cent of measured financial assets- it is difficult to reverse. The new policy has been applied to the foreign currency credit ratings of several Argentine borrowers and the counterparty rating of one Panamanian issuer. As a result, those borrowers obtained for the first time a higher rating than the country's sovereign ceiling (Iskandar, 1997; and Luce, 1997).

Appendix IV describes the impact that the establishment of the European Monetary Union (EMU) has had on the sovereign ceiling and the credit ratings for issuers domiciled within this region.

Corporate Credit Ratings

A corporate rating is an opinion on the ability and legal obligation of a company to make timely payments of principal and interest on a security over the life of the instrument. As stated earlier, the sovereign rating normally represents the upper limit of creditworthiness for a corporate issuer domiciled in that country. A corporate rating is also designed to rank, within a consistent framework, the relative risk of each corporate debt issue or issuer. The determination of the predictability of future cash generation is the primary focus of the corporate rating analysis. Of particular concern is the ability of management to sustain cash generation in the face of adverse changes in the business environment. Generally, the greater the predictability of an issuer's cash flow and the larger the cushion above anticipated principal and interest payments, the higher the issuer's rating will be.

To evaluate the predictability of cash generation and the level of protection available to the debtholder, a comprehensive analytical review of the company is

[31] For instance, in July 1996 PEMEX -the Mexican state oil company- obtained a 'BBB-' rating by Standard and Poor's and 'Baa3' by Moody's. Both ratings were higher than the sovereign rating - 'BB'/'Ba2'. The reason given by the agencies was that the issue benefited from an elaborate

conducted. The main emphasis in the analysis is on understanding the strategic factors associated with each company and identifying critical risks to future cash generation. The practice is designed to diminish the possibility of underrating a security when the company is at the bottom of a business cycle or overrating a security issued during the recovery or expansion phase of the cycle.

The rating methodology for corporations may be segmented into two broad areas: Business Risk and Financial Risk. The analysis begins with an examination of the fundamental, cultural, economic and political conditions associated with the country in which the company resides. Using this cultural, economic and political environment as a framework, the characteristics of the industry -or industries- that provide the company's source of future income are considered. With an understanding of the company's economic environment, the analyst is able to assess the basic operation position of the company and its ability to react to future events. Table III-3 in Appendix III provides a list of the business and financial risk factors which are analysed in the determination of a company's likelihood of default.

Bank Credit Ratings

Banks deserve a special consideration among the entities rated by credit rating agencies. Banks operating in free market economies are in many ways like other business entities, but there are significant differences: the most important is the role of banks in the supply of, the demand for and the price of money -i.e., in most cases, the national currency.

Bank difficulties or failures are presumed to generate more serious negative externalities for the rest of the economy than those resulting from failures of other kinds of financial firms or non-financial firms.(32) The rating assessment has to recognise this peculiarity. The collapse of a bank may, by its contagious effect on the national currency, endanger a whole economy. Consequently, governments effectively have to be involved as regulators to try to stave off such collapses or at least, to be ready to rescue the banks involved. Governments have accordingly put in

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system of special accounts into which oil export revenues owing to PEMEX were paid (Iskandar, 1996).

(32) However, Kaufman (1994) provides evidence which shows that losses to depositor creditors from bank failures are substantially lower than average losses to creditors of non-bank failures.

place a range of safeguards intended both to prevent banks from failing and to protect depositors in case such an event takes place.

In order to evaluate banks creditworthiness, the rating agencies provide three levels of assessment:

(1) Support rating. A particularly important factor to be taken into account when rating banks is the likelihood of external support for a bank, for example a state or a major shareholder, should it run into difficulties. Support rating takes into account the potential outside support -lender of last resort (LLR) support- available for the bank.(33)

(2) Stand-alone rating. In this assessment, considerations of support are put aside and the bank is evaluated as an individual entity. This rating looks at the performance, asset quality, funding, liquidity, capitalisation and market risk of the bank.

In 1995, Moody's Investor Service introduced a new rating system for financial institutions called the Bank Financial Strength Rating (BFSR). Whereas an institution's long-term debt rating indicates the agency's assessment of the likelihood of default, the BFSR represents an opinion of a bank's intrinsic strength, or alternatively, the likelihood that the institution will require financial assistance from third parties such as its owners or the government. The BFSR does not incorporate the probability that such support will be forthcoming, only the probability that it will be needed. Hence, a bank may have a relatively low BFSR, but a higher long-term (support) credit rating, reflecting the opinion that the third-party support would be forthcoming to prevent a default.

(3) Overall rating. A combination of the support and stand-alone ratings for banks is used to measure the overall creditworthiness of the institution. For instance, in addition to its legal (support) and individual (stand alone) ratings, IBCA(34) also

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(33) The establishment of an LLR is meant to provide liquidity to banks that cannot otherwise obtain it. Dowd (1996) -a free-banking advocate- argues, on the contrary, that good banks can always obtain loans to maintain their liquidity, an LLR therefore protects bad banks from the consequences of their own actions. It, therefore, directly encourages the very behaviour -greater risk-taking and the maintenance of weaker capital positions- that a sound banking regime should avoid.

(34) As noted before (2.2.1), IBCA and Fitch Investors Service merged in January, 1998. Nonetheless, for consistency purposes with the period analysed in this study, the agencies are referred to separately.

assigns security ratings, both long-term and short-term to most of the banks it rates. The aim of this rating -as any other debt rating- is to assess the likelihood of timely repayment of the bank's obligations. IBCA's security ratings are determined by combining the Individual and Legal ratings of a particular bank -essentially assessing the two factors of performance/viability into the future and potential outside support- and adding in the factors of the issuing institution's size and diversity of any particular covenants governing the issues' security.

Table III-4 in Appendix III provides an overview of the factors considered by the rating agencies when assessing the creditworthiness of banks.

Sovereign ceilings for foreign currency bank deposits.(35) The rating of a foreign currency deposit issued domestically by a domestic bank is limited by the sovereign ceiling of its home country. The ratings on foreign currency deposits issued internationally by a domestic bank branch, and the ratings on foreign currency deposits issued by a foreign bank branch in a particular country will be constrained by the lower of: (1) the bank's rating, which, in turn, is constrained by the sovereign ceiling of its home country, or (2) the sovereign ceiling of the country in which the branch is located since branches of foreign banks are subject to the laws and regulations of the country where they are located.(36)

Ratings on foreign currency bank deposits are in some cases lower than those assigned to foreign currency sovereign debt because of the inherent differences in the credit risk between bank deposits and bonds. A review of world-wide sovereign default experience since World War II carried out by Truglia, Levey and Mahoney (1995) shows that when sovereign nations have defaulted on any of their foreign currency obligations they have been more likely to default on bank deposits and commercial loans than on sovereign bonds and notes.(37) They offer several

(35) Foreign currency bank deposits are defined as: (1) foreign currency-denominated deposits issued by any domestic bank or foreign bank branch located in the country, or (2) foreign currency denominated deposits issued by foreign branches of the country's domestic banks.

(36) Moody's, for instance, maintains foreign currency bank deposit ceilings that are distinct from foreign currency sovereign ceilings. However, ratings for foreign currency bank deposits are, ultimately, subject to the sovereign ceiling. See Truglia, Levey and Mahoney, 1995.

(37) A default on a foreign currency bank deposit would be judged to occur if the government mandated credit maintenance facilities, which means that if any depositor withdraws a deposit, the depositor must immediately redeposit/relend the same amount as was withdrawn (e.g., a

explanations for this fact. First, creditor banks can easily be identified, while identification of holders of marketable securities such as bonds is usually more difficult. Almost, by definition, this makes any bond debt restructuring more complex.[38] Second, banks generally have multifaceted relationships with borrowers. Banks usually look at their longer-term relationship with a country, rather than concentrate on near-term, one-off gains. Bondholders, on the other hand, are not particularly relationship oriented. The closer relationship between bank creditors and sovereign borrowers increases the default risk of bank loans/deposits. Third, the consequences of defaulting on -i.e., rescheduling- bank deposits or loans has been more predictable and potentially far less detrimental to a nation's interests than defaulting on bonds and notes. Finally, since a foreign currency bank deposit is generally within the legal jurisdiction of the country where it is located, a government that faces rescheduling on such bank deposits is unlikely to face a successful legal challenge to its action from depositors. By contrast, given the erosion of the older concept of sovereign immunity since World War II, the legal immunity of a sovereign who defaults on foreign currency bonds has become more problematic than it once was (see "Political Risk" in 3.1.1 in Chapter 3).

2.4.3 Currency of Issuance

Local and Foreign Currency Ratings

According to the currency of issuance of the debt, sovereigns and corporations may be assigned local or foreign currency ratings. The adoption of the local currency/foreign currency nomenclatures for credit ratings identifies the added risk factors that give external debt a higher default probability than domestic debt (Truglia and Levey, 1998a; and Kranenburg, 1996a).

The distinction between local currency and foreign currency ratings for sovereigns essentially arises because a sovereign government can impose taxes and print money denominated in its own currency. These powers give most sovereign

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requirement whereby a maturing certificate of deposit or CD must be replaced by the purchase of a new CD or provide other credit equal to the amount of the maturing CD).

governments a greater capacity to repay debt in local currency than in foreign currency. Repayment risk on foreign currency is higher because it requires the ability and willingness to generate or obtain the foreign currency necessary to meet obligations. These differences normally account for higher local currency than foreign currency credit ratings for sovereigns, reflecting the greater risk of foreign currency obligations. In fact, empirical evidence establishes a clear history of substantially higher default frequency by sovereigns on foreign currency debt (Beers, 1998 and Atkinson, 1997).

It could be argued that all sovereign local currency ratings should be "triple-A", reflecting the sovereigns' "premier" borrower status in every country. However, international scale local currency ratings assess default risk on a scale which is comparable globally. Therefore, the best credit within one country, even in local currency, might not be the equivalent of the best credit in another country. In this context, there might be institutional, political, structural or other features of individual countries leading an agency to conclude that the best credit in that country should be rated below "triple-A". On the other hand, because national scale ratings are based on comparative credit analysis of obligors in one country (see 2.4.1), the government will, almost invariably, receive a "triple-A" rating.

The starting point for rating the local currency debt of any sovereign is the rating assigned to its foreign currency obligations. The two are related because the same political, social and economic factors affect the government's ability and willingness to honour both types of debt, though in varying degrees. The rating analysis for the local currency debt focuses on the stability of political institutions, the level of popular participation in the political process, the degree of social and economic cohesion in the country and the extent of its integration within the global trade and financial system. These factors, in turn, influence the conduct of fiscal and monetary policies and their interaction with the country's balance of payments.

Like sovereigns, corporations are rated for local and foreign currency denominated issues. A local currency credit rating is intended to capture the elements of country risk that could adversely affect the obligor's performance in a

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(38) Nevertheless, as discussed later in 3.2.2, the possibility of sovereigns restructuring international bonds in an orderly way -for instance through the Paris Club of government creditors-, could

particular jurisdiction in local currency (Truglia and Levey, 1998a).(39) In the case of foreign currency debt, however, an added dimension of transfer risk analysis is incorporated. Consideration must be given to the circumstances that might accompany a government's default on its foreign currency debt. This additional analysis focuses on the possible impact of such a default by the sovereign and the possible external sources of repayment. The most prominent concern for the issuer or issue in question is the risk that the home country's government may impose exchange controls which result in restricted access to foreign exchange -i.e. transfer risk- (Huhne, 1996). As stated before (2.4.2), sovereign ratings impose a ceiling on corporate ratings, although exceptions are possible.(40)

2.4.4 Coverage of the Assessment

Issue and Issuer Ratings

An issue credit rating is a current opinion of the creditworthiness of an obligor with respect to a specific financial obligation, a specific class of financial obligations, or a specific financial programme. It takes into consideration the nature and provisions of the obligation, its standing in bankruptcy or liquidation, statutory preferences, and the legality and enforceability of the obligation. In addition, it takes into account the creditworthiness of guarantors, insurers or other forms of credit enhancement of the obligation and takes into account the currency in which the obligation is denominated. Examples of issue ratings are bond ratings, CP ratings, note ratings, preferred stock ratings, and ratings for asset- and mortgage-backed securities.

On the other hand, an issuer credit rating is a current opinion of an obligor's overall capacity -its creditworthiness- to meet its financial obligations. This opinion focuses on the obligor's capacity and willingness to meet its financial commitments as they come due. It is a general statement regarding an entity's repayment capacity. It does not entail an analysis of any specific documentation accompanying a transaction. The term issuer credit rating is a generic product description. Specific

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increase the number of defaults on international bonds.

(39) See 3.2.1 in Chapter 3 for a more detailed discussion about the risks incorporated into local currency ratings.

(40) See 3.1.1 in Chapter 3 for a description of transfer risk.

sets of issuer ratings are classified according to type, for instance, sovereign credit ratings, corporate credit ratings, bank ratings, counterparty ratings, and claim-paying ability ratings for insurance companies. The broad "issuer" classification allows consistent comparison across the entire universe of borrowers and counterparties. Issuer credit ratings can be either long-term or short-term. Short-term credit ratings reflect the obligor's creditworthiness over a short-term time horizon.

2.4.5 Seniority of the Issue

Rating agencies assign ratings based on the seniority of the issue: senior secured, senior unsecured, senior subordinated, subordinated, junior subordinated and preferred stock. Junior obligations are typically rated lower than senior obligations to reflect the lower priority in bankruptcy. Recent studies on corporate bond default (Carty and Lieberman, 1996; Brand and Bahar, 1998; and, Keenan, Shtogrin and Sobehart, 1999) have shown that the probability of a corporate issuer defaulting on a particular debt issue is independent of the seniority of that issue relative to the company's other obligations. However, recovery rates of defaulted bonds suggest that, holding all else constant, while default likelihood is the same across an issuer's bonds, the greater expected losses for its subordinated issues should be reflected in lower ratings for these issues. The studies also indicate that volatility in bond prices after default is greater for both senior unsecured and senior secured bonds than for subordinated bonds. This shows that while investors can expect defaulted subordinated bonds to be worth less than defaulted senior secured or unsecured bonds, they can have greater confidence that the value of the subordinated issue will be closer to its mean.

2.4.6 Time Horizon

Short-term Ratings

Short-term issue ratings are generally assigned to those securities that mature in less than one year -365 days- such as commercial paper, short-term bank deposits, or other money market instruments. In addition, short-term issuer credit ratings reflect the creditworthiness of an obligor with respect to put features on long-term obligations.

Long-term Ratings

Long-term ratings are used to assess the creditworthiness of obligations that extend for one year or more. The ratings are based, in varying degrees, on the following considerations:

1) The likelihood of payment -capacity and willingness of the obligor to meet its financial commitment on an obligation in accordance with the terms of the obligation.
2) The nature and provisions of the obligation.
3) The protection afforded by, and the relative position of, the obligation in the event of bankruptcy and other laws affecting creditors' rights.

Long term ratings are used to rate bonds and other fixed-income obligations such as mortgage-backed securities, medium-term notes and long-term bank deposits. Some types of issuer are also rated long-term, such as insurance companies, mutual funds and the counterparties of derivatives and related financial contracts.

2.4.7 Source of Information

Solicited and Unsolicited Ratings

Unsolicited ratings differ from solicited ratings in that: (1) the rating is not requested by the issuer; (2) the agency does not receive a fee; and, (3) the agency does not have access to undisclosed company data and does not interview company management. Hirai and Tomita (1996) describe four types of unsolicited ratings in use in the United States and Europe:

(1) Ratings on publicly offered US corporate bonds. Ratings started in the United States as a service for investors and were not prepared at the request of the issuer. Until agencies began charging fees in the early 1970s, ratings were prepared without access to internal company data. Today, Moody's and Standard and Poor's will rate any SEC-registered bonds, even without the issuer's solicitation. The extensive disclosure requirements that publicly traded companies must meet in the United States make it possible for agencies to issue unsolicited ratings.

(2) Business-entity ratings. These ratings are an assessment of general credit risk of a business entity as a party in foreign exchange transactions, swaps and other market transactions. The practice of rating business entities began in the late 1970s when IBCA started issuing bank ratings and is now spreading to non-financial institutions as well. Initially, no fees were charged. Later, as the value of these ratings became more widely appreciated, the banks began paying fees to receive ratings. In this way, unsolicited ratings helped build demand in the market for solicited ratings.

(3) Indirect sovereign ratings. These ratings are determined as part of a rating agency's work in preparing a solicited rating for an issuer in a country where no public rating exists on the sovereign's debt. The sovereign rating is prepared in order to determine the sovereign ceiling. Standard and Poor's and The Japan Bond Research Institute (JBRI), for example, issue this kind of unsolicited rating.

(4) Moody's unsolicited ratings. At the request of an investor, Moody's will prepare ratings on ordinary corporate bonds, structured finance bonds and overseas issuers, using only disclosed data. Mikuni Credit Rating, in Japan, has a policy of issuing only unsolicited ratings using publicly disclosed data. It does not charge companies a fee for its ratings. Its income comes from selling its publications to investors.

There is considerable controversy -especially in the U.S. and Japan- over unsolicited ratings. One frequently voiced criticism of unsolicited ratings is that issuers can be rated unfavourably even though they did not ask for the rating and that this practice constitutes a pressure to hire the agencies' services.[41] On the one hand, unsolicited ratings can provide investors with useful information and presumably they are free of bias in favour of the issuer. On the other hand, solicited ratings are presumably more reliable since they are based on private information. Nonetheless, due to the fee charged to issuers for solicited ratings, the issuers have the right to

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[41] See for instance, Khalaf, 1996; Bottini, 1993; The Wall Street Journal, 1996; Dow Jones, 1996; Financial Times, 1996; and The New York Times, 1996.

stop the agency from publishing the rating when it is considered unfavourable to the issuer's interests.

2.5 Credit Ratings in Emerging Markets

The last sections have pointed out that emerging-market based issuers constitute one of the fastest growing components of the universe of rated issuers, thereby contributing to the global expansion of the credit rating industry. In particular, the rapid growth of sovereign credit ratings has been spurred by the increasing number of emerging market sovereigns securing credit ratings. Given that sovereign credit ratings constitute the focus of this study, it is important to emphasise the factors which have attached special attention to emerging market sovereigns in the past few years, and to review the particular role played by credit ratings in these economies.

As private financial flows have increased and the role of development finance has diminished, credit rating agencies have become more important in determining developing economies' access to world financial markets. On the other hand, the Mexican crisis of 1994-1995 and the Asian debt crisis of 1997-1998 led observers to suggest that credit rating agencies were reacting to events rather than anticipating them. The reliability of the sovereign credit ratings of developing countries was, therefore, called into question.

This section, which focuses on the increasing attention given to emerging market economies by credit rating agencies is organised as follows. The definition of emerging markets used throughout this work will be first given. Sub-sections 2.5.1 and 2.5.2 examine the increasing importance of emerging markets in international financial markets and in the credit rating industry, respectively, while sub-section 2.5.3 explores the need for credit ratings in emerging markets and highlights the uses of ratings in these economies.

Definition of Emerging Markets

"Emerging Market" is a term generally used by the business and financial community, governments and international organisations, news media and academia to describe the group of low- and middle-income nations previously referred to as "lesser-developed-countries (LDCs)". It is however a somewhat imprecise term in that there is no universal agreement on exactly which group of nations constitutes "Emerging Markets". In general, however, emerging market countries are characterised by an underdeveloped or developing infrastructure with significant potential for economic growth and increased capital market participation by foreign investors.

For the purposes of this work, the term "Emerging Markets" is used to describe the group of countries comprising "developing countries" and "countries in transition" according to the IMF country group classification.(42) However, the terms "developing countries" or "developing economies" are used as synonyms for "emerging markets" throughout this work unless stated otherwise.(43)

It is worth mentioning the fact that the IMF has "upgraded" several economies formerly considered as developing to the level of those deemed industrial countries. As of May 1997, Hong Kong, Korea, Singapore, Taiwan Province of China, and Israel were integrated with the countries traditionally known as industrial economies to form a group of "Advanced Economies", representing the IMF's recognition of the progress achieved by those former developing countries (IMF, 1997a). The reason given by the IMF for this reappraisal is that these economies now share some of the characteristics of industrial countries, in terms of: (1) per capita income level; (2) well developed financial markets; (3) high degrees of financial intermediation; and, (4) diversified economic structures with relatively large and rapidly growing service sectors.

2.5.1 Increasing Importance of Emerging Markets in the Financial Marketplace

The growing importance of emerging markets in the international capital markets is reflected in the surge in capital flows to these economies (see Table 2-6). The 1990s have witnessed a movement of capital to emerging markets on a scale -when

(42) The IMF country classification is described in the Statistical Appendix of its semi-annual publication *World Economic Outlook*.

(43) A list of countries considered emerging markets for the purposes of this work is given in Chapter 4 (Table 4-3), where the empirical work is described in detail.

measured relative to their GDPs- not seen since the gold standard era of the late 1800s and early 1900s (IMF, 1997b). This large-scale capital flow to emerging markets stimulated a number of empirical studies that sought to identify the key factors driving them. These studies have typically divided the factors influencing capital flows into two groups: (1) factors which encompass both structural and cyclical developments in international (mainly mature) financial markets that have led investors to diversify their portfolios internationally and seek higher yields in emerging markets; and (2), factors which relate to macroeconomic and structural policies in emerging markets, as well as other political and non-economic developments, that have increased their perceived creditworthiness.[44]

Table 2-6. Capital Flows to Emerging Markets (in billions of US dollars)

	1977 -82[3]	1983 -89[3]	1990	1991	1992	1993	1994	1995	1996	1997
Total net private capital inflows[1]	30.5	8.8	31.0	126.9	120.9	164.7	160.5	192.0	240.8	173.7
Net foreign direct investment	11.2	13.3	17.6	31.3	37.2	60.6	84.3	96.0	114.9	138.2
Net portfolio investment	-10.5	6.5	17.1	37.3	59.9	103.5	87.8	23.5	49.7	42.9
Other[2]	29.8	-11.0	-3.7	58.4	23.8	0.7	-11.7	72.5	76.2	-7.3
Net external borrowing from official creditors	...	...	22.2	25.7	17.6	18.7	-2.5	34.9	-9.7	29.0
Total net capital flows	30.5	8.8	53.2	152.7	138.5	183.4	158.0	226.9	231.1	202.7

Source: IMF *International Capital Markets,* September 1998.
[1] Net foreign direct investment plus net portfolio investment plus net other investment.
[2] Includes net external borrowing from official creditors for periods 1977-82 and 1983-89
[3] Annual average.

Structural Changes

Among the structural changes, the most important change has been the growing liberalisation of domestic financial markets and capital account transactions in both mature and emerging market economies. An index of capital controls in emerging markets developed by the IMF (1997b) suggests that the decline in capital account

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(44) Calvo, Leiderman and Reinhart (1996), Fernandez-Arias (1996), and World Bank (1997) examine the causes of and provide an empirical perspective on private capital flows in the 1990s to emerging markets.

restrictions in emerging market economies may have contributed to the recent boom in capital flows to these economies. The correlation between the index and capital inflows is -0.3 for the period 1982-1996 and provides some simple corroboration for the claim that liberalisation of external transactions has been instrumental in attracting foreign capital.

The World Bank (1997) shows that while many more emerging markets are now better integrated into the international financial system, the process is still at an early stage.[45] Recent empirical studies provide a similar picture: there is a growing degree of de facto integration of domestic and international financial markets, in the sense that it is becoming increasingly difficult to keep domestic financial market conditions isolated from developments in international markets.[46] A number of other observers view this growing integration of emerging markets into the international financial system as re-establishing the type of relations between capital-importing and capital-exporting countries that existed in earlier periods of high mobility, such as 1880-1914 and the 1920s (Obstfeld and Taylor, 1997).

The growing importance of portfolio flows -both bond and equity- in the 1990s has reflected two other structural changes in international financial markets, namely, the growing role of institutional investors and securitisation. Institutional investors, including mutual funds, insurance companies, pension funds and, more recently, hedge funds, have become increasingly important purchasers of emerging market securities. To an important degree, their participation in such markets has been driven by the desire both to increase the overall return on their portfolios and to diversify the risks associated with these portfolios (Gooptu, 1993; IMF 1995a,d, and 1997b; and BIS, 1997).

Securitisation has involved a greater use of direct debt and equity markets and a shift away from indirect finance -i.e., syndicated bank lending. Another form of securitisation has involved the creation of exchange-traded futures and options contracts. While the substitution of direct for indirect instruments has been driven in

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[45] The World Bank developed an index of integration which combines a measure of a country's ability to attract different forms of private flows. According to this index, the number of emerging markets classified as highly integrated increased from 2 in 1985-1987 to 13 in 1992-1994, whereas the number of countries classified as highly or moderately integrated increased from 26 to 39 for the same periods.

part by the lower relative cost of borrowing on securities markets by the more creditworthy borrowers, the growing importance of both exchange-traded and over-the-counter (OTC) derivative products has been strongly affected by the desire of portfolio managers to either hedge or increase their exposure to certain types of asset-price risks (IMF, 1997b).

Advances in information technology have also allowed international banks and investors to manage the risks associated with internationally diversified portfolios more easily. The management of the interest rate, exchange rate, and more recently, credit risks associated with these portfolios have also been facilitated by the emergence of a variety of new derivative products. These structural developments have thus created incentives for international investors, especially institutional investors, to deal with an increasingly broad range of instruments issued by public and private borrowers from an expanding set of emerging markets.[(47)]

Macroeconomic Factors

While structural changes in international financial markets have increased the role of institutional investors and improved the access of emerging market borrowers, recent empirical studies of determinants of capital flows to emerging markets in the 1990s have also highlighted the role played by macroeconomic policies and cyclical developments.[(48)] The improving economic performance of many emerging market countries has played a key role in improving their access to international financial markets. As the cross-country evidence presented by Edwards (1991) shows, there appears to be a strong link between sound economic fundamentals and foreign direct investment. For instance, the success in the early 1990s of some Western Hemisphere countries and the Philippines in restructuring their commercial bank debt, combined with some macroeconomic policies and wide-ranging structural reforms, including financial sector reforms, facilitated their re-entry into

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(46) See, for example, Dooley, Mathieson and Rojas-Suarez (1996), Haque and Montiel (1991), and Reisen and Yeches (1993).

(47) In 1987, US$0.50 out of each US$100 of foreign portfolio investment from industrial countries was invested in emerging markets, but by 1993 more than US$16 out of each incremental US$100 of foreign investment was invested in emerging markets. See IMF, 1995d.

(48) Fernandez-Arias and Montiel (1996) provide an overview of the literature on the domestic policy response of the recipient developing countries to the capital inflows during the 1990s.

international capital markets (IMF, 1995d). Furthermore, credit ratings have reflected the improved performance of emerging market countries (see 2.5.2).

In addition to the improvement in macroeconomic performance of emerging market countries, empirical studies have also emphasised the impact of changes in the global macroeconomic environment during the 1990s. Many observers argue that the decline in nominal interest rates in industrial countries has been a crucial influence on the amount of capital flowing to emerging markets. For example, evidence provided by Calvo, Leiderman and Reinhart (1993), Dooley, Fernandez-Arias and Kletzer (1996), and Fernandez-Arias (1996) seems to favour the view that movements in international interest rates are the most important factor influencing the magnitude of flows.[(49)]

Another issue that confers importance to emerging markets is the creation of the European Monetary Union. The introduction of the single European currency will eliminate profits from trading and cross-currency arbitrage for banks within the EU. Banks in Europe have already began to expand capacity to trade in dollar, yen and emerging-market currencies in order to compensate.

The broader and deeper debt and equity markets created by the EMU should bring new opportunities within the region for the more creditworthy emerging markets. Furthermore, the creation of the single-currency market will eliminate profit gains and risk reduction from portfolio diversification within EMU increasing, thereby, opportunities for trading emerging market instruments. For example, investment banks may see the potential to introduce more lower-quality credits to the capital markets, as institutional investors look to replace lost opportunities for investments based on currency and inflation differentials. The use of ratings might also be enhanced since various regional governments, banks, insurance companies and corporates will individually account for a much smaller proportion of the total issuance, investment or underwriting activity in a much bigger financial marketplace. In anticipation, a number of local issuers who have so far relied on their name

[(49)] A World Bank (1997) recent analysis indicates, however, that for the period 1990-96 the correlation of flows to emerging markets and US/industrial country interest rates is close to zero. The low correlation can be explained by the fact that the foreign direct investment, which is largely unresponsive to (moderate) changes in international interest rates, has increased as a proportion of total capital flows to developing economies.

recognition are now considering credit ratings to help them reach new investors and counterparties in the larger, post-EMU pool.

2.5.2 Emerging Markets and Rating Agencies

The recent financial crises in Asia and Russia, following on the heels of the Mexican peso crisis of 1994-1995, accentuated the focus on credit risk in emerging markets, highlighting the need for local expertise, extensive surveillance capabilities, and fine distinctions in credit quality. This increasing need for credit risk assessment and the importance gained by emerging markets in the last few years in international capital markets -as described in the previous section- have also been reflected in the dramatic overseas expansion of the established international credit rating agencies. Some of the rating agencies have established their own offices in emerging markets and some others have formed co-operative partnerships with local agencies to extend their reach into emerging markets.(50) The greatly expanded activities of credit rating agencies in these markets is also evidenced by an increasing demand for credit ratings. The number of emerging market countries that have been assigned credit ratings increased from 13 at the beginning of this decade to 53 in early 1997 (BIS, 1997).

The rapid expansion of rating activities in the domestic financial markets of emerging economies has led the agencies to apply an increasing number of national rating scales in tandem with their international rating scale. As described in section 2.4.1, national scale ratings provide added value in countries where sovereign and other credit risks compress international scale ratings to low levels, thereby reducing, or even obscuring, credit risk distinctions that would otherwise be evident in the absence of international risk factors. The attractiveness of a national rating scale which allows increased differentiation among local issuers is enhanced when national financial markets are dominated by domestic issuers and investors. Mexico, Argentina, Brazil and Taiwan are examples of emerging markets where a national rating scale is currently operating.

Nevertheless, the credibility of local agencies has been questioned. The scepticism of international investors -and even domestic ones- regarding local agencies is related to the apparent conflict of interest raised by the ownership of the agencies in emerging markets. Most of them are owned by the government or by financial institutions (see Table I-2 in Appendix I), including some for which credit ratings are issued (Lyons, 1996). This scepticism seems to be supported by evidence which shows that agencies rate issuers from their own country more leniently (Beattie and Searle, 1992b). Moreover, although there is a general requirement on the part of the local securities regulator that an agency satisfies minimum standards of independence and competence, there is no international arbiter of sound ratings methodology. Therefore, companies in emerging markets tapping the Euromarkets still need a rating from one of the larger agencies.

The rating of emerging market borrowers has posed some difficulties for the rating agencies, as suggested by the fact that the international rating agencies have differed in their opinions on emerging market debt. A study on sovereign credit ratings (Cantor and Packer, 1995) found substantially more disagreement between the agencies in their assessments of credit risk for low-quality sovereigns -i.e., emerging market sovereigns- than both for high-quality sovereigns and low-quality US corporate credits. The study attributes this disagreement to the relative inexperience of the rating agencies in rating emerging market debt and to the higher perceived market risk for sovereign issuers than for corporates. Standard and Poor's, for example, had not rated a sub-investment grade sovereign bond until Mexico and Hungary came to the market in 1992, whereas it has been rating investment-grade sovereign debt since the 1970s.

The following section examines in more detail the role played by credit ratings in emerging market countries.

2.5.3 The Role of Credit Ratings in Emerging Markets

The last two sections have emphasised the increasing importance of emerging markets in both the international capital markets and the credit rating industry. This section describes the major contributions of credit ratings to the development of emerging markets.

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(50) The geographic expansion of the credit rating industry is described in 2.2.1.

The role played by credit ratings in emerging market economies parallels that in the major international financial markets which has been explained in section 2.3. Nevertheless, this role is heightened by the peculiarities inherent to emerging markets such as a consistently faster growth rate than those of developed countries, the greater need for external finance and the lack of clear sources of credit information. In order to avoid repetition only the uses of ratings which incorporate these particular features will be discussed here.

Provision of Minimum Accounting and Disclosure Standards

In many developing countries, the lack of consolidated financial accounts makes the task of establishing a comprehensive credit profile very difficult. Satisfactory auditing and accounting standards are not always prevalent in emerging economies. The interpretation of published financial statements in some of these countries is not always straightforward and misunderstandings are often blamed on lack of clarity in financial reporting. Information disclosure on behalf of borrowers is, at times, inadequate and variable. For some countries, both equity and debt markets are still in their infancy with regard to the legal framework in which securities are traded, resulting in predictable international investor caution. These characteristics obstruct the access of emerging markets to the international financial markets because of the difficulty of assessing the risk associated with an issuer or issue in these markets.

Goldstein and Turner (1996) have identified the weakness of accounting, disclosure and legal framework as some of the causes of banking crises in emerging economies. For instance, the Asian debt crisis of 1997-1998 underscores the poor financial disclosure and the lack of transparency in data and policy framework still prevalent in emerging nations (FitchIBCA, 1998; Truglia, 1998; Griep and Beers, 1998; and Dale, 1998). As a result, many observers have stressed the need for standardisation of practices in compiling data on public and private sector debt, and improvement and consistency of disclosure standards at both institutional and country levels. Some propose -among other measures- a fuller and more internationally harmonised public disclosure of bank soundness and performance, with a greater role for private rating agencies, as a possible policy measure to strengthen market discipline in emerging economies. Credit rating agencies require a minimum of disclosure and accounting standards in order to operate and in doing so, they might help to enhance higher standards. As shown in 2.3.4, emerging market financial regulators are increasingly relying on credit ratings to improve transparency and promote market discipline.

Access to International Markets

Several studies on developing countries have suggested that a robust financial system contributes to growth (Gupta, 1986; World Bank, 1990; Ghani, 1992 and Bascom, 1994). It is, therefore, not surprising that governments in emerging economies try to foster the development of their financial markets. In fact, since 1970, developing countries' share of world output has increased from 36 percent to about 50 percent and is set to reach 60 percent by 2020 (Lapper, 1997). The rapid growth of emerging economies requires substantial domestic and offshore funding. These demands will only be met by institutional lenders and investors if there is adequate disclosure and reliability of financial information. A factor which conveys importance to credit ratings is the increased use of international capital markets by emerging market borrowers in order to raise funds. In these international markets a credit rating by a prominent agency is often required. In this context, credit ratings ease the access of emerging market borrowers to international markets by helping them overcome the lack of name recognition in foreign markets. Moreover, international investors have increased the demand for bonds in currencies other than the traditional global currencies, thereby increasing the value of obtaining a local currency rating for emerging market borrowers. In fact, local currency debt in emerging markets has outperformed traded external debt instruments recently and is an increasingly important asset class (Cantor and Packer, 1995; Huband, 1997; and IMF, 1997b).

Borrower and Investor Diversification

Credit ratings have facilitated borrowers' and investors' diversification in emerging markets. The benefits of portfolio diversification have been already examined (2.3.1), but the focus here is the increasing role played by credit ratings in emerging markets due to fundamental changes in the nature of both lenders and borrowers in international financial markets. In the late 1970s and early 1980s, foreign capital was provided primarily by banks which, in theory, had the capacity independently to assess and monitor country creditworthiness. Furthermore, developing country recipients of private capital flows were dominated by a small number of countries and well-known borrowers within those countries, usually governments. In the 1990s, however, flows of foreign capital are being channelled by pension funds, mutual funds, insurance companies and others with little experience in assessing the creditworthiness of many emerging market countries represented in their diversification portfolios. At the same time, borrowers with little or no credit history -both governments and private institutions- seek to tap international credit markets. The creditworthiness assessment of emerging market borrowers has been facilitated by the existence of reliable credit ratings.

2.6 The Information Content of Credit Ratings

The previous sections have both identified and described the driving forces behind the global expansion of the credit rating industry. The particular features which accord emerging markets special attention have also been discussed, together with the distinct role played by credit ratings in these markets. Additionally, the different categories of ratings have been described in detail. It has been demonstrated that ratings, especially sovereign ratings, are having a growing impact on the direction of cross-border financial flows. Given the importance of sovereign credit ratings in the allocation of resources domestically and internationally, this study focuses on the information content of sovereign credit ratings, as explained below.

The analysis of the information that ratings contain is important for a number of reasons. First, split ratings occur quite frequently leaving investors uncertain about the credit risk of the issuer in question. It has been suggested that such disagreement between agencies may stem from factors such as differences in the agencies' rating scales, differences in the factors evaluated and the weighting attached to each of these factors, as well as timeliness to respond to new information relevant to issuers (Beattie and Searle, 1992a,b; Cantor and Packer, 1996a,b and 1997; Moon and Stotsky, 1993; and Goldstein, 1996).

Second, the level of agreement between agencies varies across the industrial, geographical, and economic classification of the issuers. This may be explained, in part, by the level of knowledge and understanding that raters have of specific countries. The implication is that agencies may differ in their assessment of individual issuers because their ratings reflect different information. On the other hand, such selective disagreement may also be evidence of the agencies' bias against certain types of issuers. This is suggested, for instance, by the results of empirical work showing that, after controlling for variables accounting for economic performance, issuers in emerging markets receive ratings consistently lower than issuers domiciled in developed markets (Cantor and Packer, 1996a).

Third, although empirical work has attempted to show that credit ratings supply the financial markets with new information, no consensus has been reached. The issue has been mainly addressed by measuring the effect of ratings either on bond or stock prices. The results are mixed and suggest that the effect of the information content of ratings depends on factors such as the type of announcement - downgrade or upgrade-, the credit quality of the issue -investment grade or non-investment grade-, and the type of issuer -developed market or emerging market issuer. By contrast, another group of studies has shown that credit ratings effectively summarise the information already available in the market. This pronounced difference in findings calls for further research which can offer deeper insights into the information content of credit ratings.

Fourth, rating agencies give special emphasis to the qualitative elements included in their assessments of creditworthiness. These subjective elements are intended to capture the willingness of the issuer to meet its debt obligations -a factor especially important in assessing sovereign creditworthiness-, as well as the political risks of the country of domicile which may impair the capacity for timely debt repayment. It is the agencies' claim that this subjective assessment constitutes the added value of their ratings. Nonetheless, according to researchers, political variables and proxies for willingness to repay have, on several occasions, failed to explain the creditworthiness of a borrower, especially when jointly considered with economic indicators. In addition, models which have included only a few economic variables have been quite successful in predicting ratings. Although the failure of these models to fully explain credit ratings may stem from shortcomings of the models themselves or inadequate explanatory variables, the more likely implication is that agencies provide new information through their qualitative analysis. However, further research is needed to determine to what extent qualitative factors, such as reputation, play a role in borrowers' perceived creditworthiness and to what extent these factors are included in credit ratings.

Finally, the most crucial issue about credit ratings is their accuracy and timeliness in assessing the likelihood of default of an issuer. As discussed throughout this chapter, credit ratings are used on the basis that they accurately reflect the credit standing of borrowers. Lenders and investors evaluate the credit quality of borrowers by using credit ratings and make their investment decisions accordingly. Similarly, regulators implicitly assume that credit ratings provide a reliable assessment of credit when mandating their use. On the other hand, if agencies fail to provide accurate ratings, this imposes heavy costs on financial markets. Such costs of inaccurate ratings include: (1) the misallocation of resources by providing misleading information to market participants; (2) the elimination of warning signals about the possible deterioration of a borrower's credit standing, thereby preventing the borrower from taking either preventive or corrective actions; (3) the losses imposed on creditors attributable to less-than-optimal decisions based on inaccurate information; and, in general, (4) the dislocation of financial markets, including, in the extreme, exacerbation of systemic risk.

For the above reasons it is important to determine what information is contained in credit ratings. Additionally, it is desirable that any systematic variation incorporated into the ratings of different agencies should be identified and communicated to market participants.

2.7 Scope of this Research

In line with the above considerations, this work attempts to provide insights into the information content of sovereign credit ratings. Section 2.6 identified the features that render desirable and relevant the exploration of the information content of ratings. However, the study of the determinants of sovereign ratings is particularly important for the following reasons. First, while the determinants of corporate and municipal bond ratings have been extensively investigated, empirical work on the factors that are included by credit rating agencies in their assessments of sovereign creditworthiness has not until recently been pursued. The scarcity of research on sovereign ratings of private agencies reflects the fact that the rating of sovereign issuers is a relatively new business. Therefore, an adequate database that could be used as the basis for empirical research was not available until recently. Second, given that sovereign ratings represent a benchmark for any other rating assigned to an issue or issuer domiciled in that country, it follows that the accuracy of sovereign ratings will determine the accuracy of other types of ratings.

In particular, this study attempts to address the following issues regarding the information content of sovereign ratings:

(1) it explores the extent to which both foreign and local currency sovereign ratings can be explained by a relatively small number of quantitative and qualitative variables;

(2) it attempts to ascertain the factors that explain the differences between local and foreign currency ratings assigned to the same country, i.e., the determinants of perceived transfer risk;

(3) it analyses the relative influence of macroeconomic variables and balance-sheet variables, as well as lag- and average-valued macroeconomic variables on foreign and local currency sovereign ratings, and on transfer risk;

(4) it examines the differences in the information conveyed by the ratings of different agencies, as well as the differences across agencies regarding their assessments of transfer risk;

(5) it investigates the effect of the geographic region and the economic development classification of the country on its local and foreign currency sovereign credit ratings, and on perceived transfer risk;

(6) it tests for the robustness of ordered probit analysis to explain sovereign credit ratings as compared to ordinary least squares regression; and,

(7) it quantifies the impact on sovereign credit ratings and on transfer risk of the preferred model of sovereign creditworthiness indicators.

The remainder of this work is organised as follows. Chapter 3 examines the aspects of sovereign credit ratings which underscore the study of their information content. Chapters 4, 5 and 6 explain in detail the issues addressed by the research, as outlined above, and present the empirical results. A description of the methodology adopted for the research is included together with the presentation of the results. Chapter 7 concludes the thesis by highlighting some implications of the research findings.

3. Sovereign Credit Ratings

Sovereign credit ratings are gaining importance as more governments with greater default risk and a greater number of companies domiciled in riskier host countries borrow in international bond markets. But while ratings have proved useful to governments seeking market access, the difficulty of assessing sovereign risk has led to agency disagreements and public controversy.

This chapter provides a description of the key role played by sovereign credit ratings in financial markets while attempting also to contribute to a better understanding of the risk incorporated into sovereign ratings. The discussion is presented in the following sequence. The first section highlights the special features of sovereign credit ratings, namely the risks associated with sovereign governments, the growing number of sovereign issuers tapping international capital markets, the impact of ratings on the sovereign's borrowing terms, the implications of the sovereign ceiling for other domestic borrowers, and the disagreement between agencies regarding specific rating assignments. The second section identifies the differences between foreign and local currency sovereign ratings. These differences relate to the risks incorporated into each type of rating, the higher default risk associated with foreign currency ratings, and differences in the time-in-default and recovery values between local and foreign currency defaults. The third section describes the debt structure of emerging market sovereigns. The last section provides a conclusion.

3.1 Importance of Sovereign Ratings

Sovereignty means having supreme power, especially over a politic body, freedom from external control, i.e., to be an autonomous state (Truglia, Levey and Mahoney, 1995). These characteristics are what distinguish sovereign borrowers from all other borrowers and account for the differences in their perceived creditworthiness, as described in the previous chapter.

Given that sovereign credit ratings reflect the sovereign's overall creditworthiness it is possible to identify several reasons which cause sovereign ratings to be accorded particular attention amongst the different categories of ratings. Specifically, these reasons are: (1) the risks associated with sovereigns; (2) the growth in the number of sovereign borrowers tapping international bond markets; (3) the effect of ratings on the sovereign's borrowing terms; (4) the implications that the sovereign ceiling has for the ratings of other borrowers; and, (5) the disagreement between agencies regarding specific rating assignments. The remainder of this section analyses each of these aspects in detail.

3.1.1 Risks Associated with Sovereigns

To provide a framework for understanding the risks associated with sovereign borrowing that are borne by lenders and/or investors in capital markets, this section starts with a description of country risk. *Country risk* has been traditionally defined as the possibility that sovereign borrowers of a particular country may be unable or unwilling, and other non-sovereign borrowers unable, to fulfil their foreign obligations for reasons beyond the usual risks which arise in relation to all lending (Dale, 1986). The idea behind this definition is that there may be no legal redress against a foreign borrower that chooses to renege on its external obligations, and that whereas private sector borrowers are subject to legal process, they may be prevented from obtaining the necessary foreign exchange to service their foreign debt. As sub-categories of country risk, *sovereign risk* may be viewed as the special risk arising from a sovereign borrower's immunity from legal process, while *transfer risk* refers to the danger that otherwise solvent entities may become bad credits because of local foreign exchange restrictions, in other words, the possibility that ordinary credit risk may be switched into country risk.

Nevertheless, the traditional definition of country risk differs slightly from that used by the credit rating agencies in their rating process (see figures 3-1 and 3-2). In a general context, *country risk* refers to the economic, business and social environment factors that influence both the sovereign's own rating and those of other issuers domiciled within the same country. More specifically, and as a sub-category of country risk, *sovereign risk* refers both to the risk of default by a sovereign government on its foreign currency obligations, and to the risk that direct or indirect actions by the sovereign might affect the ability of a domestic issuer to use its available funds to meet debt obligations denominated in foreign currency. In the first sense, sovereign risk addresses the *credit risk* of national governments, but not the specific default risks of other issuers. Credit risk, in turn, relates to two key aspects: *economic risk*, which addresses the government's ability to repay its obligations on time, and *political risk*, which addresses the sovereign's willingness to repay debt. In practice, of course, political and economic risks are related. A government that is unwilling to repay debt usually is pursuing economic policies that weaken its ability to do so.

In many cases, especially in emerging capital markets, *transfer risk* will dominate the assessment of sovereign risk. As a sub-category of sovereign risk, transfer risk refers both to the risk that the sovereign will be unable to secure foreign exchange to service its foreign currency debt, and to the likelihood that the sovereign may absolutely prohibit, or otherwise constrain, non-sovereign issuers' access to foreign exchange, thereby preventing the issuer from meeting its foreign obligations in a timely manner.

In this context, it is possible to identify the following risks specifically associated with sovereign debt: (1) credit risk, the risk that the sovereign will default on its debt obligations; (2) political risk, the risk that the sovereign may be unwilling to honour its debt, despite its economic capacity to do so; (3) transfer risk, the risk of failure on the part of the sovereign to secure foreign exchange to repay its foreign currency debt; (4) systemic risk, global financial sector risks that might influence the timing and magnitude of sovereign defaults; and, (5) market risk, which involves changes in the market value of the sovereign's debt.

Figure 3-1. Traditional Definition of Country Risk

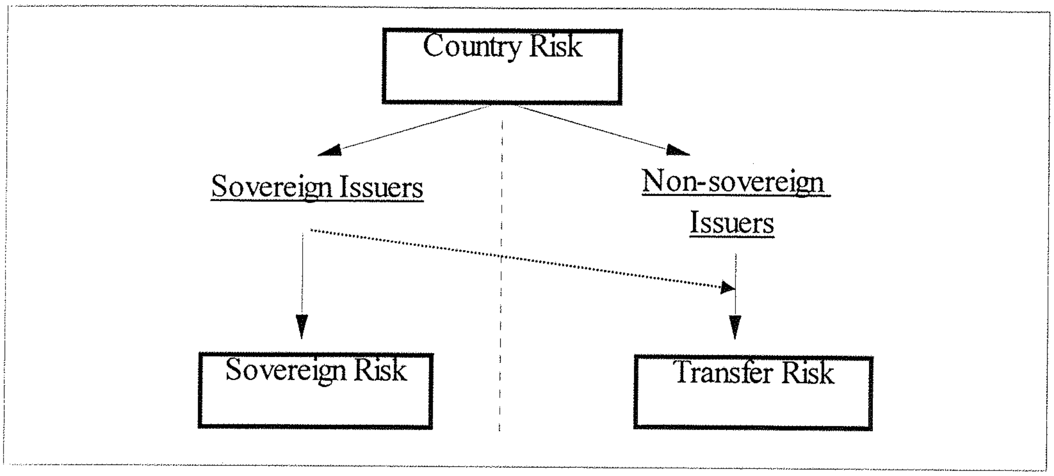
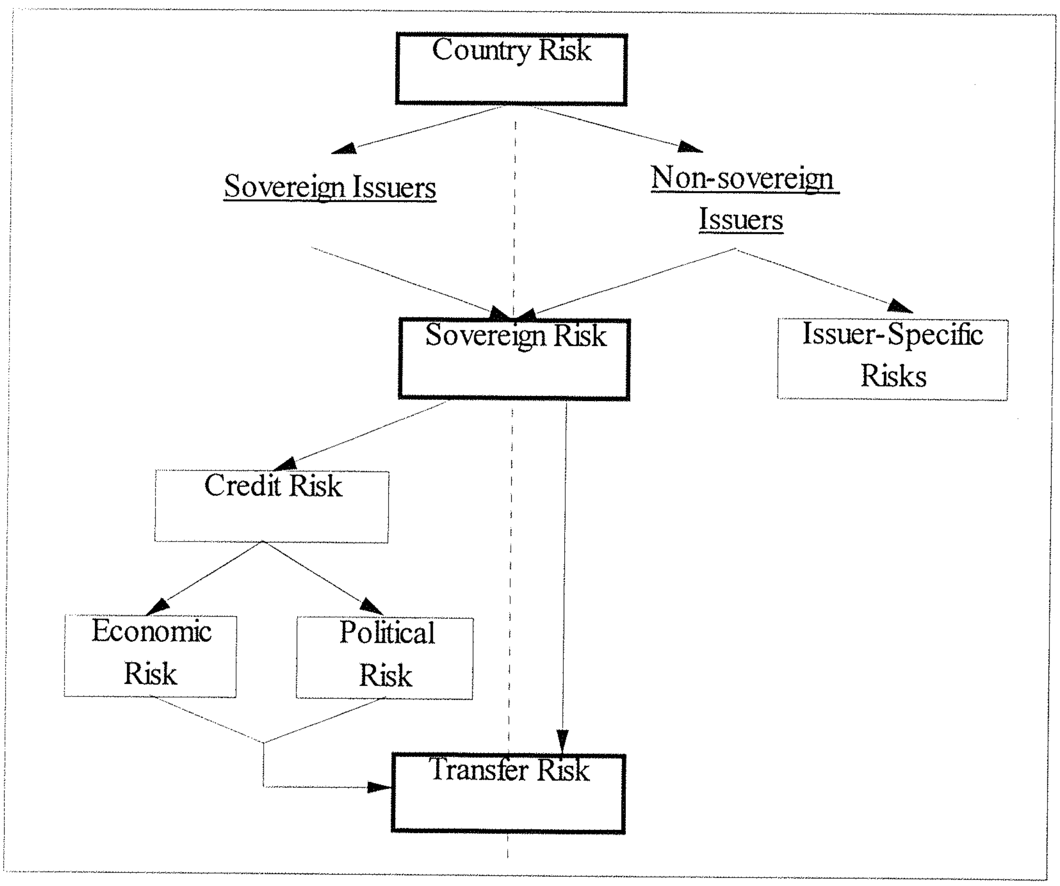


Figure 3-2. Rating Agency Definition of Country Risk



Credit Risk

Of central interest to investors and other creditors is sovereign credit risk, that is, the likelihood that a sovereign borrower will default on its obligations. As mentioned above, credit or default risk of sovereign government debt incorporates both the political risk associated with the sovereign borrower -willingness to repay-, and the risk of the sovereign's lack of economic capacity to support its level of total debt. In an extreme case, credit risk may include the risk that a host government might exercise its sovereign power to repudiate unilaterally its foreign obligations. A key aspect of sovereign credit risk is the assessment of transfer risk- the risk of transferring local currency debt service into foreign currency to repay foreign currency debt. Due to the importance of political and transfer risks of sovereign debt, they are discussed separately (see below).

Definition of Sovereign Default. As mentioned earlier, default is any breach in the terms of the original debt contract which could ultimately inflict capital losses on the creditors (see 2.4.2 in Chapter 2). Questions may arise, however, when applying this definition to different types of sovereign obligations. A sovereign issuer may be considered in default in any of the following circumstances:

1) for *local and foreign currency bonds, notes and bills*, when either scheduled debt service was not paid on the due date, or an exchange offer of new debt contains terms less favourable than the original issue (such as the issuance of Brady bonds);[1]
2) for *local and foreign currency bank loans*, when either scheduled debt service is not paid on due date, or a rescheduling of principal and/or interest is agreed to by creditors;
3) for *central bank currency*, when notes are converted into new currency of less than equivalent face value.

Historically, sovereign lending has been a risky business. In the 1830s, 31 percent of governments defaulted on their foreign currency obligations.[2] Nearly a century later, a sudden increase in sovereign lending in the 1920s ended with a wave

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(1) Brady bonds are bonds issued in exchange for restructured or defaulted sovereign commercial bank debt of emerging market countries. The bonds are denominated in hard currency and are normally collateralised by zero-coupon US Treasury bonds. Commercial banks would normally grant some amount of debt relief to debtor nations.

of defaults during the Great Depression. Indeed, more than one third of sovereign issuers defaulted on their international bonds between 1930 and 1935. More recently, since 1970, approximately 40 percent of the governments with outstanding domestic and foreign currency debt have defaulted at least once (Cantor and Packer, 1995; and Beers, 1998). Interestingly, only sovereign governments of emerging market countries defaulted over this later period. It is worth mentioning, that although the number of defaulting sovereign issuers has been low compared with the number of defaulting non-government issuers in other industries -such as industrial issuers, non-bank financial institutions and the retail sector-, sovereign issuers have normally comprised the largest component of total defaults in terms of the dollar amount of debt affected (Keenan, Shtogrin and Sobehart, 1999). As discussed below (see 3.1.2), the recent integration of emerging market sovereign borrowers in the international financial markets has led to a decline in the credit quality of the group of sovereign borrowers as a whole, thereby increasing the probability of default on sovereign debt. As a result, access to an accurate and timely measure of sovereign default has become one of the greatest concerns for the financial community.

Political Risk

Although political risk is one of the factors contributing to sovereign default -i.e., credit risk-, it is examined here separately since willingness to pay is a qualitative factor which distinguishes sovereign from most other types of issuers. Moreover, a government that is unwilling to repay debt is usually pursuing policies that weaken its ability to do so.

Political risks arising from the possibility of expropriation, asset freeze, exchange controls and other forms of government intervention and regulation cannot generally be eliminated in a world of sovereign countries because each reserves the right to take such action.(3)

(2) The statistics on local and foreign currency sovereign default given here and the rest of this study include all the applicable debt categories identified in the definition of sovereign default provided in this section.

(3) Although expropriation and freezes constitute dramatic political events, history has recorded some examples of such risk. In 1979, the Carter administration froze Iranian assets in the United States. The freeze meant that Iranian deposits held in the United States or with US banks abroad could not be used to pay debts or be exchanged for other assets. In 1989 President George Bush imposed a similar freeze on Panamanian assets. See Rivera-Batiz and Rivera-Batiz, 1994. Far more reaching

The lack of a bankruptcy procedure for sovereign debt default, comprises another risk posed by lending to governments. According to Eaton, Gersovitz and Stiglitz (1986) the major difference between domestic and international debt is that the former are legal obligations, enforceable in courts.(4) Another difference is that, domestically, debtors who cannot meet their obligations have the option of filing for bankruptcy. Repayment of sovereign international debt, on the other hand, is largely voluntary; the penalties to be imposed on a country that does not honour a contract are, at best, indirect. In the case of a distressed sovereign debtor there is no court system with jurisdiction over the totality of the debtor state's obligations which can thereby compel dissident creditors to accept a generally agreed restructuring.(5)

Partly because creditors have only limited legal redress, a government may default on some or all of its obligations for political reasons even if it possesses the financial capacity for timely debt service. The creditworthiness of a country might not be well defined since it is difficult to distinguish between its ability to pay and its willingness to pay. This willingness to repay has been the subject of some research. For instance, according to the willingness-to-pay approach developed by Eaton and Gersovitz (1981), the borrower compares the perceived costs and benefits associated with repayment. If the perceived costs exceed the benefits, the borrower threatens to renege on its debt service obligations, and willingly faces retaliation from creditors. Solvency is not a relevant issue when the borrower has the resources to honour its debt service obligations. It is the "willingness" of the borrower to repay the loan which determines whether or not the borrower will renege on its debt service obligations. Furthermore, once a borrower has threatened to renege on debt service obligations, the best interests of creditors are served by renegotiating the loan, since it is assumed that lenders do not receive any benefits from retaliation. Thus, lenders

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for international banking operations were the implications of the US freeze on Libya's bank deposits in 1986. While the Iranian litigation was never resolved because the freeze was lifted before the various actions came to trial, Libyan Arab Foreign Bank succeeded in its claim relating to recover the amount outstanding in an account held in a London branch of an American bank. See FT Financial Regulation Report, 1987.

(4) See also Hermalin and Rose (1999) for a discussion about the different sources of risk in international and domestic lending.

(5) Eichengreen and Portes (1995) propose the creation of a sovereign bankruptcy procedure as an alternative to prevent crises in heavily indebted nations and examine the suitability of such procedure.

at least preserve the possibility of collecting on the loan in the future. This gives rise to debt rescheduling so frequently observed (Lee, 1991).[6]

Sovereign immunity, before World War II, was considered absolute. Creditors had no recourse to their own court to redress a default by a foreign government. Over the years, however, sovereign states have agreed to curtail their own sovereign immunity in order to permit commercial and industrial activities to prosper.[7] Although attempts to codify sovereign immunity issues have failed to eliminate completely the uncertainty surrounding sovereign lending,[8] lawsuits brought against defaulting sovereign debtors have made evident the complications surrounding the resolution of sovereign default claims.[9] What it is particularly relevant today is that sovereign borrowers can no longer be sure of the legal consequences of a sovereign default.

Nevertheless, contracts that are not enforceable through the legal system may still be enforced by some kind of reputational mechanism. Eaton (1996) argues that even though a creditor can typically seize only a small part of the debtor's assets in the event of default, creditors do make loans, and debtors often repay them. Hence, sovereign borrowers must repay for reasons other than avoiding seizure of assets by creditors. An implication might be that default impairs a country's subsequent access to world credit markets, and this impairment reduces its welfare. Therefore, a country makes repayments on its foreign debt in order to preserve its reputation for creditworthiness needed for future borrowing.[10]

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(6) Empirical work has shown that the willingness-to-pay model helps to explain the occurrence of commercial and official bank debt reschedulings -although at varying degrees- (Lee, 1991), and the credit ratings assigned by bankers to countries (Lee, 1993a).

(7) A review of the development and implications of the legal and economic framework of sovereign borrowing is given by Truglia, Levey and Mahoney (1995).

(8) Examples of these codification attempts are the Sovereign Immunities Act of 1976 in the United States, the State Immunity Act of 1978 in the UK and the international agreement signed in the European Convention on State Immunity.

(9) Costa Rica (1981) and Argentina (1992), for instance, were sued by their creditors in response to their debt default. Although both cases upheld the ability of creditors to bring suit against a sovereign borrower in the US, neither of them succeeded in providing a resolution in favour of the creditors. See Truglia, Levey and Mahoney, 1995.

(10) Other research works which support this reputation-for-repayment approach include Eaton, Gersovitz and Stiglitz, 1986; and, Grossman and Van Huyck, 1988. Additionally, Özler (1990 and 1992) shows that a borrower's past repayment performance affects subsequent credit terms. By contrast, Bulow and Rogoff (1989) argue that reputation for repayment does not enhance a country's ability to borrow.

Transfer Risk

Transfer risk is the major component of a sovereign foreign currency debt rating. It is a factor every time a debt is payable in a different currency than that generating the cash relied upon for payment. The term "transfer risk" covers the risk that the cash flow being generated in local currency cannot be converted to the desired foreign exchange, as well as the risk that such foreign exchange cannot be transferred beyond the country's borders. As explained before, according to the rating agencies, the term transfer risk applies to both sovereign and non-sovereign borrowers (see figure 3-2). Theoretically, the sovereign has the power to monopolise foreign exchange earnings. Thus, sovereign debt generally benefits from the least transfer risk. In the case of non-sovereign borrowers, transfer risk results from the imposition by the relevant government of exchange controls, which may take many shapes and forms (see Appendix V). They may be a temporary measure, or they might be put in place for an extended period of time. Strict exchange controls may be imposed when a government experiences a severe liquidity problem due to mismatches between the currency and the maturity of liabilities and assets, volatility of capital flows which are subject to sudden reversals, local currency depreciation, or loss of investors' confidence.

Exchange controls may include restrictions on the use of foreign currencies received by a local corporation as payments for goods or for services. For example, a sovereign can decree that corporations operating under its jurisdiction must repatriate export earnings generated in foreign currencies and deposit such proceeds with the central bank. The result of this type of control is that the affected corporations cannot use their foreign exchange income as they wish, thereby impairing the ability of domestic borrowers to honour their foreign debt obligations. In fact, during the period 1975-1995, among those countries where sovereigns defaulted on foreign currency debt and where private sector foreign currency debt was significant at the time of the sovereign defaults, private sector defaults featured in 68 percent of total cases of sovereign defaults (Chambers, 1997). Exchange controls imposed by the sovereign were the key factor in virtually all cases of private sector default involving foreign currency debt. By contrast, where sovereigns defaulted on local currency debt, private sector defaults were much less frequent -29 percent of the total.

As a general rule, it is extremely difficult for any private entity under the control of its relevant sovereign government to exceed the sovereign foreign currency debt rating. In some cases, however, the effect of a foreign currency sovereign rating can be mitigated by structural devices built into the cross-border transaction. In most cases, the purpose of these devices is to avoid the transfer risk altogether by making alternative sources of funds available for payment on the securities. Generally, the funds come from collateral posted in a different jurisdiction than that connected with the restricting foreign currency rating. They can also come from some types of swaps, or they can be supplied by third-party guarantees. Specifically, host jurisdiction transfer risk can be avoided or reduced when: (1) the debt issue is guaranteed by a guarantor domiciled outside the jurisdiction of the sovereign in question and the guarantee is unrestricted and not conditional on the sovereign's actions or the performance of the issuer; or, (2) the issuer is domiciled in an offshore financial centre and neither substantial business is undertaken nor substantial assets are maintained within that jurisdiction;[11] or, (3) when significant financial support from the foreign parent company is available to the issuing company; and, (4) by making use of structured transactions where there is sufficient protection to ensure that actions by any one or a group of sovereigns would not affect timely payment of principal and interest. These transactions may include issues backed by export receivables and other securitised loans.

On the other hand, when foreign investors purchase debt denominated in local currency, they normally do so with the expectation that repayments of interest and principal can be exchanged for foreign currency at a time of their own choosing. In this context, transfer risk is shifted from borrowers to investors since the latter may be unable to freely convert the local currency proceeds of debt service into their domestic currency. During periods of severe balance of payments pressure, for instance, governments may restrict the ability of non-residents to obtain foreign

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[11] Offshore financial centres provide services for non-residents while, usually, keeping their international business separate from their domestic business. They are normally characterised by economic and political stability, an efficient and experienced financial community, good

exchange. Local currency debt service may continue on a timely basis, but cross-border investors are unable to repatriate the proceeds. By the time the currency restrictions are eased, the value of local currency debt to such investors is likely to be impaired by a depreciation of the exchange rate in terms of foreign currency.(12) As described in 3.2.1, transfer risk borne by investors is normally not included in local currency sovereign ratings. It becomes a factor only when currency inconvertibility could result in default under the terms of a specific debt issue.

Until recently, transfer risk was not a major concern for most cross-border investors. The vast majority of local currency debt held offshore originated in the capital markets of the major OECD countries, where the threat of exchange controls adversely affecting investors is perceived to be minimal. However, the relaxation of currency restrictions by the governments of many developing countries has helped trigger rapid growth in their domestic bond markets by attracting substantial cross-border investment.(13) Transfer risk is a potentially bigger concern in these countries due to structural characteristics that subject them to greater volatility. These include an unstable macroeconomic environment, concentrated economic activity and exports, and susceptibility to greater shocks -terms of trade, weather, interest rates, and policy volatility. The high volatility of capital flows, exchange rates, assets prices and macroeconomic variables results in greater uncertainty and vulnerability to financial crises (World Bank, 1998a).

Systemic Risk

One major concern about sovereign distress is the contagion threat it poses to the international financial system. Systemic risk in this context is the cross-border transmission of financial shocks originating in a sovereign default, that may ultimately destabilise financial markets. The global integration of financial markets

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communication and support services, and a regulatory climate that protect investors and depositors but is not unduly restrictive to financial institutions.

(12) Such was the case of many Americans who had invested in Mexican certificates of deposit in the early 1980s attracted by high interest rates. In 1982, when the Mexican government took over the banking system, it imposed strict exchange controls, outlawing the export of US dollars and devaluating the peso. As a result, many American investors ended up in great losses. See Rivera-Batiz and Rivera-Batiz, 1994.

(13) Mexico's central bank, for example, estimates that over half of the government's debt payable in pesos was hold by non-residents in 1995, compared to just 10% at the end of 1991 (Beers, 1995). See also Table 2-2 in Chapter 2.

has been accompanied by a series of systemic crises characterised by: (1) an abrupt reduction in or complete loss of access to global capital markets for the affected countries; (2) spillover effects to countries viewed by market participants as being in similar condition; (3) severe currency and banking stress in the affected countries; and, (4) perceptions that banking and securities markets in mature economies could be deeply affected if there were widespread defaults on emerging market's external obligations (IMF, 1998a).

A key feature of the crises since the 1980s has been the existence of contagion or spillover effects. There was contagion, for instance, in the wave of defaults that occurred in Latin America in 1982 (Eichengreen and Portes, 1987). More recently, the Mexican shock of 1994 has provided a powerful demonstration that financial markets are very closely interconnected (IMF, 1995c and 1998a; and Sachs, Tornell and Velasco, 1996), and the sequence of events in East Asia in 1997 confirms that currency crises pass contagiously from one country to another (World Bank, 1998b). The markets' violent reaction to financial difficulties -in the form of self-fulfilling panic- forces governments to adopt drastic monetary and fiscal authority packages that threaten to destabilise output, employment and economic growth (Eichengreen and Portes, 1995).

While the term contagion or systemic risk has been widely used to describe the above financial crises, observers have come to different conclusions as to whether or not these episodes are evidence of irrational investor behaviour. Wolf (1997) concludes that it is difficult to find compelling evidence for irrational contagion effects. However, other studies, such as Eichengreen, Rose and Wyplosz (1996), have shown that while certain macroeconomic factors help to explain which countries experience currency crises, there remains an unexplained correlation in the timing of crises: that is, currency crises are to some extent contagious.

Historically, financial crises have been more recurrent in developing countries than in industrial countries and, since the start of the 1980s, they have become even more frequent (World Bank, 1998a). Over the past 100 years industrial countries have reduced the incidence and severity of systemic crises through public policy and institutional reforms. In developing countries, however, there is often a mismatch between public policies and the institutional structures intended to prevent financial crises and their integration with world financial markets. Thus the number of such crises remains large and their costs have been growing. The risk of financial crises arising in developing countries is amplified by the interaction of factors such as inadequate macroeconomic policies, surges in capital flows, fragility of domestic financial systems, weak corporate governance, and ill-prepared financial and capital account liberalisation.

Market Risk

In addition to the risks mentioned above, holders of sovereign debt are also exposed to the risks posed by the market, such as foreign exchange risk, interest rate risk and changes in market prices of commodity exports and debt instruments. These risks may affect the repayment capacity of a sovereign and, in turn, increase the default risk of sovereign debt instruments. The possibility that an unexpected change in exchange rates will alter the value of repayment of debt and might result in losses for investors or creditors arises from the foreign exchange risk -or currency risk. Currency risk is a consideration for investors who hold debt denominated in a currency other than their own. If the debt is denominated in the lender's home currency, risk is shifted to the borrower. However, the creditor still bears the risk that the borrower cannot obtain the foreign currency to repay the loan -transfer risk. As a result, debtor countries might need to reschedule their external hard currency debt and ration access of local firms to hard currencies.

The increasing acceptance of the benefits of free capital flows, and therefore the reluctance to impose foreign exchange controls, may mean that a government responds to an exchange crisis by maintaining a free capital account but allowing the currency to fall -sometimes dramatically- to a market-clearing level. This was the response, for example, of Turkey in early 1994 and Mexico at the end of that year. These currency shocks are a market risk that can entail increases in credit risks within the private sector, particularly for banks or corporates that have assets and liabilities whose currency composition is not matched (Huhne, 1996).

Differences in interest rates and inflation across countries, also influence exchange rates and often overshadow credit considerations. Interest rate risk has been evidenced in sovereign lending to heavily indebted developing countries. In the

1980s the debt crisis erupted when the major Latin American countries with large dollar-denominated burdens -e.g., Mexico, Brazil, Peru and Argentina- announced their inability to meet their debt-service obligations. This was the result of a conjunction of internal and external events including a contraction of export earning associated with world recession and higher interest payments linked to climbing world interest rates.

Liquidity risk has been evident for emerging market sovereigns whose future debt service capacity is highly affected by the variability of foreign exchange available to the country. Sharp fluctuations in the world market price of a country's primary commodity exports might lead to a decrease in foreign exchange earnings, thereby impairing severely the country's liquidity and prompting the likelihood of default on its foreign obligations.(14) Mushkat and Leong (1995) have discriminated between developing economies that are highly vulnerable to volatility of export earnings and those which are not. Their analytical procedure suggests that Asian borrowers -e.g., China, Thailand, India and Indonesia- present a lower default risk when compared with some of the Latin American economies -e.g., Argentina, Mexico and Brazil.

These, then, are the special risks associated with sovereign borrowers which together distinguish sovereign risk -and therefore sovereign ratings- from conventional credit risks and risk assessment. The following sections complement this discussion by describing several features of sovereign ratings that highlight their special significance in today's global financial markets.

3.1.2 Growth of Sovereign Issuers Tapping International Markets

The last chapter identified the increasing number of issuers borrowing in the international markets as one of the driving factors behind the rating industry's growth. Sovereign borrowers have not been the exception, having also contributed to the expansion of the rating business. At the same time, their growth has posed some additional risk to financial markets. For these reasons, sovereign credit ratings have become the centre of special attention in recent years.

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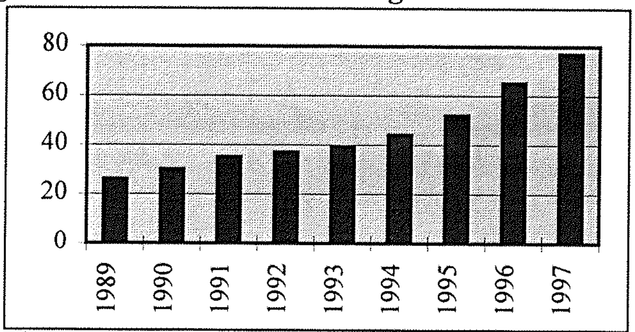
(14) Such was the case of Peru in 1976 and 1982-1983. Following a steep decline in commodity prices and the evaporation of liquidity the country suffered two "debt crises".

Although the current practice of assigning ratings which assess overall sovereign risk is relatively recent, some rating agencies have been rating bonds issued by foreign governments since the early 1920s. In 1929, Moody's rated bonds issued by roughly fifty central governments as a result of a very active international bond market. A declining demand for sovereign ratings followed the widespread defaults of the 1930s in the aftermath of the Great Depression. The market for foreign government bonds remained largely dormant after World War II, until the 1970s when the international bond markets revived. Notwithstanding this economic recovery, demand for sovereign ratings was slow to materialise. By 1985, only fifteen foreign governments borrowed in the U.S. capital markets and, thereby, felt the need to obtain credit ratings.

The sovereign business expanded rapidly in the late 1980s and early 1990s when weaker credits found market conditions sufficiently favourable to issue debt in international credit markets. These governments increasingly tapped the Yankee bond market, where credit ratings are a *de facto* requirement. Moreover, a recent survey (Cicolecchia, 1999) identified the sovereign market as the European credit market with the highest preference from institutional investors within Europe. Figures 3-3 and 3-4 show the growth in the number of sovereign governments rated by at least one rating agency and the growth in the number of agencies assigning those sovereign ratings from 1989 to the end of 1997. It can be noted that agency sovereign activity has returned to pre-Depression levels and that in the last few years additional rating agencies have also ventured into sovereign rating activity.

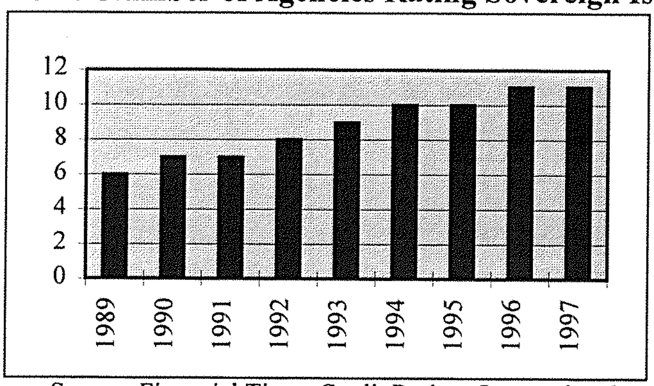
The growth in the demand for rating services has coincided with a trend towards assignment of lower quality sovereign credit ratings. Before 1985, most initial ratings were of the highest credit quality, AAA/Aaa, but during the 1990s, the median of the ratings assigned has been the lowest possible investment grade rating, BBB-/Baa3. It is interesting to note, however, that by 1995 the average initial rating for newly rated sovereigns was of the highest speculative-grade, BB+/Ba1 (see Table 3-1). According to Kranenburg (1996b), the growing importance of bonds versus bank loans as the main source of external financing for sovereigns is one of the key factors driving this transformation (see Table 2-3 in Chapter 2). The shift of sovereign borrowing from the syndicated bank loan market to the bond and commercial paper markets, where there is an established tradition of using opinions provided by independent rating services, has made it possible for the non-investment grade sector to gain access to the global securities market. In addition, the trend towards medium grade credit ratings is actually a sign of significant progress for some countries; several now in this credit range were in or near default just a few years ago.

Figure 3-3. Number of Sovereign Borrowers Rated[1]



[1]Long-term foreign currency sovereign credit ratings
Source: Financial Times Credit Ratings International

Figure 3-4. Number of Agencies Rating Sovereign Issuers



Source: Financial Times Credit Ratings International

Table 3-1. Shift in Distribution of Sovereign Ratings

Year Rating was first assigned by Standard and Poor's or Moody's	Number of newly rated sovereigns	Median rating assigned (S & P's/Moody's)
Pre-1975	3	AAA/Aaa
1975-79	9	AAA/Aaa
1980-84	3	AAA/Aaa
1985-89	19	A/A2
1990-1994	15	BBB-/Baa3
1995-1997[1]	17	BB+/Ba1

[1]Ratings reported are arithmetic average; the median rating for this period was BBB-/Baa3.
Sources: Standard and Poor's; Moody's Investors Service, Financial Times Credit Ratings International

3.1.3 Effect of Ratings on Sovereign Borrowing Terms

One of the most controversial aspects of sovereign ratings is the extent to which sovereign risk is reflected in the relationship between sovereign ratings and market yields. The apparent influence of ratings on borrowing terms not only has fostered the demand for sovereign ratings -as discussed in 2.3.7-, but also shows certain particular features for this rating category.

Cantor and Packer (1995, 1996a) have found that sovereign ratings have considerable power to explain sovereign yields.(15) In the most recent of their studies they found that sovereign yields tend to rise as ratings decline.(16) Their results suggest that ratings provide additional information beyond that contained in the standard macroeconomic country statistics incorporated in market yields, such as external debt, per capita income, GDP growth, inflation, and fiscal and external balance. They have also shown that, although the ordering of market yields of sovereign debt is negatively correlated with credit ratings -i.e., the higher the rating the lower the yield-, the correlation is lower for the sample of non-investment grade sovereigns than for the investment grade sovereigns. Moreover, despite the fact that sovereigns tend to be more highly rated than corporates on average, sovereign bonds are typically traded at higher yields than comparably rated US corporate bonds, and the gap between sovereign and corporate yields increases as rating quality declines.(17) Mixed results have been found by Larrain, Reisen and von Maltzan (1997). They analysed a sample of sovereign bonds of both developed and emerging markets for a longer period, 1987-1996. Using ratings of Moody's and Standard and Poor's, they report a mutual interaction between sovereign yield spreads and ratings. That is, changes in ratings seem to explain changes in sovereign bond spreads and vice versa. Eichengreen and Mody (1998) also find a negative relationship between

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(15) They used a cross-sectional analysis for a sample of thirty-five countries (both developed and developing) with actively traded Eurodollar bonds in the fall of 1995. The single rating variable explained over 90 percent of the variation in spreads.

(16) These findings coincide with those of Ederington, Yawitz and Roberts (1987) and Altman (1989) for corporate bonds, and Thompson and Vaz (1990), and Moon and Stotsky (1993) for municipal bonds.

(17) Higher spreads on sovereign bonds over similarly rated corporate bonds may be explained by a variety of factors, such as a greater asymmetry of information between debtor and creditor, the difficulty of defining sovereign assets not immune from attachment, the lack of a bankruptcy procedure (Eichengreen and Portes, 1995), the limited amount of secured lending to sovereigns

credit ratings and spreads. However, they limit their study to developing country bonds issued in the years 1991-1996. Their results confirm that higher credit quality translates into a higher probability of a country issuing new bond debt and on a lower spread. Equally, countries are penalised for inferior credit ratings, in that they find it both more difficult and more costly to borrow.[18]

It has been suggested that rating announcements may cause a change in the market's assessment of sovereign risk which is reflected in changes in bond spreads. Cantor and Packer (1996a) show that spreads tend to rise for negative announcements -possible downgrade- and to fall for positive announcements - possible upgrade. Their statistical analysis indicates that rating announcements have a much stronger impact on speculative-grade sovereigns than on investment grade sovereigns.[19] In addition, the impact of one agency's announcement is greater if the announcement confirms the other agency's rating or a previous rating announcement. Nevertheless, the impact of announcements does not appear to rely on the distinction between rating changes and outlook/watchlist changes or the distinction between positive and negative announcements. Larrain, Reisen and von Maltzan (1997) show that the impact of rating announcements is highly significant only for announcements on emerging market sovereign bonds. Contrary to Cantor and Packer (1996a) they find a significant impact only for investment-grade, emerging market securities. Furthermore, only negative announcements -possible downgrades- have a strong and significant effect on yield spreads for these securities.

Related findings in a recent study on sovereign rating migration (Fridson, 1998) suggest that rating stability decreases with time and as ratings decline. This indicates that, the lower the initial rating and the longer the time period considered, the lower the probability that the sovereign will remain at the initial rating at the end

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(Franks, 1995), and because financial markets are more pessimistic about sovereign credit risks than the agencies (Cantor and Packer, 1996a).

(18) Sovereign credit ratings used in this study were gathered from Institutional Investor. These ratings are based on a survey of international bankers, who assign a numerical value ranging from 0 to 100 (with 100 indicating zero probability of default). Additionally, the sample included private and non-private (sovereign and public agency) bonds. The results are, therefore, not straightforward comparable to those of Cantor and Packer (1996a) who included Moody's and Standard and Poor's credit ratings, and only sovereign bonds in their study.

(19) By contrast, Hand, Holthausen and Leftwich (1992) found that rating announcements have a significant impact on spreads of both investment-grade and speculative-grade corporate bonds.

of that period.[20] On the other hand, the results suggest that sovereign ratings are unbiased. That is, a country is as likely to be upgraded as it is to be downgraded, unless it is constrained by being at the top or bottom of the rating scale.

In brief, although the rating agencies' opinions appear to independently affect market spreads there is not sufficient evidence to confirm a causal relationship by which sovereign ratings determine yields.[21] Another important feature of credit ratings and the pricing of securities is the effect of split ratings on yield spreads which is described in 3.1.5.

3.1.4 Sovereign Ceiling Implications for Other Borrowers

The most direct impact of sovereign ratings is the ceiling they typically impose on the ratings of other issuers domiciled within the same country. The reasons for the ceiling role of sovereign ratings have already been identified as stemming mainly from the exposure of domestic borrowers to transfer risk and the powers that give most sovereign governments a greater capacity to repay their debt compared with other issuers.[22] As a result, the sovereign's borrowing cost establishes a benchmark for the debt of the other local issuers. Corporate, bank, state or municipal borrowers are seldom able to borrow more cheaply than their sovereigns. Consistent with this, Eichengreen and Mody (1998) found that, in emerging markets, private bonds carry higher spreads than sovereign bonds, reflecting the benchmark status of public issues and private bonds' greater perceived riskiness.

Conversely, corporate ratings may also have an impact on sovereign borrowing terms. For instance, as a result of the elimination of the sovereign ceiling for private sector borrowers in Argentina in 1997, the ratings of some of the largest Argentine companies were upgraded to a level higher than the sovereign rating. The improvement in the credit standing of the private companies strengthened the perceived creditworthiness of Argentine and Latin American counterparts and led to

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(20) For example, at the BB level, which is a category of particular interest to international emerging market investors, the historical record indicates an 8(8) percent probability of rising to BBB and a 4(33) percent probability of downgrading to B within one year(five years).

(21) The same non-conclusive evidence has been found for state and municipal governments. Although Bottini (1993), and Hsueh and Liu (1993) have found that interest costs for these kinds of governments are related to their ratings, causality cannot be claimed.

(22) See 2.4.2 in Chapter 2 for a detailed description of the sovereign ceiling role of sovereign ratings and its exceptions, and section 3.1.1. in this chapter for the description of "Transfer risk".

the narrowing of spreads on Argentine Brady bonds and Brady bonds in general. The move was viewed as benefiting the sovereign asset class as a whole.[(23)]

The previous chapter identified several situations in which domestic issuers may be rated higher than the sovereign rating, such as substantial offshore earnings and assets, a strong foreign parent company and domicile in a dollarised economy. In addition, obligations enjoying preferred creditor status may be considered as possessing a somewhat higher level of creditworthiness than the borrowing government's sovereign rating for other obligations. Multilateral lending institutions such as the International Bank for Reconstruction and Development (World Bank), the International Financial Corporation (IFC) and the Interamerican Development Bank (IADB) enjoy preferred creditor status. By virtue of its membership of the lending organisation and as a condition for eligibility to receive loans, the borrowing country undertakes no to impose any currency restriction or other impairment on the repayment of such loans. Because of the borrowing country's strong incentive to maintain timely loan repayment, these obligations may be assigned higher ratings than those on other sovereign obligations.

A special note should be made, however, of the ceiling imposed by local currency sovereign ratings. A local currency rating assesses the country-level risks that need to be incorporated into the ratings of locally domiciled obligors or locally originated structured transactions denominated in local currency. As with the foreign currency sovereign ceiling, the local currency sovereign ceiling does not act as an absolutely rigid ceiling. It indicates the rating level that might be assigned to the financially strongest issuer in the country, if they warrant that level on the basis of their stand-alone creditworthiness. These guidelines, on the other hand, do not affect local currency ratings of genuinely creditworthy foreign obligors. Foreign obligors usually receive a rating similar to the local currency rating in their home country and are not generally constrained by the local currency sovereign rating of the host country. The reason for this is that countries in distress are usually in need of foreign currency. Therefore, a creditworthy foreign obligor which has to repay an obligation in the host country's local currency could always bring in an adequate amount of

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[(23)] Standard and Poor's decision to eliminate the sovereign ceiling constraint for Argentina's private sector in April 1997 was reflected in the narrowing of spreads on Argentine Brady bonds over US foreign currency to purchase local currency in order to meet its debt service obligations. This is why local currency denominated bonds of multilateral organisations such as the World Bank and the Asian Development Bank have been rated "triple-A" even when they have borrowed in exotic local currencies. Nevertheless, local subsidiaries and/or local branches of foreign banks are subject to the local currency sovereign ceiling of the host country unless there is an explicit guarantee, or similar assurance, from the home office.(24)

3.1.5 Agency Disagreements over Sovereign Assessment

Discrepancies between ratings assigned to a sovereign by different rating agencies are not unusual. Such disagreements have prompted research which attempts to determine the sources of differences of opinion between agencies. For example, Beattie and Searle (1992b) have shown that consensus between agencies is greater for sovereign ratings than for other groups of issuers such as banks and other financial institutions, utilities and most corporates. On the other hand, Cantor and Packer (1995) found that, for low quality credits, differences of opinion between the agencies is greater for sovereigns than for corporates. Rating agencies agree more consistently in their assessments of investment-grade sovereigns than in their ratings of sub-investment grade sovereigns.(25) That is, disagreement is greater in the case of emerging market sovereigns. More recently, it appears that sovereigns, in general, are more susceptible to split ratings -i.e., different ratings assigned by different agencies to the same sovereign- than banks or corporates. Indeed, more than a fifth of all the fifty-two sovereigns jointly rated by FitchIBCA, Standard and Poor's and Moody's at the beginning of 1998 had rating differences of two notches or more, a far greater proportion than with other entities, where differences of more than one

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Treasury Bonds by 30 basis points and of Bradys, in general, by 20 basis points. See Luce, 1997.

(24) Ratings of bank deposits issued by foreign bank branches will be constrained by the sovereign ceiling of the host country, since branches of foreign banks are subject to the laws and regulations of the country where they are located. See "Sovereign ceilings for foreign currency bank deposits" in 2.4.2 in Chapter 2.

(25) In their sample, Cantor and Packer (1995) found that Moody's and Standard and Poor's agreed 67 percent of the time on sovereigns rated AA/Aa or above and 56 percent on other investment grade sovereigns, whereas they only agreed 29 percent on below investment grade sovereigns.

notch are rare (FitchIBCA, 1998).[26] It may be noted that there has been a trend towards greater disagreement between agencies over time. This reflects, in part, the lower credit quality of the sovereign issuers which have entered the capital markets in recent years and the greater uncertainties surrounding the assessment of sovereign risk of these countries.

Several factors have been identified as possibly contributing to split ratings,[27] but recent studies agree that differences in the rating scales of individual raters are the most important factor (Beattie and Searle, 1992a; and Cantor and Packer, 1996b and 1997). In the case of sovereign ratings, specifically, the greater frequency of disagreements over below investment-grade issuers suggests greater uncertainty in the assessment of this type of risk. Such disagreements may also reflect the agencies' limited experience assessing sovereign risk since sovereign rating business is a relatively recent phenomenon. On the other hand, the different risks associated with sovereign borrowers make sovereign assessment a more difficult task than measuring the credit risk of a corporation. It is not surprising, therefore, that opinions about the quantification and weightings of country risk factors can differ greatly amongst the rating agencies.

One important research finding concerns the relationship between split ratings and yields. Studies on corporate and municipal bonds have found that yields on split-rated bonds corresponds to the yield on the lower rating (Hsueh and Kidwell, 1988; Thompson and Vaz, 1990; and Moon and Stotsky, 1993).[28] Despite this, issuers appear to have an incentive to obtain more than one rating, since there is evidence that two -or more- equal ratings can reduce investors' required yield compared to the yields that they require for securities with either only one rating or split ratings.[29] Although the relationship between split sovereign ratings and spreads has not been systematically investigated, it has been observed that markets

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(26) A rating notch is a one-level difference on a rating scale, such as the difference between A1 and A2 for Moody's or between A+ and A for Standard and Poor's and FitchIBCA.

(27) For instance, different individual raters' rating scales, different raters' method of evaluation, random judgement element, differential rating lag, and differential information.

(28) By contrast, Cantor, Packer and Cole (1997) suggest that the best results in terms of bias and forecast prediction are obtained when yields are inferred from the average of the two ratings, instead of the lower rating.

(29) See for instance, Billingsley, et.al., 1985; Liu and Moore, 1987; Hsueh and Kidwell, 1988; Perry, Liu and Evans, 1988; and Thompson and Vaz, 1990.

tend to levy an extra risk premium on emerging market sovereigns at a particular rating level as compared with US corporates at the same rating level. Moreover, the spread gap widens as ratings decline. The higher yields on non-investment grade sovereign bonds relative to similarly rated corporate bonds reflect the greater disagreement between agencies over this lower-rated group of sovereign issuers.[30]

3.2 Local and Foreign Currency Sovereign Ratings

The previous section examined factors which give special significance to sovereign ratings. This section highlights the differences between foreign currency and local currency sovereign ratings.

Local and foreign currency ratings reflect the differences between the willingness and the ability of a government to meet its obligations denominated in domestic and foreign currencies. Three main differences can be identified. First, foreign and local currency sovereign ratings incorporate different kinds of risk. Second, sovereigns have shown a higher default frequency on foreign currency debt than on domestic claims, and, third, foreign and local currency defaults differ in the time-in-default and recovery values. These points are examined in detail below.

3.2.1 Risks Incorporated in Sovereign Ratings

Although the risk of a foreign currency default is not a perfect predictor of possible local currency risks, many of the variables required to determine a foreign currency rating are similar to those which would indicate the level of sovereign risk measured in local currency (Truglia and Levey, 1998a; and Beers and Cavanaugh, 1999). Nonetheless, default risk in local currency is generally, though not necessarily always, lower than the risk of default in foreign currency.

Sovereign issuers are assigned typically foreign currency ratings that are lower than their local currency ratings, thereby reflecting the government's greater willingness and ability to fulfil their domestic currency obligations. As mentioned

[30] Cantor and Packer (1995) found the mean of the spreads over comparable corporates to be 11 basis points for investment-grade sovereigns and 29 basis points for non-investment grade sovereigns.

before, this is a recognition of the sovereign's powers to tax and to control the domestic financial system. According to their definition, foreign currency sovereign ratings incorporate an appraisal of credit risk, that is, the risk that the sovereign will default on its foreign currency denominated obligations. Additionally, foreign currency sovereign ratings reflect the transfer risk borne by the sovereign borrower. The fact that sovereigns must secure foreign exchange to service their debt directly poses default risk in foreign currency debt repayment. In effect, the sovereign's foreign currency rating is an assessment of the factors taken into account to assign the local currency rating, plus the transfer risk (Salem, et.al., 1995).

By contrast, local currency ratings incorporate *only* the credit risk of the issuer. In other words, they reflect only an appraisal of the risk the sovereign will default on its obligations. (31) These differences between local and foreign currency sovereign ratings are enhanced by the greater emphasis of local currency ratings on the stand-alone credit characteristics of the sovereign. While the assessment of a sovereign government ability and willingness to service local currency debt is based mainly on its potentially unlimited access to local currency resources, foreign currency ratings assess the availability of official resources -especially during periods of balance of payments stress. That is, access to funding from the IMF and other multilateral and bilateral official sources is a related factor considered in the analysis of a sovereign's foreign currency rating (Truglia, 1998; and, Beers and Cavanaugh, 1999).

Nevertheless, market risks are not addressed by agencies' sovereign ratings; whether these be foreign currency or local currency. Losses in the market value of a security due to changes in foreign exchange rates or to changes in its market price are not normally considered in the credit ratings of a sovereign government. Foreign exchange risk is incorporated in sovereign ratings only to the extent that it reflects the potential for default on debt instruments.

Another important feature of local and foreign currency sovereign ratings is that they consider both public and private sector debt burdens (FitchIBCA, 1998; and, Beers and Cavanaugh, 1999). Private sector debt is examined because, in some circumstances, it can become a liability of the state.(32) Problems in the financial sector, in particular, can impair the sovereign's credit standing when they lead to official rescues of failing banks. Korea and Thailand, for instance, are sovereigns whose foreign and local currency ratings were downgraded in 1997-1998, in part because of the escalating cost of supporting their banking sectors.

For all this, any divergence between a sovereign's local and foreign currency ratings reflects the distinctive risks of each type of debt. Generally, the constraints the government faces in servicing its local currency debt are lower resulting in a higher rating for local currency denominated debt than for foreign currency debt.(33)

3.2.2 Sovereign Default Frequency

As pointed out above (3.2.1), local currency sovereign ratings reflect the lower perceived default risk of local currency debt compared to that of foreign currency debt. This sub-section describes the default history of sovereign borrowers on both local and foreign currency-denominated debt.

The historical evidence confirms the greater risk of external sovereign borrowing. A recent survey of sovereign defaults (Beers, 1998) shows that defaults on foreign currency sovereign debt have been more common than defaults on local currency sovereign obligations.(34) Defaults on foreign currency bonds took place repeatedly, and on substantial scale, throughout the 19th century and as recently as the 1940s. Sovereign defaults fell to low levels only in the first three decades after the Second World War, when cross-border sovereign bond issuance also was minimal. Defaults on foreign currency bonds were rare in the late 1970s and 1980s mainly because bond issuance by sovereigns of lesser credit quality was also rare. Defaults on bank loans occurred more frequently since, starting in the 1970s, bank

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(31) However, until July 1995, Standard and Poor's included in its local currency ratings the risk that the investors may be unable to freely convert the local currency proceeds of debt service into a foreign currency -i.e., transfer risk (Beers, 1995).

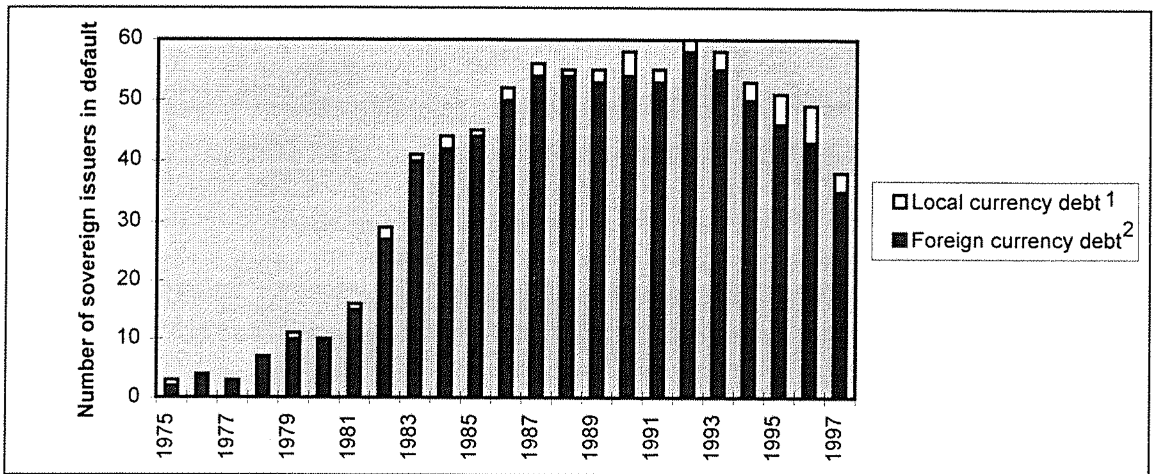
(32) Chambers (1997) reports that, for the 1975-95 period, in most cases of private sector foreign currency debt defaults, sovereign governments ultimately assumed the defaulted private sector debt in whole or in part and consolidated it in their own defaulted obligations.

(33) See also 2.4.3 in Chapter 2.

(34) According to the definition of sovereign default given in 3.1.1, local currency obligations include government and central bank securities, as well as bank loans and central bank currency. Foreign currency debt includes bank loans and all capital market issues sold in cross-border and local markets.

loans became the major source of cross-border borrowing for many governments. For speculative-grade rated sovereigns, in particular, foreign currency bond issuance only expanded after 1990, when Mexico issued the first Brady bonds in exchange for defaulted bank debt. Figure 3-5 shows the number of sovereign issuers with local and foreign currency debt in default during the 1975-1997 period.

Figure 3-5. Sovereign Debt in Default by Number of Issuers



[1] Includes government and central bank securities, as well as bank loans and central bank currency.
[2] Includes bank loans and all capital market issues sold in cross-border and local markets. Sovereign loans in arrears from multilateral lending institutions (such as the World Bank) are not included.
Source: Standard and Poor's.

The figure illustrates clearly the lower frequency of sovereign default on local currency than foreign currency debt. For the whole of the 1975-1997 period, the ratio of issuer defaults on the two types of debt was 1:6. A total of 12 issuers have defaulted on their local currency obligations since 1975, whereas 76 issuers have defaulted on their foreign currency bond and bank debt. Of the 12 sovereigns defaulting on their local currency debt, five previously defaulted on their foreign currency debt. On the other hand, a sizeable majority of sovereigns -71- continued servicing local currency debt without interruption after defaulting on foreign currency debt.

Defaults on foreign currency bonds, in contrast with defaults on bank loans, have been exceptional, although from a longer-term perspective they are gradually increasing. Defaults in the 1990s mainly reflect defaults on bank loans, not bonds. The latter, while increasing since the 1970s, nonetheless remain at a low level. Of the 76 issuers defaulting on their foreign currency debt, nine issuers defaulted on foreign currency bonds, while issuers defaulting on both bank debt and bonds featured in eight cases. In most cases, defaulted bonds where held by banks, rather than public issues held by a broad cross-section of investors. The higher frequency of sovereign default on bank debt than bond debt supports the discussion held in 2.4.2 in Chapter 2. The section identified several reasons for the higher likelihood of default on bank debt, such as the greater difficulties in identifying bondholders, the closer and longer-term relationship between banks and sovereign borrowers, and the more predictable and less detrimental consequences of bank debt default. These reasons make any bond debt restructuring more complex, thereby decreasing the likelihood of bond debt default.[35]

Interestingly, although from 1992 to 1997 the number of sovereign issuers in default and the value of sovereign debt in default declined -from 52 to 37 issuers and from 220 to 77 billion US dollar (Beers, 1998)-, the accumulation of low-quality credit in recent years poses a higher default risk in capital markets as a whole (see Table 3-1). It has been argued that the downward rating pressures affecting a number of emerging market governments, as well as the below-average credit quality of newly rated issuers are likely to result in higher sovereign default rates by the end of this decade or the beginning of the next. Additionally, judging from the increasing volume of bond issuance by emerging market sovereigns,[36] many with ratings in the speculative-grade category, it is expected that defaults on bank debt will feature less prominently and foreign currency bond defaults much more so. As noted before, attempts to restructure international bonds in an orderly way could also trigger defaults on international bonds (see footnote 35). As a result, default rates on foreign currency bonds may eventually converge on the default rates on loans from banks.

Despite the fact that defaults on sovereign debt have been numerous over the past three decades, there is no long history or substantial sample of ratings and defaults with which to provide scientific correlations, in strong contrast to the long

[35] Nevertheless, the possibility of sovereigns restructuring international bonds in an orderly way, such as the IMF's suggestion that Pakistan should restructure its public debt -including international bonds- to the Paris Club of government creditors, could trigger defaults on international bonds and increase the cost of international bail-outs over the long term. See Luce, 1999; Moody's, 1999; and, Ostrovsky, 1999b.

[36] See 3.3 for a description of emerging market sovereigns' debt structure.

history of ratings and defaults in the US corporate market. The reason is that, in the modern period, no sovereign issuer has defaulted on any local or foreign currency debt *rated* by the agencies (Beers, 1998; and FitchIBCA, 1998). Nor, until recently, have rating agencies assigned credit ratings to any of the sovereign issuers which defaulted in prior years. In contrast to the rated corporate issuers, therefore, the default rate on sovereign debt -which reflects the relationship between credit ratings and the probability of default- remains zero.[37]

3.2.3 Severity of Sovereign Default

Debt ratings traditionally have addressed the likelihood of timely repayment of interest and principal. Increasingly, though, the time period between default and ultimate settlement, along with the recovery value of debt in default, can be critical factors when rating certain types of obligations with sovereign-related risks, such as structured financings. In addition to the differences in default frequency, sovereign defaults on local and foreign currency debt are associated with different time-in-default and recovery values. According to the survey previously mentioned, defaults on local currency obligations tend to be remedied relatively quickly. Among issuers identified in the survey, the duration of each default averaged 2.5 years. By contrast, the average period of default for foreign currency bank debt was seven years. The duration of foreign currency bond defaults was shorter, at about five years, reflecting the more modest face value of the defaulted bonds then outstanding and, in some cases, the fact that bank debt was not in default at the same time. Both factors helped facilitate negotiations between issuers and creditors, reducing the time between default and ultimate settlement.

Recovery values -calculated on a weighted average, present value basis- were highest, and showed the least variation, for foreign currency bond defaults. The recovery rate was higher for bonds refinanced promptly through the issuance of new debt. Recoveries were lower on bonds in default for longer periods of time.

[37] Nevertheless, Izvorski (1998) has computed a relative market rating for the Brady bonds of seven developing countries based on the default probabilities implicit in the prices of these bonds. He has found that the levels of default probabilities obtained are consistent with the generally perceived riskiness of the issuers judged by Moody's ratings.

Recoveries on bank debt fared worse and varied more. Recoveries on defaulted local currency debt have been lower, and still more variable.

As described throughout this section, differences in the risks incorporated into local and foreign currency sovereign ratings, as well as differences in the default frequency, time-in-default and recovery values between these two kinds of debt, account for the difference between local and foreign currency ratings assigned to sovereign borrowers. It has also been noted that the increasing number of sovereign borrowers in emerging markets securing sovereign ratings has resulted in greater disagreement between agencies and has posed additional default risk to financial markets. The next section describes briefly the trends in debt structure of emerging market borrowers and highlights certain features of emerging market sovereign debt.

3.3 Emerging Market Debt Structure

World-wide capital markets have been willing and able to extend credit to a larger and more diverse set of speculative-grade borrowers. The receptivity of international bond markets to issuance by speculative-grade rated sovereigns, especially since the early 1990s, has increased the perceived default risk of the market as a whole. Moreover, it is thought that this decline in sovereign credit quality might lead to a new wave of sovereign bond defaults in the first decade of the new millennium. This section provides a review of the debt structure of emerging market borrowers and suggests that the increasing reliance of emerging market sovereigns on bond issuance for their cross-border financing may presage a rise in sovereign default rates in the near future.

Reflecting the general trend observed in global capital markets,(38) bond issuance has become the most important source of capital for emerging market borrowers seeking to raise foreign currency funds in the international markets (Table 3-2). Although bonds have displaced syndicated loans as the primary financing instrument for these borrowers, syndicated credits still account for a significant proportion of emerging market debt.

(38) See 2.3.2 in Chapter 2.

Table 3-2. Emerging Market Bond Issues, Equity Issues and Loan Commitments (Billions of US dollars)

	1991	1992	1993	1994	1995	1996	1997
Bond issues[1]	13.95	24.39	62.67	56.54	57.62	101.93	127.94
Loan commitments[2]	41.65	31.46	40.70	56.98	82.97	90.73	123.59
Equity issues	5.57	7.25	11.92	18.04	11.19	16.41	24.80

[1]Including notes issues under Euro medium-term note (EMTN) programmes
[2]Including certificates of deposit
Source: *International Financial Markets*, IMF, September 1998.

The growing volume of bonds issued by developing country issuers is supported by a maturing secondary market for developing country debt instruments. Secondary market transactions show greater trading activity in foreign currency denominated instruments compared to local currency instruments of emerging market debt. More than one half of the traded emerging market debt is denominated in foreign currencies (Table 3-3). Brady bonds are still the most active category of emerging market debt, representing almost 41 percent of total trading volume in 1997.[(39)] Other sovereign Eurobonds accounted for 22 percent of the reported volume for the same year, while local currency instruments accounted for as much as 25 percent of reported volume. Financial market deregulation, globalisation of capital markets, the spread of securitisation, the increasing use of derivatives instruments to help mitigate exchange rate risks all combine to raise the demand for local currency-denominated securities.

An interesting feature concerning Brady bonds is the different treatment agencies have given them. Moody's has typically rated them lower than the foreign currency sovereign rating, whereas other non-Brady Eurobonds -such as Yankee bonds- have been rated at the sovereign ceiling.[(40)] The reason for the lower ratings is

[(39)] The decline in outstanding Brady debt, however, has caused the turnover in this instrument to decrease in recent years from 61 percent of total trading volume in 1994 to 51 and 41 percent in 1996 and 1997, respectively.

[(40)] A noteworthy exception are Polish Brady bonds which were upgraded to an investment-grade rating -Baa3- by Moody's in 1996, bringing them in line with the other country's eurobonds. The reasons given by the agency were the increasing marketability and liquidity of this Brady debt. See Lapper, 1996.

that Brady bonds, although less risky than the loans they replaced or other bank debt, remain more vulnerable to rescheduling in a potential debt crisis than other types of bonds due to their sizeable share of emerging market external debt and to their relatively concentrated ownership (Estébanez, Lindow and Levey, 1994). On the other hand, the ratings that Standard and Poor's has assigned to Brady bonds have been identical to the ratings of each sovereign's other foreign currency debt on the grounds that, according to the agency, in most sovereign debt-crisis scenarios, Brady bond-holders likely will fare no worse than holders of other types of foreign currency bonds (Beers, 1996a). The reasons for this are that Brady bonds reflect the same underlying sovereign credit risks and, legally, rank equally with other sovereign currency bonds; that sovereigns have an incentive to treat Brady bonds' on a par with other types of foreign currency debt since Bradys' debt service burden is much less than for other types of debt because the sovereign has no need to find additional cash to pay investors at maturity given that the principal amount due on collateralised bonds, such as most Brady bonds, is, by definition, already fully funded; and, that the original creditor banks have sold many Bradys to an array of institutional investos which, increasingly, is as diverse as those holding Yankee, Eurobond, and other types of registered and bearer sovereign debt. The agency recognises, however, that the smaller issues of Brady bonds are still largely owned by the original creditor banks, and that bonds with such characteristics could, going forward, be rated lower than other types of foreign currency debt

Table 3-3. Secondary Market Transactions in Debt Instruments of Emerging Markets (Billions of US dollars)

	1993	1994	1995	1996	1997
Total turnover	1,978.9	2,766.2	2,738.8	5296.9	5915.9
of which					
Brady bonds	1,021.3	1,684.0	1,580.1	2689.9	2402.5
Corporate and non-Brady sovereign Bonds	176.6	159.5	211.1	568.2	1334.8
Local market instruments[1]	361.9	524.3	593.2	1273.8	1506.0

[1]Data for 1993 do not include trading in short-term local instruments
Source: *International Financial Markets*, IMF, September 1998.

At the same time, spreads on Brady bonds have been persistently higher than those on non-Brady Eurobonds (IMF, 1997c). Various explanations for the persistence of these yield differentials have been offered. First, it has been argued that since Brady bonds represent structured loans, they carry the stigma of prior defaults, whereas non-Brady Eurobonds are original-issue debt. Investors may perceive that there is a greater risk of default on Brady bonds, thereby requiring a higher yield. Second, the actual "stripping" of the Brady bonds of their collateral to earn the stripped yield -which requires shorting the collateral, US Treasury discount bonds, in a portfolio- entails costs which are reflected in higher spreads on Brady bonds. Third, the unusual cash-flow patterns, such as below market coupons, of Brady bonds may have prompted investors to demand higher yields. Fourth, since many of the non-Brady Eurobonds are bearer securities, some investors may be willing to pay a premium for anonymity that allows them to forgo registering the securities. Fifth, non-Brady Eurobonds tend to have lower volatilities than Brady bonds, and so investors may require a lower yield. Finally, all Brady bonds are callable at par while most of the more recently issued non-Brady Eurobonds are not. For most of the period since the inception of Brady bonds the call option has been so far out-of-the-money that its value has been insignificant, however, as the prices of emerging market debt have risen rapidly over the past few years, the value of the call feature on Brady bonds has become a consideration. In order to compensate for the higher risk of the sovereign exercising the call option, investors may require higher yields.

3.4 Conclusion

This chapter has highlighted aspects of sovereign ratings which give them a particularly important role in financial markets. These factors are:

1) the distinctive kinds of risk associated with sovereign borrowers, which distinguish them from most other types of borrowers;
2) the growing demand for sovereign ratings due to the increasing number of sovereign borrowers who are enabled to access international financial markets by securing a credit rating;

3) the suggested causal effect of sovereign ratings on the borrowing terms of the sovereign government;
4) the constraints that sovereign ratings establish on domestic borrowers in terms of both credit rating assignments (the sovereign ceiling) and borrowing costs;
5) the disagreement between rating agencies regarding the ratings assigned to emerging market borrowers; and,
6) the potentially greater default risk that sovereign debt entails as suggested by recent sovereign defaults and the lower credit quality of sovereign borrowers gaining access to international capital markets.

The discussion has also focused on the different constraints that sovereign governments face in servicing their local and foreign currency debt, and that account for disparities between their local and foreign currency ratings. Three such differences were identified, namely those related to the kinds of risk that local and foreign currency sovereign ratings incorporate, the higher default frequency on foreign relative to local currency debt, and the severity of local and foreign currency defaults (local currency defaults being cured relatively quickly, but at lower and more variable recovery values than foreign currency debt defaults).

Finally, the chapter has emphasised the increasing recourse of emerging market sovereigns to the international bond markets in the 1990s. Many observers expect a new default cycle to emerge over the next decade, in part due to the low credit quality of many of these sovereigns, as reflected in their speculative-grade ratings.

Given the above considerations, it has become more important than ever before for policy makers, regulators and market participants to understand the sovereign risk assessment process undertaken by rating agencies. The following chapters provide an analysis of the factors considered by rating agencies in the determination of sovereign credit ratings.

4. The Determinants of Foreign Currency Sovereign Ratings

As discussed in the previous chapters, several reasons confer importance to the investigation of the information content of sovereign credit ratings. The dramatic growth in the demand for sovereign credit ratings in recent years, underpinned by the influence of rating changes on the cost of both public and private sector debt, has resulted in a growing number of agencies entering the sovereign rating business, thereby increasing the probability of inter-agency disagreements and, consequently, split ratings. At the same time, ratings that are lower than anticipated, and the distrust on rating agencies' ability to provide timely indications of troubled sovereigns as witnessed by Mexico's and East Asia's financial crises in 1994-1995 and 1997-1998, respectively, often prompt issuers and investors, as well as academic observers to question the consistency and rationale of sovereign ratings.

Achieving sustained access to international capital markets in order to increase the supply of investment funds will be a key policy objective for many developing countries during the rest of the 1990s and beyond. Given that credit ratings can afford emerging markets easier access to international capital markets, knowing which policies or economic developments are likely to help most in restoring perceived creditworthiness -i.e., credit ratings- will be important to the design of adjustment programmes whose objective is to help achieve or restore access to international financial markets.

The empirical analysis in this chapter provides some evidence on the determinants of foreign currency sovereign ratings. The following key issues are raised: (1) the systematic differences between agencies regarding both the factors included in the sovereign rating process and the weightings attached to those factors; (2) the effect of the sovereign's geographic region on the credit ratings assigned by the agencies; (3) the relative importance of lagged and average historical values of variables to explain sovereign credit ratings; (4) the extent to which macroeconomic and balance-sheet variables influence rating agencies' opinions of sovereign creditworthiness; and, (5) the robustness of ordered probit analysis to model the information content of foreign currency sovereign ratings as compared to ordinary least squares regression analysis.

While filling important gaps in the understanding of the sovereign rating process, the empirical analysis included in this chapter extends the existing literature in the following ways: (1) it uses a larger sample in terms of the number of countries, the number of rating agencies and the number of total observations; (2) it includes, for the first time, Canadian and Japanese rating agencies in the analysis; (3) it makes use of more recent data than any study to date; (4) it expands the group of explanatory variables to include a set of balance-sheet variables; (5) it pays attention, for the first time, to the lag structures of explanatory variables; (6) it analyses the data sample using ordered probit regression estimation technique, which, as explained later, more appropriately applies to the analysis of risk-rating measures of an ordinal rather than cardinal nature; (7) it compares the accuracy, in terms of correctly classified ratings, between ordered probit and OLS estimations; and, (8) it discriminates for the first time between the statistically and the quantitatively significant variables resulting from these estimations.

The findings suggest that both macroeconomic and balance-sheet variables, which the literature identifies as important factors of a sovereign's capacity and willingness to service external debt play an important role in determining foreign currency sovereign credit ratings. The results also show that rating agencies rely largely on average historical values of economic indicators to determine credit ratings. Furthermore, this analysis demonstrates that there are systematic differences in foreign currency sovereign ratings across agencies and across geographic regions. While ordered probit analysis performs slightly better than OLS at classifying correctly the ratings at the broad-letter level, it performs considerably better at the rating-notch level classifying correctly 40 percent of the ratings compared to only less than a quarter of the sample for OLS. Finally, the quantitative analysis suggests that not all the statistically significant variables have a significant quantitative impact on foreign currency ratings, and that the rating agency and the region of the sovereign have a significant quantitative impact on the ratings.

This chapter is organised as follows. The first section reviews the existing literature on the determinants of sovereign credit ratings. Section two provides the theoretical framework within which the explanatory variables of this analysis were chosen, while section three describes these explanatory variables. Section four outlines the hypotheses tested in this chapter. The regression model and the data used in this analysis are described in sections five and six, respectively. Section seven presents the results of the empirical analysis, section eight describes and discusses the accuracy of the models, and section nine analyses the quantitative impact of the preferred model. Section ten concludes the chapter.

4.1 Previous Research

Due in part to the newness of the sovereign rating business, research attempting to shed light on the determinants of credit ratings and to ascertain the extent to which ratings can be correctly predicted using publicly available financial statistics has been largely confined to non-sovereign credit ratings. Horrigan (1966) was the first study to estimate and predict corporate bond ratings. Ederington and Yawitz (1987) provide a survey of studies aimed at explaining the determinants of corporate bond ratings. Moon and Stotsky (1993) examine the determinants of municipal government debt ratings and Cluff and Farnham (1985) provide a survey of earlier studies on municipal ratings. Mar-Molinero, Apellaniz and Serrano (1996) identify the factors that are used by the rating agencies in the determination of bank ratings.

The first systematic study of the relationship between sovereign credit ratings and their determinants is provided by Cantor and Packer (1996a), who analysed the ratings by Moody's and Standard and Poor's for one year (1995) and forty-nine sovereigns. They used ordinary least squares regression analysis to estimate the relative significance of eight economic variables in a country's creditworthiness, as measured by its credit rating.(1) The cross-sectional analysis suggests that sovereign credit ratings are broadly consistent with macroeconomic fundamentals which the two agencies appear to weigh similarly. Linden, McNamara and Vaaler (1998)

(1) The explanatory variables included per capita income, growth of GDP, rate of inflation, fiscal balance, external balance, external debt, an indicator for economic development and an indicator for default history on foreign currency debt.

expanded the scope of inquiry to include all six NRSROs,[(2)] and ten (1987-1996) years of sovereign risk rating observations.[(3)] In addition, the work assesses the significance of possible regional effects. Using the same explanatory variables as Cantor and Packer (1996a), the data sample was analysed using multilevel ordinal logistic regression estimation techniques. The study shows that there are systematic differences in sovereign credit ratings across rating firms and geographic regions.

4.2 The Theoretical Framework

As explained before (3.1.1), sovereign credit ratings are a measure of sovereign default risk, thereby reflecting the ability and willingness of sovereign borrowers to meet their debt obligations. Two different theoretical approaches have been used to model country default risk (Haque, et.al., 1996). The debt-service capacity approach regards default as arising out of an unintended deterioration in the borrowing country's capacity to service its debt. In contrast, the cost-benefit approach views the rescheduling -or default- of a country's external debt as a rational choice by the borrower, based on an assessment of the costs and benefits of rescheduling or repudiation.

4.2.1 The Debt-Service Capacity Approach

In the debt-service capacity approach, the probability of default is a function of the unsustainability of a given level of external debt, arising either as a result of short-term illiquidity or long-run insolvency that is reflected in liquidity problems. A number of key economic variables can serve as indicators of future liquidity and solvency problems in this approach. Saini and Bates (1984) provide a review of the major studies which have attempted to measure country risk and among the economic variables that have been identified as determinants of a country's debt servicing capacity are the following: export earnings, growth of output, the ratio of

(2) For the period covered by this study, the US Securities and Exchange Commission (SEC) designated six rating agencies as nationally recognised statistical ratings organisations (NRSROs): Moody's Investors Service, Standard and Poor's, Duff and Phelps, Fitch Investors Service, IBCA and Thomson BankWatch.

(3) Nevertheless, the study does not specify the number of countries included in the sample.

debt to GDP, the ratio of international reserves to imports, the current account balance, the terms of trade, the inflation rate and the real exchange rate.

While, when constructing models of debt service capacity, most researchers have focused their attention on traditional macroeconomic -or "ratio"- variables, such as those mentioned above, this study also introduces variables which reflect a country's balance-sheet structure. These variables are intended to explain debt service capacity of sovereign borrowers along the lines of Kindleberger's (1978) and Minsky's (1982) descriptions of financial crises. These theories view a financial crisis as a disequilibrium process involving several stages. During a period of economic expansion, a sense of optimism induces borrowers to become more leveraged and to take on potentially more risky activities. Lenders, also optimistic, support these developments. Assuming a proved ability to service the debt incurred, this situation can continue until it is undermined by an unforeseen shock. If the shock affects the cash flow of borrowers, then they will draw on precautionary balances by reducing holdings of short-term assets and activating outstanding lines of credit. This is done in the hope that the effects of the shock are of short duration. If they are not and there is a continued deterioration in the borrower's cash flow then they will be forced into a position whereby they fall into arrears -default- on debt service payments. Ultimately lenders may be forced into a position whereby the borrower's debt position is restructured. During this period lenders may increase risk premia on new borrowing or ration credit. On the basis of these considerations, it is expected to find variables characterising the balance-sheet position of sovereign borrowers -such as the ratio of short- and long-term debt to total debt, the ratio of foreign exchange reserves to IMF quota, and the use of IMF credit- to play an important role in explaining sovereign default risk.[4]

[4] Lloyd-Ellis, McKenzie and Thomas (1989 and 1990), and Elmore and McKenzie (1996) show that balance-sheet variables are empirically superior to macroeconomic variables in explaining developing countries' debt service capacity. They argue that this is due to the fact that traditional macroeconomic variables do not capture developments on both the credit and debit sides of a country's balance sheet of payments accounts and that balance-sheet variables are available with a shorter publication lag. For instance, a high ratio of debt service to exports may be acceptable if there exist current account surpluses which enable the debt service to be met.

4.2.2 The Cost-Benefit Approach

The cost-benefit approach was formalised by Eaton and Gersovitz (1981), who argued that, in the absence of legal institutions to enforce international loan agreements, a market mechanism emerges in the form of a threat to future exclusion from voluntary international capital flows.(5) In the extreme case, the cost of repudiation of debt is the loss in welfare owing to the debtor being forced into autarky or, at a minimum, barter in foreign debt. The benefit of default is the windfall gain consisting of the economy's total outstanding debt. The approach emphasises four motives for a country to incur sovereign external debt, which are regarded as instrumental in determining the probability of default and, hence, play a fundamental role in influencing the measures of country creditworthiness. These motives include the consumption-smoothing motive, in which the country has a greater incentive to smooth its consumption by maintaining access to international markets; the reputation motive, in which the debtor has an incentive to maintain a reputation for repayment in order to have access to future borrowing; the investment motive, arising from an expectation of a relatively high productivity in the borrowing country; and the adjustment motive, based on a measure of current account sustainability.

4.3 Explanatory Variables

Given the theoretical framework described above, the explanatory variables for this study have been chosen to be consistent with the factors that both theoretical and empirical literature have stressed as important in determining the capacity and willingness of sovereign borrowers to service external debt. It is worth noting, however, that these factors are at the same time consistent with those indicated by the rating agencies as used in assessing sovereign creditworthiness (see Table III-2 in Appendix III).

Not all possible explanatory variables have been included, however. Some studies have tested for the effects of political variables on perceived country

(5) For a survey of the literature on this approach, see Eaton, Gersovitz and Stiglitz, 1986.

creditworthiness.[6] Although the results indicate that both political instability and economic variables are taken into account in evaluating country creditworthiness, it appears that country creditworthiness perceptions are largely based on a country's economic performance, which is expected to reflect longer term political stability (Brewer and Rivoli, 1990; Cosset and Roy, 1991; and Lee, 1993b). Furthermore, Haque, Mark and Mathieson (1998) have shown that, while including political events can improve the explanatory power of regression models that analyse country creditworthiness, the exclusion of political variables does not bias the parameter estimates for the effects of economic variables. Hence, political stability variables have been considered here to the extent that they are reflected in the economic variables included in this analysis, as described below.

4.3.1 Macroeconomic Variables

In line with Cantor and Packer (1996a), eight economic indicators have been chosen as explanatory variables (see Table 4-1):

1) **External debt.** A higher debt burden should correspond to a higher risk of default. The weight of the burden increases as a country's foreign currency debt rises relative to its foreign currency earnings. Hence, the higher the ratio of debt to exports, the lower a country's risk rating.
2) **Fiscal balance.** A large federal deficit absorbs private domestic savings and suggests that a government lacks the ability or will to tax its citizenry to cover current expenses or to service its debt. Therefore, the lower the fiscal balance (i.e., the higher the government deficit) of a country relative to its GDP, the lower the rating will be.
3) **External balance.** A large current account deficit indicates that the public and private sectors together rely heavily on funds from abroad. Current account deficits that persist result in growth in foreign indebtedness, which may become unsustainable over time. Hence, the larger the current account deficit (surplus), the lower (higher) the sovereign rating will be.

[6] These studies used Euromoney and Institutional Investor magazines' country risk ratings as the measure of country creditworthiness.

4) **Inflation.** A high rate of inflation points to structural problems in the government's finances. When a government appears unable or unwilling to pay for current budgetary expenses through taxes or debt issuance, it must resort to inflationary money finance. Public dissatisfaction with inflation may in turn lead to political instability. As a result, the higher the inflation rate, the lower the creditworthiness rating will be.

5) **Income.** The greater the potential tax base of the borrowing country, the greater the ability of a government to repay debt. This variable can also serve as a proxy for the level of political stability. Therefore, the higher a country's per capita income, the higher the country's credit rating.

6) **GDP growth.** A relatively high rate of economic growth suggests that a country's existing debt burden will become easier to service over time, whereas a decline in the rate of growth can contribute to long-term insolvency problems and, hence, lower credit ratings.

7) **Development indicator.** Although the level of economic development is already measured by the per capita income variable, the inclusion of a variable which differentiates between developed and developing countries is intended to capture a possible threshold effect into the relationship between economic development and risk. That is, rating agencies seem to consider that once countries reach a certain income or level of development, they may be less likely to default. The proxy for this minimum income or development level is an indicator variable noting whether or not a country is classified as industrialised by the International Monetary Fund. It would, therefore, be expected that countries with a higher level of economic development have higher credit ratings. The IMF classification for the countries included in the sample is given in Table 4-3.

8) **Default history.** Other things being equal, a country that has defaulted on debt in the recent past is widely perceived as a high credit risk. Both theoretical considerations of the role of reputation in sovereign debt (Eaton, 1996) and related empirical evidence (Özler, 1992) indicate that defaulting sovereigns suffer a severe decline in their standing with creditors. Credit reputation is factored in by using an indicator variable that notes whether or not a country has defaulted on its foreign currency bank and/or bond debt since 1975.

4.3.2 Balance-Sheet Variables

In line with Lloyd-Ellis, McKenzie and Thomas (1989), and in order to investigate the extent to which balance-sheet variables are included in the rating agencies' assessment of sovereign creditworthiness, this analysis hypothesises sovereign credit ratings to be a function of the following balance-sheet variables:

1) Long-term bank debt relative to total bank borrowing;
2) Medium-term bank debt relative to total bank borrowing;
3) Short-term bank debt relative to total bank borrowing;
4) Country's total debt relative to total bank lending for the sample;
5) Undisbursed credit commitments relative to total bank lending to a country;
6) Foreign exchange reserves relative to the IMF quota;
7) Use of IMF credit relative to the IMF quota;
8) Total bank borrowing relative to bank deposits.

According to Kindleberger's (1978) and Minsky's (1982) description of financial crises, it is hypothesised that, in response to a deteriorating cash-flow position, liquid assets (foreign exchange reserves) will fall and undisbursed credit commitments will be drawn down; IMF credit may then be sought as banks begin to extend only short-term loans. If the crisis is country-specific its own debt relative to total debt will fall. Therefore, higher levels of foreign exchange reserves, undisbursed credit commitments and long-term debt relative to total bank debt are expected to be associated with higher credit ratings, whereas higher levels of short-term debt relative to total debt and a higher ratio of use of IMF credit to IMF quota should result in lower credit ratings.

A description of the balance-sheet variables included in this analysis, as well as the quantification method and the source of information are provided in Table 4-2.

4.3.3 Regional and Agency Indicators

In addition to the macroeconomic and balance-sheet variables described above, and in line with Linden, McNamara and Vaaler (1998), two sets of indicator variables have been included to capture effects on sovereign ratings in a given year related to the sovereign being rated by a specific agency or related to the sovereign's location in a specific geographic region. The first set of indicator variables defines the eleven different rating agencies for analysis: (1) Moody's Investors Service; (2) Standard and Poor's; (3) IBCA; (4) Thomson BankWatch; (5) Duff and Phelps; (6) Fitch Investors Service; (7) Japan Bond Research Institute (JBRI); (8) Japan Credit Rating Agency (JCRA); (9) Nippon Investors Service; (10) Dominion Bond Rating Service; and, (11) Canadian Bond Rating Service.

The second set of variables defines five separate geographic regions for analysis: (1) Africa/Middle East; (2) Asia/Pacific Central; (3) Eastern Europe; (4) Latin America; and, (5) West Europe/North America.

The geographical classification of the countries included in the sample is provided in Table 4-3.

4.4 Hypotheses

The preceding sections and the previous chapter provide a theoretical and empirical background for this analysis and suggest its key hypotheses. Arguably, credit rating agencies have access to the same information -both publicly available information and private information obtained from the sovereign issuer-, which is then incorporated into the rating process. Nevertheless, disagreement between agencies frequently results in different ratings assigned to the same sovereign (see 3.1.5). This suggests, for instance, that agencies may assess different quantitative or qualitative factors in their rating process, or that they attach different weightings to the same factors. It is thus hypothesised that,

Hypothesis 1: There are significant differences across agencies in the determinants of sovereign credit ratings and/or the relative importance attached to each determinant.

In addition to differences between rating firms, it would also be expected to find systematic rating differences across regions. As discussed in the last chapter (3.1.1), a major concern about sovereign default is the contagion effects it poses to the financial systems of other countries. The recent crises in Mexico (1994-1995) and East Asia (1997-1998) have shown that there are often systematic effects that relate to entire regions. Consequently, although a set of general economic and political factors will explain sovereign ratings on a global scale, there will still be systematic regional differences reflecting differences in the perceived risk associated with particular geographic regions. It is therefore presumed that,

Hypothesis 2: The geographic region of the sovereign significantly affects its credit rating and this effect is significantly different across regions.

While systematic studies of the determinants of sovereign credit ratings (4.1) have used average historical values of the macroeconomic indicators included as explanatory variables of ratings, it would be expected that a forward looking rating process additionally assesses the economic trends which reflect an improving or deteriorating performance of the country and future debt service capacity. These trends would be represented by the lagged values of the variable in previous years. It would, thus, be expected that lagged values of macroeconomic variables play also an important role in the determination of credit ratings. Hence,

Hypothesis 3: Lagged values of macroeconomic variables significantly affect sovereign credit ratings over and above the effect of their average historical values.

Finally, on the basis of Kindleberger's (1978) and Minsky's (1982) description of financial crises (see 4.2.1), this study hypothesises that balance-sheet variables reflect a country's capacity to service its external obligations and, in line with the results of Lloyd-Ellis, McKenzie and Thomas (1989), and Elmore and McKenzie (1996), it would be expected that balance-sheet variables outperform or, at least, complement macroeconomic variables in explaining sovereign default risk. Therefore,

Hypothesis 4: Balance-sheet variables play a significant role in explaining sovereign credit ratings.

4.5 The Estimation Method

To test the hypotheses outlined above, this analysis uses the ordered probit model developed by Aitchison and Silvey (1957), Ashford (1959), and Gurland, Lee and Dahmn (1960), and introduced to the social sciences by McKelvey and Zavoina (1975). The selection of ordered probit as the estimation method has been made on the basis that it more appropriately applies to dependent variables of a discrete, ordinal nature such as credit ratings. As pointed out by Kaplan and Urwitz (1979), ordinary least squares (OLS) analysis assumes that the underlying dependent variable, credit ratings in this case, has been categorised into equally spaced discrete intervals -rating categories. That is, the risk differential between an AAA/Aaa and an AA/Aa rating is the same as between a BB/Ba and B rating. While credit ratings convey ordinal information -an AAA sovereign is more creditworthy than an AA sovereign, which is more creditworthy than an A sovereign, and so forth-, it is certainly not apparent that these ratings can be interpreted as equal intervals on a scale from almost certain repayment to high risk of default. It is argued that the bias introduced by linear regression of an ordinal variable makes this practice unacceptable.(7) In fact, Moon and Stotsky (1993) found that rating categories are unevenly spaced, thereby indicating that categorising the ratings with a single linear specification with equal-spaced intervals would be inappropriate.(8)

In line with this, it is assumed that a sovereign rating represents an ordinal ranking of its creditworthiness. That is, it is assumed that there is an unobserved index of creditworthiness (Y*) which is a function of the characteristics of the issuing sovereign. Credit ratings (Y) are assumed to be observed, ordered categories. The continuous random variable Y* is defined by

$$Y^*_{ijt} = X_{it}b + e_{ijt} \tag{4-1}$$

where:

Y^*_{ijt} is the unobserved index associated with the rating agency j's assessment in year t of the sovereign i's creditworthiness;

X_{it} is a row vector of characteristics of sovereign i in year t that affect the conditional mean of Y^*_{ijt};

(7) McKelvey and Zavoina (1975), and Winship and Mare (1984) give examples where regression of ordinal dependent variables which have been treated as interval variables provides misleading results.

(8) Ederington (1985) found that, using the same data as independent variables, the ordered probit model outperformed linear regression, discriminant analysis and unordered logit models at predicting credit ratings. In addition, Cluff and Farnham (1985) argue that probit analysis is more suitable than logit analysis for the rating dependent variable because probit analysis requires less restrictive assumptions on the error term than does logit analysis. Nevertheless, Long (1997) claims that the choice between the ordered logit and probit models is largely one of convenience.

b	is a column vector of the weightings that the agencies attach to each characteristic in evaluating the sovereign's creditworthiness;

e_{ijt}	is the stochastic error term.

The observed variable, Y_{ijt}, represents ordinal rating categories, and, therefore, it is assumed to take a finite number of discrete values, m_k. The unobserved dependent variable, Y^*_{ijt}, is then restricted to take k ordinal values according to the following equation:

$$Y_{ijt} = m_k \quad \text{if } \mu_{k-1} \leq Y^*_{ijt} < \mu_k \quad \text{for } k = 1, 2, \ldots\ldots n \tag{4-2}$$

The μ's are the thresholds or cutpoints which define the intervals for each rating category on the creditworthiness scale. The extreme rating categories 1 and n are defined by open-ended intervals with $\mu_0 = -\infty$ and $\mu_n = \infty$. In this analysis, k=16 rating categories (i.e., B-/B3=1, B/B2=2,.......AAA/Aaa=16).

The model that will be estimated is derived from eq. (4-1) and, expressed in probability, is given by:

$$\Pr (Y_{ijt}=m_k \mid X_{it}) = F (\mu_k - X_{it}b) - F (\mu_{k-1} - X_{it}b) \tag{4-3}$$

where F is the standard normal cumulative distribution function. The parameters of eq. (4-3) are estimated using maximum likelihood facilities in TSP, subject to the constraint $\mu_0 \leq \mu_1 \leq \ldots\ldots\mu_n$ to ensure ratings ordering.

Although the above discussion emphasises the greater appropriateness of the ordered probit methodology for ordinal dependent variables such as credit ratings, eq. (4-1) is also estimated using linear regression through ordinary least squares.(9) Recognising the theoretical and empirical limitations of OLS analysis discussed above, its inclusion as an alternative estimation technique is only intended to enable the comparison with Cantor and Packer's (1996a) work and with the results obtained from the maximum likelihood estimation. The comparison between OLS and probit estimations is made in terms of the differences in the estimated coefficients and *t*-

(9) OLS regression assumes that the dependent variable in eq. (4-1), Y^*_{ijt}, is the observed sovereign credit rating.

statistics, as well as in terms of the accuracy with which each technique can replicate the ratings.

4.6 Data

The sample includes the long-term foreign-currency sovereign credit ratings assigned by eleven international rating agencies to 55 sovereign borrowers for the period from 1989 to 1997. The total sample size is 1003 observations.

4.6.1 Dependent Variable

The dependent variable in the probit and OLS models is the long-term foreign currency rating assigned to each sovereign by each of the eleven agencies included in the analysis as of December 31 of each year.(10) The agencies considered in this study include five American agencies (Moody's, Standard and Poor's, Thomson BankWatch, Duff and Phelps, and Fitch), one European agency (IBCA), two Canadian agencies (Canadian Bond Rating Service and Dominion Bond Rating Service), and three Japanese agencies (JBRI, JCRA and Nippon Investors Service).(11) The ratings were obtained from the *Financial Times Credit Ratings International* database. Some countries were rated by all eleven agencies in a given year while other are only rated by one agency. The unit of measurement is, as explained above, a 16-point risk rating scale.

As pointed out in Chapter 3 (3.1.2), the expansion of the sovereign rating business in the late 1980s and early 1990s has been driven mainly by the growth in the number of weaker credits which have found market conditions sufficiently favourable to issue debt in international credit markets. This has resulted in a decline in the overall credit quality of the universe of rated sovereigns. Figures 4-1 and 4-2 show the distribution of the foreign currency sovereign credit ratings for the whole of the period covered in this analysis' sample and for each of the years included. A clear trend towards the assignment of lower ratings over the years can be observed.

(10) Except for 1989, when ratings are reported as of December 31, all ratings are reported as of January 1st. of each year. However, for the purposes of this analysis they are considered as corresponding to December 31 of the previous year.

The upper panel of graphs in figure 4-2 shows that from 1989 to 1992 the rating distribution was skewed to the right reflecting the fact that highly rated sovereigns dominated the international markets. The lower panel, on the other hand, presents quite different rating distributions for the years 1993 to 1997. It can be noted that while the number of high ratings -i.e., A-/A3 or higher- has grown slowly, the growth of below investment grade ratings has been impressive, leading to a more evenly distributed sample of ratings. For instance, in 1989, BBB+/Baa1 or lower sovereign ratings accounted for approximately 12 percent of the total, whereas this proportion soared to over 50 percent by the end of 1997. As discussed in the above mentioned section, the growing importance of bonds versus bank loans as the main source of external financing for sovereigns together with an established tradition of using credit ratings in the bond and CP markets, and the trend towards medium grade credit ratings reflecting the progress of some countries are some of the factors driving this transformation.

The change in the ratings distribution described above has some possible implications. The increasing number of non-investment grade ratings suggests that the inferences drawn from the models might differ depending on the year of the analysis. For instance, in 1989 high investment grade sovereigns dominated the sample of ratings, whereas by 1997 sovereign ratings were concentrated in the middle of the rating spectrum -i.e., low-investment grade or highly-speculative grade ratings. This implies that if annual rating models were estimated, the inferences drawn from each model would reflect the characteristics of the predominant rating categories included in the sample and could, therefore, vary over the years. Additionally, it may be argued that as rating agencies improve their skills in assessing sovereign creditworthiness, and as the factors that might trigger default events change, the weightings attached to each of these factors may also vary over the years. The analysis included in this chapter attempts to shed light on the determinants of foreign currency sovereign credit ratings for the whole of the period included in the sample, that is, 1989-1997. Nonetheless, it is recognised that inferences for a specific year might potentially vary on the basis of the issues discussed before.

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(11) Further details about these agencies can be found in Chapter 2 (2.2).

It is worthwhile noting some observations regarding the ratings distribution of the sub-sample of each rating agency. Moody's, Standard and Poor's, IBCA's and Thomson BankWatch's sub-samples are similar in terms of the countries they rate and in that they cover the whole spectrum of rating categories. On the other hand, the sub-samples for Duff and Phelps, Fitch, the three Japanese agencies, and the two Canadian agencies present greater differences. Compared to the former four mentioned agencies, the number of countries that the latter agencies rate is far smaller and the credit quality of such sovereigns varies from agency to agency. The rating spectrum, therefore, is not completely covered. This implies that the inferences drawn from the tests which examine differences across agencies - presented in section 4.7- should be viewed with some caution. That is, while the similar subsets for Moody's, Standard and Poor's, IBCA and Thomson BankWatch allow for comparisons between their ratings and the factors each agency includes in the determination of such ratings, this is not the case for the rest of the agencies. Given the difference in the number and credit quality of the sovereign issuers rated by each agency, the results which report differences between agencies whose ratings subsets are not comparable are given only on a preliminary basis. A wider coverage of sovereign issuers in the future by the newer agencies should allow for stronger inter-agency inferences based on more similarly distributed sub-samples of ratings.

4.6.2 Explanatory Variables

As described before (4.3), the explanatory variables included in this analysis comprise four different subsets: macroeconomic variables, balance-sheet variables, indicator variables for the rating agencies, and indicator variables for the geographical region of the country of interest. All explanatory variables included in the models estimated are lagged by one year, unless stated otherwise.

Figure 4-1. Foreign Currency Sovereign Ratings Distribution, 1989-1997

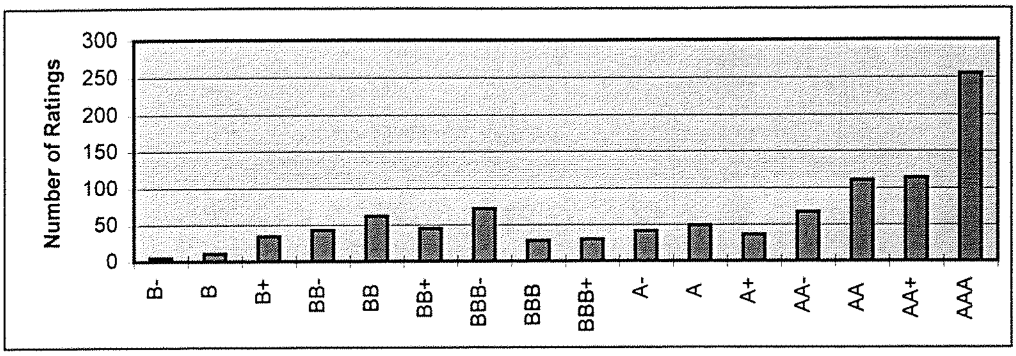
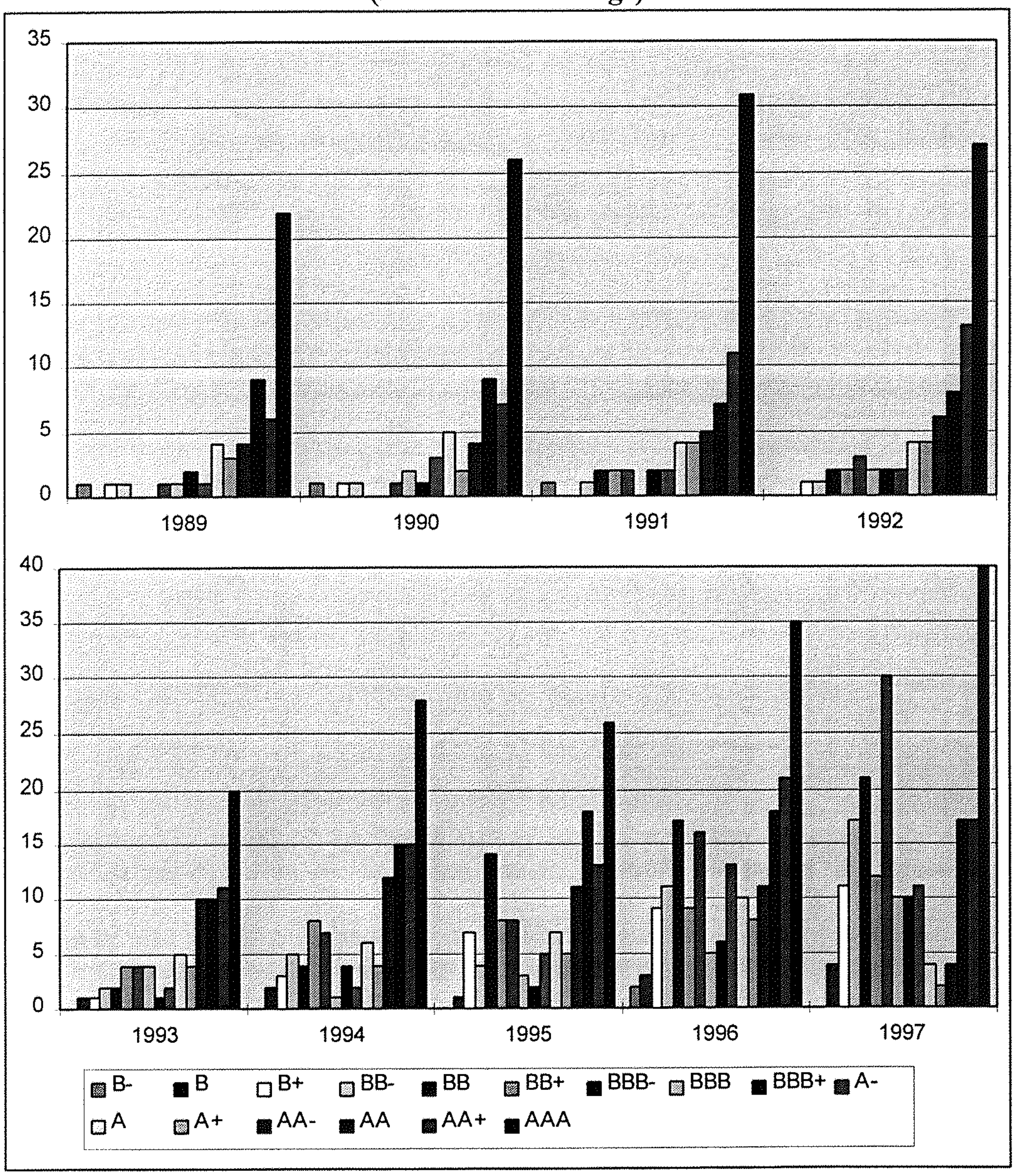


Figure 4-2. Foreign Currency Sovereign Ratings Distribution, by Year (Number of Ratings)



4.7 Results

Maximum likelihood estimates for the ordered probit model in eq. (4-3) and the results for OLS regressions are presented in Tables 4-4 to 4-14. The findings and contributions of this analysis are summarised below and start with a description of the results of the base model which includes only the eight macroeconomic indicators as explanatory variables. Improvements to the base model are subsequently made by the addition of agency and region indicators, as well as the incorporation of lagged and balance-sheet variables. Whenever differences between agencies are reported, the differences in the subset of ratings for each agency and their implications on the inferences from the models should be borne in mind (see 4.6.1).

Throughout this section, however, the results are discussed in terms of the statistical significance of the explanatory variables. The quantitative impact of the variables is given in section 4.9.

4.7.1 Base Model

Firstly, a base model with the eight macroeconomic variables (4.3.1) was estimated (first column in Table 4-4). This model is the same as that used by Cantor and Packer (1996a) in their study and is also one of the models used by Linden, McNamara and Vaaler (1998). It constitutes the starting point of this empirical analysis since it allows for comparison between its findings and the findings of the previous studies.

The results show that all variables are statistically significant and have the anticipated sign. Nevertheless, external balance appears to have the weakest impact on ratings in terms of statistical significance. This contrasts with Cantor and Packer (1996a) who found both fiscal and external balance statistically insignificant and of the unexpected sign. The negative and significant impact of government deficits on foreign currency ratings found in this analysis possesses theoretical foundation. A large government deficit may be the result of a deep recession affecting tax revenues and increasing welfare expenditures, and subsequent government unwillingness to reduce the deficit when the recovery begins. Sometimes fiscal deterioration is more closely associated with declining political popularity, impending elections, and the use of the electorate's own money in politicians' electoral campaigns. Whichever the precise cause, the consequence of a large government deficit is to reduce the country's overall savings. More of the surpluses in the corporate and personal sectors -the retained earnings of companies and the savings of people- are absorbed by the government. If investment stays the same, savings are obtained from overseas to finance the gap. If the process continues too long, the return required by foreigners rises, interest rates remain at a premium to those in other countries, and investment is affected. If no fiscal adjustment takes place, markets lose confidence and the currency may fall sharply, thereby increasing the external debt service burden and, with it, the default risk on foreign currency debt.

The results also differ from Linden, McNamara and Vaaler's (1998) who found statistical significance for all variables but the rate of inflation. Differences in the findings may stem from differences in the samples analysed. While this study includes ratings from eleven rating agencies for the period 1989-1997, the two previous studies, Cantor and Packer (1996a) and Linden, McNamara and Vaaler (1998), included only two and six agencies, for the years 1995, and 1987-1996, respectively.

The two indicator variables -development indicator and default history- proved highly significant. As expected, the sovereign's reputation for repayment, as reflected in its default history on external debt, seems to play an important role in the determination of foreign currency sovereign ratings. Sovereigns are penalised with lower ratings for having defaulted on either bank or bond foreign debt -or both- in the past 25 years. Similarly, the positive coefficient of the development indicator suggests that there still exists a stigma attached to emerging market sovereigns.

The likelihood ratio statistic tests the joint significance of the eight explanatory variables, i.e., tests the hypothesis that all coefficients except the intercept are zero.(12) The null hypothesis is clearly rejected in each case according to

(12) To test for the joint significance of subsets of explanatory variables, likelihood ratio (LR) tests are used. The LR statistic is given by $-2\ln(L_0/L_1)$ where L_1 is the value of the likelihood function for the model including all the variables with unconstrained coefficients, and L_0 is the value of the likelihood function for the model resulting from constraining the coefficients of the subset of variables of interest to zero. When the significance of the base model is tested, all coefficients except the intercept are zero. The LR statistic will follow a chi-square distribution with degrees of freedom (d.f.) equal to the number of constraints imposed. See Aldrich and Nelson, 1984.

the χ^2 (d.f.=8) distribution, suggesting that the subset of macroeconomic variables significantly explain the foreign currency sovereign ratings assigned by the agencies

Column four in Table 4-4 presents the OLS estimates for the base model. The major difference in the statistical significance of coefficients between OLS and probit is for external balance, which has an insignificant coefficient in the OLS estimation, but a significant probit-estimated coefficient. There is also a difference in the magnitude of the coefficients. Kaplan and Urwitz (1979) argue that this difference is likely to be caused by the endogenous shifting of the dependent variable in the ordered probit procedure. Therefore, at least on this estimation sample, only small differences are observed between the two techniques. While the OLS estimation presents a slightly lower explanatory power, R^2=0.86, on this analysis' sample than on the sample used in previous research, R^2=0.92 (Cantor and Packer, 1996a), the magnitude of *t*-statistics is considerably higher in this analysis. The positive and significant coefficients of fiscal balance and GDP growth in the base model constitute the major differences between this analysis and the previous work. As mentioned before, this previous study found a coefficient statistically insignificant and of the opposite sign for the fiscal balance, whereas the coefficient of GDP growth is significant only at the 10 percent level. A further comparison between ordered probit and OLS is given in section 4.8 which evaluates the accuracy of the two estimation procedures for this analysis.

These findings, thus, seem to confirm the results of previous research and suggest that rating agencies assign foreign currency sovereign ratings by assessing factors that are consistent with those stressed by the theoretical literature as important in determining sovereign capacity and willingness to service external debt. Furthermore, the macroeconomic variables chosen in this analysis appear to be a powerful set of explanatory factors of foreign currency sovereign ratings. The base model cannot capture, however, differences between agencies' assessments. Agencies' differences are examined by adding a subset of agency indicator variables to the base model, as described in the next section.

4.7.2 Agency Indicators

To test for differences between agencies -hypothesis 1- several models have been estimated. Model 1 in Table 4-4 tests for the effects of the addition of the rating agency indicator variables to the base model.[13] The probit estimates given in the second column show that the agency indicator variables significantly added to the explanatory value of the model (LR=85.08; d.f.=9; $p<0.01$). Examining the effect of the inclusion of the rating agencies, it is found that, for this sample, Thomson BankWatch assigns consistently lower ratings than Standard and Poor's -the reference agency. On the other hand, Fitch Investors Service assigns significantly higher ratings than Standard and Poor's. This latter finding is consistent with Ederington and Yawitz's (1987) observation that Fitch is often viewed as tending to rate corporate issues higher than the other agencies. The two Canadian agencies[14] and two of the Japanese agencies -JCRA and Nippon Investors Service- also assign significantly higher ratings than Standard and Poor's. Additionally, although the effect is not statistically significant, it appears that Moody's and IBCA rate sovereigns less favourably, and JBRI more favourably, than Standard and Poor's. The lack of statistical significance of these three agency indicator variables suggests that Moody's, IBCA, JBRI and Standard and Poor's broadly agree on their assessments of sovereign creditworthiness, although there is still a small variation.

These findings, however, contrast with those of Linden, McNamara and Vaaler (1998), who found that only one agency -Duff and Phelps- assigns sovereign ratings which are significantly different -higher- from those assigned by Standard and Poor's. The analysis presented in this chapter has also found that Duff and Phelps assigns higher ratings than Standard and Poor's, but the statistical significance of this agency's indicator is only moderate.

Column five in Table 4-4 shows the results of the OLS regression for the model with agency indicators. The results are similar to those of the ordered probit model. Although there are small differences in the magnitude of coefficients and *t*-statistics, no major differences in the statistical significance of the coefficients are observed. The most notable difference is the highly significant coefficient of JBRI -

[13] The quantitative impact of the variables included in Model 1 is given in section 4.9.

found insignificant in Model 1- which indicates that this agency appears to assign higher foreign currency sovereign ratings than Standard and Poor's. Consistent with the results of the probit model, the addition of the subset of agency indicators improved the explanatory power of the base model (R^2=0.87), though only slightly.

To test for the differences between agencies regarding the determinants of foreign currency sovereign ratings and their weightings, Models 3 to 6 were estimated. These models include as explanatory variables the eight macroeconomic variables of the base model and the indicators for the geographic region. They were estimated separately for each of the agencies whose sub-sample size permitted the analysis. The differences in the significance of the macroeconomic variables across agencies is discussed here, while the inferences regarding the regional effect on the ratings are presented in the next section. The estimates of the probit models are shown in Table 4-5. Each model examines individually the determinants of the sovereign ratings assigned by Moody's, Standard and Poor's, IBCA and Thomson BankWatch.[15] The models suggest significant differences in the sovereign ratings assigned by the different agencies.

The estimates of Models 3 and 4 suggest that Moody's and Standard and Poor's broadly share the same rating criteria and show the greatest agreement, although they weigh some variables differently.[16] Focusing only on the coefficients with different statistical significance, Moody's seems to place more weight -greater magnitude of coefficient- on external debt as a negative factor than Standard and Poor's, and less weight on fiscal balance and more weight on GDP growth as positive factors. These findings are consistent with Cantor and Packer (1996a), who, estimating the base model for their sample -i.e., without including the regional indicators-, found that the two agencies attach slightly different weightings to roughly the same significant macroeconomic variables. Nonetheless, the findings differ from Cantor and Packer's (1996a) in that while they found fiscal balance to be not significant and the development indicator to be a significant determinant of both

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(14) Due to the limited number of individual observations for Canadian Bond Rating Service and Dominion Bond Rating Service, they were grouped under the heading "Canadian agencies".

(15) Individual models were estimated only for these four agencies since only them assign ratings both in each of the 16 rating categories and for the five geographic regions.

(16) Greater agreement between Moody's and Standard and Poor's than between other pairs of agencies has also been found by Beattie and Searle (1992a).

Moody's and Standard and Poor's ratings, the opposite was found in this empirical analysis. As discussed in the next section, the lack of significance of the development indicator is the result of the inclusion of the region indicators in the models.

This analysis expands Cantor and Packer's (1996a) study to include nine more rating agencies. The results show that moving away from the two leading agencies -Moody's and Standard and Poor's- the differences in the determinants of sovereign ratings become more evident. For instance, external debt and income appear to be the most statistically significant factors in IBCA's assessment of sovereign creditworthiness (Model 5). Interestingly, the growth of GDP and the default history of the sovereign seem to be irrelevant in the assessment, as reflected in the statistically insignificant coefficients of these variables. Compared to Moody's and Standard and Poor's, IBCA places less weight on fiscal balance and inflation as positive and negative factors, respectively. These results, however, contradict the prior finding -from Model 1- that IBCA's ratings are not significantly different from those of Moody's and Standard and Poor's. This suggests that identical rating categories may reflect different information and gives rise to questions about the comparability of credit ratings from different agencies.

Thomson BankWatch's ratings appear to be determined mainly by the external debt, the per capita income, and the GDP growth of the sovereign (Model 6). Thomson places less weight than the two leading American agencies on the rate of inflation and on the default history of the sovereign as negative factors, and more weight on the GDP growth as a positive factor. The greater disagreement between Thomson BankWatch, and Moody's and Standard and Poor's stems from the lack of significance of the fiscal balance in Thomson's model.

The OLS estimates of these four models are shown in Table 4-6. The coefficients and *t*-statistics show that the statistical inferences are practically unchanged. The explanatory power of the models for Moody's and Standard and Poor's proved almost as high as that found in previous research which did not include regional indicators -R^2= 0.90 and 0.88, respectively as opposed to 0.91 and 0.93 in Cantor and Packer's (1996a) work. In general, the models shown in Table 4-6 explain roughly 90 percent of the sample variation.

In sum, the findings seem to support hypothesis 1. Although the base model suggested that foreign currency sovereign credit ratings may be explained by a small number of macroeconomic variables which is broadly shared by the rating agencies, the analysis of the effect of agency indicators leads to suggest that there exist significant differences across rating agencies regarding the determinants of foreign currency sovereign credit ratings. Moreover, when similarity in rating criteria is observed, differences in the weightings attached to each factor may still be present.

4.7.3 Regional Indicators

As for hypothesis 2, which recognised that the contagion effects of sovereign default evidenced recently have caused the default risk associated with sovereigns in the same geographic region to be perceived as similar, it was expected to find that sovereign ratings would vary systematically across regions. Supporting this hypothesis, it is found that the addition of the geographic region indicator variables significantly added explanatory value to the base model (LR=90.38; d.f.=4; $p<0.01$) as shown by the probit results of Model 2 (third column in Table 4-4). It can be noted that after controlling for the basic economic characteristics of the countries, sovereigns outside West Europe and North America received systematically and significantly lower ratings. This finding is confirmed by Models 3, 4, 5 and 6, which show that Moody's, Standard and Poor's, IBCA and Thomson BankWatch assign systematically lower ratings to sovereigns located outside the region of their home country. Moreover, it seems that rating agencies place greater importance to the country's geographic region than to the country's IMF classification as reflected by the fact that, after including the regional indicator variables, the significance of the development indicator was curtailed. Nevertheless, this finding contrasts with Linden, McNamara and Vaaler's (1998) results which found a negative effect of the sovereign's geographic region only on the ratings of sovereigns from the Africa/Middle East and Asia/Pacific Central regions.

In order to test for differences between agencies within each region, Models 7 to 11 were estimated (Table 4-7).[17] In line with Linden, McNamara and Vaaler

[17] The models were estimated using the range of rating categories observed for each region as the dependent variable. See note in Table 4-7.

(1998), the models individually estimate the determinants of sovereign ratings for each of the five geographic regions considered in the analysis and include the agency indicator variables having Standard and Poor's as the reference agency. This analysis differs, however, in that the Canadian and the Japanese rating agencies have also been incorporated into the models. On the whole, the results seem to support previous research findings and suggest that, compared to Standard and Poor's, Moody's and Duff and Phelps assign significantly higher ratings to sovereigns in Africa and the Middle East.(18) The results also show that Thomson BankWatch appears to be more pessimistic than Standard and Poor's about sovereigns in Asia, the Pacific Central region, and Eastern Europe, as reflected in Thomson's significantly lower ratings. Latin American sovereign borrowers are rated more favourably by Duff and Phelps relative to Standard and Poor's. On the other hand, Fitch assigns ratings which are not significantly different from those assigned by Standard and Poor's. Interestingly, it is found that, although IBCA and Standard and Poor's seem to assign in every region sovereign ratings which are not significantly different, the ratings still convey different information as reflected in the differences in the determinants of the ratings and their weightings shown in Models 4 and 5. As suggested before, contrary to common assumption, identical ratings from different agencies may reflect different information and, therefore, be not comparable.

The Canadian agencies, which limit their activities to their own region, seem not to assign ratings significantly different from Standard and Poor's, whereas, on the whole, the Japanese agencies appear to assess more favourably the sovereigns they rate. JCRA and Nippon Investors Service are both found to assign higher ratings than Standard and Poor's to sovereigns in Africa and the Middle East, and West Europe and North America. Additionally, JCRA rates more favourably sovereigns in Eastern Europe. Finally, Latin American sovereign borrowers rated by Nippon Investors Service obtain ratings which are systematically higher than

(18) It is worth noting that, for this region, the coefficients for the income -GDP per capita- and the default history are exceptionally large compared to the rest. This may reflect the differences between the countries included in the region. While the income per capita in South Africa and Turkey is, approximately, three times as large as that in Jordan, Israel's income per capita is roughly five times that of the two former countries. Further, of these four countries, only Israel had a record of no default during the period analysed.

Standard and Poor's ratings. Interestingly, Nippon assigns significantly higher ratings than Standard and Poor's in every region it covers.

In addition to the above discussion, previous research has suggested that rating agencies rate more leniently issuers from their own country (Beattie and Searle, 1992b). The findings drawn from Models 3, 4, 5 and 6 strongly support this view for three of the American agencies -Moody's, Standard and Poor's and Thomson BankWatch- and for the European agency -IBCA. The coefficients of the region indicator variables of these models show that, invariably, the agencies assign significantly lower ratings to sovereigns outside their home region, after accounting for the factors related to the sovereign's ability and willingness to service its debt. Furthermore, the Japanese agency JBRI was found to assign significantly higher ratings to sovereigns from its own region relative to Standard and Poor's (Model 8). Moody's and Thomson BankWatch seem to assign lower ratings than Standard and Poor's to sovereigns located in their same region (Model 11). Arguably, however, these findings may reflect the fact that rating agencies have a greater understanding of the sovereigns located in their proximity, and, therefore, they act cautiously assigning more conservative ratings to sovereigns outside their home region.

All the above findings are supported by the OLS regression results shown in Tables 4-4 (sixth column) and 4-8 since the difference in the statistical significance of the coefficients between the two techniques -OLS and probit- is minor.

In brief, the analysis of regional effects on ratings suggests that, after controlling for the economic characteristics of the sovereigns, the geographic region is a significant determinant of their foreign currency credit ratings. Moreover, clear differences between agencies on a region by region basis were found. Sovereigns in regions that are distant from the home country of the rater appear to be seen less favourably by the raters. Evidence supporting the view that newer rating agencies may assign higher ratings as an strategy to increase their market share was, nevertheless, not found.

4.7.4 Average and Lagged Variables

All the models estimated thus far in this empirical analysis have used mainly average historical values for the macroeconomic explanatory variables, as defined in Table 4-

1.[19] According to hypothesis 3, it would be expected that rating agencies pay attention, additionally, to the individual lagged values of these variables in order to assess sovereign creditworthiness. For instance, a given average rate of inflation may be the result of two different situations: it may reflect a sustained annual inflation rate in the past three years -according to the definition of average inflation used here-, or it may be the result of a successful adjustment programme, thereby reflecting a continued decline in the annual rate of inflation during that period. It would be expected that the perceived creditworthiness of the sovereign is higher in the latter situation and that lagged variables which capture such differences in performance are taken into account by rating agencies in their credit risk assessments.

To test this hypothesis Model 12 was estimated (Table 4-9).[20] The model includes the average historical value and the values lagged by one, two, and three years, for each of the six economic variables considered -i.e., external debt, fiscal balance, external balance, inflation, income and GDP growth.[21] Neither of the indicator variables, the development indicator and the default history, took lagged values. The probit estimates given in the first column of the table show that, although the addition of lagged variables added to the explanatory value of the base model (LR=48.06; d.f.=18; $p<0.01$), of the additional lagged variables, only the value of GDP growth lagged by one year appeared significant. Of the original variables -i.e., those included in the base model-, only the average value of the rate of inflation, the average value of GDP growth, the development indicator and the indicator for default history remain in the model as significant determinants of foreign currency sovereign ratings and have coefficients of the expected sign. Furthermore, the latter two indicator variables appear to be the most statistically significant of these determinants. The negative coefficient of the lagged value of the GDP growth and the positive coefficient for its average value may suggest that past

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[19] The values of external debt and income per capita are values lagged by one year, whereas fiscal balance, external balance, the rate of inflation, and GDP growth are average historical values, as described in Table 4-1.

[20] Kazakhstan was excluded from the sample due to the lack of observations for the lagged variables. Since inflation is transformed to natural logarithm values, two observations for The Netherlands and one for Germany were also excluded due to negative values of the rate of inflation.

[21] An alternative model including the macroeconomic variables lagged by only one and two years was also estimated. Nevertheless, this model add no explanatory value to the base model.

high levels of growth might have led to higher levels of indebtedness and that this negative effect on ratings may be compensated if the level of growth is sustained, that is, offset by the positive effect of a high average growth.

The OLS estimates for Model 12 are presented in the second column of Table 4-9. Although the statistical inferences drawn from the probit estimates hold for the OLS results, three additional variables appeared significant, namely the income per capita lagged by one and two years and the value of GDP growth lagged by three years. The greater compatibility of ordered probit with the nature of credit ratings leads to conclude that the inferences drawn from this estimation are more appropriate than those from OLS.

In order to examine the differences across agencies regarding the relative importance of lagged variables in their rating processes, Models 13 to 16 were estimated. The probit and OLS results are shown in Tables 4-10 and 4-11, respectively.(22) Consistent with the findings in section 4.7.2, which analysed the differences across agencies regarding the significance of the macroeconomic variables included in the base model, the probit estimates suggest that Moody's and Standard and Poor's broadly share the same rating criteria and that, in terms of the level of significance and magnitude of the estimated coefficients, these two agencies present the highest level of agreement on a pairwise case basis. The findings are also consistent with those of Model 12 -described earlier in this section- in that, judging from the variables found significant for each agency, rating agencies appear to place a greater weight on average historical values than on lagged values of macroeconomic variables. It is found that, while IBCA attaches a greater weight to the external debt as a negative factor influencing foreign currency sovereign credit ratings, Moody's and Standard and Poor's do so for the inflation rate. Nevertheless, the three agencies seem to incorporate into their ratings the value of the fiscal balance lagged by one year as a positive factor and as the most significant lagged variable. Furthermore, it appears that, among the four agencies analysed separately, the development indicator has a positive impact only on the ratings of Moody's and Standard and Poor's. Nonetheless, all four agencies consider a history of default on

(22) The models were estimated using lagged values by one and two years only due to the smaller sub-sample sizes for individual agencies.

foreign currency debt as a factor having a negative effect on ratings, though at varying degrees; it is highly significant for Moody's and Standard and Poor's ratings, whereas it is only moderately significant for IBCA and Thomson BankWatch.

Contrasting the probit estimates for Models 3 to 6 (Table 4-5) and Models 13 to 16 (Table 4-10) it is found that IBCA proved more consistent in terms of the variables which were found significant. It may be argued, therefore, that Moody's, Standard and Poor's and Thomson BankWatch's ratings are more sensitive to the sample analysed and the definition of the explanatory variables used than IBCA's ratings.

Comparing the probit and OLS estimates for Models 13 to 16 (Tables 4-10 and 4-11) it is observed that, although differences in the significance of the coefficients between the two techniques are minor, the magnitude of the coefficients differs considerably in some cases, such as the income per capita, the development indicator, and the indicator of default history.

The results suggest, therefore, that rating agencies base their assessments of sovereign creditworthiness primarily on average historical values of a country's macroeconomic fundamentals. Although individually insignificant, lagged variables have a significant joint impact on foreign currency ratings. Consequently, mixed evidence has been found supporting the hypothesis that both average and lagged variables are included in the agencies' assessment of sovereign creditworthiness -i.e., hypothesis 3.

4.7.5 Macroeconomic and Balance-Sheet Variables

Hypothesis 4 suggested that balance-sheet variables would play an important role in the determination of foreign currency sovereign credit ratings. A model which includes both macroeconomic and balance-sheet variables was estimated in order to examine the relative importance of these two groups to explain sovereign credit ratings.[23] The model is presented in Table 4-12 (Model 17) and it can be noted that

[23] The balance-sheet data used in this test are obtained from the Bank for International Settlements who, at the time of this study, did not make publicly available such data for the BIS reporting countries (see Table 4-3) nor for Switzerland. Therefore, these countries were excluded from the sample. Norway was included for the period 1989-1993, before becoming a BIS reporting country. Additionally, the two Canadian agencies were excluded from the analysis since no sovereign included in the sample was rated by them.

both macroeconomic variables and balance-sheet variables were statistically significant. From the probit estimates it is found that the addition of the balance-sheet variables significantly added explanatory value to the model with only macroeconomic variables (LR=54.78; d.f.=8; p<0.01). Therefore, both subsets of variables contribute to determining foreign currency sovereign credit ratings. Of the macroeconomic variables, external debt, rate of inflation, income, GDP growth and the indicator of default history remain significant and all have the expected sign. That is, higher levels of external debt, higher rates of inflation and a relatively recent history of default lead to lower ratings, whereas higher levels of income per capita and GDP growth result in higher ratings. Additionally, three of the balance-sheet variables were significant: long- and short-term bank debt relative to total bank debt, and the use of IMF credit. Of them, the proportion of long-term bank debt and the use of IMF credit have the anticipated sign -positive and negative, respectively. Nevertheless, the positive coefficient of short-term bank debt relative to total bank debt is not consistent with the theoretical framework explained before. The results suggest that an increase in the ratio of either short- or long-term bank debt to total bank debt -or both- in a country's balance-sheet increases the probability of a higher rating, whereas a sovereign's greater recourse to IMF funding leads to lower ratings.

Examining the results, it appears that rating agencies share the conventional opinion that a higher level of external debt relative to exports imply that the funds for servicing the debt are less likely to be available, thereby increasing the probability of default. The negative impact of the use of IMF credit on ratings suggests that agencies view IMF support as a necessary source of funding indicating a sovereign facing debt service problems. Interestingly, however, rating agencies seem to interpret the lending by banks to a sovereign as a sign of financial strength, as reflected in the positive coefficients of both short- and long-term bank debt relative to total bank debt.

These findings seem to be partly consistent with previous research on developing country debt rescheduling. Lloyd-Ellis, McKenzie and Thomas (1989 and 1990) estimated a model containing both macroeconomic and balance-sheet variables to examine the relative importance of the different groups to predict rescheduling. For their sample of annual data (1977-1981) they found that both long-term and short-term bank debt relative to total bank debt are balance-sheet variables significantly related to default risk. Although these variables were also found significant in this analysis, the suggested relationship between them and default risk is the opposite. While the analysis in this chapter found higher levels of long- and short-term debt to be associated with higher ratings -and, therefore, lower default risk-, the above mentioned studies found these variables to be directly related to the probability of rescheduling -i.e., higher levels of bank debt are associated with higher probability of default. Additionally, these studies found the proportion of foreign exchange reserves relative to IMF quota, and total bank borrowing relative to total bank deposits to be significant. Of the traditional macroeconomic variables considered in the previous studies, only the growth of export volumes was found significant. These studies, thus, concluded that balance-sheet variables are better at explaining rescheduling than the traditional macroeconomic variables. From the analysis presented in this section, however, it cannot be concluded that balance-sheet variables are better determinants of default risk than macroeconomic variables, but instead, that both groups make a contribution to explaining sovereign default risk, as measured by sovereign credit ratings.

Compared to the base model which included only the macroeconomic variables, several differences are found after the addition of the balance-sheet variables. Fiscal balance and the development indicator, although of the anticipated sign, are not significant, and nor is the external balance which has an unexpected negative sign. The findings suggest that rating agencies place greater weight to bankers' opinion of sovereign creditworthiness than to the IMF country classification, as reflected in the significant coefficients for the long- and short-term bank debt relative to total bank debt and the statistically insignificant coefficient of the development indicator. Judging from the statistical insignificance of external and fiscal balance, and the significantly negative coefficient of the use of IMF credit relative to the country's quota, it appears that once a country relies heavily on IMF funds to honour its debt obligations, the level of own economic resources (foreign exchange earnings and government revenues) becomes irrelevant to assess its sovereign default risk.

The second column of Table 4-12 presents the OLS estimates for the model. Judging from the coefficients of the variables, no major difference in the statistical significance is found between OLS and probit estimations.

To investigate the extent to which macroeconomic and balance-sheet variables are included in the rating process of different agencies, Model 17 was estimated separately for Moody's, Standard and Poor's, IBCA and Thomson BankWatch -Models 18 to 21, respectively. The probit results are shown in Table 4-13, while OLS estimates are given in Table 4-14. On the whole, the probit estimates suggest that, both collectively and individually, rating agencies incorporate macroeconomic as well as balance-sheet variables in their assessments of sovereign creditworthiness and these variables are broadly the same. Some differences across agencies, however, arise. Judging from the number of significant variables in each subset, it is found that, of the agencies analysed, Thomson BankWatch seems to place the greatest weight on macroeconomic variables, while IBCA relies least on balance-sheet variables to rate sovereigns. The most noteworthy finding from the agency-specific models is that, while considered together all the agencies (Model 17), the fiscal balance proved insignificant, it was found significant for all agencies but for Moody's. Furthermore, this variable has an unexpected -negative- sign for IBCA and Thomson BankWatch suggesting that these agencies may perceive endogeneity in the fiscal policy: risky countries trying to improve their credit standings may opt more conservative fiscal policies and, therefore, lower ratings reflect lower government deficits. This finding, however, contrasts with Cantor and Packer (1996a), who estimated separate models for Moody's and Standard and Poor's including only the macroeconomic variables. While they found an inverse relationship between fiscal balance and credit ratings -i.e., the higher the government deficit, the higher the rating- for both agencies, this analysis has found a direct relationship -higher government deficits result in lower credit ratings. It is also interesting to note that while Moody's, Standard and Poor's and Thomson BankWatch seem to pay attention to the maturity structure of sovereign debt, as reflected in the significant coefficients for both short- and long-term bank debt relative to total bank debt, IBCA's ratings seem to be largely based on assessments of longer term debt indicated in the significant coefficients of the proportion of medium- and long-term bank debt to total bank debt.[24] Additionally, although of the anticipated sign, the use of IMF credit relative to the sovereign's IMF quota was found insignificant for IBCA, while proving significant for the rest of the agencies analysed.

Comparing the results of Models 18 to 21 with those of Models 3 to 6, which estimated separately models for the four agencies mentioned above using only the macroeconomic and region indicator variables, some interesting inferences can be drawn. It is found that, in terms of the macroeconomic variables which were significant, Moody's and Thomson BankWatch proved the most consistent since, except for the fiscal balance, the statistically significant variables were unchanged. That is, Moody's and Thomson's macroeconomic determinants of the sovereign ratings seem to prevail despite the samples analysed.[25] On the other hand, while, in the model including balance-sheet variables, fiscal balance and GDP growth proved significant and insignificant, respectively, for Standard and Poor's, the opposite was found in the models without balance-sheet variables. Finally, the greatest difference is found for IBCA's models for which fiscal balance, GDP growth and the default history indicator were significant in the model including balance-sheet variables, whereas they have insignificant coefficients in the model without such variables.

OLS estimates for Models 18 to 21 are reported in Table 4-14. There is almost no difference in the statistical significance of the coefficients for Moody's and Standard and Poor's models. Nevertheless, for IBCA and Thomson BankWatch, although the variables which proved significant were practically the same, most of them have a lower level of significance as compared to the results of the probit models. Hence, differences between probit and OLS estimation techniques cannot be disregarded.

The findings, therefore, give support to hypothesis 4, which postulated that balance-sheet variables that have proved helpful to reflect a country's capacity to service its external debt would complement macroeconomic variables to explain

[24] In fact, in January 1998, FitchIBCA recognised that its most significant analytical omission during the Asian crisis of 1997-1998 was that, as in the case of Korea, they ignored the warning signals from a very high and rising share of short-term debt in total external debt (FitchIBCA, 1998).

[25] It must be recalled that the sample sizes for the individual agencies were larger for models 3 to 6 than for models 18 to 21 due to the smaller number of countries whose balance-sheet data were available.

foreign currency sovereign ratings. Given that there are many ways in which a sovereign may default on its external debt, as showed in the great diversity of variables identified by debt-service capacity and willingness models as contributing to default, it is not surprising that a model which captures more than one facet of a country's economy better explains the information content of sovereign credit ratings. This analysis has found that both macroeconomic variables and balance-sheet variables contribute to the determination of agencies' sovereign ratings, thereby suggesting that a model which fails to incorporate both types of variables may be misspecified. Finally, the extent to which these two groups of variables are incorporated into sovereign credit ratings varies across rating agencies.

4.8 Accuracy of Estimation Models

From the models estimated in this analysis, five have been selected to test for their ability to correctly classify foreign currency sovereign ratings, namely the base model, the model including agency indicators (Model 1), the model including region indicators (Model 2), the model including average and lagged variables (Model 12) and the model including balance-sheet variables (Model 17).[26] Two measures of model accuracy were employed: the ability of the model to correctly classify the sovereign ratings from the same data set on which the model is estimated, and the percentage of the sovereign ratings that is predicted correctly in a separate -holdout-sample different from that used to estimate the model.[27] The accuracy tests measure the ratings correctly classified as a proportion of total ratings in the sample tested.[28] The rating intervals obtained from the probit analysis for each model which tests accuracy within the sample are given in Table 4-15. These intervals are used to determine the fitted rating for each observation which is then compared to the actual

(26) Since accuracy tests are intended to measure the ability of the models to correctly classify or predict foreign currency ratings in general, the models which include all agencies together were selected to carry out such tests.

(27) Previous research has also made use of these two types of tests to measure the accuracy of models predicting credit ratings. Kaplan and Urwitz (1979) measured in this way the correctly classified corporate bonds included in their study and provide a review of earlier studies following the same evaluation procedures. See also Ederington (1985) and Ederington and Yawitz (1987).

(28) For a description of the criteria for correctly classified ratings see note at the bottom of Table 4-16.

rating to obtain the number of correct classifications of the model. A similar procedure is employed to carry out the accuracy test in the holdout sample, but using the corresponding intervals.

The results for both tests of accuracy are shown in Table 4-16. Model 1, including the agency indicators, performs best of the five models. Within the sample and on a 16-rating scale, 37 percent of the ratings are correctly classified by the model, and about three-quarters of the total sample are classified within one notch of the correct rating. Another way of measuring the accuracy of the models is to compare fitted ratings rounded off to the nearest broad letter rating with actual broad letter ratings.(29) The five models classify these broad letter ratings with about 60 percent of accuracy. Although this is a slightly lower accuracy rate than that of 70 percent found in the literature of the determinants of sovereign ratings (Cantor and Packer, 1996a),(30) it is still quite remarkable taking into account the considerably larger sample used in this analysis -1003 observations as opposed to 49-, the greater number of agencies included -11 as opposed to only 2-, the higher variability in ratings reflecting the lower economic stability of a longer time period, and the fact that the ratings utilised were not averaged.

Further accuracy measures were done by predicting the holdout sample of the ratings for 1997 using the models estimated on the sub-sample of the ratings assigned from 1992 to 1996. In general, the predictive ability of the models proved inferior to their explanatory ability, as shown by the slightly lower percentages of correctly classified ratings for the holdout sample -about one third- than for the classification within the sample. Once more, the model including the agency indicators (Model 1) proved most successful in predicting ratings. While approximately 60 percent of the broad letter ratings were predicted correctly by this model, about 70 percent of the ratings were predicted within one notch of the correct rating. Except for Model 17, including balance-sheet variables, the models are able,

(29) This measure, however, lacks the exactness of the test at the rating-notch level since fitted ratings which are one notch higher or lower than the actual rating -e.g., BBB- or BBB+ instead of BBB-, will be correctly classified at the broad letter category although, in fact, they are misclassified. Additionally, in practice, only notch-level ratings will be observed. Nevertheless, this measure is used to allow for comparison with previous work which has reported accuracy of estimation only at the broad-letter rating level.

(30) No comparison with Linden, McNamara and Vaaler (1998) is possible since they do not report accuracy performance for their models.

on the whole, to predict correctly at least half of the broad letter ratings in the holdout sample and about two-thirds of the ratings within an error of one rating notch.

Table 4-16 also reports the accuracy for the OLS models. Comparing the results with those of the probit models it is observed that, within the sample and for broad letter ratings, ordered probit analysis performs slightly better classifying correctly a higher proportion of the sample of ratings. Nevertheless, the usefulness of probit becomes evident for classifying ratings at the notch-level for which the models perform considerably better than OLS estimations: while probit models classify correctly roughly 40 percent of the ratings, OLS does so for only less than a quarter of the sample. The analysis of the holdout sample casts somewhat different results. It is found that for prediction purposes and at the broad-letter level, OLS estimations fare slightly better than probit models. Nonetheless, at the rating-notch level, probit models proved better once more classifying correctly more than one-third of the sample as opposed to only one-quarter for the best of the OLS models.

The higher accuracy of the models to classify the ratings at the broad-letter level than at the rating-notch level, using either technique, reflects the fact that for most broad-letter rating categories, the ratings are concentrated in the mid-class rating -e.g., BB/Ba2, A/A2, or AA/Aa2- as shown in Figure 4-1 (see 4.6.1). This implies that mid-class ratings -such as BB/Ba2- would be deemed incorrectly classified by the model at the rating-notch level whether the fitted rating was one notch higher or lower than the mid-class -BB-/Ba3 or BB+/Ba1 in this case-, whereas it would be considered as correctly classified both within one notch of the correct rating and at the broad-letter level. Given the high proportion of mid-class ratings, it is not surprising that the models have succeeded in classifying correctly a higher proportion of broad letter ratings than at the notch level.

As pointed out by Ederington and Yawitz (1987), one possible explanation for which statistical models cannot predict all ratings is that ratings contain private information available to the rating agencies -but not to the market-, which cannot be included in the models. If the rating models are incorrect for this reason, then little improvement in predicting ratings is possible and the informational role of ratings is clear. Nevertheless, further research is needed to draw any conclusion on this matter.

4.9 Quantitative Analysis

In an attempt to discriminate between the statistically and the quantitatively significant variables which affect foreign currency sovereign ratings, this section describes the quantitative analysis of the preferred model. The preferred model selected is that which presented the highest accuracy rate for the correct classification of foreign currency sovereign ratings at the rating notch level. From the results given in the previous section, it follows that this model is Model 1 which includes the agency indicators and which performed best of the models evaluated.

The quantitative impact of the macroeconomic variables on credit ratings was measured in terms of the changes in the median rating produced by changes in the variables. The following procedure was used: the probabilities of the predicted rating being classified in each of the sixteen rating categories were calculated according to eq. (3) (see 4.5). The median rating is defined as the rating at which the cumulative probability added to 0.5. For continuous variables -i.e., external debt, fiscal and external balance, inflation, income, and GDP growth- these probabilities were evaluated at the mean value of the regressors. The median rating obtained using these probabilities was then compared to the median rating which results from adding up to 0.5 the probabilities obtained by varying the value of the variable of interest, and holding the rest of the variables at their sample means. These variations in value were made in intervals of 10 percentage changes from a decrease in 50 percent to an increase of 50 percent in the variable. The change in the median rating, in terms of rating notches, resulting from the change in the variable of interest is reported here as the quantitative impact of the variable. For dummy variables -i.e., the development indicator, the indicator of default history, and the agency indicators- the quantitative impact was analysed by comparing the probabilities that result when the variables take each of their two different values -0 and 1- while the other variables are held at their sample means. Similarly to continuous variables, the quantitative impact was measured by examining the change in the median rating associated with the two values of the dummy variable.

For the continuous variables, the quantitative impact is as follows. Changes in the ratio of external debt to exports do not affect greatly the median rating. While increases of up to 50 percent in the level of external indebtedness produce no change in the median rating, A/A2, reductions in the level of external debt produce a minor upgrade of one rating notch on the median rating, from A/A2 to A+/A1. Nevertheless, this effect is observed only if the decrease is 30 percent or more in the ratio of external debt to exports. The quantitative impact of both fiscal and external balance, and the growth of GDP on foreign currency ratings, on the other hand, is even smaller. Neither the improvement nor the deterioration up to 50 percent in such variables result in changes in the median rating. Moreover, the probability of obtaining an investment grade rating is virtually unaltered by changes in either fiscal or external balance or changes in the GDP growth. The impact of the rate of inflation is somewhat more meaningful. Policies leading to a reduction in the rate of inflation between 20 and 40 percent will lead to an upgrading of one rating notch in the median rating from A/A2 to A+/A1, while reductions of 50 percent will upgrade the median rating two rating notches. Increases in the rate of inflation, however, will not affect the median rating unless they are higher than 40 percent. Nonetheless, an increase in the rate of inflation of 50 percent downgrades the median rating only one rating notch.

The quantitative impact of the income per capita is more significant than that of the variables described above. The median rating is sensitive to changes of 10 percent in the average value of the income per capita. For instance, a decrease of 10 percent in the average value of the GDP per capita results in a decline of one rating notch in the median rating from A/A2 to A-/A3, while decreases of 20 and 30 percent in the average value downgrade the median rating three and four rating notches -to BBB/Baa2 and BBB-/Baa3-, respectively. Conversely, increases in the average value of the income per capita upgrade the median rating. Whereas an increase of 10 percent in the income per capita upgrades the median rating from A/A2 to AA-/Aa3 -i.e., two rating notches-, levels of income per capita which are 20 and 30 percent higher than the average will account for median ratings which are three and four rating notches higher -AA/Aa2 and AA+/Aa1, respectively.

Further, it is found that, other things being equal, a history of default on foreign currency debt produces a decline of three rating notches in the median rating from A+/A1 to BBB+/Baa1. Furthermore, the probability of a sovereign being rated investment grade declines from 0.96 to 0.68 if the sovereign has a history of default on foreign currency debt. The quantitative impact of the economic development indicator, on the other hand, is smaller. Holding everything else at their sample means, a classification of the country as industrial by the IMF upgrades one rating notch the median rating, to A+/A1 from A/A2, as compared to countries that are not industrial. Furthermore, a developing country is almost as likely as an industrial country to be rated BBB-/Baa3 or higher, that is, to be rated investment grade (p=0.99). However, other things being equal, the probability of the sovereign obtaining an A/A2 rating or higher increases by 0.15 -from 0.27 to 0.42- if it is classified as industrial.

The quantitative effect of the rating agency on the foreign currency ratings is analysed by examining the change in the median rating produced by each of the agency indicators relative to Standard and Poor's. It is found that Moody's and IBCA are the only agencies whose quantitative impact is not significantly different from Standard and Poor's since the median rating remains unchanged -A/A2. On the other hand, Thomson BankWatch's assigns lower ratings which downgrade the median rating one notch from A/A2 to A-/A3, while Duff and Phelps' and JBRI's higher ratings have a positive quantitative impact resulting in an upgrade of the median rating of one rating notch to A+/A1. The effect of the other two Japanese rating agencies, JCRA and Nippon Investors Service, and the Canadian agencies is greater since, relative to Standard and Poor's, their ratings upgrade two rating notches the median rating -from A/A2 to AA-/Aa3. Fitch has the greatest quantitative impact on the median rating producing an upgrade of three rating notches -from A/A2 to AA/Aa2. Furthermore, while the probability of a sovereign being rated investment grade is practically the same for every rating agency -over 0.97-, differences are observed in the probability of obtaining higher ratings. For instance, relative to Standard and Poor's, sovereigns are least likely to secure an A-/A3 rating or higher from Thomson BankWatch -probability of 0.61-, while there is a probability of 0.95 or higher to obtain such a rating if the sovereign is rated by Fitch, JCRA, Nippon Investors Service or one of the Canadian agencies. Moreover, the corresponding probability for Moody's, Standard and Poor's and IBCA is about 0.80, and for Duff and Phelps and JBRI roughly 0.90. The quantitative impact of the agency indicators confirms the statistical significance of these variables, except for the indicator of JBRI which proved statistically insignificant, but quantitatively important.

In order to examine the quantitative impact of the geographic region of the sovereign on its foreign currency rating, the effect of the region indicators included in Model 2 was determined. It is found that, relative to sovereigns in West Europe and North America, the geographic region of the sovereign has a negative quantitative impact on foreign currency ratings. The greatest impact is for sovereigns in Africa, the Middle East, and Latin America whose lower ratings produce a downgrade in the median foreign currency rating of five rating notches, from AA-/AA3 to BBB/Baa2. Eastern European and Asian sovereigns also receive lower ratings, but the impact is lower resulting in a downgrade of three rating notches of the median rating -from AA-/Aa3 to A-/A3. Furthermore, West European, North American, Asian, and East European sovereigns have a very high probability of obtaining an investment grade rating -0.96 or higher-, while sovereigns in Africa, the Middle East, and Latin America are less likely to obtain such a rating having a probability of roughly 0.90. On the other hand, while sovereigns in West Europe and North America are very likely to obtain an A-/A3 or higher foreign currency rating -probability of 0.95-, sovereigns in Asia and Eastern Europe have a probability of 0.80 and 0.57, respectively. However, lower perceived creditworthiness results in notably lower probabilities of being rated A-/A3 or higher for sovereigns in Africa/Middle East and Latin America -0.35 and 0.31, respectively.

In summary, the quantitative analysis presented in this section has shown that not all the statistically significant variables associated with foreign currency sovereign ratings possess a significant quantitative impact on them. In fact, it appears that the greater quantitative impact is produced by the default history on foreign currency debt and the level of income per capita. The ratio of external debt to exports and the IMF classification of the country have a smaller quantitative impact. Finally, the agency and the geographic region indicators proved also quantitatively significant, though at varying degrees.

4.10 Conclusion

This chapter has explored the information content of foreign currency sovereign credit ratings using ordered probit and OLS analysis. The empirical results indicate that economic fundamentals have played a key role in determining a sovereign's foreign currency credit rating. These fundamentals are linked to those variables that have been identified in the literature as important determinants of a sovereign's capacity and willingness to service external debt. Nonetheless, this analysis has shown that financial balance-sheet variables act also as significant explanatory variables of foreign currency credit ratings implying that models of sovereign credit ratings which fail to include these variables in addition to conventional macroeconomic variables may be misspecified. In particular, the ratios of long- and short-term bank debt to total debt, and the use of IMF credit relative to the country's IMF quota proved significant of the set of balance-sheet variables employed. The findings also show that rating agencies rely largely on average historical values of economic indicators to determine credit ratings. The sovereign's economic improvement or deterioration, as reflected in lagged variables, seems to play a role only when these variables are considered jointly.

Although differences in the number and the credit quality of the sovereigns rated by each agency do not permit the generalisation of the findings for all agencies, the similarity of the sub-samples of Moody's, Standard and Poor's, IBCA and Thomson BankWatch allows for the following interpretation of the results. This analysis suggests systematic differences in foreign currency sovereign credit ratings across rating agencies and across geographic regions. While rating agencies seem to differ in the criteria used to determine credit ratings and the weightings attached to them, the agencies also seem to differ in the ratings they accord to sovereigns within specific geographic regions. The results show that rating agencies rate issuers from their own region more favourably. Although, according to previous research, this could reflect greater leniency, judging from the nature of the rating process, higher ratings for sovereigns in the same geographic region of the rating agency are more likely to be the result of the agencies' greater understanding of such sovereigns. Analysing the agencies individually, it is suggested that identical foreign currency ratings from different agencies may convey different information as is the case for

Standard and Poor's and IBCA. Although rating agencies appeared to incorporate both macroeconomic and balance-sheet variables in their ratings, they may differ in the specific variables they include and in the weightings attached to those variables. In particular, IBCA appears to place the least emphasis while Standard and Poor's the greatest emphasis on balance-sheet variables in their rating processes. Furthermore, it is suggested that, examining the agencies jointly or separately, the determinants of foreign currency sovereign ratings are sensitive to the sample of countries analysed, as well as to the definition of the explanatory variables. In this respect, Moody's proved most consistent of the agencies analysed.

The probit models are successful in classifying correctly approximately 60 percent of the sovereigns at the broad letter rating. About two-thirds of a holdout sample of sovereigns and three-quarters of the estimation sample are correctly classified within one rating notch of the correct rating. The robustness of the ordered probit analysis is tested by comparing its performance with that of OLS regression. While, within the sample and for broad letter ratings, ordered probit performs slightly better classifying correctly a higher proportion of the sample, its usefulness becomes evident for classifying ratings at the notch-level for which the models perform considerably better than OLS estimations. Probit models classify correctly roughly 40 percent of the ratings, whereas OLS does so for only less than a quarter of the sample. On the other hand, for prediction purposes and at the broad-letter level, OLS estimations fare slightly better than probit models, but at the notch-level probit proved better again classifying correctly more than one-third of the holdout sample, as opposed to only one-quarter for the best of the OLS models. The higher accuracy of ordered probit models, particularly at the rating-notch level, suggests that the ordered probit technique is more robust than OLS since it is more compatible with the structure of the rating process. Nevertheless, further research is needed to determine the reasons for the failure of the models to replicate all ratings.

The quantitative analysis of the preferred model -the model including the agency indicators- demonstrated that not all the statistically significant variables which determine foreign currency sovereign ratings have a significant quantitative impact on the ratings. It appears that the default history on foreign currency debt and the level of income per capita have the strongest negative and positive quantitative impact on foreign currency ratings, respectively, while the ratio of external debt to exports and the IMF classification of the country have a smaller impact. The agency indicators suggest that Moody's, Standard and Poor's and IBCA broadly agree on their assignments of foreign currency ratings. Further, except for Thomson BankWatch, which assigns lower ratings, the rest of the agencies seem to assign higher foreign currency ratings than Standard and Poor's. The analysis of the impact of the region indicators suggests that sovereigns from Africa, the Middle East, and Latin America are more likely to obtain lower foreign currency ratings.

These findings have important implications for both sovereign borrowers and users of credit ratings. Regarding the implications for sovereigns, the findings suggest a possible incentive for "rate-shopping". Given the suggested systematic differences between rating agencies across regions and that agencies tend to assign more favourable ratings to sovereigns in their own region of the world, sovereign borrowers may wish to contract with rating agencies which seem likely to provide more favourable ratings -one or two rating notches higher according to the findings of this empirical analysis-, such as rating agencies trying to expand the coverage of their sovereign rating activities or agencies headquartered in the same geographic region of the sovereign. Moreover, sovereigns seeking to improve their credit ratings should aim not only at implementing policies that improve their economic fundamentals but also at reducing information asymmetries between them and the agencies in an attempt to compensate for geographical distance and possible lower understanding of the ratee by the rater.

Insofar as the implications for the users of ratings, the findings suggest that uses of ratings which presuppose comparability may prove inadequate since the information conveyed by a given credit rating category may vary across agencies. This finding gains relevance after the reform to capital adequacy standards proposed in June 1999 by the Basle Committee on Banking Supervision. The new proposal bases the capital adequacy ratios of banks on the credit ratings of borrowers and, contrary to the findings of this analysis, presumes equal credit risk for the same rating categories of different agencies. Under the above proposal, a difference of one notch in the credit rating of a sovereign, such as between BBB-/Baa3 and BB+/Ba1, or between A-/A3 and BBB+/Baa1, would represent an increase in the risk weighting from 50 to 100 percent and from 20 to 50 percent, respectively, for the bank exposed to the credit risk of such sovereigns. Since the New Capital Adequacy Framework does not distinguish between the ratings of different agencies, this may also provide sovereign borrowers with an incentive for "rate-shopping" in an attempt to obtain better borrowing terms. This implies that without further and rigorous research, it cannot be assumed the default risk associated with a given rating category to be equal across agencies.

Table 4-1. Description of Macroeconomic Explanatory Variables

Variable Name	Definition	Unit of Measurement	Data Sources
External Debt	Total external debt relative to exports for the previous year	Percent	External debt: External Debt Statistics, OECD Exports: International Financial Statistics, IMF
Fiscal Balance	Average Annual Central Government Deficit (-) or Surplus (+) relative to GDP for the previous three years	Percent	International Financial Statistics, IMF
External Balance	Average Annual Current Account Balance relative to GDP for the previous three years	Percent	International Financial Statistics, IMF
Inflation	Average Annual Consumer Price Inflation Rate for the previous three years	Percent*	International Financial Statistics, IMF
Income	GDP per capita for the previous year	US Dollars*	International Financial Statistics, IMF
GDP Growth	Average Annual Real GDP Growth on a year-over-year basis for the previous four years	Percent	International Financial Statistics, IMF
Development Indicator	IMF country classification for the current year	Indicator variable: 1= industrial 0 = not industrial	World Economic Outlook, IMF
Default History	Default on foreign currency bank and/or bond debt since 1975	Indicator variable: 1= default 0= no default	Standard and Poor's

* In the estimation models these variables are transformed to natural logarithms

Table 4-2. Description of Balance-Sheet Explanatory Variables

Variable Name	Definition	Unit of Measurement	Data Sources
Long Term Debt/ Total Bank Debt	BIS reporting banks' cross-border claims on the country with maturity over two years relative to total bank debt, as of December of the previous year	Percent	The Maturity, Sectoral and Nationality Distribution of International Bank Lending, BIS
Medium Term Debt/ Total Bank Debt	BIS reporting banks' cross-border claims on the country with maturity over one year and up to two years relative to total bank debt, as of December of the previous year	Percent	The Maturity, Sectoral and Nationality Distribution of International Bank Lending, BIS
Short Term Debt/ Total Bank Debt	BIS reporting banks' cross-border claims on the country with maturity up to and including one year relative to total bank debt, as of December of the previous year	Percent	The Maturity, Sectoral and Nationality Distribution of International Bank Lending, BIS
Country Debt/ Sample Debt	Country's total bank debt relative to total bank debt of the sample, as of December of the previous year	Percent	The Maturity, Sectoral and Nationality Distribution of International Bank Lending, BIS
Undisbursed C.M./ Total Bank Debt	Undisbursed credit commitments and backup facilities relative to total bank debt, as of December of the previous year	Percent	The Maturity, Sectoral and Nationality Distribution of International Bank Lending, BIS
Forex. Reserves/ IMF Quota	Monetary authorities' holdings of foreign exchange relative to IMF quota, as of December of the previous year	Percent	International Financial Statistics, IMF
Use IMF Credit/ IMF Quota	Total IMF credit and loans outstanding relative to IMF quota, as of December of the previous	Percent	International Financial Statistics, IMF
Total Bank Borr./ Deposits	External positions of BIS reporting banks (assets relative to liabilities) vis-à-vis individual countries, as of December of the previous year	Percent	International Banking and Financial Market Developments, BIS

Table 4-3. Countries Included in the Sample[1]

Region 1 Africa/Middle East	Region 2 Asia/Pacific Central	Region 3 Eastern Europe	Region 4 Latin America	Region 5 West Europe/ North America
Israel	Australia	Czech Republic	Argentina	Austria*
Jordan	China	Hungary	Brazil	Belgium*
South Africa	India	Kazakhstan	Chile	Canada*
Turkey	Indonesia	Lithuania	Colombia	Cyprus
	Japan*	Poland	Dominican Republic	Denmark*
	Korea	Rumania	Mexico	Finland*
	Malaysia	Russia	Uruguay	France*
	New Zealand	Slovakia	Venezuela	Germany*
	Pakistan	Slovenia		Greece
	Philippines			Iceland
	Singapore			Ireland*
	Thailand			Italy*
				Luxembourg*
				Malta
				Netherlands*
				Norway*
				Portugal
				Spain*
				Sweden*
				Switzerland
				United Kingdom*
				United States*

* BIS reporting countries

[1] Industrial countries, according to IMF country classification, include BIS reporting countries (*), Greece, Iceland, Portugal, Switzerland, Australia, and New Zealand. Israel, Korea and Singapore are classified as industrial countries in 1997. All other countries are considered as emerging markets (not industrial).

Table 4-4. Results. Base Model, Model 1 and Model 2.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B1=3, B/B2=2,.......AAA/Aaa=16)					
PERIOD	1989-1997					
NO. OF OBSERVATIONS	1003					
NO. OF COUNTRIES	55					
NO. OF AGENCIES	11					
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**			**OLS**		
	BASE MODEL	**MODEL 1**	**MODEL 2**	**BASE MODEL**	**MODEL 1**	**MODEL 2**
INTERCEPT	0.728	0.933 *	0.715	1.043	1.026	0.834
	(1.357)	(1.69)	(1.175)	(1.363)	(1.378)	(1.014)
EXTERNAL DEBT	-0.004 ***	-0.004 ***	-0.004 ***	-0.007 ***	-0.007 ***	-0.006 ***
	(9.254)	(9.583)	(8.009)	(11.637)	(11.824)	(10.107)
FISCAL BALANCE	0.021 ***	0.023 ***	0.037 ***	0.029 **	0.032 ***	0.050 ***
	(2.783)	(2.916)	(4.656)	(2.408)	(2.706)	(4.221)
EXTERNAL BALANCE	0.022 **	0.030 ***	0.015	0.014	0.023 *	0.002
	(2.323)	(3.128)	(1.556)	(1.133)	(1.868)	(.16)
INFLATION	-0.450 ***	-0.485 ***	-0.381 ***	-0.748 ***	-0.771 ***	-0.578 ***
	(11.895)	(12.531)	(9.619)	(13.35)	(14.153)	(10.356)
INCOME	0.709 ***	0.750 ***	0.839 ***	1.335 ***	1.360 ***	1.526 ***
	(12.533)	(13.068)	(13.082)	(15.778)	(16.605)	(17.445)
GDP GROWTH	0.052 ***	0.048 ***	0.067 ***	0.122 ***	0.104 ***	0.126 ***
	(3.547)	(3.219)	(4.196)	(5.545)	(4.789)	(5.626)
DEVELOPMENT INDICATOR	0.540 ***	0.395 ***	-0.307 *	1.092 ***	0.831 ***	-0.535 *
	(3.63)	(2.618)	(1.646)	(4.724)	(3.684)	(1.954)
DEFAULT HISTORY	-1.183 ***	-1.319 ***	-0.704 ***	-2.237 ***	-2.300 ***	-1.141 ***
	(9.381)	(10.179)	(4.671)	(11.757)	(12.314)	(5.178)
MOODY'S		-0.091			-0.036	
		(1.076)			(.287)	
IBCA		-0.013			-0.009	
		(.103)			(.051)	
THOMSON BANK.		-0.577 ***			-0.853 ***	
		(4.4)			(4.351)	
DUFF AND PHELPS		0.336 *			0.199	
		(1.727)			(.696)	
FITCH		1.156 ***			1.369 ***	
		(3.368)			(3.204)	
JBRI		0.254			0.800 ***	
		(1.6)			(3.341)	
JCRA		0.763 ***			0.923 ***	
		(3.798)			(3.333)	
NIPPON INV. SERV.		0.989 ***			1.113 ***	
		(4.099)			(2.624)	
CANADIAN AGENCIES		0.899 ***			1.644 ***	
		(2.735)			(4.549)	
AFRICA/MIDDLE EAST			-1.896 ***			-3.451 ***
			(8.384)			(10.609)
ASIA/PACIFIC CENTRAL			-0.989 ***			-1.451 ***
			(7.134)			(7.223)
EASTERN EUROPE			-1.345 ***			-2.656 ***
			(6.038)			(8.337)
LATIN AMERICA			-2.009 ***			-3.521 ***
			(8.618)			(10.521)
-2 ln L	3327.92	3242.84	3237.54			
LR	1583.30 ***	85.08 ***	90.38 ***			
Adjusted R-Squared				0.863	0.873	0.879
Standard Error				1.647	1.586	1.549

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1)LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text.

2)Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 4-5. Ordered Probit Results. Models 3-6.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)			
ESTIMATION TECHNIQUE	ORDERED PROBIT ANALYSIS			
PERIOD	1989-1997	1989-1997	1994-1997	1996-1997
NO. OF OBSERVATIONS	313	322	107	84
AGENCY	MOODY'S	S&P's	IBCA	THOMSON BANKWATCH
	MODEL 3	**MODEL 4**	**MODEL 5**	**MODEL 6**
INTERCEPT	2.866 **	-0.872	-3.466	-1.707
	(2.451)	(.828)	(1.163)	(.832)
EXTERNAL DEBT	-0.006 ***	-0.001 **	-0.006 ***	-0.006 ***
	(6.642)	(2.121)	(2.928)	(3.283)
FISCAL BALANCE	0.039 **	0.059 ***	0.041 *	0.025
	(2.574)	(3.85)	(1.768)	(1.132)
EXTERNAL BALANCE	0.021	0.035 *	0.007	-0.066 *
	(1.375)	(1.945)	(.191)	(1.888)
INFLATION	-0.440 ***	-0.458 ***	-0.311 **	-0.328 **
	(5.838)	(5.908)	(2.077)	(2.347)
INCOME	0.710 ***	1.003 ***	1.426 ***	1.157 ***
	(6.289)	(8.872)	(4.172)	(4.831)
GDP GROWTH	0.070 **	0.059 *	0.071	0.166 ***
	(2.209)	(1.919)	(1.385)	(3.259)
DEVELOPMENT INDICATOR	0.324	-0.008	-0.953	-0.977
	(.964)	(.025)	(1.111)	(1.475)
DEFAULT HISTORY	-0.947 ***	-1.122 ***	0.112	-0.688 *
	(3.19)	(3.949)	(.191)	(1.727)
AFRICA/MIDDLE EAST	-1.108 **	-2.052 ***	-3.655 ***	-2.095 ***
	(2.559)	(5.423)	(4.199)	(2.724)
ASIA/PACIFIC CENTRAL	-0.667 ***	-0.696 ***	-1.239 **	-1.747 ***
	(2.812)	(3.005)	(2.049)	(2.929)
EASTERN EUROPE	-1.104 **	-0.794 *	-1.690 **	-1.776 **
	(2.531)	(1.887)	(2.094)	(2.481)
LATIN AMERICA	-1.636 ***	-1.947 ***	-2.832 ***	-2.749 ***
	(3.83)	(4.902)	(2.844)	(3.305)
-2 log L	968.48	977.51	284.84	264.80

* significant at 10% level

** significant at 5% level

*** significant at 1% level

Notes: Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 4-6. OLS Results. Models 3-6.

DEPENDENT VARIABLE ESTIMATION TECHNIQUE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16) OLS			
PERIOD NO. OF OBSERVATIONS	1989-1997 313	1989-1997 322	1994-1997 107	1996-1997 84
AGENCY	MOODY'S	S&P's	IBCA	THOMSON BANKWATCH
	MODEL 3	**MODEL 4**	**MODEL 5**	**MODEL 6**
INTERCEPT	3.384 ** (2.536)	-1.232 (.91)	-2.664 (.824)	-2.982 (.994)
EXTERNAL DEBT	-0.007 *** (7.208)	-0.003 *** (2.788)	-0.010 *** (3.909)	-0.009 *** (3.575)
FISCAL BALANCE	0.064 *** (3.119)	0.082 *** (3.811)	0.039 (1.405)	0.025 (.747)
EXTERNAL BALANCE	0.017 (1.036)	0.018 (.764)	0.00005 (.001)	-0.068 (1.348)
INFLATION	-0.563 *** (5.875)	-0.701 *** (7.012)	-0.392 ** (2.459)	-0.491 ** (2.418)
INCOME	1.139 *** (8.25)	1.730 *** (12.495)	1.899 *** (5.113)	1.907 *** (5.873)
GDP GROWTH	0.084 ** (2.079)	0.084 ** (2.06)	0.145 ** (2.553)	0.227 *** (3.373)
DEVELOPMENT INDICATOR	0.674 (1.49)	-0.231 (.518)	-1.060 (1.021)	-1.390 (1.366)
DEFAULT HISTORY	-1.129 *** (3.31)	-1.428 *** (3.791)	0.063 (.086)	-0.982 * (1.652)
AFRICA/MIDDLE EAST	-1.924 *** (3.331)	-3.613 *** (7.124)	-5.014 *** (5.14)	-3.569 *** (3.157)
ASIA/PACIFIC CENTRAL	-0.810 ** (2.523)	-0.948 *** (2.996)	-1.913 *** (2.726)	-2.323 *** (2.631)
EASTERN EUROPE	-1.975 *** (3.447)	-1.805 *** (3.113)	-2.813 *** (3.288)	-3.116 *** (2.985)
LATIN AMERICA	-2.554 *** (4.536)	-3.316 *** (6.218)	-4.009 *** (3.647)	-4.140 *** (3.414)
Adjusted R-Squared Standard Error	0.896 1.437	0.881 1.494	0.916 1.324	0.895 1.605

* significant at 10% level; ** significant at 5% level; *** significant at 1% level
Note: values in parentheses are absolute t-statistics

Table 4-7. Ordered Probit Results. Models 7-11.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)				
ESTIMATION TECHNIQUE	ORDERED PROBIT ANALYSIS				
PERIOD	1989-1997	1989-1997	1993-1997	1989-1997	1989-1997
NO. OF OBSERVATIONS	59	226	69	131	518
REGION	1 AFRICA/ MIDDLE EAST	2 ASIA/ PACIFIC CENTRAL	3 EASTERN EUROPE	4 LATIN AMERICA	5 WEST EUROPE/ NTH. AMERICA
	MODEL 7	**MODEL 8**	**MODEL 9**	**MODEL 10**	**MODEL 11**
INTERCEPT	-110.167 *** (4.755)	2.947 ** (2.000)	-27.025 *** (4.359)	1.309 (.593)	-10.162 *** (5.977)
EXTERNAL DEBT	0.009 * (1.893)	-0.006 *** (5.468)	-0.011 *** (2.704)	-0.006 *** (5.651)	-0.004 *** (2.733)
FISCAL BALANCE	1.420 *** (3.85)	0.026 (.946)	0.048 ** (2.000)	0.250 *** (4.026)	0.101 *** (7.405)
EXTERNAL BALANCE	-0.779 ** (1.967)	0.027 (1.517)	-0.062 (.656)	-0.067 * (1.738)	-0.022 (1.457)
INFLATION	-1.015 ** (2.262)	-0.587 *** (4.651)	-0.415 (.817)	0.001 (.1)	-0.703 *** (6.732)
INCOME	14.085 *** (5.076)	0.556 *** (4.12)	4.405 *** (6.267)	0.466 (1.535)	1.621 *** (9.187)
GDP GROWTH	-1.640 *** (4.851)	0.020 (.608)	-0.008 (.068)	0.337 *** (5.817)	0.120 *** (3.149)
DEVELOPMENT INDICATOR		0.196 (.685)			-0.869 (1.304)
DEFAULT HISTORY	15.404 *** (4.273)	-1.465 *** (3.92)	0.224 (.266)	-1.746 *** (3.771)	
MOODY'S	0.828 * (1.793)	-0.194 (1.169)	-0.264 (.637)	-0.153 (.638)	-0.245 ** (1.981)
IBCA	-0.893 (1.605)	-0.526 (1.253)	0.421 (.942)	0.381 (1.122)	-0.145 (.847)
THOMSON BANK.	0.294 (.441)	-0.817 *** (3.033)	-1.257 *** (2.651)	-0.512 (1.476)	-0.459 ** (1.974)
DUFF AND PHELPS	1.595 ** (2.225)	-0.887 (1.6)	-0.272 (.402)	0.671 ** (2.14)	
FITCH		0.514 (.912)			
JBRI		0.527 * (1.948)		1.158 (1.452)	0.119 (.546)
JCRA	2.435 *** (2.885)	0.385 (1.024)	1.799 ** (2.46)		1.302 *** (3.912)
NIPPON INV. SERV.	3.045 *** (3.764)			2.227 *** (3.655)	1.421 *** (4.343)
CANADIAN AGENCIES					0.496 (1.465)
-2 ln L	118.17	780.52	141.60	396.17	1268.11

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

The models were estimated using only the rating categories observed for each region. Region 1 includes categories 2 (B/B2) to 10 (A-/A3); Region 2 categories 1(B-/B3) to 16 (AAA/Aaa); Region 3 categories 2 (B/B2) to 11 (A/A2); Region 4 categories 1 (B-/B3) to 11 (A/A2); and Region 5 categories 7 (BBB-/Baa3) to 16 (AAA/Aaa).

Table 4-8. OLS Results. Models 7-11.

DEPENDENT VARIABLE ESTIMATION TECHNIQUE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16) OLS				
PERIOD NO. OF OBSERVATIONS	1989-1997 59	1989-1997 226	1993-1997 69	1989-1997 131	1989-1997 518
REGION	1 AFRICA/ MIDDLE EAST	2 ASIA/ PACIFIC CENTRAL	3 EASTERN EUROPE	4 LATIN AMERICA	5 WEST EUROPE/ NTH. AMERICA
	MODEL 7	**MODEL 8**	**MODEL 9**	**MODEL 10**	**MODEL 11**
INTERCEPT	-56.408 *** (5.035)	6.366 *** (3.063)	-14.564 *** (3.842)	3.296 (1.208)	-2.858 (1.544)
EXTERNAL DEBT	0.007 * (1.842)	-0.012 *** (7.697)	-0.007 *** (3.166)	-0.006 *** (5.913)	-0.003 ** (1.964)
FISCAL BALANCE	0.886 *** (3.715)	0.022 (.534)	0.040 ** (2.443)	0.337 *** (4.783)	0.139 *** (9.118)
EXTERNAL BALANCE	0.085 (.522)	0.001 (.031)	-0.034 (.52)	-0.075 (1.57)	-0.049 *** (3.184)
INFLATION	-1.091 *** (3.487)	-0.944 *** (4.981)	-0.399 (1.16)	0.044 (.409)	-1.067 *** (10.735)
INCOME	7.883 *** (5.994)	0.912 *** (4.565)	2.928 *** (7.997)	0.496 (1.331)	1.966 *** (10.506)
GDP GROWTH	-0.815 *** (5.258)	0.030 (.601)	-0.045 (.594)	0.398 *** (6.632)	0.161 *** (3.862)
DEVELOPMENT INDICATOR		-0.485 (1.184)			-0.318 (.415)
DEFAULT HISTORY	8.485 *** (4.069)	-2.532 *** (4.587)	0.277 (.515)	-2.137 *** (4.006)	
MOODY'S	0.436 (1.268)	-0.121 (.47)	-0.151 (.519)	-0.123 (.409)	-0.123 (.906)
IBCA	-0.789 * (1.854)	-0.822 (1.26)	0.330 (1.052)	0.503 (1.194)	-0.030 (.161)
THOMSON BANK.	0.102 (.216)	-1.206 *** (2.941)	-0.758 ** (2.421)	-0.576 (1.384)	-0.505 ** (2.005)
DUFF AND PHELPS	1.075 * (1.923)	-1.657 * (1.931)	-0.201 (.419)	0.828 ** (2.131)	
FITCH		1.022 (1.186)			
JBRI		0.871 ** (2.151)		1.458 (1.456)	0.635 ** (2.465)
JCRA	1.605 ** (2.533)	0.465 (.814)	1.475 *** (3.002)		1.336 *** (4.463)
NIPPON INV. SERV.	2.035 *** (3.639)			2.662 *** (3.796)	2.373 *** (6.379)
CANADIAN AGENCIES					0.568 * (1.658)
Adjusted R-Squared Standard Error	0.845 0.921	0.815 1.615	0.837 0.821	0.683 1.312	0.585 1.252

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: the models were estimated using only the rating categories observed for each region. Region 1 includes categories 2 (B/B2) to 10 (A-/A3); Region 2 categories 1(B-/B3) to 16 (AAA/Aaa); Region 3 categories 2 (B/B2) to 11 (A/A2); Region 4 categories 1 (B-/B3) to 11 (A/A2); and Region 5 categories 7 (BBB-/Baa3) to 16 (AAA/Aaa).

Values in parentheses are absolute t-statistics.

Table 4-9. Results. Model 12.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,…….AAA/Aaa=16)	
PERIOD: 1989-1997 NO. OF COUNTRIES: 54	NO. OF OBSERVATIONS: 995 NO. OF AGENCIES: 11	
ESTIMATION TECHNIQUE	ORDERED PROBIT	OLS
INTERCEPT	0.952 (1.586)	1.285 (1.537)
EXTERNAL DEBT (X) (AVERAGE)	-1.276 (.513)	-2.626 (.686)
EXTERNAL DEBT (-1)	0.422 (.508)	0.868 (.68)
EXTERNAL DEBT (-2)	0.429 (.517)	0.882 (.691)
EXTERNAL DEBT (-3)	0.422 (.509)	0.870 (.681)
FISCAL BALANCE (X) (AVERAGE)	0.349 (.81)	0.591 (.853)
FISCAL BALANCE (-1)	-0.103 (.709)	-0.175 (.753)
FISCAL BALANCE (-2)	-0.090 (.628)	-0.159 (.689)
FISCAL BALANCE (-3)	-0.114 (.792)	-0.196 (.851)
EXT. BALANCE (X) (AVERAGE)	1.713 (.248)	2.852 (.257)
EXT. BALANCE (-1)	-0.581 (.253)	-0.953 (.258)
EXT. BALANCE (-2)	-0.558 (.242)	-0.954 (.258)
EXT. BALANCE (-3)	-0.550 (.239)	-0.941 (.255)
INFLATION (X) (AVERAGE)	-0.508 ** (1.996)	-0.674 * (1.794)
INFLATION (-1)	0.094 (1.109)	0.024 (.182)
INFLATION (-2)	0.025 (.207)	0.044 (.243)
INFLATION (-3)	-0.094 (.704)	-0.216 (1.122)
INCOME (X) (AVERAGE)	-1.114 (.229)	1.727 (1.61)
INCOME (-1)	1.645 (.959)	1.423 *** (5.099)
INCOME (-2)	0.372 (.233)	-0.766 * (1.919)
INCOME (-3)	-0.205 (.119)	-1.073 (1.281)
GDP GROWTH (X) (AVERAGE)	0.109 ** (2.426)	0.263 *** (3.826)
GDP GROWTH (-1)	-0.040 ** (1.978)	-0.051 * (1.785)
GDP GROWTH (-2)	-0.020 (.992)	-0.027 (.869)
GDP GROWTH (-3)	-0.023 (1.121)	-0.075 ** (2.376)
DEVELOPMENT INDICATOR	0.705 *** (4.638)	1.288 *** (5.209)
DEFAULT HISTORY	-1.147 *** (8.426)	-2.115 *** (10.343)
-2 ln L LR Adjusted R-Squared Standard Error	3262.92 48.06 ***	 0.865 1.629

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: (1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text. (2)Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 4-10. Ordered Probit Results. Models 13-16.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)			
ESTIMATION TECHNIQUE	ORDERED PROBIT ANALYSIS			
PERIOD	1989-1997	1989-1997	1994-1997	1996-1997
NO. OBSERVATIONS	312	320	106	83
AGENCY	MOODY'S	S&P's	IBCA	THOMSON BANKWATCH
	MODEL 13	**MODEL 14**	**MODEL 15**	**MODEL 16**
INTERCEPT	3.420 ***	-0.366	-3.043	-1.926
	(2.716)	(.368)	(.903)	(.932)
EXTERNAL DEBT (AVERAGE)	0.003	-0.011 *	0.018	0.003
	(.472)	(1.874)	(.976)	(.162)
EXTERNAL DEBT (-1)	-0.005	0.003	-0.036 ***	-0.005
	(1.223)	(1.051)	(2.951)	(.496)
EXTERNAL DEBT (-2)	-0.004	0.006	0.006	-0.006
	(.634)	(1.424)	(.497)	(.327)
FISCAL BALANCE (AVERAGE)	-0.0003	0.012	-0.060	-0.010
	(.008)	(.349)	(1.279)	(.222)
FISCAL BALANCE (-1)	0.035 *	0.051 **	0.092 ***	0.015
	(1.836)	(2.527)	(3.241)	(.555)
FISCAL BALANCE (-2)	0.004	0.001	0.022	0.002
	(.224)	(.038)	(1.09)	(.099)
EXT. BALANCE (AVERAGE)	0.090	0.086	0.149	0.011
	(1.165)	(1.101)	(.598)	(.053)
EXT. BALANCE (-1)	-0.038	-0.045	-0.070	-0.0002
	(1.178)	(1.439)	(.838)	(.003)
EXT. BALANCE (-2)	-0.024	0.001	-0.087	-0.065
	(.423)	(.026)	(.504)	(.465)
INFLATION (AVERAGE)	-0.871 ***	-0.630 ***	-0.243	-0.588
	(3.628)	(2.595)	(.601)	(1.541)
INFLATION (-1)	0.235 *	0.048	0.016	0.091
	(1.795)	(.355)	(.07)	(.324)
INFLATION (-2)	0.154	0.045	-0.215	-0.026
	(.721)	(.202)	(.659)	(.078)
INCOME (AVERAGE)	-1.887	1.000	-2.209	-2.284
	(1.464)	(.691)	(.515)	(.39)
INCOME (-1)	1.029 **	0.0002	2.664	3.394
	(2.563)	(.115)	(1.314)	(1.037)
INCOME (-2)	1.479	-0.172	0.919	-0.120
	(1.299)	(.119)	(.306)	(.032)
GDP GROWTH (AVERAGE)	0.061	0.048	0.224 **	0.165
	(1.364)	(1.011)	(2.257)	(1.513)
GDP GROWTH (-1)	0.002	-0.005	-0.096	0.003
	(.063)	(.156)	(1.428)	(.036)
GDP GROWTH (-2)	-0.015	0.003	-0.076	-0.041
	(.495)	(.092)	(1.117)	(.507)
DEVELOPMENT INDICATOR	1.077 ***	0.854 ***	-0.324	0.136
	(3.72)	(3.133)	(.392)	(.24)
DEFAULT HISTORY	-1.274 ***	-1.626 ***	-1.009 *	-0.879 **
	(4.804)	(6.342)	(1.936)	(2.018)
-2 ln L	968.19	998.12	277.34	272.15

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 4-11. OLS Results. Models 13-16.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)			
ESTIMATION TECHNIQUE	OLS			
PERIOD	1989-1997	1989-1997	1994-1997	1996-1997
NO. OBSERVATIONS	312	320	106	83
AGENCY	MOODY'S	S&P's	IBCA	THOMSON BANKWATCH
	MODEL 13	**MODEL 14**	**MODEL 15**	**MODEL 16**
INTERCEPT	3.156 **	0.133	-5.599	-2.113
	(2.459)	(.095)	(1.388)	(.634)
EXTERNAL DEBT (AVERAGE)	0.005	-0.018 **	0.007	0.002
	(.568)	(1.981)	(.267)	(.048)
EXTERNAL DEBT (-1)	-0.007	0.004	-0.033 **	-0.0005
	(1.309)	(.914)	(2.227)	(.027)
EXTERNAL DEBT (-2)	-0.006	0.011	0.011	-0.012
	(.697)	(1.525)	(.641)	(.392)
FISCAL BALANCE (AVERAGE)	0.006	0.014	-0.068	-0.019
	(.119)	(.267)	(1.089)	(.252)
FISCAL BALANCE (-1)	0.057 **	0.081 ***	0.090 **	0.027
	(2.116)	(2.616)	(2.446)	(.564)
FISCAL BALANCE (-2)	0.003	-0.00005	0.018	0.006
	(.12)	(.002)	(.642)	(.176)
EXT. BALANCE (AVERAGE)	0.096	0.041	0.038	-0.118
	(.922)	(.348)	(.114)	(.327)
EXT. BALANCE (-1)	-0.033	-0.041	-0.019	0.096
	(.745)	(.843)	(.17)	(.645)
EXT. BALANCE (-2)	-0.044	0.023	-0.042	-0.030
	(.559)	(.275)	(.179)	(.124)
INFLATION (AVERAGE)	-1.046 ***	-1.159 ***	-0.328	-0.817
	(3.185)	(3.17)	(.643)	(1.259)
INFLATION (-1)	0.247	-0.004	-0.012	0.029
	(1.361)	(.022)	(.041)	(.061)
INFLATION (-2)	0.138	0.195	-0.135	-0.067
	(.461)	(.598)	(.316)	(.115)
INCOME (AVERAGE)	0.124	2.256	2.438	0.764
	(.392)	(1.063)	(.427)	(.076)
INCOME (-1)	0.860 ***	0.00005	1.172	3.182
	(2.608)	(.711)	(.432)	(.58)
INCOME (-2)	0.056	-0.778	-1.538	-2.364
	(.125)	(.366)	(.385)	(.368)
GDP GROWTH (AVERAGE)	0.094	0.068	0.316 **	0.177
	(1.549)	(.952)	(2.5)	(.965)
GDP GROWTH (-1)	0.019	-0.009	-0.079	0.039
	(.479)	(.188)	(.896)	(.27)
GDP GROWTH (-2)	-0.007	0.025	-0.043	-0.007
	(.183)	(.525)	(.484)	(.051)
DEVELOPMENT INDICATOR	1.900 ***	1.280 ***	0.089	0.781
	(4.79)	(3.13)	(.08)	(.799)
DEFAULT HISTORY	-2.072 ***	-2.527 ***	-1.471 **	-1.295 *
	(6.05)	(7.124)	(2.074)	(1.709)
Adjusted R-Squared	0.895	0.869	0.915	0.895
Standard Error	1.486	1.614	1.469	1.827

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Note: Values in parentheses are absolute t-statistics

Table 4-12. Results. Model 17.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)	
PERIOD	1989-1997	
NO. OF OBSERVATIONS	562	
NO. OF COUNTRIES	38	
NO. OF AGENCIES	9	
ESTIMATION TECHNIQUE	**ORDERED PROBIT**	**OLS**
INTERCEPT	-2.447 ** (2.05)	-5.787 *** (2.961)
EXTERNAL DEBT	-0.004 *** (8.708)	-0.006 *** (9.127)
FISCAL BALANCE	0.009 (.873)	0.009 (.515)
EXTERNAL BALANCE	-0.007 (.509)	-0.020 (.891)
INFLATION	-0.469 *** (9.989)	-0.740 *** (9.806)
INCOME	0.632 *** (9.072)	1.202 *** (10.752)
GDP GROWTH	0.065 *** (3.315)	0.144 *** (4.445)
DEVELOPMENT INDICATOR	0.022 (.13)	0.082 (.289)
DEFAULT HISTORY	-1.022 *** (7.469)	-1.815 *** (8.104)
LONG TERM DEBT/ TOTAL BANK DEBT(%)	0.046 *** (4.399)	0.089 *** (5.141)
MEDIUM TERM DEBT/ TOTAL BANK DEBT(%)	0.025 (1.238)	0.036 (1.05)
SHORT TERM DEBT/ TOTAL BANK DEBT(%)	0.040 *** (4.109)	0.073 *** (4.469)
COUNTRY DEBT/ SAMPLE DEBT (%)	0.009 (.436)	0.027 (.796)
UNDISBURSED C.M./ TOTAL BANK DEBT(%)	0.005 (.857)	0.017 * (1.853)
FOREX. RESERVES/ IMF QUOTA (%)	-3.600E-06 (.129)	0.00001 (.209)
USE IMF CREDIT/ IMF QUOTA (%)	-0.004 *** (5.309)	-0.005 *** (4.604)
TOTAL BANK BORR./ DEPOSITS (%)	0.00009 (1.262)	0.000 (.582)
-2 ln L	2107.12	
LR	54.78 ***	
Adjusted R-Squared		0.788
Standard Error		1.749

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 4-13. Ordered Probit Results. Models 18-21.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)			
ESTIMATION TECHNIQUE	ORDERED PROBIT ANALYSIS			
PERIOD	1989-1997	1989-1997	1994-1997	1996-1997
NO. OF OBSERVATIONS	181	183	46	57
AGENCY	MOODY'S	S&P's	IBCA	THOMSON BANKWATCH
	MODEL 18	**MODEL 19**	**MODEL 20**	**MODEL 21**
INTERCEPT	-0.678	-4.504 **	-1.454	-10.058 **
	(.294)	(2.128)	(.298)	(2.221)
EXTERNAL DEBT	-0.006 ***	-0.002 ***	-0.009 ***	-0.009 ***
	(6.789)	(2.621)	(3.48)	(4.515)
FISCAL BALANCE	0.019	0.046 **	-0.165 ***	-0.071 **
	(1.024)	(2.453)	(3.443)	(2.072)
EXTERNAL BALANCE	0.011	-0.005	0.021	-0.135 *
	(.453)	(.199)	(.399)	(1.76)
INFLATION	-0.521 ***	-0.548 ***	-0.798 ***	-0.558 ***
	(5.966)	(5.897)	(3.387)	(3.22)
INCOME	0.623 ***	0.682 ***	1.209 ***	1.316 ***
	(4.878)	(6.114)	(2.897)	(4.344)
GDP GROWTH	0.076 **	-0.001	0.365 ***	0.283 ***
	(2.07)	(.022)	(3.258)	(3.552)
DEVELOPMENT	0.306	0.250	-1.333	-0.806
INDICATOR	(.952)	(.841)	(1.615)	(1.209)
DEFAULT HISTORY	-1.187 ***	-1.466 ***	-1.686 ***	-0.747 *
	(4.308)	(5.552)	(2.599)	(1.68)
LONG TERM DEBT/	0.040 **	0.058 ***	0.088 **	0.088 **
TOTAL BANK DEBT(%)	(1.995)	(2.971)	(2.384)	(2.215)
MEDIUM TERM DEBT/	0.032	0.052	-0.222 **	-0.036
TOTAL BANK DEBT(%)	(.83)	(1.32)	(2.176)	(.557)
SHORT TERM DEBT/	0.040 **	0.059 ***	-0.014	0.058 *
TOTAL BANK DEBT(%)	(2.093)	(3.145)	(.482)	(1.804)
COUNTRY DEBT/	0.022	0.061 *	-0.141	-0.076
SAMPLE DEBT (%)	(.63)	(1.753)	(1.046)	(.632)
UNDISBURSED C.M./	0.011	0.009	-0.048	0.017
TOTAL BANK DEBT(%)	(1.118)	(.862)	(1.324)	(.766)
FOREX. RESERVES/	-0.0001	-0.00001	0.0002	0.00015
IMF QUOTA (%)	(1.129)	(.289)	(.371)	(.537)
USE IMF CREDIT/	-0.004 ***	-0.004 ***	-0.001	-0.007 **
IMF QUOTA (%)	(3.096)	(3.315)	(.472)	(2.567)
TOTAL BANK BORR./	0.0001	0.00004	0.0006	0.001
DEPOSITS (%)	(.444)	(.359)	(.963)	(1.583)
-2 ln L	576.62	642.59	126.31	167.09

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 4-14. OLS Results. Models 18-21.

DEPENDENT VARIABLE	FOREIGN CURRENCY SOVEREIGN RATINGS (B-/B3=1, B/B2=2,.......AAA/Aaa=16)			
ESTIMATION TECHNIQUE	OLS			
PERIOD	1989-1997	1989-1997	1994-1997	1996-1997
NO. OF OBSERVATIONS	181	183	46	57
AGENCY	MOODY'S	S&P's	IBCA	THOMSON BANKWATCH
	MODEL 18	**MODEL 19**	**MODEL 20**	**MODEL 21**
INTERCEPT	-2.801	-6.911 **	-4.342	-11.0824 *
	(.933)	(2.054)	(.64)	(1.906)
EXTERNAL DEBT	-0.007 ***	-0.003 ***	-0.010 ***	-0.011 ***
	(7.012)	(2.815)	(2.963)	(4.45)
FISCAL BALANCE	0.026	0.069 **	-0.155 **	-0.080 *
	(.994)	(2.259)	(2.464)	(1.666)
EXTERNAL BALANCE	0.005	-0.032	0.005	-0.207 **
	(.138)	(.85)	(.061)	(2.471)
INFLATION	-0.648 ***	-0.906 ***	-0.692 **	-0.598 ***
	(5.749)	(6.300)	(2.449)	(2.617)
INCOME	0.970 ***	1.197 ***	1.447 **	1.554 ***
	(5.865)	(7.118)	(2.508)	(4.328)
GDP GROWTH	0.133 ***	0.011	0.388 **	0.348 ***
	(2.833)	(.19)	(2.559)	(3.298)
DEVELOPMENT	0.511	0.233	-0.825	-0.631
INDICATOR	(1.181)	(.49)	(.692)	(.714)
DEFAULT HISTORY	-1.780 ***	-2.099 ***	-1.566 *	-0.760
	(5.027)	(5.228)	(1.700)	(1.227)
LONG TERM DEBT/	0.070 ***	0.098 ***	0.106 **	0.104 *
TOTAL BANK DEBT(%)	(2.581)	(3.156)	(2.014)	(1.941)
MEDIUM TERM DEBT/	0.049	0.065	-0.210	-0.058
TOTAL BANK DEBT(%)	(.91)	(1.01)	(1.438)	(.637)
SHORT TERM DEBT/	0.060 **	0.093 ***	0.006	0.066
TOTAL BANK DEBT(%)	(2.298)	(3.092)	(.131)	(1.481)
COUNTRY DEBT/	0.056	0.077	-0.119	0.007
SAMPLE DEBT (%)	(1.174)	(1.399)	(.606)	(.045)
UNDISBURSED C.M./	0.020	0.024	-0.029	0.026
TOTAL BANK DEBT(%)	(1.527)	(1.458)	(.586)	(.969)
FOREX. RESERVES/	-0.0001	0.00001	0.001	0.0001
IMF QUOTA (%)	(.956)	(.085)	(.698)	(.314)
USE IMF CREDIT/	-0.005 ***	-0.007 ***	-0.001	-0.006 *
IMF QUOTA (%)	(2.723)	(3.175)	(.287)	(1.721)
TOTAL BANK BORR./	-0.00001	0.0001	0.001	0.001
DEPOSITS (%)	(.081)	(.426)	(.592)	(.829)
Adjusted R-Squared	0.863	0.819	0.832	0.872
Standard Error	1.462	1.695	1.630	1.550

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Table 4-15. Cutpoints Defining Intervals for Each Foreign Currency Rating Category[1] (Within-Sample Tests)

	BASE MODEL	MODEL 1	MODEL 2	MODEL 12	MODEL 17
μ_1	0	0	0	0	0
μ_2	0.70326	0.76406	0.70703	0.69825	0.69225
μ_3	1.57410	1.70644	1.58892	1.62259	1.54449
μ_4	2.25228	2.44162	2.27260	2.28479	2.21757
μ_5	3.02317	3.27129	3.04164	3.06934	3.04030
μ_6	3.54129	3.81199	3.56850	3.59244	3.61141
μ_7	4.38148	4.69316	4.46403	4.42893	4.50609
μ_8	4.68068	4.99992	4.78970	4.72969	4.83687
μ_9	5.00281	5.32764	5.14742	5.05711	5.20272
μ_{10}	5.44338	5.78656	5.66701	5.50751	5.70277
μ_{11}	5.94144	6.31695	6.24863	6.01431	6.29015
μ_{12}	6.25602	6.65344	6.58057	6.33316	6.68374
μ_{13}	6.76402	7.19612	7.09513	6.85666	7.21435
μ_{14}	7.42187	7.88722	7.78116	7.54674	8.10083
μ_{15}	7.99034	8.47547	8.38647	8.13966	8.86819

[1] $\mu_0=-\infty$; $\mu_{16}=\infty$

Table 4-16. Foreign Currency Ratings Correctly Classified, by Model (Percent)

	BASE MODEL		MODEL 1		MODEL 2		MODEL 12		MODEL 17	
	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS
A) WITHIN SAMPLE										
Total observations	1003		1003		1003		995		562	
Notch-level ratings										
Correctly Classified	35.39	21.83	36.99	22.63	35.59	24.33	35.98	22.71	25.44	19.04
Within one notch of correct rating	72.48	64.31	74.98	67.60	75.67	68.00	73.57	64.22	65.84	62.63
Broad letter ratings										
Correctly Classified	56.63	52.44	58.62	53.34	58.33	52.24	59.10	52.56	57.47	56.94
B) HOLDOUT SAMPLE										
Total observations	210		210		210		205		146	
Notch-level ratings										
Correctly Classified	34.76	23.81	35.71	25.24	32.86	22.86	31.71	20.00	22.60	18.49
Within one notch of correct rating	64.76	65.71	69.05	66.67	63.81	68.57	63.41	64.39	60.27	62.33
Broad letter ratings										
Correctly Classified	52.38	54.76	58.57	59.52	52.38	54.29	49.27	39.02	45.89	47.95

Note: All figures are proportions of the total ratings in the sample analysed. Correctly classified notch-level ratings are fitted ratings matching exactly the actual rating at the notch level. Ratings which are classified correctly within one notch of the correct rating are fitted ratings which: (1) match exactly the actual rating, or (2) are either one rating notch higher or lower than the actual rating. Ratings correctly classified at the broad-letter level are fitted ratings rounded off to the nearest broad-letter rating category which match the rounded-off broad-letter category of the actual rating. For instance, the categories BBB-/Baa3, BBB/Baa2, and BBB+/Baa1 are rounded off to the broad letter category BBB/Baa. Fitted and actual broad-letter ratings obtained in this way and matching exactly are deemed to be correctly classified by the models at the broad letter level.

5. The Determinants of Local Currency Sovereign Ratings

In recent years, there has been an increasing concern about the growth of domestic public debt in developing countries with high levels of external debt and its implications both for stabilisation policies and for attempts to deal with the external debt problem. Despite the critical impact the growth of domestic public debt can have in these areas, the number of studies providing a systematic analysis of the domestic public debt situation in these countries are far more limited than those dealing with the external debt problem (Reisen, 1989a,b).

At the same time, the explosion of cross-border interest in local currency securities has raised the demand for local currency ratings. Financial market deregulation, globalisation of capital markets, the spread of securitisation, and the increasing use of derivatives instruments to help mitigate exchange rate volatility have combined to increase the demand for local currency-denominated securities.

The empirical work described in this chapter begins the process of evaluating the factors that influence local currency sovereign credit ratings and presents the first systematic analysis of the determinants of this type of ratings. The analysis focuses on seven main areas: (1) the factors that determine local currency sovereign ratings; (2) the differences between agencies regarding the factors included in their assessment of sovereign creditworthiness for local currency obligations; (3) the effect of the sovereign's geographic region on its local currency credit rating; (4) the relative importance of lagged and average historical values of macroeconomic variables to explain local currency sovereign ratings; (5) the relative influence of macroeconomic and balance-sheet variables on rating agencies' opinions of sovereign creditworthiness; (6) the robustness of ordered probit analysis to capture the nature of local currency sovereign ratings as compared to linear regression; and, (7) the difference between the statistical and the quantitative impact of the preferred model on local currency ratings.

The findings suggest that the criteria underlying local currency sovereign ratings are consistent with a theoretical framework relating external and domestic debt in that the fiscal balance, the income per capita and the rate of inflation play a significant role in explaining the ratings. Additionally, the level of external debt appears to significantly affect local currency ratings indicating that rating agencies perceive foreign and local currency denominated debt as having equal claims on government resources. By way of contrast, current account balance, GDP growth, and the country's IMF classification are found not to be significantly related to the local currency rating of the sovereign. The impact of lagged variables on local currency ratings proved not significant relative to average macroeconomic variables, while balance-sheet variables have a moderate joint impact on the ratings. Significant and systematic differences are found across agencies in terms of both the factors included in their local currency ratings and the weightings attached to them. The geographic region of the sovereign has also a significant influence on its local currency rating accounting for a lower rating if the sovereign's geographic region is different from the region where the rating agency is headquartered. Furthermore, important differences are found in the determinants of local and foreign currency ratings, as well as in the effect of the agency and the geographic region on each type of rating. The accuracy tests confirm the robustness of ordered probit to model credit ratings as compared to ordinary least squares. Finally, the quantitative analysis suggests that, from the statistically significant variables, only the income per capita and the history of default on local and foreign currency debt have a significant quantitative impact on local currency ratings. The indicators for the geographic region of the sovereign and the rating agency proved also quantitatively significant, though at varying degrees. It is found that the variables which have a significant quantitative impact on foreign currency ratings differ slightly from those which quantitatively affect local currency ratings, and that the power if this impact also varies across types of ratings.

This chapter is organised as follows. The first section briefly describes the default risk associated with local currency sovereign debt. Section two explains the analytical framework of this analysis, while section three defines the explanatory variables selected within this framework. Section four outlines the hypotheses to be tested. The estimation method and the data used are described in section five. Section six presents the results of the empirical analysis and section seven evaluates the performance of the estimation models. Section eight discusses the quantitative impact of the preferred model. Section nine concludes the chapter.

5.1 Default Risk of Domestic Debt

The growth of local currency denominated debt of emerging market sovereigns during the 1980s was a source of concern for two main reasons (Guidotti and Kumar, 1991). First, the growth of domestic debt led to a sharp increase in debt-service payments and a further weakening in the government's ability to service its external debt. Increased debt-service requirements, for both domestic and external debt, also put more pressure on public sector investment. A second major reason for concern was the sharp increase in the rate of inflation that accompanied the increased fiscal deficits and the domestic burden from 1982 onwards. Concern about domestic debt has persisted during the 1990s as the relaxation of currency restrictions by the governments of many developing countries has helped trigger rapid growth in their domestic bond markets by attracting substantial cross-border investment.

Nevertheless, sovereign default on local currency obligations has been historically rare. As pointed out in Chapter 2 (2.4.3), the relative rarity of local currency sovereign defaults compared with foreign currency defaults is reflected in the credit ratings of the two types of debt. Sovereigns are assigned local currency ratings which are normally higher than foreign currency ratings, although the former are not necessarily "triple-A". While sovereign issuers are presumed to be free of default risk for debt denominated in their own currency since they can print money and impose taxes to repay domestic debt (Ostrovsky, 1999a), there are possible institutional, structural, political or other features of individual countries which might lead a rating agency to conclude that even the best credit in that country should be rated below "triple-A" for local currency denominated obligations (Truglia and Levey, 1998a). These features include: (1) a substantial risk of political regime change which could lead to a general repudiation of debts, a risk of civil war/anarchy, or a risk of foreign invasion; (2) the lack of a well established system of contract law, which allows successful suits for collection of unpaid debts or seizure of collateral; (3) the lack of a deep financial system which is effective in making payments and avoiding technical breakdowns; (4) a regulatory or legal environment which is malleable, corrupt or unpredictable and which makes the repayment of domestic debt uncertain; and (5) a tendency towards hyperinflation. Concerning hyperinflation, however, what is important is not so much the rate of inflation itself, but rather the possibility that the government of the country, in an attempt to avoid a descent into hyperinflation, might impose controls on the domestic payments systems, such as a deposit freeze, which could jeopardise many obligors' ability -including the government itself- to repay their debt on a timely basis. Furthermore, continued recourse to the printing of domestic currency in order to meet local currency denominated obligations could lead to hyperinflation, which, in turn, might lead to political instability -e.g., a revolution-, thereby increasing the default risk on local currency debt and causing the local currency sovereign rating to be lower than "triple-A".

Experience shows that sovereign defaults on local currency debt stem from more extreme political and economic circumstances than foreign currency defaults (Beers, 1995). A change of regime or state succession -accompanied by a revolution, war, and widespread social and economic stress- are examples where political risk is the paramount influence. On the other hand, hyperinflation, fed by the collapse of public finance, is the most important example of the type of economic risks that can trigger local currency default. The chain of events leading to default typically features an absence of political consensus on economic policy objectives, high budget deficits, rapid growth in public spending and debt, and accelerating price inflation. In addition, foreign currency default usually precedes local currency default by a number of years. Local currency default may follow when budget deficits reach a level where the government is reluctant to levy additional taxes to maintain debt service, while inflation is already eroding the real value of debt, and with it the influence of the state's creditors.

5.2 The Analytical Framework

Guidotti and Kumar (1991) suggest that developments related to domestic and external debt have to be viewed within a unified framework that integrates several different aspects of the fiscal situation. They provide a framework to obtain a measure of public sector solvency and of the fiscal adjustment required to service the outstanding public debt fully. Within this framework, the basic operations of the public sector are analysed in terms of a balance sheet listing its assets and liabilities. Government assets can be thought of as being composed of two elements: (1) the current stock of assets; and, (2) the present value of anticipated future revenues from tax and non-tax sources, discounted back to the present using a given discount rate. Current assets include both domestic and foreign assets.(1) Similarly, corresponding to government assets, government liabilities can also be thought of as composed of two parts: (1) the current outstanding stock of debt and other current obligations; and, (2) the present value of future expenditures, including subsidies.

The difference between the government's assets and liabilities is its net worth. A government is regarded as being solvent -i.e., being able to meet its current and future obligations- when its net worth is positive, that is, when the government's assets (revenues) exceed its liabilities (expenditures). On the other hand, if net worth is negative, then the government is insolvent and, without an increase in its assets, it is not able to meet its current contractual obligations. Insofar as sovereign governments, however, the above definition of solvency may appear to be rather simplistic, because not all government assets can be used to service government liabilities.(2) Thus, it is assumed that government (tax and non-tax) revenues constitute the main source of funds available to service public debt.

Schematically, and, according to the above framework, a government's balance sheet in terms of domestic currency can be represented by the following identity:

$$EA^* + R = G + S + B + EB^* + K \tag{5-1}$$

where G, S, and R denote the present values of (expected) government expenditures, subsidies, and (tax and non-tax) revenues; A^* denotes the stock of foreign exchange

(1) Domestic assets are, for example, land and buildings owned by the government, and domestic government loans made to the private sector. Foreign assets may include foreign exchange reserves, foreign loans made by the government, and fixed foreign assets, such as embassies.

(2) For instance, real state properties are less likely to be used to service debt due to is lower liquidity as compared to revenues or international reserves.

reserves;[3] and B and B^* denote domestic and external debt, respectively.[4] E denotes the exchange rate. B is denominated in local currency, while A^* and B^* are denominated in foreign currency. K denotes the government's net worth. Consequently, government assets appear on the left-hand side of its balance sheet while government liabilities appear on the right-hand side. Because the balance sheet focuses on those assets which are considered as most likely to be used to service the public debt, K provides a measure of the government's net worth which is relevant in assessing the public sector's ability to service its liabilities. Within this framework, solvency is defined only with respect to this notion of government net worth.

This forward-looking balance sheet provides several insights. First, for a given net worth to be maintained, any increase in debt has to be matched by one or both of the following: (1) an increase in the government revenues or current assets; and, (2) a decrease in expenditures. The changes in revenues and/or expenditures comprise not only current fiscal adjustments, but also expectations of future improvements. Second, domestic and external debt appear to enter the statement of public sector liabilities on an equal footing, that is, domestic and external debt have equal claims on government resources. Therefore, if an external debt-servicing problem exists, then it is likely that a domestic debt-servicing problem also exists. Third, the anticipated future stream of government expenditure and subsidies is, to the extent that the stream is perceived as a "permanent" obligation, also as a form of government debt. In this context, subsidies and transfers, which may be thought of as representing promises to provide flows of payments in much the same way governments agree to make contractual interest payments, may also be deemed government debt. Finally, it follows that whether a government is solvent or not depends on the amount of its expenditures, its total revenues, and its debt. A solvent government does not have a debt problem, while an insolvent government will not be able to service fully its debt obligations. Nonetheless, this framework makes no distinction between ability and willingness to pay. The willingness to pay, in the

[3] The framework assumes that foreign exchange reserves are a current asset which may be used for servicing debt.

context of fiscal adjustment -to subside a negative net worth-, is an important factor, which may vary across countries. Thus, even if the government is technically solvent, its public debt could still pose risk of default.

5.3 Selection of Explanatory Variables

The framework described above, the review of sovereign default events, and the examination of the rating agencies' sovereign rating criteria suggest the factors which are important to explain local currency sovereign ratings. Specifically, the selection of explanatory variables for this analysis is consistent with the notion that the same economical, political and social factors affect the sovereign's ability and willingness to honour local and foreign currency debt, though in varying degrees (Truglia and Levey, 1998a; and Beers and Cavanaugh, 1999). Therefore, the same explanatory variables included in the last chapter to explore the determinants of foreign currency sovereign ratings are used here in an attempt to ascertain the differences between the determinants of local and foreign currency sovereign ratings.(5) These variables include: (1) average and lagged macroeconomic variables; (2) rating agency indicators; (3) geographic region indicators; and, (4) balance-sheet variables.

Although the analytical framework described above emphasised the importance of future magnitudes of government assets and liabilities, the macroeconomic and balance-sheet variables used in this analysis have been limited to their average and lagged values. This, nevertheless, is also consistent with Guidotti and Kumar (1991), who have postulated that the fiscal performance in the recent past provides a reasonable indication of the balance likely to prevail in the future.

Political stability variables have been excluded from the analysis on the basis that, as discussed before (4.3), country creditworthiness appears to be largely based

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(4) As explained later in the section, this framework considers long-term or "permanent" government expenditures as debt, and differentiation among expenditures, subsidies, and debt in eq. (5-1) is made with respect to this notion.

(5) See 4.3, and Tables 4-1 and 4-2 for a description of the explanatory variables of foreign currency sovereign ratings.

on a country's economic performance, which is expected to reflect longer term political stability (Brewer and Rivoli, 1990; Cosset and Roy, 1991; and Lee, 1993b). Additionally, they have been excluded on the basis that, although including political-event variables can improve the explanatory power of regression models that analyse country creditworthiness, their exclusion does not bias the parameter estimates for the effects of economic variables (Haque, Mark and Mathieson, 1998). Similar to Chapter 4, thus, political stability variables have been considered here to the extent that they are reflected in the economic variables included in this analysis, as described below.

5.3.1 Macroeconomic Variables

Compared to the analysis described in the previous chapter, the macroeconomic variables used here include an additional indicator variable, namely the sovereign's history of default on local currency debt since 1975. Local currency obligations comprise government and central bank securities, as well as bank loans and central bank currency.(6) The relationship between the nine macroeconomic variables included in this analysis and local currency sovereign ratings is summarised below.

1) **External Debt.** Assuming domestic and external debt have equal claims on government resources, a domestic debt problem may occur where the level of such debt is low by international standards if, at the same time, the external debt burden is high. Higher levels of external debt are more likely to result in domestic debt-servicing problems, and, hence, lower local currency sovereign ratings.
2) **Fiscal Balance.** A large fiscal deficit suggests that a government is not able or willing to tax its citizenry to cover current expenditures or to service its debt. In the data used in this analysis, the government deficit or surplus equals the total financing of the country with a reverse sign and is, therefore, used as a proxy for total -domestic plus foreign- public debt. A higher debt burden should correspond to a higher risk of default. The higher the government deficit, the lower its perceived ability to service debt, and, hence, the lower the local currency rating will be.

(6) Definition of default corresponds to that given in section 3.1.1 in Chapter 3.

3) **External Balance.** In order to obtain current account surpluses with which to service external debt, domestic demand may be restrained. This restraint may lead, in turn, to lower wages, profits and per capita income, as well as to lower imports, thus eroding the tax base. Lower revenues may then impair the sovereign's ability to service debt. Therefore, the larger the current account surplus, the lower the local currency rating.

4) **Inflation.** Arguably, the real value of nominal debt could be reduced by an increase in the price level. However, increases in price inflation can have adverse effects on investment and growth, and can undermine popular support for governments. As a result, policy makers usually respond with measures to contain inflation; if they do not, and price increases accelerate to the point of hyperinflation, serious economic damage and an erosion of public trust in political institutions can arise. Such conditions are fertile ground for a sovereign local currency default. Hence, higher inflation rates will result in lower local currency credit ratings.

5) **Income.** A country with a relatively high and rising standard of living, and income distributions can more readily support high levels of public debt, and withstand unexpected economic shocks, than can one with a poor or stagnant economy. A higher tax base suggests a greater ability to service debt. At the same time, the country may be deemed broadly equitable, thereby reflecting political stability. As a result, the higher a country's per capita income, the higher the sovereign's local currency rating will be.

6) **GDP Growth.** A relatively high rate of economic growth suggests that a country's existing debt burden will become easier to service over time, hence, a higher rate of growth will contribute towards a higher local currency credit rating.

7) **Development Indicator.** As discussed in the previous chapter (4.3.1), the inclusion of an indicator variable which discriminates between industrial and non-industrial (developing) countries is intended to capture a possible threshold effect into the relationship between economic development and default risk. It has been argued that, when the difference in fiscal performance between industrial and developing countries does not appear to justify the presence of a debt crisis only in developing countries, a possible explanation is that industrial countries' ability to

raise additional revenues may be substantially greater than that of developing countries, because of the former's more efficient tax collection system, as well as other structural factors. In this context, the market's more optimistic view about industrial countries' future fiscal performance could have a significant impact on the sovereign's perceived creditworthiness. Therefore, it is expected that countries with a higher level of economic development have higher local currency ratings. The IMF classification of the countries included in this analysis, used as the proxy for economic development, is provided in Table 5-1.

8) **Foreign Debt Default History.** Given that sovereign defaults on foreign currency obligations have often preceded local currency defaults, sovereigns which have defaulted in the recent past on foreign currency debt may be perceived as higher credit risks for local currency obligations than countries with a reputation for timely repayment. Therefore, a country which has defaulted on its foreign currency debt is expected to have lower local currency ratings.

9) **Local Debt Default History.** This indicator variable took the value 1 if the sovereign defaulted on its local currency debt since 1975, and 0 otherwise. A sovereign with a recent history of local currency default is expected to have a lower rating than one that has maintained an unblemished debt record reflecting the role of reputation in sovereign debt.

5.3.2 Balance-Sheet Variables

The second subset of explanatory variables includes the same eight balance-sheet variables described in the previous chapter (4.3.2), the rationale for this being once again that if an external debt-servicing problem exists, then it is likely that a domestic debt-servicing problem also exists. Therefore, it is expected that variables which reflect a country's balance-sheet structure and which help to explain foreign currency debt service capacity of sovereign borrowers, can also explain local currency sovereign ratings. This allows, in addition, to examine the extent to which rating agencies incorporate this type of variables in the assessment of sovereign creditworthiness, while comparing their relative importance to local and foreign currency sovereign ratings.

5.3.3 Agency and Regional Indicators

The third subset of explanatory variables comprises the indicators which define the five different agencies included in this analysis. These indicator variables are intended to capture the effect of the rating agency assessing sovereign creditworthiness on the local currency ratings assigned to the sovereigns. The rating agencies included in this study are: (1) Moody's Investors Service; (2) Standard and Poor's; (3) IBCA; (4) Thomson BankWatch; and, (5) Duff and Phelps.(7) Except for the London-based agency IBCA, all agencies are headquartered in the United States. Furthermore, all five agencies are designated by the US Securities and Exchange Commission (SEC) as nationally recognised statistical rating organisations (NRSROs).

Finally, in order to account for the effect of the sovereign's geographic region on its local currency rating, a subset of regional indicator variables was included. These indicators define the five separate geographic regions for analysis: (1) Africa/Middle East; (2) Asia/Pacific Central; (3) Eastern Europe; (4) Latin America; and, (5) West Europe/North America. Table 5-1 lists the countries included in this analysis classified by geographic region.

5.4 Hypotheses

In examining the determinants of local currency sovereign ratings the following issues are raised. First, rating agencies have expressed that the same information is evaluated in the determination of local and foreign currency sovereign ratings, although different emphasis is placed on these factors reflecting the distinctive credit risks of each type of debt (Truglia and Levey, 1998a; and Beers and Cavanaugh, 1999). Nevertheless, the agencies repeatedly cite the rate of inflation as one of the most important factors -sometimes the most important- when assessing local currency sovereign creditworthiness. Additionally, the framework discussed before (5.2) stresses the importance of the government's fiscal performance to its ability of

(7) Of the eleven agencies included in the analysis of foreign currency sovereign ratings, only these five agencies assigned local currency ratings for the period covered.

servicing debt obligations. In this context, the following hypothesis has been formulated:

Hypothesis 1: While the same macroeconomic variables will broadly explain both local and foreign currency ratings, it is expected that fiscal balance and inflation play a more significant role in the determination of local currency ratings.

The systematic differences between rating agencies regarding sovereign creditworthiness found in the previous chapter suggest that these differences may also be found in local currency ratings. It is thus expected that,

Hypothesis 2: Rating agencies differ significantly in the assessment of local currency sovereign creditworthiness, and this disagreement is reflected in systematically lower or higher ratings depending on the agency providing the rating.

The findings of the previous chapter show that regional characteristics influence sovereign ratings independent of other economic fundamentals. This analysis also examines this influence on local currency ratings by classifying the countries included in the analysis by geographic region. It is therefore expected that,

Hypothesis 3: The geographic region of the sovereign has a significant effect on its local currency rating.

Although the foreign currency rating criteria utilised by the rating agencies appear to focus primarily on average historical values of macroeconomic variables (see 4.7.4), this study considers the possibility that local currency ratings are also determined by the lagged values of these variables. In this context,

Hypothesis 4: Lagged values of macroeconomic variables have a significant effect on local currency ratings beyond the effect of the average historical values of these variables.

Finally, it has been suggested that a model which attempts to shed light on the determinants of foreign currency sovereign ratings and which fails to include country balance-sheet data as explanatory variables, may be misspecified (4.7.5). Furthermore, given that a deteriorating external debt-service capacity may impair the ability of a sovereign to honour its local currency denominated debt, it would be expected that balance-sheet variables, which reflect external debt-servicing problems and help to explain foreign currency sovereign ratings, also reflect domestic debt-servicing problems and determine local currency sovereign ratings. Thus,

Hypothesis 5: Balance-sheet variables play a significant role in determining local currency sovereign ratings over and above that played by macroeconomic variables.

5.5 Estimation Method and Data

Consistent with the discussion in the previous chapter (4.5), the determinants of local currency sovereign ratings are estimated using ordered probit analysis which captures the discreteness and ordering of credit ratings, while quantifying the effects of the explanatory variables on them. The ordered probit model is estimated by maximum likelihood and the results are compared with the estimates obtained from regressing the sample data using ordinary least squares (OLS) to test for the robustness of each technique.(8) As in the previous chapter, it is recognised that OLS has theoretical and empirical limitations for modelling categorical, ordinal dependent variables. However, the inclusion of OLS in the analysis is only intended to provide a means for comparison between its performance and the performance of ordered probit models, and for consistency purposes with the foreign currency ratings analysis.

The sample data include the long-term local currency sovereign credit ratings assigned by five international rating agencies to 49 sovereign borrowers for the period from 1992 to 1997. The total sample size is 304 observations.

5.5.1 Dependent Variable

The dependent variable in both the probit and the OLS models is the long-term local currency rating assigned to each sovereign by each of the five agencies included in the analysis as of December 31 of each year.(9) As mentioned before, the agencies included in this study comprise four American agencies (Moody's, Standard and

(8) See 4.5 in Chapter 4 for a full description of the estimation model.

Poor's, Thomson BankWatch, and Duff and Phelps), and one European agency (IBCA). The local currency ratings were obtained from the following publications: *Financial Times Credit Ratings International, Moody's Global Ratings Guide, Standard and Poor's Global Ratings Handbook,*[10] and *IBCA Ratings.* Some countries are rated by only one agency in a given year, while other are rated by several agencies. The unit of measurement is a 14-point risk rating scale.[11]

Figures 5-1 and 5-2 show the distribution of the local currency sovereign ratings included in this analysis' sample for the whole of the period covered and for each of the years comprised in that period, respectively. It can be noted that the participation of cross-border investors in local capital markets around the world has contributed to raising the demand for local currency ratings in recent years. From 1992 to 1997 the number of local currency sovereign ratings assigned more than quadrupled, increasing to 76 ratings from 18. Furthermore, the increase in the number of local currency ratings has coincided with a trend towards the assignment of lower ratings. From 1992 to 1994, the sovereigns rated for local currency obligations were mainly "triple-A" credits, and sovereigns rated "double-A" or higher accounted for approximately 90 percent of the total, for that period. By the second half of the period analysed, 1995-1997, however, local currency ratings were more evenly distributed. In 1997, only 50 percent of the total ratings were "double-A" or higher, while sovereigns rated BBB+/Baa1 or lower amounted to about 30 percent of the total. This reflects the rapid expansion of the rating activity in the domestic financial markets of middle- and low-income economies and the growing interest in the local currency securities of these markets. It also reflects the fact that, while the local currency securities markets were dominated by the highest quality credits, such as the United States, Japan, United Kingdom, France, and Germany, local currency ratings were unquestionably "triple-A", on the grounds that the

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(9) Ratings assigned by Thomson BankWatch and Duff and Phelps are reported as of January 1 of each year, but, for the purposes of this study, they are considered to correspond to December 31 of the previous year.

(10) Before November 1996, this publication was called *Ratings Handbook.*

(11) To be consistent with the analysis of foreign currency ratings (see 4.5), the rating scale is divided here in 16 categories to assign a numeric equivalent to the ratings. That is, B-/B3=1, B/B2=2, B+/B1=3,.......AAA/Aaa=16. Nevertheless, the lowest local currency rating assigned to a sovereign in the sample used is B+/B1(=3) and, therefore, the models have been estimated using categories 3(B+/B1) to 16(AAA/Aaa) only.

sovereign possesses the power to print local currency. Nevertheless, the advent of sovereign issuers from emerging markets in the local currency securities markets, and the fact that local currency sovereign issuer ratings are intended to be comparable internationally, made it evident that differences in the credit attributes of different sovereigns should lead to distinctions in their local currency ratings. Moreover, despite the ability of the sovereign to print local currency, political, institutional or other factors might result in local currency default risk and, therefore, local currency ratings which are lower than "triple-A".(12)

Similar to the discussion on foreign currency ratings presented in the previous chapter (4.6.1), the shift in the local currency ratings distribution for the years included in the sample of this analysis has some implications. The growing number of sovereigns rated low- or below-investment grade suggests that the weightings attached to the factors which determine the ratings may vary from year to year reflecting the differences in the distribution of ratings. That is, the inferences drawn from the models would reflect the characteristics of the sovereigns included in the different annual samples. Since the composition of the sample has gradually changed over the years, it would be expected to observe more dramatic differences between the determinants of ratings of distant years than between samples of consecutive years. Additionally, the agencies' greater understanding and more accurate assessment of sovereign creditworthiness obtained through the years may also result in differences in the factors that determine ratings and in the weightings attached to them. The analysis included in this chapter, however, attempts to explain the determinants of local currency sovereign ratings for the whole of the period included in the sample -1992 to 1997. Nevertheless, it is recognised that differences between the inferences for the whole period and specific years may differ as a result of the changes in the ratings distribution.

(12) Section 5.1 discussed the factors which might lead a rating agency to conclude that a sovereign issuer should be rated below "triple-A" for its local currency obligations.

Figure 5-1. Local Currency Sovereign Ratings Distribution, 1992-1997

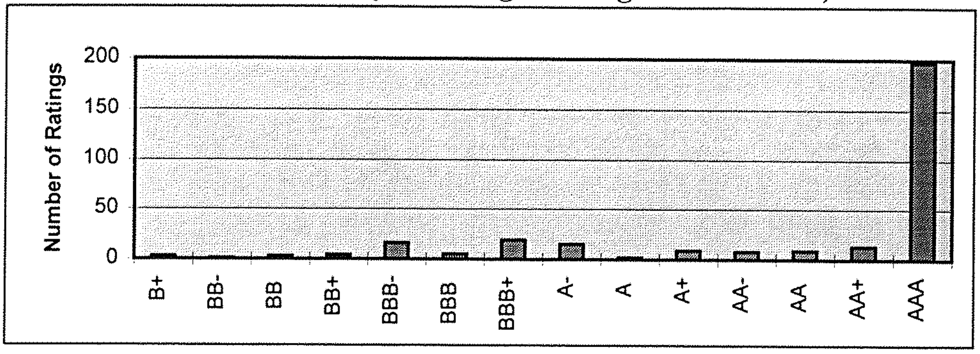
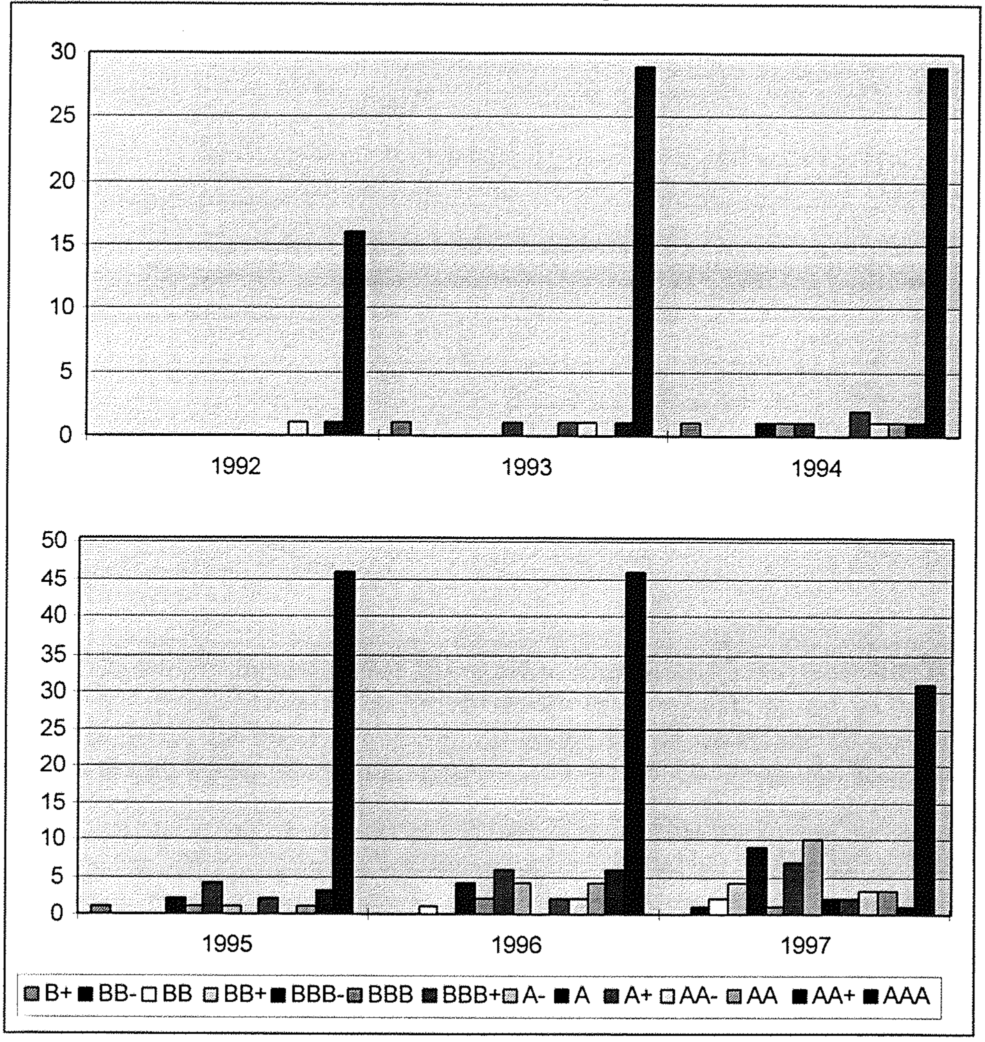


Figure 5-2. Local Currency Sovereign Ratings Distribution, by Year (Number of Ratings)



Some differences are observed in the sub-sample for each of the agencies. Moody's, Standard and Poor's and IBCA present subsets of ratings which cover similar rating categories -from B+/B1 to AAA/Aaa- although Moody's and IBCA rate a slightly smaller number of sovereigns. On the other hand, Duff and Phelps and Thomson BankWatch rate a far more limited number of sovereign issuers resulting in subsets of ratings which are not comparable to that of Standard and Poor's -the reference category in the analysis- neither to Moody's nor to IBCA's rating sub-samples. This implies that the differences found between agencies cannot be generalised for all five agencies included in the sample. The similarity in the number and credit quality of the sovereigns rated by Moody's, Standard and Poor's and IBCA, however, permits the interpretation of the findings in terms of the differences between these agencies. Inferences drawn from Duff and Phelps' and Thomson BankWatch's models are also reported, but it is recognised that their validity is dubious due to the limited number of sovereigns rated by these agencies, which result in incomplete rating spectrums for their sub-samples.

5.5.2 Explanatory Variables

The explanatory variables included in this analysis have been defined as including four different subsets of variables (see 5.3): macroeconomic variables, balance-sheet variables, agency indicator variables, and region indicator variables. All explanatory variables included in the models estimated are lagged by one year, unless stated otherwise.

5.6 Results

The results of the ordered probit and OLS regression analyses are shown in Tables 5-2 to 5-8. The findings of these analyses are summarised below and start with the description of the results obtained from the base model which includes the nine macroeconomic explanatory variables. Improvements to the base model are subsequently made by the inclusion of agency and region indicators, as well as the addition of lagged and balance-sheet variables. Nevertheless, the tests which attempt to shed light on the differences between rating agencies suffer from the limitations in the dependent variable described before (5.5.1).

The results, however, are interpreted throughout this section in terms of the statistical significance of the explanatory variables. The quantitative impact of the variables is given in section 5.8.

5.6.1 Base Model

The first model estimated, the base model, uses nine macroeconomic variables (5.3.1) as factors influencing local currency ratings. The results of the probit estimation are shown in the first column of Table 5-2. Although all coefficients have the expected sign, except for external balance, not all variables have a statistically significant effect on the ratings. Supporting hypothesis 1, it is found that fiscal balance and the rate of inflation have both a significant impact on local currency credit ratings, being the relationship such that higher government deficits and higher rates of inflation result in lower ratings. Furthermore, the effect of the rate of inflation appears to be greater than that of the fiscal balance both in terms of statistical significance and the magnitude of its coefficient. This finding is consistent with Standard and Poor's indication that the rate of inflation is the single most important leading indicator of sovereign local currency credit trends (Beers, 1995). The negative relationship between inflation and ratings is also supported by the analytical framework discussed before (5.2) which argues that given a large stock of nominal domestic debt and a high rate of inflation, and to the extent that the public anticipates future inflation to remain high or to increase, nominal interest rates will rise. Such a rise in interest rates will, in turn, increase the debt burden even further, making inflation appear an attractive route for the policymaker to reduce the real value of the nominal debt. This vicious circle may be more costly to the economy, and to the society generally, than alternative policies such as tax increases or fiscal tightening and may result in greater default risk and, hence, lower ratings.

The coefficient of external debt indicates that there is a negative and significant effect of the foreign debt burden of a country on its local currency rating. This suggests that rating agencies do not share the view that domestic debt may be perceived as having "senior" status relative to external debt. Higher seniority of local currency debt compared to external debt implies that, whatever government resources were available, these would be used to service domestic debt first. Guidotti and Kumar (1991) point out two observations which provide some support to this notion based on the ability of externally indebted countries to issue new domestic debt after the debt crisis of 1982.[(13)] First, domestic public debt, unlike external debt, continued, in general, to be serviced and governments continued to have access to domestic funds. In fact, since 1975, a sizeable majority of sovereigns continued servicing local currency debt without interruption even after defaulting on foreign currency debt (Beers, 1998). Second, domestic debt was issued at interest rates that, at least on an ex post basis, were not higher -and were often not considerably lower- in real terms than the interest on external debt. Additionally, it may be argued that, since domestic obligations are enforceable in courts while external debt obligations are not, this enforcement mechanism provides a greater incentive for the sovereign government to honour its local currency debt (Eaton, Gersovitz and Stiglitz, 1986). Nonetheless, the results suggest that the likely seniority of local currency debt compared with foreign currency debt is not prominent in the rating agencies' assessments of sovereign creditworthiness.

The significance of the level of external debt on local currency sovereign ratings may also be explained by the relationship between external debt and the fiscal situation. One of the reasons for a precarious fiscal situation is a low level of tax revenues, which may, in turn, reflect an external debt problem. That is, in order to secure foreign exchange earnings -i.e., to obtain current account surpluses- with which to service external debt, domestic demand may be restrained leading to lower wages, profits, per capita income, as well as to lower imports, thereby eroding the tax base (Easterly, 1989; and Reisen, 1989b). In this context, a higher level of external debt is more likely to result in a lower level of resources available to service local currency debt and, therefore, greater default risk on such obligations.

Further interesting is the fact that, although in terms of statistical significance, the fiscal balance appears to be a less important factor than the level of external debt in determining local currency ratings, the magnitude of its coefficient

(13) These countries comprise the Group of Fifteen (G-15) countries: Argentina, Bolivia, Brazil, Chile, Colombia, Côte d'Ivoire, Ecuador, Mexico, Morocco, Nigeria, Peru, the Philippines, Uruguay,

shows that the weight attached to the fiscal balance is far larger. Given that the fiscal deficit is also used in this analysis to proxy the total public debt (external plus domestic), these findings imply that, while the level of total debt contributes significantly to explaining local currency ratings, the risk that the sovereign may lack the ability to secure foreign exchange earnings with which to service its external debt is also regarded by the agencies as a significant factor posing greater default risk to local currency debt -for the reasons exposed above. Furthermore, a government faced with a fiscal deficit which reflects a decline in the tax base may opt for partly offsetting this decline by an increase in tax rates. But increasing tax rates may also entail other direct economic and political costs which may generate general discontent (Reisen and van Trotsenburg, 1988). Government fiscal deterioration associated with declining political popularity of the governing party -as in the latter case- or with impending elections -if government resources are used to finance political campaigns- may, in turn, lead to political instability and greater risk of default on local -and foreign- currency debt and, therefore, lower local currency ratings.

Also a negative impact is found for the two indicator variables proxying the reputation of the sovereign, namely foreign and local currency default history. Both coefficients are negative, statistically significant, and large in magnitude indicating the importance of repayment record to the sovereign's perceived creditworthiness. The coefficient of the local currency default history is slightly more significant and considerably larger -about four times as large- than the coefficient for the history of default on foreign currency debt. The negative relationship between the repayment record on external debt and local currency ratings is consistent with sovereign default experience which shows that foreign currency debt default often precedes default on local currency obligations. However, given that default on foreign currency debt might be deemed to be an early signal of potential local currency debt service problems, and since long-term credit ratings are intended to provide an appraisal of future likelihood of default, it could arguably be expected that the difference between the effect on ratings of previous local currency debt default and foreign currency debt default was narrower than that found in this analysis. The sample's small number of

Venezuela and Yugoslavia.

observations for default on local currency debt in the past 25 five years -Argentina (1993-1997) and Brazil (1996-1997)- may be the cause of the extraordinarily large coefficient for the default history on local currency debt.

On the other hand, a positive and significant coefficient is observed on the per capita income variable, which supports the view that a greater potential tax base reflects potentially higher government revenues, and, therefore, a better ability of the government to honour local currency debt.

Three factors, external balance, GDP growth and the development indicator, have coefficients which are statistically insignificant. One possible explanation for the lack of significance of the external balance is that current account imbalances may be incorporated into local currency ratings only to the extent that they reflect external debt-servicing problems that are likely to impair the sovereign's ability and willingness to service domestic debt. The unanticipated positive sign suggests that the relationship between external balance and local currency default may be described as follows. Current account deficits reflect foreign capital inflows into the country. If rates of return are high, and investment is being directed to sectors which earn foreign currency -such as exports- the economy will be able to absorb plentiful supplies of foreign capital to service foreign currency debt. On the other hand, capital inflows may be financing any other purpose, such as consumption, which may not help service external debt. If policymakers believe that capital inflows - current account deficits- will merely fund consumption and prove ultimately to be unsustainable, countries faced with enormous surges in capital inflows may have to offset their expansionary effects by raising taxes or cutting spending further. This may result in political instability and, in turn, increase the probability of default on local currency debt. The statistical insignificance of the coefficient of external balance in the base model suggests, however, that the risk posed by unsustainable current account deficits on local currency debt default may have been directly captured by the external debt variable, diminishing the significance of external balance as an explanatory variable for local currency ratings.

The effect of GDP growth on ratings was also found not significant. Although the coefficient of this variable is positive suggesting that higher levels of GDP growth reflect that more resources will be available to service debt obligations and, therefore higher credit ratings, this effect is not significant when considered together with the rest of the macroeconomic variables. For instance, higher levels of economic growth may lead to higher levels of income per capita, which may be deemed a more direct measure of government revenues given that it reflects the tax base. Furthermore, high rates of inflation which create uncertainty regarding firms' future costs and revenues, and which may discourage investment will reduce the rate of economic growth (Kormendi and Meguire, 1985). On the other hand, government policies to reduce the rate of inflation -such as cutting government expenditure or raising taxes- may themselves reduce the rate of economic growth. Given the endogeneity among these variables, rating agencies may account for the effect of GDP growth on credit ratings in the per capita income or the rate of inflation -or both-, thereby attenuating the impact of economic growth on local currency ratings and explaining its insignificant coefficient in the base model.

The insignificant coefficient of the development indicator suggests that rating agencies base their assessments of local currency sovereign creditworthiness mainly on the stand-alone credit characteristics of each borrower without penalising a country which has been classified as developing by the IMF, or favouring those classified as industrial. Therefore, local currency ratings appear to be unbiased with respect to this classification.

The likelihood ratio statistic tests the joint significance of the macroeconomic explanatory variables, i.e., tests the hypothesis that all coefficients except the intercept are zero. The null hypothesis is clearly rejected according to the χ^2 (d.f.=9) distribution, suggesting that the nine macroeconomic variables considered together have a significant impact on local currency sovereign ratings.(14)

It can be noted from column four in Table 5-2 that there are several differences in the statistical significance of the coefficients estimated using OLS and ordered probit. Moreover, contrast between the two techniques is greater than for foreign currency rating models (Table 4-4) in terms of differences in both the

(14) To test for the joint significance of subsets of explanatory variables, likelihood ratio (LR) tests are used. The LR statistic is given by $-2\ln(L_0/L_1)$ where L_1 is the value of the likelihood function for the model including all the variables with unconstrained coefficients, and L_0 is the value of the likelihood function for the model resulting from constraining the coefficients of the subset of variables of interest to zero. When the significance of the base model is tested, all coefficients

magnitude and the statistical significance of the coefficients, possibly due to the smaller sample size for local currency ratings. The coefficients of external balance and GDP growth, which appeared insignificant using ordered probit, resulted in the expected sign and were highly significant in the OLS regression. On the other hand, while fiscal balance proved significant in the probit results, it was found insignificant in the OLS analysis. At least for this estimation sample, differences between the two techniques cannot be disregarded. A further analysis of the performance of OLS and probit estimations is provided in section 5.7.

Comparing the probit estimates of the base models in Tables 5-2 and 4-4, some differences between the determinants of local and foreign currency sovereign ratings can be highlighted.(15) The main contrast arises from the different coefficients of external balance, GDP growth, and the development indicator. While these coefficients are statistically insignificant for local currency ratings, they are highly significant for foreign currency ratings. Additionally, the indicator of default history on foreign currency was found to have a greater impact on foreign than on local currency ratings. These differences and their likely explanations are discussed below.

The possible reasons for the statistical insignificance of external balance in the determination of local currency ratings have been explained in detail above and are summarised here. The level of foreign exchange earnings of a country -as reflected in the current account balance- affects directly its capacity to service foreign currency debt, and, therefore, its foreign currency rating. By contrast, current account imbalances may affect local currency sovereign ratings to the extent that either a foreign currency debt problem -resulting form an unsustainable current account deficit- or rigorous fiscal adjustments aimed at preventing such a problem might lead to political instability and increase the likelihood of default on local currency sovereign debt. In this context, it can be explained that, relative to external debt and the rest of the variables in the base model, external balance does not significantly contribute to explaining local currency sovereign ratings.

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except the intercept are zero. The LR statistic will follow a chi-square distribution with degrees of freedom (d.f.) equal to the number of constraints imposed. See Aldrich and Nelson, 1984.

(15) Chapter 6 provides a detailed analysis of the determinants of transfer risk, proxied by the difference between local and foreign currency sovereign ratings.

As mentioned before, the stigma attached to developing (non-industrial) countries for foreign currency ratings seems to have been eliminated for local currency ratings. This is observed in the greater magnitude and statistical significance of the coefficient of the development indicator in the model for foreign currency ratings compared to the local currency ratings model. This may be recognition of the agencies that both industrial and developing countries possess the powers to tax their citizenry and to print local currency, which bolster the sovereigns' ability to service local currency debt. Therefore, the agencies may discriminate between countries with the same economic classification by assessing their individual characteristics.

Furthermore, although fiscal balance is found to play a slightly more significant role in explaining foreign currency ratings than local currency ratings, the magnitude of this variable's coefficient in the local currency ratings model almost tripled that for foreign currency ratings. Quantitatively, therefore, fiscal balance seems to have a greater impact on local than on foreign currency ratings (see 5.8). This difference may be due to the fact that government revenues comprise a direct source of local currency debt repayment since the currency of denomination of such revenues and the domestic debt service is the same -the domestic currency-, while for foreign currency debt, the government must still exchange these revenues for the required foreign exchange. Therefore, although higher positive fiscal balances -government surpluses- indicate a lower probability of default and result in higher credit ratings for both domestic and external debt, its effect is, as expected, higher on local than on foreign currency sovereign ratings.

Finally, the default history on foreign currency debt proved more significant for foreign than for local currency ratings. Not surprisingly, the coefficient of this indicator is twice as large for foreign currency ratings as for local currency ratings. This indicates that the sovereign's reputation for untimely repayment of external debt has a greater negative impact on foreign than on local currency ratings.

The results presented in this sub-section provide mixed evidence to support hypothesis 1 which presumed local and foreign currency sovereign ratings to be determined by the same factors, though at varying degrees. Considered jointly, the same macroeconomic variables appear to broadly explain both local and foreign currency sovereign ratings, but important differences are observed in the impact of individual variables on the two types of ratings. While the external debt burden and the rate of inflation appeared similarly significant for both types of ratings, the fiscal balance and the indicator of foreign currency debt default were found more statistically significant for foreign than for local currency ratings. Nonetheless, the quantitative impact of fiscal balance is greater on local currency ratings than on foreign currency ratings. Further, external balance, GDP growth, and the development indicator proved significant only for foreign currency ratings. Therefore, as expected for hypothesis 1, the fiscal balance and the rate of inflation seem to play an important role in the determination of local currency sovereign ratings.

5.6.2 Agency Indicators

Model 1 in Table 5-2 reports further results of the test for the relative differences between agencies regarding local currency ratings. The inclusion of the agency indicator variables significantly improved the explanatory power of the base probit model, as shown by the likelihood ratio statistic ($LR=23.92$; $d.f.=4$; $p<0.01$). The results support hypothesis 2 in that agencies significantly differ in their assessments of local currency sovereign creditworthiness. The negative and significant coefficients on Moody's, Thomson BankWatch,[16] and, to a lesser extent, IBCA, suggest that these agencies assign consistently lower local currency ratings than Standard and Poor's -the reference agency. In contrast, although the effect is not statistically significant, it appears that Duff and Phelps rates sovereigns more favourably than Standard and Poor's.

These findings contrast partly with the results of the previous chapter. Although the sign of the coefficients on the indicators of each of the four agencies included in the local currency ratings analysis is the same as for the corresponding indicators in the analysis of foreign currency ratings, important differences in the magnitude and significance of such coefficients are found. Table 4-4 presented the results for Model 1 using the sample for foreign currency ratings. The estimates

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[16] It is worth noting that the extraordinarily larger coefficient on Thomson BankWatch is due to the fact that there is only one observation for this agency in this analysis' sample.

suggest that Moody's, Standard and Poor's, and IBCA seem to broadly agree on foreign currency sovereign ratings: the coefficients on these agency indicators were negative, indicating that Moody's and IBCA assign lower foreign currency ratings than Standard and Poor's, but the magnitude of these coefficients was small and their effect not statistically significant. The analysis on local currency ratings is consistent with these results in that Moody's and IBCA's indicators also have a negative impact on local currency ratings. However, the coefficients of these variables are considerably larger and highly significant compared with those on the foreign currency ratings analysis. On the other hand, compared to Standard and Poor's, Thomson BankWatch assigns systematically and significantly lower ratings, for both local and foreign currency denominated debt. Finally, relative to Standard and Poor's, Duff and Phelps assigns higher local currency sovereign ratings, confirming the results found for foreign currency ratings. Nonetheless, the latter effect was found to be moderately significant, whereas the former proved not significant. Interestingly, the magnitude of the agency indicator coefficients were, in general, far larger for the local than for the foreign currency ratings model indicating greater disagreement between Standard and Poor's and the rest of the agencies for local currency ratings. The only exception was Duff and Phelps whose difference in ratings with Standard and Poor's was smaller for local than for foreign currency ratings.

OLS results, shown in the fifth column of Table 5-2, also lead to the conclusion that Standard and Poor's and Duff and Phelps appear to assign higher local currency ratings than the rest of the agencies included in the analysis. On the whole, however, it is observed that a greater number of macroeconomic variables were significant using OLS rather than probit estimation. Consistent with the results for the base model, while the fiscal balance was found significant in the ordered probit analysis, it is found insignificant in OLS. On the other hand, OLS estimated coefficients of external balance and GDP growth were significant, whereas probit estimates were insignificant. Additionally, the sovereign's history of default on foreign currency debt, which proved insignificant in the probit estimation of Model 1, was found significant and inversely related to local currency ratings in the OLS model. Significant differences are, thus, found between the two estimation techniques. Ordered probit is, nevertheless, considered to be more compatible than OLS with the structure of credit ratings and the conclusions drawn from this model are deemed more robust.

Examining the OLS and the ordered probit estimates presented in this and the previous chapter, it is found that, for a given model, the difference in the magnitude of the coefficients -in percentage changes- between both statistical techniques is, in general, greater for the local currency ratings models than for the foreign currency ratings models. In particular, this difference is greater for the estimates of external debt, inflation, GDP growth, and the development indicator comparing local and foreign currency ratings models. These differences may reflect the smaller sample size of local currency ratings, but, nevertheless, give evidence that applying a simple linear model which assumes a continuous dependent variable to a dependent variable of a discrete, ordinal nature such as credit ratings may result in misleading inferences.

To further examine the differences in the information content of local currency sovereign ratings across agencies Models 3 to 5 were estimated. The results are presented in Table 5-3 and show the estimates for the individual models of Moody's, Standard and Poor's and IBCA which include, in addition to the nine macroeconomic variables of the base model, the indicators for the geographic region.(17) These models, however, were estimated using only OLS since none of the agencies assigns ratings which cover the full range of 16 categories of the rating spectrum. That is, the missing categories were scattered throughout the rating scale, implying that, in order to be able to estimate the models using ordered probit, the missing categories should have been grouped into the most immediate rating category for which there were observations. This would have resulted in the following distortions on the dependent variable: (1) a different rating scale for each of the agencies comprising a different number of rating categories; and, (2) a grouping of rating categories, such as BB-, BB and BB+ into BBB-, or A and A+ into AA-, which would have diminished the meaningfulness of the estimates. Given that the objective of estimating these models is to test for differences across agencies regarding the information contained in their ratings, it follows that having a similar rating scale in terms of the number of rating categories is essential for drawing any conclusion on this matter. For these reasons, Models 3, 4 and 5 were estimated using only ordinary least squares regression. It is recognised, however, that OLS has theoretical and empirical shortcomings -as compared to ordered probit- to model an ordinal, discrete dependent variable such as credit ratings. Nevertheless, the purpose of estimating individual models for the agencies employing this technique is to provide tentative results which support the notion that there are significant differences across agencies and which justify future research using a more appropriate technique when a larger sample of local currency ratings so permits.

The differences in the significance of the macroeconomic variables across agencies is discussed here, while the inferences regarding the regional effect on the ratings of each agency are presented in the next sub-section.

Although tentatively, the estimates in Table 5-3 suggest that there appear to be significant differences in the determinants of local currency ratings among Moody's, Standard and Poor's and IBCA. While Moody's ratings are found to be significantly affected by the fiscal balance and the default history on local currency debt, all variables except for the fiscal balance proved statistically significant for Standard and Poor's. IBCA's estimates, on the other hand, are more similar to Standard and Poor's. But for the growth of GDP and the indicator of default history on foreign currency debt, which have a significant impact on Standard and Poor's ratings while an insignificant impact on IBCA's, both agencies seem to broadly share the same criteria for assigning local currency sovereign ratings. This contrasts partly with the results of the previous chapter (see Table 4-6), which showed that among the different agencies analysed, Moody's and Standard and Poor's presented the highest level of agreement regarding the determinants of foreign currency sovereign ratings in terms of both the magnitude and the statistical significance of the estimated coefficients. Nonetheless, a sovereign's default in the recent past appears to be more equally weighed by Moody's and Standard and Poor's compared to IBCA, for both local and foreign currency ratings, as reflected in the more similar magnitude and

(17) Individual models for Thomson BankWatch and Duff and Phelps could not be estimated since in both cases the number of observations in the sub-samples (1 and 7 observations, respectively) was

statistical significance between the former two agencies in the coefficients of the indicators of default on foreign and local currency debt.

It can be noted from the estimates in Table 5-3 that the coefficients of the three indicator variables -development indicator and the history of default on both local and foreign currency debt- are very large reflecting the great impact of these qualitative characteristics on the sovereign's rating. Contrary to expectations, the development indicator presents a negative coefficient in both Standard and Poor's and IBCA's models. This suggests that, according to the economic characteristics included in the model, industrial countries would have far higher local currency ratings than non-industrial countries compared to the ratings observed in practice. The narrower difference observed in practice may be explained by the fact that also non-industrial sovereigns have the ability to print their local currency.(18)

In sum, as expected for hypothesis 2, the rating agencies assign local currency sovereign ratings which are systematically and significantly different. On the whole, Standard and Poor's appeared more optimistic about the sovereign's local currency creditworthiness than the other agencies. While these results confirm the findings of the previous chapter in that disagreement between agencies regarding sovereign creditworthiness is notable, they suggest, additionally, that the disagreement is not consistent across types of ratings. That is, while Moody's and Standard and Poor's seem to agree most on the criteria for foreign currency ratings, this is the case for IBCA and Standard and Poor's on local currency ratings.

5.6.3 Regional Indicators

The third column in Table 5-2 presents probit estimation results for Model 2, where the effect of the geographic region of the sovereign on local currency ratings is directly tested. It is found that the model added significantly to the explanatory value of the base model, as reflected by the likelihood ratio statistic (LR=27.82; d.f.=4; $p<0.01$). Moreover, it is important to note that the likelihood ratios of Model 1 and Model 2 are similar indicating that both models improve the explanatory power of the base model in like manner.

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smaller than the number of parameters to be estimated.

Negative and significant coefficients are observed on the indicators of all geographic regions, except for Latin America, where the coefficient is also negative, but statistically insignificant. This suggests that, after having considered the individual economic characteristics of the sovereign, rating agencies assign systematically lower ratings to sovereigns in regions other than the geographic region in which they are headquartered.[19] These results are consistent with those of Models 3, 4 and 5 (Table 5-3) which show that Moody's, Standard and Poor's and IBCA assign lower ratings to sovereigns outside their own geographic region, although at varying degrees. For instance, sovereigns in Africa and the Middle East receive, from the three agencies, ratings which are significantly and systematically lower than the ratings of sovereigns in West Europe or North America. This is the same case for sovereigns in Asia, Pacific Central and Eastern Europe, but only when they are rated by Standard and Poor's or IBCA. Latin American sovereigns receive significantly lower ratings than West European or North American sovereigns from Moody's, and, to a lesser extent, from IBCA. The difference in the magnitude of the coefficients of the regional indicators for the different agencies suggest that the impact of the geographic region on local currency ratings varies greatly across agencies, being IBCA the agency which seems to place a greater weight on the geographic region to determine a sovereign's local currency credit rating.[20]

On the whole, these results confirm those obtained in the previous chapter, but with one noteworthy exception. In general, the geographic region of the sovereign has a significantly negative effect on both the local and the foreign currency ratings of the sovereign relative to West Europe/North America, except for Latin American sovereign borrowers. While the effect of the geographic region on the foreign currency ratings of these sovereigns is also negative and significant, they are the only group of sovereigns whose local currency ratings seem not to be affected by this factor, at least in statistical terms. This finding, however, is surprising given the fact that one third of the sovereign defaults on local currency debt since 1975 has

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[18] In this sample, the modal local currency rating for industrial countries (AAA/Aaa) was 7 notches higher than for non-industrial countries (BBB+/Baa1).

[19] The agencies included in this study are headquartered in the United States and London. Therefore, West Europe/North America has been chosen as the reference region.

occurred in that region of the world (Beers, 1998). Nonetheless, the significant and largely negative coefficient on the indicator of default on local currency debt suggests that the effect of this indicator may have accounted for the default risk of Latin American sovereigns, thereby curtailing the impact of the geographic region for these sovereigns.

Further, the results support the findings of the last chapter which showed that, rating agencies assign higher ratings to sovereigns located in their own geographic region. As discussed before, although this could seem to support previous research which concluded that rating agencies appear to be more lenient when rating issuers from their own country (Beattie and Searle, 1992b), the higher ratings could instead be the result of a greater understanding of the agencies about such sovereigns.

Comparing the estimates of the probit model with those obtained using OLS - shown in the last column of Table 5-2-, it is observed that the inferences regarding the effect of the geographic region on local currency ratings remained unchanged. Nonetheless, the number of significant variables proved greater once more, being the most noticeable finding that of the negative and significant coefficient for the development indicator suggesting that, as discussed in the last section, the differences between the local currency ratings of industrial and non-industrial countries cannot fully be explained by the economic performance of the sovereign. Further, large differences in the magnitude of the coefficients of the region indicators are found between OLS and ordered probit. While these findings are consistent with those in section 5.6.1 in that this difference -in terms of percentage change- is wider for local than for foreign currency ratings for the macroeconomic variables, the difference between the two techniques is greater for foreign currency ratings for the coefficients of the regional indicators. Due to the higher compatibility of ordered probit with the discrete, ordinal nature of credit ratings, the conclusions drawn from this model are considered more valid.

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(20) It should be remembered, however, that Models 3, 4 and 5 were estimated using only OLS, and, recognising the shortcomings of this technique, these results should be taken with the appropriate caution.

Table 5-4 presents results for Models 6 to 9 which test for the differences between agencies within each geographic region.(21) The models were estimated using only OLS due to the lack of sub-samples having the full range of rating categories on the rating scale.(22) The findings suggest that IBCA assigns local currency ratings which are not significantly different from Standard and Poor's ratings, although the information contained in them may vary. The latter is implied by Models 4 and 5 which show that both agencies differ in their rating criteria and the weightings attached to them. This is consistent with the analysis presented in the previous chapter which attained similar findings for foreign currency sovereign ratings. Also consistent is the finding that, relative to Standard and Poor's, Moody's assigns lower ratings to sovereigns in West Europe and North America; that Duff and Phelps rates sovereigns in Eastern Europe and Latin America not significantly different; and that Thomson BankWatch's ratings in Asia and Pacific Central are significantly lower.(23) However, the results differ for the Latin American sovereigns. While they obtain systematically higher foreign currency ratings from Duff and Phelps compared with Standard and Poor's -although not statistically significant-, they are assigned systematically lower local currency ratings by Moody's. Examining the sign of the coefficients of the agency indicators for local and for foreign currency ratings (Tables 5-4 and 4-8, respectively) it is found that, while the sign of Duff and Phelps' coefficients remained unchanged, the sign of the coefficients of Moody's and IBCA vary for each type of rating. This suggests that, relative to Standard and Poor's, Moody's and IBCA assign ratings which are different -higher or lower- depending on the currency of denomination of the debt evaluated and the geographic region of the sovereign assessed.

Summarising, the findings suggest that there is evidence supporting hypothesis 3 in that the geographic region of the sovereign has been found to have a significant impact on local currency ratings. This effect has two features. First, consistent with the results found for foreign currency ratings, rating agencies appear

(21) An individual model for Africa and the Middle East (Region 1) could not be estimated due to the smaller number of observations for the region relative to the number of parameters to be estimated.

(22) This is similar to the difficulties found earlier to estimate the models for each agency separately using ordered probit. The reasons for using OLS only are given in 5.6.2.

to rate more favourably the local currency obligations of sovereigns located in the region of the world where they are headquartered, probably reflecting the agencies' greater understanding of such sovereigns. Second, for a given geographic region, the credit ratings assigned to a sovereign borrower may vary across rating agencies and the difference will depend upon the currency of denomination of the debt assessed.

5.6.4 Average and Lagged Variables

According to hypothesis 4, it was expected that the lagged values of macroeconomic variables had a significant effect on local currency ratings over and above the effect of the average historical values of these variables. Table 5-5 presents the estimation results for the model including average variables and variables lagged by one and two years (Model 10).(24) Judging from the probit estimates given in the first column of the table, there appears to be a lack of influence of the individual lagged variables on local currency ratings, as reflected in the insignificant coefficients for all of them. From the original variables -i.e., those included in the base model-(25) only three remained significant: the income per capita, and the default history on both foreign and local currency debt. Furthermore, the coefficients of these three variables have the anticipated sign. That is, higher levels of income result in higher ratings, while sovereigns who have defaulted on either local or foreign currency debt -or both- receive lower ratings.

Despite the fact that the insignificant coefficients of the additional lagged variables lead to conclude that each of these variables taken alone is not significantly related to local currency ratings, this does not directly support the assertion that the lagged variables together do not have a significant impact on the ratings. To test for the joint effect of the subset of lagged variables on local currency ratings, the

(23) Nevertheless, the extraordinarily large coefficient of Thomson BankWatch may be due to the fact that there is only one observation for this agency in the sample.

(24) Kazakhstan was excluded from the sample due to the lack of observations for the lagged variables. Additionally, an alternative model including lagged variables up to three years was estimated. The model, however, fared worse than the model presented here and did not add significant explanatory value to the subset of variables included in the base model.

(25) It should be noted that the values of the income per capita and external debt variables included in the base model are the values lagged by one year, not the average historical values. The other four macroeconomic indicators -fiscal balance, external balance, inflation and GDP growth- are average historical values. The three dummy variables -development indicator, foreign and local debt default history- did not take lagged values.

likelihood ratio statistic was calculated. The null hypothesis -that all the coefficients of the additional lagged variables are zero- cannot be rejected (LR= 6.96; d.f.=12; p<0.90). This indicates that, relative to average historical values, neither jointly nor individually do lagged variables help to explain the determinants of rating agencies' assessments of local currency sovereign creditworthiness.

These results contrast with those obtained for foreign currency ratings (see 4.7.4), which showed that the inclusion of the subset of lagged variables added explanatory value to the base model although, considered individually, only the value of GDP growth lagged by one year was found significant. That is, the joint effect of the lagged variables was highly significant on foreign currency ratings.

Although differences in the statistical significance of the coefficients estimated using OLS and ordered probit are found, inferences from OLS results are consistent with the finding that lagged variables do not add significantly to the explanatory value of the variables included in the base model -adjusted R-squared is slightly lower (0.83) than for the base model (0.84). While a greater number of variables was found statistically significant with the OLS technique, only the income per capita lagged by two years appeared to have a significant effect on local currency ratings, among the lagged variables. Furthermore, consistent with the findings in the previous sub-sections, the difference in the magnitude of the estimated coefficients between OLS and ordered probit appeared greater for the local currency rating models than for the models estimated for foreign currency ratings (Tables 5-5 and 4-9, respectively). Therefore, due to the greater appropriateness of the probit model to the nature of the dependent variable -credit ratings- inferences from the probit estimates are deemed superior.

To explore the differences across agencies regarding the importance given to lagged values of macroeconomic variables in their rating processes Models 11, 12 and 13 were estimated using OLS.[26] The models include the average and lagged variables used in Model 10, but they are estimated separately for Moody's, Standard

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[26] As discussed in 5.6.2, the lack of observations for some of the rating categories makes unsuitable the estimation of the models using ordered probit.

and Poor's and IBCA.[27] The results are shown in Table 5-6 and, compared with Models 3, 4 and 5 which included only the average variables, suggest that lagged variables add no significant explanatory power to the average-valued variables. This is reflected in the minor improvement in the R-squared value for Moody's and IBCA's models and the decline in this value for Standard and Poor's model. Further, judging by the number of statistically significant lagged variables in each agency-specific model, it appears that, compared to Moody's and Standard and Poor's, IBCA seems to give greater importance to lagged values of macroeconomic variables -in addition to their average historical values- in its local currency rating process. The estimates show, in addition, that there are differences in the determinants of local currency sovereign ratings across agencies, confirming the findings of the previous sub-sections. For example, examining the estimates for the lagged variables, while the lagged values of external debt and external balance appear to significantly affect IBCA's local currency ratings, Moody's ratings are affected by the lagged values of the fiscal balance and the external debt. On the other hand, no lagged variable appears to have a significant impact on Standard and Poor's ratings; only the reputation of the sovereign for past default -for both local and foreign currency obligations- proved significant. It is worth noting the great weight that Moody's attaches to the income per capita for both the average and lagged values, as reflected in the extraordinarily large coefficients of these variables compared with the other two agencies. Nevertheless the effect of this variable on Moody's ratings is significant only for the value lagged by one year. Comparing the results of the agency-specific models for local and foreign currency ratings (Tables 5-6 and 4-11, respectively) it is found that, while Moody's and IBCA seem to place a greater weight on lagged variables for local currency ratings than for foreign currency ratings, the opposite is suggested for Standard and Poor's.

In brief, no evidence was found to support hypothesis 4, which expected lagged variables to help explain local currency credit ratings over and above the explanatory power of average-valued variables. The findings suggest that, relative to the average historical values of macroeconomic variables, neither individually nor

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[27] Small sub-sample sizes for Thomson BankWatch and Duff and Phelps impeded the estimation of individual models for these agencies. In both cases the number of observations (1 and 6,

jointly, do lagged variables seem to explain the local currency ratings assigned by the agencies. The impact of lagged variables is found to be greater on foreign currency ratings than on local currency ratings both analysing the agencies together and analysing them separately. Individually considered, however, rating agencies appear to include different lagged variables in their local currency rating process, although they seem to base their ratings -both local and foreign currency ratings- mainly on average historical values of macroeconomic variables and the history of default of the sovereign.

5.6.5 Macroeconomic and Balance-Sheet Variables

A final test was carried out to determine the relative importance of macroeconomic and balance-sheet variables to the local currency ratings assigned to sovereign borrowers. The estimation results are shown in Model 14 in Table 5-7. The sample used is smaller than in the models estimated previously in this analysis because BIS reporting countries (see Table 5-1), as well as Switzerland are excluded.(28)

Probit estimates are shown in the first column of Table 5-7. Consistent with the results of the base model, negative and significant coefficients are observed on external debt, the rate of inflation and the default history on foreign debt. The coefficients on per capita income and GDP growth are significant and positive. Interestingly, although of the anticipated sign, the coefficients of fiscal balance and the history of default on local currency debt were found insignificant.

Further, two balance-sheet variables, the ratio of long-term debt to total bank debt and the ratio of total bank borrowing to deposits, appeared significant. The unexpected positive coefficients suggest that rating agencies may perceive higher levels of bank debt as a sign of financial strength of the sovereign. This implies that by extending loans to sovereign governments, international banks convey a positive signal to the market regarding the creditworthiness of sovereign borrowers, which seems to be incorporated into credit ratings.

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respectively) was smaller than the number of parameters to be estimated.

(28) The balance-sheet data used in this test are obtained from the Bank for International Settlements who, at the time of this study, did not make publicly available such data for the BIS reporting countries. Norway is included in the sample for the period 1992-1993, before becoming a BIS reporting country.

Broadly, these results confirm those for foreign currency ratings (see 4.7.5). The same macroeconomic variables proved significant and their coefficients present the same signs. The major difference, however, is found for the subset of balance-sheet variables. While long-term debt to total debt appears significant for both local and foreign currency ratings, the ratio of short-term debt to total debt and the use of IMF credit have significant coefficients only for foreign currency ratings. Furthermore, while the joint impact of the subset of balance-sheet variables on foreign currency ratings is highly significant, the impact on local currency ratings is only moderately significant as reflected in the likelihood ratio statistic (LR=14.85; d.f.=8; p<0.10).

The findings are also partly consistent with previous research which examined the relative importance of macroeconomic and balance-sheet variables to predict developing country debt rescheduling (Lloyd-Ellis, McKenzie and Thomas, 1989 and 1990).[29] These studies concluded that balance-sheet variables are superior than traditional "ratio" variables to explain debt rescheduling. In their preferred model for annual results only one traditional variable, the growth of export volumes, resulted significant, as opposed to four balance-sheet variables including the ratio of total bank borrowing to total bank deposits and the ratio of long term debt to total bank debt, which were also found significant in this analysis of local currency ratings. This analysis has also found that the set of balance-sheet variables adds explanatory power to the set of macroeconomic variables. However, the statistically significant macroeconomic variables outnumbered the significant balance-sheet variables in Model 14. The findings of this analysis and those of Lloyd-Ellis, McKenzie and Thomas' studies differ in that, while they found that a higher proportion of long-term debt to total bank debt and a higher ratio of total bank borrowing to total bank deposits would increase the probability of default -i.e., debt rescheduling-, the estimates of Model 14 suggest that higher values of these two balance-sheet variables would result in higher local currency sovereign ratings -i.e., lower risk of default.

Comparing probit and OLS estimates (second column in Table 5-7), no major differences in the statistical significance of the coefficients estimated using either

[29] These studies, however, focused on rescheduling of external debt.

technique are found. The most important contrast is the coefficient for the value of short-term debt relative to total bank debt found significant in the OLS regression analysis and insignificant in the probit model. This is surprising since all the models estimated thus far in this chapter have shown great differences in the estimated coefficients between the two techniques.

In an attempt to ascertain the differences across agencies regarding the relative importance of macroeconomic and balance-sheet variables in their assessment of local currency sovereign creditworthiness, Model 14 was estimated separately for Standard and Poor's and IBCA.[30] The results of the ordinary least squares regression for each agency are presented in Table 5-8 under the headings Model 15 and Model 16.[31] It is worth noting the similarity between the model including all agencies (Model 14) and the model estimated individually for Standard and Poor's (Model 15) in terms of the statistical significance and magnitude of the estimated coefficients. This may be the result of the large proportion of Standard and Poor's ratings in the sample -about 60 percent. Nevertheless, the greater difference is found for the subset of balance-sheet variables, of which the ratios of long- and short-term bank debt to total bank debt were found significant for Standard and Poor's, whereas the proportion of long-term bank debt and the ratio of bank borrowing to total bank deposits were found significant for the model including all agencies. The lack of significant variables in IBCA's model may be attributable to the small sub-sample size for this agency. No further differences between agencies, therefore, can be identified. Nonetheless, the results suggest that, considered individually, rating agencies may differ in the relative importance they give to macroeconomic and balance-sheet variables in determining local currency sovereign ratings.

In sum, the findings suggest that both macroeconomic and balance-sheet variables contribute to explaining local currency sovereign ratings, although the explanatory power of the latter subset of variables is lower for local than for foreign currency ratings. Moreover, the statistically significant balance-sheet variables

(30) Individual models for Moody's, Thomson BankWatch and Duff and Phelps were not feasible due the small sub-sample sizes (18, 1 and 7 observations, respectively).

(31) As in previous agency-specific models, due to the lack of observations for some rating categories, ordered probit could not be employed to estimate these models. See 5.6.2.

proved different between foreign and local currency rating models. The results suggest that rating agencies place a significant weight on bankers' lending decisions when assessing sovereign ability and willingness to service local currency debt and that, individually considered, agencies may weigh differently balance-sheet variables in their local currency rating process.

5.7 Accuracy of Estimation Models

Five of the estimated models were selected to determine the accuracy of ordered probit as compared with OLS estimations, namely the base model including average macroeconomic variables, Model 1 including the agency indicators, Model 2 including the geographic region indicators, Model 10 including both average and lagged macroeconomic variables, and Model 14 including macroeconomic and balance-sheet variables.(32) As in the previous chapter, the accuracy of the models was measured in two forms: (1) the ability of the model to correctly classify the sovereign ratings within the sample on which the model was estimated, and, (2) the percentage of sovereign ratings that is predicted correctly in a holdout sample, which is different from that used to estimate the model. In this case, the holdout sample of ratings for 1997 was predicted using the models estimated on the sub-sample for the period 1992-1996. The accuracy tests measure the ratings correctly classified as a proportion of total ratings in the sample tested.(33) The rating intervals obtained from the probit analysis for each of the selected models which test accuracy within the sample are given in Table 5-9. These intervals are used to determine the fitted rating for each observation, which is then compared to the actual rating to obtain the number of correct classifications of the model. A similar procedure is used for the accuracy test in the holdout sample using the corresponding intervals. Both measures of accuracy are shown in Table 5-10. Given that this study presents the

(32) Since the objective of the accuracy tests is to check the ability of the models to classify or predict local currency credit ratings in general, the models which analyse the sample including all agencies together were selected to conduct such tests.

(33) See note at the bottom of Table 5-10 for a description of the criteria used to determine the correctly classified ratings.

first systematic analysis on local currency sovereign ratings, no comparison with earlier research is possible.

Examining the results for ordered probit models it is found that, except for Model 14, which includes balance-sheet variables and uses a different sample (see 5.6.5), about three-quarters of the ratings are correctly classified within the estimation sample at the rating-notch level, and the accuracy rates invariably exceed 80 percent for broad letter ratings.[34] Of the five models, Model 2, including the indicators for the geographic region, performs best. This contrasts with the findings for foreign currency ratings for which the model including the agency indicators produced the highest accuracy rates.

Misclassifications that exceeded three rating notches seldom occurred. For example, the models classify Korea, on average, 7 notches higher than its actual rating on December 31, 1997, both within the sample and in the holdout sample.[35] This can be explained by the fact that Korea's actual rating is the result of a series of dramatic rating downgrades experienced by the country after the onset of the Asian crisis in 1997 reflecting a collapse in confidence in the Korean authorities, uncertainty surrounding presidential elections in December 1997, and concern about policy responses to the impending financial crisis. Such qualitative considerations, not captured by the models, may have led to the failure to correctly classify Korea's rating. Nevertheless, if the models had failed to identify Korea as an outlier, it could have been suspected that the models were misspecified and/or overfitted.

The prediction of the holdout sample of sovereign ratings for 1997 using the models estimated on the sub-sample for the 1992-1996 period yields lower accuracy rates: the ability of the models to classify correctly the ratings is inferior for the holdout sample than within the sample. Excluding Model 14 once more, about 60 percent of the ratings are classified correctly at the notch-level rating, and approximately 80 percent at the broad letter rating. Over 70 percent of the ratings are correctly classified within one notch of the correct rating. Once again, Model 2,

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[34] As discussed in the previous chapter (footnote 29), the test for accuracy at the rating notch level is preferred to the broad-letter level test on the basis of its higher exactness and the impracticality of broad-letter ratings. Nevertheless, the latter has been included here for consistency and comparison with the previous chapter.

including the regional indicators, performs substantially better than the other models when classifying the ratings on a 16-category scale. Model 14, on the other hand, which includes balance-sheet variables, performs considerably worse than the other four models.

Table 5-10 also presents the accuracy results for OLS regression models. On the whole, the theoretically higher robustness of ordered probit is confirmed. Although both techniques perform similarly at classifying ratings with an error of one rating notch, the percentage of ratings correctly classified at both the rating-notch and the broad-letter levels is higher using ordered probit analysis. Furthermore, correct rating classifications within the estimation sample are about twice as high for probit as for OLS:[36] 75 and over 80 percent for notch-level and broad letter level, respectively, using ordered probit as compared to about 33 and 45 percent for OLS. The prediction power of OLS regression proved better than its explanatory power as reflected in the higher number of correctly classified ratings for the holdout sample than for the estimation sample, but, as pointed out above, the accuracy of the technique was lower than for ordered probit. For the holdout sample OLS models classify correctly about 40 percent of the ratings at the notch-level and approximately 55 percent of the broad letter ratings.

One observation is noteworthy about the accuracy results for the OLS models. For the tests carried out within the sample, it is found that the proportion of ratings correctly classified within one notch of the correct rating is considerably larger than the broad letter ratings correctly classified -about 80 percent as opposed to 45 percent, respectively. This reflects this sample's ratings distribution shown earlier in Figure 5-1. It can be noted that most of the ratings are concentrated on "triple-A" ratings or on the "edge" rating categories, that is in the rating categories with the modifiers +/- or 1/3, for instance, BBB-/Baa3 or BBB+/Baa1 as opposed to BBB/Baa2. Given this ratings distribution and the fact that an error of one rating notch of the model results in a rating being classified as correct within one notch

[35] The models classified the country 4 rating notches higher than Moody's rating and 9 notches higher than Standard and Poor's and IBCA's ratings. The arithmetical average of these notches is the average referred to.

[36] The accuracy rates reported here for OLS models also exclude the model including balance-sheet variables (Model 14) for which both techniques performed considerably worse compared with the rest of the models.

even if the broad categories of the actual and fitted ratings are different, it is not surprising to observe lower accuracy of the models to classify the ratings within the broad letter category. Although this is normally the case for the results shown in Table 5-10, ordered probit fared far better than OLS at classifying the ratings at the broad-letter level, thereby showing its greater robustness.

Comparing the accuracy results between local and foreign currency rating models some similarities and some differences are observed. On the whole, both ordered probit and OLS models proved superior predicting local currency ratings to predicting foreign currency ratings. For both types of ratings, however, the robustness of ordered probit as compared to OLS is confirmed by the former's considerably higher percentage of correctly classified ratings at the rating-notch level, the most rigorous of the accuracy tests employed. Further, for foreign as well as for local currency ratings, differences between the two estimation techniques at classifying the ratings correctly within one notch of the actual rating are small both within the sample and in the holdout sample. Nonetheless, the most remarkable contrast between the two techniques is evidenced by the accuracy test within the sample of local currency sovereign ratings. As pointed out above, the concentration of local currency ratings in the "edge" categories for this analysis' sample resulted in a substantially lower rate of correct rating classifications at the broad-letter level than classifications within an error of one rating notch for OLS. On the other hand, the corresponding accuracy rates for ordered probit remained virtually unchanged -over 80 percent in both cases for most models. This substantiates the theoretical superiority of ordered probit over linear regression in modelling credit ratings.

5.8 Quantitative Analysis

As in the previous chapter, in order to differentiate between the statistical and the quantitative significance of the variables which help to explain local currency sovereign ratings, this section describes the quantitative impact of the preferred model on local currency ratings. The preferred model selected is the model which succeeded in classifying correctly the highest proportion of local currency ratings at the rating notch level. Given the results of the previous section, the preferred model is Model 2 which includes the geographic region indicators and which performed best of the models evaluated.

The quantitative impact of the macroeconomic variables on credit ratings was measured in terms of the changes in the median rating produced by changes in each of these variables. The procedure used in Chapter 4 (4.9) was also used here. That is, the probabilities of the predicted rating being classified in each of the fourteen rating categories were calculated according to eq. (3) (see 4.5).(37) The median rating is defined as the rating at which the cumulative probability added to 0.5. For continuous variables -i.e., external debt, fiscal and external balance, inflation, income, and GDP growth- these probabilities were evaluated at their mean values. The median rating obtained using these probabilities was then compared to the median rating which results from adding up to 0.5 the probabilities obtained by varying the value of the variable of interest, and holding the rest of the variables at their sample means. These variations in value were made in intervals of 10 percentage changes from a decrease in 50 percent to an increase of 50 percent in the variable. The quantitative impact was determined by the change, in terms of rating notches, in the median rating resulting from the change in the variable of interest. For dummy variables -i.e., the development indicator, the indicators of default history on foreign and local currency debt, and the region indicators-, the quantitative impact was determined by comparing the probabilities that result when the variables take each of their two different values -0 and 1- while the other variables are held at their sample means. Similarly, the quantitative impact was measured by examining the change in the median rating associated with the change in value of the dummy variable.

On the whole, the quantitative impact of the continuous variables is minor. Except for the income per capita, none of these variables produces a change in the median rating when its value is altered. Being the median rating AAA/Aaa, the highest rating, this would be expected for improvements in the variables since upgrades are not possible. Nonetheless, not even changes reflecting deterioration in

(37) It must be noted that categories 1 (BB-/Ba3) and 2 (BB/Ba2) are not included in this analysis since the lowest local currency assigned to the sovereigns in the sample is BB+/Ba1 (category 3).

the macroeconomic fundamentals of the sovereign affected quantitatively the median rating. The only continuous variable which proved quantitatively significant was the income per capita for which decreases of 10 and 20 percent downgrade the median rating by one and three rating notches, respectively. That is, the median rating declines from AAA/Aaa to AA+/Aa1 and AA-/Aa3 for each of those changes. Further, although declines in the level of income per capita produce a decline in the median rating, it remains investment grade even for large decreases in the level of income. For instance, a decline in the income per capita as large as 50 percent downgrades the median rating to BBB-/Baa3, the lowest investment-grade rating category.

Slightly different results are found for the three macroeconomic dummy variables. Countries classified as industrial by the IMF do not seem to be rated significantly different -higher- than developing countries as reflected in the lack of quantitative impact of this variable on local currency ratings. The median rating, AAA/Aaa, is not affected by changes in the value of the development indicator. On the other hand, a history of default on either foreign or local currency debt -or both- downgrades the median rating by one and six rating notches, respectively. Previous default on foreign currency debt causes the median rating to decline one rating notch from AAA/Aaa to AA+/Aa1, while a reputation for past default on local currency debt downgrades six rating notches the median rating to A-/A3. Moreover, while having defaulted previously on foreign currency debt reduces the probability of being rated AA-/Aa3 or higher from 0.96 to 0.89, previous default on local currency debt reduces such probability to only 0.18. For the latter case, the probability of being rated A-/A3 or higher decreases from 0.99 to 0.60.

Examining the effect of the geographic region on the median rating, it is found that, relative to sovereigns in West Europe and North America, sovereigns in other regions of the world receive quantitatively lower ratings, which are reflected in a decline in the median local currency rating. For instance, the lower ratings for sovereigns in Africa, the Middle East, and Eastern Europe will downgrade the median rating three rating notches from AAA/Aaa to AA-/Aa3, while the effect for sovereigns in Asia, the Pacific Central, and Latin America is smaller producing a decline in the median rating of only one rating notch -i.e., the median is downgraded to AA+/Aa1. Furthermore, the probability of obtaining a specific rating is affected by the geographic region of the sovereign. For example, while the probability of obtaining an investment grade local currency rating is very high -0.99- regardless of the geographic region of the sovereign, the likelihood of obtaining ratings at the upper end of the rating spectrum varies across regions. Sovereigns in West Europe and North America have the highest probability, 0.98, of securing an AA-/Aa3 or higher rating followed by Latin American sovereigns which have a probability of 0.92. Sovereigns in Asia/Pacific Central and Eastern Europe are less likely to obtain such high ratings as reflected in the lower probabilities of securing them -0.85 and 0.63, respectively. Nevertheless, sovereigns in Africa and the Middle East are the least likely to obtain an AA-/Aa3 or higher rating, having a probability of only 0.54 to be rated so.

To ascertain the quantitative impact of the rating agency on local currency ratings, the effect on the median rating of the agency indicators included in Model 1 was determined. The findings suggest that, other things being equal, and relative to Standard and Poor's, Moody's assigns lower local currency ratings which have a negative impact on the median rating producing a downgrade of one rating notch from AAA/Aaa to AA+/Aa1. The quantitative effect of IBCA and Duff and Phelps, however, is not significant since their ratings do not alter the median local currency rating. This suggests that IBCA's and Duff and Phelps' ratings are not quantitatively different from those of Standard and Poor's. The insignificant quantitative impact of IBCA's indicator contrasts with the findings for the statistical significance of this variable, which suggested that IBCA's ratings are significantly and systematically lower than Standard and Poor's local currency ratings. Additionally, while the probability of a sovereign obtaining an AA-/Aa3 or higher local currency rating is 0.97 and 0.98 if the sovereign is rated by Standard and Poor's and Duff and Phelps, respectively, these probabilities are slightly lower if the sovereign is rated either by IBCA or by Moody's -0.92 and 0.83, respectively.(38)

Comparing the results of this quantitative analysis and those of the corresponding analysis for foreign currency ratings (see 4.9), it is noted that the findings coincide in that the history of default on foreign currency debt and the income per capita have a significant quantitative effect on both types of ratings. Nonetheless, the quantitative impact of the history of default is greater for foreign currency ratings than for local currency ratings. The median rating is downgraded three notches in the former case and one rating notch in the latter. The impact of the income per capita, on the other hand, is somewhat greater on local than on foreign currency ratings. While decreases of 10 and 20 percent in the level of income produce the same quantitative impact on both types of ratings -the median rating declines by one and three rating notches respectively-, a decline of 30 percent in the per capita income results in a downgrade of six rating notches in the median local currency rating and four rating notches in the median foreign currency rating. Furthermore, the level of external debt relative to exports and the development indicator, which have also a quantitative, though smaller, impact on foreign currency ratings, do not seem to have an important quantitative impact on local currency ratings. In general, the quantitative impact of the agency and the geographic region indicators is greater on foreign currency ratings than on local currency ratings. Sovereigns in Africa, the Middle East, and Latin America appeared to be more negatively affected for both types of ratings, while Standard and Poor's and IBCA are found to assign foreign and local currency ratings which are not quantitatively different.

Summarising, the quantitative analysis presented in this section has shown that, although all the variables which have a significant quantitative effect on local currency sovereign ratings are also found to be statistically significant, this is not the case for the opposite -i.e., not all statistically significant variables proved quantitatively significant. It is found that the greater quantitative impact is produced by the default history on both foreign and local currency debt, and the level of income per capita. Further, the geographic region of the sovereign proved also quantitatively significant, though at varying degrees, while quantitatively significant differences across agencies are found. Moreover, the quantitative impact of macroeconomic variables and the indicators of the agency and geographic region

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[38] The effect of Thomson BankWatch is such that it downgrades the median local currency rating seven rating notches, from AAA/Aaa to BBB+/Baa3. Nevertheless, this extraordinary effect is

differs between foreign and local currency ratings. Finally, it is surprising the fact that neither the fiscal balance nor the rate of inflation, which have been identified theoretically as the best indicators of local currency creditworthiness, have a significant quantitative impact on local currency ratings.

5.9 Conclusion

The analysis described in this chapter uses ordered probit and OLS to investigate the determinants of local currency sovereign credit ratings. Specifically, the analysis tests for the effect of average and lagged values of macroeconomic variables on the ratings, and the relative impact of balance-sheet variables. It also tests for the effect of the geographic region of the sovereign and for the impact of the agency assigning the rating.

Rating agency assessments of local currency sovereign creditworthiness are found to be explained by a small number of variables reflecting the economic performance of the country. In line with the analytical framework adopted, it is found that the fiscal performance and the rate of inflation, which are closely related, have a statistically significant impact on local currency ratings.

Also statistically, the fiscal balance and the per capita income of the country are found to have the most significant positive impact on local currency ratings, indicating the direct relationship between these two variables and the current and future levels of government revenues. Higher government revenues result in greater ability to meet both current and future domestic obligations, and, therefore, higher local currency ratings.

On the other hand, local currency ratings are inversely related to the rate of inflation and the level of external debt. The latter suggests that domestic and foreign debt enter the statement of sovereign liabilities on an equal footing. That is, both types of debt have equal claims on government resources and domestic debt is not deemed senior relative to foreign debt. This is consistent with the fact that sovereign defaults on local currency debt are often preceded by default on foreign currency debt by a number of years, resulting in a higher perceived default risk on local

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due to the fact that there is only one observation for this agency in the sample analysed.

currency obligations when a high foreign debt burden exists. Such has been the case, for instance, for Angola, Argentina, Brazil, Croatia, and Venezuela which, prior to their default on local currency debt, defaulted on foreign currency obligations (Beers, 1998).

The differences in the number and credit quality of the sovereigns rated by Duff and Phelps and Thomson BankWatch as compared to the rest of the agencies included in the analysis do not allow for generalisations regarding the differences in ratings and their determinants across agencies. Nonetheless, the similarity of the subsets for Moody's, Standard and Poor's and IBCA suggests that the rating agency and the geographic region of the sovereign also play a significant role in the determination of local currency ratings. While Standard and Poor's and assign ratings which are broadly similar, Moody's assigns systematically lower local currency sovereign ratings compared with Standard and Poor's. Furthermore, the individual analysis of the rating agencies tentatively suggests that there are significant differences across agencies in the rating criteria and the weightings attached to them. In this context, Standard and Poor's and IBCA appeared to agree most on the macroeconomic indicators included in their local currency sovereign ratings, whereas Moody's and IBCA seem to place a greater weight than Standard and Poor's on the lagged values of such variables. Due to small sub-sample sizes, little can be said about the relative importance of balance-sheet variables to the local currency ratings of the different agencies. Nevertheless, it is presumed that the impact of balance-sheet variables on local currency ratings may vary if the agencies are considered separately as opposed to be considered jointly. Additionally, both collectively and individually, rating agencies are found to assign lower ratings to sovereigns outside the region where they are headquartered. Although this analysis explores the relationship between raters and ratees at the region-level rather than at the country-level, the results are consistent with previous research findings suggesting that agencies rate more favourably issuers from their own country (Beattie and Searle, 1992b). Despite the fact that this earlier work attributes the higher ratings to a more lenient assessment, it can be argued, instead, that this is the result of the agencies' greater understanding of the economic, social, and political situation of the sovereigns in their own geographic region.

Considered all agencies together, neither the individual nor the joint impact of lagged variables is found to be significantly related to local currency ratings. On the other hand, two balance-sheet variables, namely the ratio of long-term debt to total bank debt and the ratio of total bank borrowing to total bank deposits have a significant effect on the ratings, although the explanatory value added by this subset of variables is only moderately significant relative to the explanatory value of macroeconomic variables.

Judging for the findings of this and the previous chapter, there appear to be significant differences between the determinants of local and foreign currency ratings. While the external balance and the development indicator have a statistically significant and positive effect on foreign currency ratings, they proved not statistically related to local currency ratings. Moreover, although the statistical significance of the fiscal balance was higher for foreign currency ratings, the quantitative impact of this variable was as negligible for foreign currency ratings as it was for local currency ratings. The indicator of the sovereign's history of default on foreign currency debt was found to have a greater impact on foreign than on local currency ratings in terms of both statistical and quantitative significance.

The findings of this and the previous chapter also differ in that while the foreign currency ratings of Moody's and IBCA were not significantly different from those of Standard and Poor's, of the former two agencies, only Moody's appears to assign systematically lower local currency ratings than Standard and Poor's. On the other hand, Thomson BankWatch assigns ratings which are consistently lower than Standard and Poor's ratings for both foreign and local currency denominated sovereign debt. The results also suggest that Duff and Phelps assigns higher ratings than Standard and Poor's for foreign currency debt, although this difference was neither statistically nor quantitatively significant for local currency ratings. On the whole, the coefficients of the agency indicators were larger for the local than for the foreign currency ratings model indicating greater disagreement between Standard and Poor's and the rest of the agencies in the local currency ratings assigned to sovereign borrowers. Furthermore, the agency-specific models show that Moody's and Standard and Poor's seem to agree most on the criteria for foreign currency ratings, while IBCA and Standard and Poor's appear to do so for local currency ratings. Interestingly, while the latter two agencies appear to broadly assign the same ratings -both local and foreign currency- in every region of the world, their ratings seem to convey different information, being this difference greater for foreign currency ratings.

Further examining the effect of the geographic region it is found that except for the local currency ratings of Latin American sovereigns, relative to sovereigns in West Europe and North America, sovereign borrowers receive both lower local currency ratings and lower foreign currency ratings. Additionally, region-specific models suggest that differences in the ratings assigned to sovereign borrowers by different rating agencies depend upon the currency of denomination of the debt evaluated and the geographic region of the sovereign.

Also contrasting is the effect of the lagged variables. While, relative to average historical values, lagged variables have a significant effect on foreign currency ratings, their impact is not significant on local currency sovereign ratings. Further, while Moody's and IBCA seem to place a greater weight on lagged variables for local currency ratings than for foreign currency ratings, the opposite is found for Standard and Poor's. So far as balance-sheet variables, both individually and jointly, they help to explain sovereign credit ratings over and above the explanatory power of macroeconomic variables. Further, balance-sheet variables proved more significant determinants of foreign currency ratings than of local currency ratings. Nonetheless, the specific balance-sheet variables which were significant differ between local and foreign currency ratings models.

From the analysis of local currency ratings it is tentatively concluded that the use of OLS regression for analysing ordinal, discrete dependent variables such as credit ratings may convey misleading results. The estimations show that, in general, the differences between the two techniques are greater for local currency ratings than for foreign currency ratings in terms of both the statistical significance and the magnitude of the estimated coefficients. This may reflect the smaller sample of local currency ratings. While the inferences drawn from either OLS or ordered probit remained practically unchanged for foreign currency ratings, OLS estimates produced misleading results for local currency ratings as compared to ordered probit estimates. Ordered probit analysis is deemed more robust due to its greater compatibility with the nature of credit ratings.

The accuracy of models was measured in terms of the proportion of total ratings correctly classified both within the sample on which the models were estimated and in a holdout sample. On the whole, ordered probit proved more robust than OLS showing higher accuracy rates in both the analysis of local currency ratings and the analysis of foreign currency ratings. Nevertheless, considered separately, while ordered probit fared better for local currency ratings, OLS did so for foreign currency ratings. Although both techniques perform similarly at classifying ratings with an error of one rating notch -about 80 and 70 percent for local and foreign currency ratings, respectively-, the percentage of ratings correctly classified at both the rating-notch level and the broad-letter level is higher using ordered probit analysis.

For local currency ratings and for the test within the estimation sample, ordered probit models classify correctly about three-quarters of the ratings at the rating-notch level, and more than 80 percent of the broad letter ratings, while OLS correct classifications amount to about one-third and 45 percent, respectively. However, the ability of both techniques to classify correctly the ratings in the holdout sample is inferior. OLS performed better in the holdout sample than within the sample, although the accuracy of ordered probit remained higher. About 60 percent of the ratings are classified correctly at the rating-notch level and approximately 80 percent at the broad letter rating using probit models compared to 40 and 55 percent for OLS regressions.

The analysis of foreign currency ratings brings forward different results. Within the estimation sample, probit models classify correctly roughly 40 percent of the ratings at the notch level, whereas OLS does so for less than one-quarter of the sample. For the holdout sample and at the rating-notch level, probit models also proved better classifying correctly more than one-third of the sample as opposed to only one-quarter for the best of the OLS models. At the broad-letter level both techniques succeeded in predicting correctly about 60 percent of the ratings within the estimation sample as well as in the holdout sample. The superiority of ordered probit over OLS is, therefore, evidenced principally by the former's invariably higher rates of correctly classified ratings at the rating-notch level, the most rigorous of the accuracy tests employed. In general, the accuracy rates of probit models were about 50 percent higher than OLS rates except for the test within the sample of local currency ratings where these rates were almost twice as high. Additionally, it has been shown that the robustness of ordered probit prevails regardless of the sample distribution. For example, for the sample of local currency ratings, which presents a high concentration of ratings in the "edge" categories, the accuracy rates of the ordered probit models within one notch of the correct rating and at the broad-letter level are virtually the same, while the latter accuracy rate declined considerably for OLS compared to the former.

The quantitative analysis presented in this chapter has shown that not all the variables which proved statistically significant at explaining local currency ratings have a significant quantitative effect on the ratings. It is found that the greater quantitative impact is produced by the default history on both foreign and local currency debt, and the level of income per capita. Further, the geographic region of the sovereign and the rating agency indicators proved also quantitatively significant, though at varying degrees. Moreover, the variables which have a significant quantitative impact on foreign currency ratings differ slightly from those which quantitatively affect local currency ratings, and the power of such impact also varies across types of ratings. Surprisingly, it is found that neither the fiscal balance nor the rate of inflation have a significant quantitative impact on local currency ratings.

Finally, several important implications are drawn from this analysis. First, the finding that some agencies may assign consistently lower or higher ratings than others suggests that individual rating scales may differ from agency to agency. In this case, the systematically lower local currency ratings of Moody's relative to Standard and Poor's, the higher foreign currency ratings of Duff and Phelps, and the lower foreign currency ratings of Thomson BankWatch suggest possible different individual rating scales. As explained before, ratings represent the perceived default risk on a continuous underlying scale which is then partitioned to form ordinal rating categories. If agency A's location of the divisions on the unobservable scale between rating categories consistently exceeds those of agency B, then systematically lower ratings from agency A would be observed, even if both agencies have formed identical views of a sovereign's likelihood of default. On the other hand, if agency A's location of the divisions exceeds those of agency B for some rating categories only no overall systematic difference would be observed. The latter may be the case of Duff and Phelps and Standard and Poor's local currency ratings, and of Moody's, IBCA's, and Standard and Poor's foreign currency ratings which proved not systematically different. All this implies that uses of ratings which assume that identical ratings of different agencies represent identical default risk may prove inadequate. As discussed at length in the previous chapter (4.10), these findings gain importance in view of the new capital adequacy proposal of the Basle Committee on Banking Supervision which bases the capital adequacy ratios of banks on the credit ratings of debtors and assumes comparable credit risk for ratings across agencies. Under this new approach, however, claims on sovereigns denominated in local currency will be assessed in respect of the sovereign's long-term foreign currency rating, although a modified, preferred treatment may be available at the discretion of the pertinent supervisory authorities. However, the differences in the information content of foreign and local currency ratings found in this work suggest that the use of foreign currency ratings as an indication of sovereign credit risk on local currency denominated obligations may prove inadequate. Moreover, since local currency ratings are deemed a more accurate measure of the credit risk of local currency denominated claims, they have been proposed as the criteria for the determination of the risk weight for such exposures (Ostrovsky, 1999a). Nevertheless, the suggested systematic differences across agencies -though inconsistent across types of ratings- found in this analysis raise questions about the superiority of local currency ratings for such purposes. Second, the determinants of local currency sovereign ratings suggest that rating agencies perceive a higher risk of default where the domestic debt burden is low if, at the same time, the ratio of external debt to exports is high or the current or future fiscal position -present value of anticipated future revenues- is weak. Finally, it follows from the last observation that the domestic debt situation is not analysed in isolation from the external debt situation and that adjustment programmes designed for the long-term sustainability of improvements in the fiscal balance of a country will result in improved perceived creditworthiness for local currency debt.

Table 5-1. Countries Included in the Empirical Analysis[1]

Region 1 Africa/Middle East	Region 2 Asia/Pacific Central	Region 3 Eastern Europe	Region 4 Latin America	Region 5 West Europe/ North America
Israel	Australia	Czech Republic	Argentina	Austria*
Jordan	India	Hungary	Brazil	Belgium*
South Africa	Indonesia	Kazakhstan	Chile	Canada*
	Japan*	Lithuania	Colombia	Cyprus
	Korea	Poland	Dominican Republic	Denmark*
	Malaysia	Rumania	Mexico	Finland*
	New Zealand	Slovakia	Uruguay	France*
	Philippines	Slovenia		Germany*
	Singapore			Greece
	Thailand			Iceland
				Ireland*
				Italy*
				Malta
				Netherlands*
				Norway*
				Portugal
				Spain*
				Sweden*
				Switzerland
				United Kingdom*
				United States*

* BIS reporting countries

[1] Industrial countries, according to the IMF classification, include BIS reporting countries (*), Greece, Iceland, Portugal, Switzerland, Australia and New Zealand. Israel, Korea and Singapore are considered industrial countries in 1997. All other countries are considered emerging markets (non-industrial).

Table 5-2. Results. Base Model, Model 1 and Model 2.

DEPENDENT VARIABLE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,.......AAA/Aaa=16)					
PERIOD	1992-1997					
NO. OF OBSERVATIONS	304					
NO. OF COUNTRIES	49					
NO. OF AGENCIES	5					
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**			**OLS**		
	BASE MODEL	**MODEL 1**	**MODEL 2**	**BASE MODEL**	**MODEL 1**	**MODEL 2**
INTERCEPT	-1.166	0.137	1.076	1.002	1.823	4.468 ***
	(.794)	(.088)	(.605)	(.62)	(1.144)	(2.67)
EXTERNAL DEBT	-0.004 ***	-0.004 ***	-0.006 ***	-0.007 ***	-0.007 ***	-0.010 ***
	(3.875)	(4.401)	(5.291)	(5.67)	(6.174)	(8.346)
FISCAL BALANCE	0.059 **	0.061 **	0.079 ***	0.030	0.028	0.042 **
	(2.549)	(2.568)	(3.067)	(1.393)	(1.348)	(2.002)
EXTERNAL BALANCE	0.003	-0.001	-0.009	-0.077 ***	-0.077 ***	-0.092 ***
	(.094)	(.04)	(.294)	(3.031)	(3.095)	(3.894)
INFLATION	-0.346 ***	-0.446 ***	-0.334 ***	-0.475 ***	-0.523 ***	-0.430 ***
	(3.628)	(4.403)	(2.979)	(4.461)	(5.000)	(3.914)
INCOME	0.893 ***	0.909 ***	0.845 ***	1.517 ***	1.454 ***	1.330 ***
	(5.423)	(5.402)	(4.338)	(8.556)	(8.324)	(7.454)
GDP GROWTH	0.028	0.014	0.025	0.129 ***	0.122 ***	0.094 ***
	(.84)	(.4)	(.713)	(3.612)	(3.454)	(2.851)
DEVELOPMENT	0.328	0.478	-0.583	-0.002	0.085	-1.375 ***
INDICATOR	(.806)	(1.132)	(1.21)	(.004)	(.196)	(3.009)
DEFAULT HISTORY	-0.570 **	-0.409	-0.520 *	-1.253 ***	-1.123 ***	-1.022 ***
FOREIGN CURRENCY DEBT	(2.312)	(1.605)	(1.8)	(4.004)	(3.612)	(3.047)
DEFAULT HISTORY	-2.413 ***	-2.578 ***	-2.654 ***	-3.981 ***	-3.740 ***	-4.269 ***
LOCAL CURRENCY DEBT	(4.533)	(4.56)	(4.797)	(6.936)	(6.593)	(8.065)
MOODY'S		-0.935 ***			-0.482 **	
		(3.67)			(2.297)	
IBCA		-0.505 **			-0.479 **	
		(2.166)			(2.465)	
THOMSON BANK.		-3.616 ***			-1.436 ***	
		(3.074)			(3.18)	
DUFF AND PHELPS		0.119			0.290	
		(.277)			(.533)	
AFRICA/MIDDLE EAST			-2.020 ***			-2.974 ***
			(4.284)			(6.001)
ASIA/PACIFIC CENTRAL			-1.113 ***			-0.924 ***
			(3.167)			(3.413)
EASTERN EUROPE			-1.814 ***			-2.715 ***
			(3.674)			(5.623)
LATIN AMERICA			-0.781			-0.439
			(1.603)			(.879)
- 2 ln L	501.66	477.74	473.84			
LR	388.65 ***	23.92 ***	27.82 ***			
Adjusted R-Squared				0.840	0.848	0.870
Standard Error				1.361	1.327	1.226

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 14 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged

3) The lowest local currency sovereign rating in the sample is B+/B1 (category 3).

Table 5-3. OLS Results. Models 3-5.

DEPENDENT VARIABLE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,.......AAA/Aaa=16)		
ESTIMATION TECHNIQUE	OLS		
PERIOD	1993-1997	1992-1997	1995-1997
NO. OF OBSERVATIONS	56	172	68
AGENCY	MOODY'S	S&P'S	IBCA
	MODEL 3	**MODEL 4**	**MODEL 5**
INTERCEPT	7.105 (1.193)	4.569 ** (2.42)	4.746 (1.317)
EXTERNAL DEBT	-0.004 (.481)	-0.009 *** (6.805)	-0.028 *** (7.021)
FISCAL BALANCE	0.126 *** (3.212)	0.034 (1.243)	0.005 (.154)
EXTERNAL BALANCE	0.021 (.248)	-0.090 *** (3.56)	-0.155 *** (3.012)
INFLATION	-0.445 (1.586)	-0.407 *** (3.052)	-0.440 ** (2.23)
INCOME	0.978 (1.661)	1.302 *** (6.683)	1.647 *** (4.474)
GDP GROWTH	-0.119 (1.37)	0.114 *** (2.69)	0.083 (1.357)
DEVELOPMENT INDICATOR		-1.193 ** (2.445)	-4.871 *** (4.396)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	2.270 (1.027)	-1.191 *** (3.118)	0.160 (.235)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-4.292 *** (2.901)	-3.765 *** (6.091)	-1.944 * (1.656)
AFRICA/MIDDLE EAST	-5.874 *** (3.753)	-2.807 *** (5.126)	-7.369 *** (5.292)
ASIA/PACIFIC CENTRAL	-0.018 (.033)	-0.929 *** (2.895)	-2.443 *** (3.644)
EASTERN EUROPE		-2.739 *** (4.682)	-4.479 *** (4.064)
LATIN AMERICA	-5.857 *** (2.85)	-0.309 (.567)	-2.603 (1.955)
Adjusted R-Squared	0.937	0.889	0.937
Standard Error	0.987	1.124	0.961

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: Values in parentheses are absolute t-statistics. No observations for categories 1 (B-/B3) and 2 (B/B2)Moody's assigns no local currency sovereign ratings in Eastern Europe and the development indicator coefficient is missing due to singularity problems (whenever the development indicator is 0, the indicator of default history on foreign currency debt is 1, and vice versa).

Table 5-4. OLS Results. Models 6-9.

DEPENDENT VARIABLE ESTIMATION TECHNIQUE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,.......AAA/Aaa=16) OLS			
PERIOD	1992-1997	1992-1997	1992-1997	1992-1997
NO. OF OBSERVATIONS	50	22	38	181
REGION	**ASIA/PACIFIC CENTRAL**	**EASTERN EUROPE**	**LATIN AMERICA**	**WEST EUROPE/NTH. AMERICA**
	MODEL 6	**MODEL 7**	**MODEL 8**	**MODEL 9**
INTERCEPT	12.340 * (2.01)	1.418 (.248)	3.345 (.367)	14.868 *** (7.217)
EXTERNAL DEBT	-0.022 *** (3.16)	-0.004 (1.315)	-0.008 ** (2.631)	-0.0004 (.146)
FISCAL BALANCE	-0.104 (.975)	0.373 *** (4.057)	0.253 (1.049)	0.049 *** (3.866)
EXTERNAL BALANCE	0.038 (.509)	0.017 (.242)	-0.455 ** (2.194)	-0.023 (1.034)
INFLATION	-0.684 (.868)	-1.132 * (2.118)	0.099 (.359)	-0.361 *** (2.984)
INCOME	0.920 (1.348)	1.763 *** (3.59)	0.951 (.814)	0.088 (.466)
GDP GROWTH	-0.285 (2.288)	-0.202 (1.545)	0.339 ** (2.362)	0.001 (.046)
DEVELOPMENT INDICATOR	-4.201 *** (3.74)			0.802 (.716)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	-1.621 (1.525)	0.128 (.223)	-1.433 (1.073)	
DEFAULT HISTORY LOCAL CURRENCY DEBT			-3.343 ** (2.706)	
MOODY'S	0.601 (1.025)		-2.523 *** (2.902)	-0.378 *** (3.014)
IBCA	-1.138 (1.475)	-0.238 (1.276)	-1.375 (1.595)	0.024 (.204)
THOMSON BANKWATCH	-5.212 *** (3.175)			
DUFF AND PHELPS		-0.403 (1.185)	0.183 (.183)	
Adjusted R-Squared	0.845	0.981	0.854	0.203
Standard Error	1.480	0.400	1.567	0.641

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Values in parentheses are absolute t-statistics

Note: No observations for categories 1 (B-/B3) and 2 (B/B2)

Table 5-5. Results. Model 10.

DEPENDENT VARIABLE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,…….AAA/Aaa=16)	
PERIOD: 1992-1997	NO. OF COUNTRIES: 48	
NO. OF OBSERVATIONS: 301	NO. OF AGENCIES: 5	
ESTIMATION TECHNIQUE	**ORDERED PROBIT**	**OLS**
INTERCEPT	0.342 (.209)	2.024 (1.138)
EXTERNAL DEBT (AVERAGE)	-0.001 (.082)	0.006 (.633)
EXT. DEBT (-1)	-0.001 (.32)	0.0002 (.033)
EXT. DEBT (-2)	-0.001 (.232)	-0.012 (1.457)
FISCAL BALANCE (AVERAGE)	0.145 (1.502)	0.168 * (1.803)
FISCAL BALANCE (-1)	-0.037 (.842)	-0.068 (1.583)
FISCAL BALANCE (-2)	-0.035 (.745)	-0.054 (1.214)
EXT. BALANCE (AVERAGE)	0.117 (.791)	-0.033 (.217)
EXT. BALANCE (-1)	-0.022 (.413)	0.014 (.238)
EXT. BALANCE (-2)	-0.081 (.775)	-0.055 (.511)
INFLATION (AVERAGE)	-0.580 (1.548)	-0.430 (1.168)
INFLATION (-1)	0.053 (.213)	-0.139 (.598)
INFLATION (-2)	0.165 (.609)	0.056 (.219)
INCOME (AVERAGE)	-0.738 (.232)	3.103 (1.08)
INCOME (-1)	3.275 ** (2.182)	2.130 (1.478)
INCOME (-2)	-0.176 (.741)	-3.810 * (1.793)
GDP GROWTH (AVERAGE)	0.059 (.74)	0.147 ** (2.015)
GDP GROWTH (-1)	-0.065 (1.203)	-0.021 (.453)
GDP GROWTH (-2)	-0.046 (.887)	-0.017 (.363)
DEVELOPMENT INDICATOR	0.365 (.83)	-0.034 (.074)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	-0.697 ** (2.49)	-1.356 *** (3.953)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-2.292 *** (2.913)	-4.314 *** (5.413)
-2 ln L	483.74	
LR	6.96	
Adjusted R-Squared		0.832
Standard Error		1.366

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 14 in the main text.

2)Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

3) The lowest local currency sovereign rating in the sample is B+/B1 (category 3).

Table 5-6. OLS Results. Models 11-13.

DEPENDENT VARIABLE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,.......AAA/Aaa=16)		
ESTIMATION TECHNIQUE	OLS		
PERIOD	1993-1997	1992-1997	1995-1997
NO. OF OBSERVATIONS	56	171	67
AGENCY	MOODY'S	S&P's	IBCA
	MODEL 11	**MODEL 12**	**MODEL 13**
INTERCEPT	3.271 (.362)	2.135 (1.07)	4.308 (1.005)
EXTERNAL DEBT (AVERAGE)	0.146 ** (2.232)	0.003 (.328)	0.136 *** (3.401)
EXT. DEBT (-1)	-0.028 (1.131)	0.006 (.845)	-0.100 *** (4.449)
EXT. DEBT (-2)	-0.123 ** (2.5)	-0.014 (1.587)	-0.084 *** (2.715)
FISCAL BALANCE (AVERAGE)	0.651 ** (2.185)	0.160 (1.36)	0.282 (1.589)
FISCAL BALANCE (-1)	-0.223 * (1.913)	-0.073 (1.285)	-0.121 (1.556)
FISCAL BALANCE (-2)	-0.251 (1.301)	-0.060 (1.056)	-0.104 (1.422)
EXT. BALANCE (AVERAGE)	-0.470 (.72)	0.090 (.509)	-0.703 ** (2.08)
EXT. BALANCE (-1)	0.238 (.787)	-0.052 (.769)	0.519 *** (3.751)
EXT. BALANCE (-2)	0.153 (.407)	-0.097 (.787)	0.152 (.683)
INFLATION (AVERAGE)	-0.864 (.942)	-0.616 (1.256)	-0.032 (.053)
INFLATION (-1)	-0.135 (.28)	0.069 (.222)	-0.105 (.263)
INFLATION (-2)	0.164 (.283)	0.136 (.387)	-0.115 (.304)
INCOME (AVERAGE)	-9.174 (1.399)	5.093 (1.351)	9.501 * (1.823)
INCOME (-1)	7.827 ** (2.053)	0.178 (.093)	-1.613 (.574)
INCOME (-2)	2.700 (.579)	-3.848 (1.436)	-6.304 (1.62)
GDP GROWTH (AVERAGE)	-0.082 (.537)	0.150 (1.577)	0.417 *** (2.984)
GDP GROWTH (-1)	0.075 (.589)	0.007 (.127)	-0.139 (1.263)
GDP GROWTH (-2)	-0.022 (.204)	-0.022 (.347)	0.044 (.476)
DEVELOPMENT INDICATOR		-0.142 (.266)	-4.506 *** (4.259)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	-0.839 (.362)	-1.509 *** (3.681)	-2.878 *** (4.153)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-4.654 * (2.016)	-3.210 *** (3.29)	2.334 (1.14)
Adjusted R-Squared	0.944	0.855	0.941
Standard Error	1.050	1.297	0.985

* significant at 10% level; ** significant at 5% level; *** significant at 1% level
Values in parentheses are absolute t-statistics
Note: No observations for categories 1 (B-/B3) and 2 (B/B2)

Notes: Values in parentheses are absolute t-statistics. Note: No observations for categories 1 (B-/B3) and 2 (B/B2). The development indicator coefficient is missing in Moody's model due to singularity problems (whenever the development indicator is 0, the indicator of default history on foreign currency debt is 1, and vice versa).

Table 5-7. Results. Model 14.

DEPENDENT VARIABLE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,.......AAA/Aaa=16)	
PERIOD	1992-1997	
NO. OF OBSERVATIONS	132	
NO. OF COUNTRIES	33	
NO. OF AGENCIES	5	
ESTIMATION TECHNIQUE	**ORDERED PROBIT**	**OLS**
INTERCEPT	-3.550 (1.14)	-5.971 (1.223)
EXTERNAL DEBT	-0.005 *** (3.975)	-0.010 *** (4.72)
FISCAL BALANCE	0.032 (.782)	0.066 (1.012)
EXTERNAL BALANCE	-0.028 (.728)	-0.071 (1.177)
INFLATION	-0.398 *** (3.082)	-0.697 *** (3.39)
INCOME	0.752 *** (3.682)	1.309 *** (4.079)
GDP GROWTH	0.120 ** (2.325)	0.275 *** (3.377)
DEVELOPMENT INDICATOR	0.618 (1.28)	0.708 (.997)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	-0.688 ** (2.34)	-1.306 *** (2.615)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-0.932 (1.256)	-1.677 (1.519)
LONG TERM DEBT/ TOTAL BANK DEBT(%)	0.055 ** (2.28)	0.153 *** (3.914)
MEDIUM TERM DEBT/ TOTAL BANK DEBT(%)	-0.003 (.066)	0.069 (.966)
SHORT TERM DEBT/ TOTAL BANK DEBT(%)	0.028 (1.279)	0.077 ** (2.151)
COUNTRY DEBT/ SAMPLE DEBT (%)	-0.134 (1.47)	-0.107 (.891)
UNDISBURSED C.M./ TOTAL BANK DEBT(%)	0.015 (0.700)	-0.017 (.578)
FOREX. RESERVES/ IMF QUOTA (%)	-0.00001 (.049)	-0.00024 (1.119)
USE IMF CREDIT/ IMF QUOTA (%)	-0.002 (1.547)	-0.003 (1.367)
TOTAL BANK BORR./ DEPOSITS (%)	0.001 ** (2.306)	0.001 * (1.672)
-2 ln L	401.82	
LR	14.85 *	
Adjusted R-Squared		0.774
Standard Error		1.805

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 14 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

3) The lowest local currency sovereign rating in the sample is B+/B1 (category 3).

Table 5-8. OLS Results. Models 15-16.

DEPENDENT VARIABLE	LOCAL CURRENCY SOVEREIGN RATINGS (B+/B1=3, BB-/Ba3=4,…….AAA/Aaa=16)	
ESTIMATION TECHNIQUE	OLS	
PERIOD	1992-1997	1995-1997
NO. OF OBSERVATIONS	82	24
AGENCY	S&P's	IBCA
	MODEL 15	**MODEL 16**
INTERCEPT	-8.607 (1.587)	45.237 (.832)
EXTERNAL DEBT	-0.010 *** (4.635)	-0.070 (1.374)
FISCAL BALANCE	0.059 (.831)	0.053 (.109)
EXTERNAL BALANCE	-0.052 (.897)	-0.775 (1.023)
INFLATION	-0.650 *** (2.832)	-2.806 (1.115)
INCOME	1.212 *** (3.591)	-1.841 (.396)
GDP GROWTH	0.339 *** (3.68)	0.147 (.272)
DEVELOPMENT INDICATOR	0.950 (1.221)	-3.839 (1.00)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	-1.494 *** (2.685)	0.287 (.107)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-1.022 (.848)	18.160 (.993)
LONG TERM DEBT/ TOTAL BANK DEBT(%)	0.198 *** (4.38)	0.122 (.641)
MEDIUM TERM DEBT/ TOTAL BANK DEBT(%)	0.087 (1.138)	-0.757 (1.244)
SHORT TERM DEBT/ TOTAL BANK DEBT(%)	0.105 ** (2.489)	-0.072 (.437)
COUNTRY DEBT/ SAMPLE DEBT (%)	-0.021 (.163)	-0.268 (.324)
UNDISBURSED C.M./ TOTAL BANK DEBT(%)	-0.015 (0.454)	-0.125 (.672)
FOREX. RESERVES/ IMF QUOTA (%)	-0.0003 (1.467)	-0.0003 (.112)
USE IMF CREDIT/ IMF QUOTA (%)	-0.002 (.74)	-0.028 (1.003)
TOTAL BANK BORR./ DEPOSITS (%)	0.001 (1.227)	0.009 (1.027)
Adjusted R-Squared Standard Error	0.840 1.594	0.866 2.684

* significant at 10% level; ** significant at 5% level; *** significant at 1% level
Values in parentheses are absolute t-statistics
Note: no observations for categories 1 (B-/B3) and 2 (B/2).
Notes: Values in parentheses are absolute t-statistics.

Table 5-9. Cutpoints Defining Intervals for Each Local Currency Rating Category[1] (Within-Sample Tests)

	BASE MODEL	MODEL 1	MODEL 2	MODEL 10	MODEL 14
μ_3	0	0	0	0	0
μ_4	0.28843	0.36138	0.31796	0.33132	0.27422
μ_5	0.95685	1.32987	0.98362	1.08982	0.93069
μ_6	1.51491	2.12587	1.49908	1.42392	1.49852
μ_7	2.83030	3.67727	2.87916	2.91072	2.79426
μ_8	3.05405	3.91206	3.12319	3.15121	3.04517
μ_9	3.81618	4.71930	3.95207	3.93074	3.89431
μ_{10}	4.41195	5.33681	4.64803	4.53006	4.58721
μ_{11}	4.49141	5.41631	4.74701	4.61216	4.68376
μ_{12}	4.82232	5.75490	5.14126	4.94398	4.98131
μ_{13}	5.10405	6.05621	5.48229	5.21962	5.40405
μ_{14}	4.45973	6.44107	5.93542	5.57187	5.93557
μ_{15}	5.96934	6.98804	6.51051	6.09462	6.53968

[1]Rating categories 1 and 2 were not estimated due to the lack of observations.
$\mu_2=-\infty$; $\mu_{16}=\infty$

Table 5-10. Local Currency Ratings Correctly Classified, by Model (Percent)

	BASE MODEL		MODEL 1		MODEL 2		MODEL 10		MODEL 14	
	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS
A) WITHIN SAMPLE										
Total observations	304		304		304		301		132	
Notch-level ratings										
Correctly Classified	74.34	32.89	75.66	33.88	77.30	35.53	74.09	32.56	42.42	23.48
Within one notch of correct rating	86.51	77.96	85.86	79.61	89.47	85.20	84.72	80.07	71.97	72.73
Broad letter ratings										
Correctly Classified	81.58	44.41	84.21	45.72	84.54	46.38	82.39	44.19	61.36	50.00
B) HOLDOUT SAMPLE										
Total observations	67		67		67		66		40	
Notch-level ratings										
Correctly Classified	56.72	49.25	56.72	40.30	67.16	44.78	54.55	28.79	25.00	15.00
Within one notch of correct rating	73.13	77.61	71.64	76.12	83.58	85.07	69.70	68.18	60.00	57.50
Broad letter ratings										
Correctly Classified	79.10	62.69	77.61	62.69	80.60	53.73	74.24	43.94	57.50	37.50

Note: All figures are proportions of the total ratings in the sample analysed. Correctly classified notch-level ratings are fitted ratings matching exactly the actual rating at the notch level. Ratings which are classified correctly within one notch of the correct rating are fitted ratings which: (1) match exactly the actual rating, or (2) are either one rating notch higher or lower than the actual rating. Ratings correctly classified at the broad-letter level are fitted ratings rounded off to the nearest broad-letter rating category which match the rounded-off broad-letter category of the actual rating. For instance, the categories BBB-/Baa3, BBB/Baa2, and BBB+/Baa1 are rounded off to the broad letter category BBB/Baa. Fitted and actual broad-letter ratings obtained in this way and matching exactly are deemed to be correctly classified by the models at the broad letter level.

6. Local vs. Foreign Currency Ratings: A Test for Transfer Risk

Differences between local and foreign currency sovereign ratings reflect the differences between the willingness and the ability of a government to meet its obligations denominated in domestic and foreign currencies. Chapter 3 (3.2) identified these differences. Sovereign issuers are typically assigned foreign currency ratings that are lower than their local currency ratings. This is the result of the sovereign's better ability to service local currency denominated debt due to its taxation and money creation powers. Local currency ratings incorporate only an appraisal of the credit risk that the sovereign will default on its debt obligations due to insufficient local currency debt service. On the other hand, foreign currency ratings incorporate, additionally, the transfer risk borne by the sovereign borrower reflecting the fact that sovereigns must secure foreign exchange to service their foreign currency denominated debt (IBCA, 1997b; Truglia and Levey, 1998a; and, Beers and Cavanaugh, 1999). Furthermore, the assessment of a sovereign government's ability and willingness to service local currency debt emphasises its potentially unlimited access to local currency resources, whereas foreign currency ratings also assess the availability of external resources -e.g., funding from the IMF and other multilateral and bilateral official sources. In fact, the lower perceived default risk on local currency debt is evidenced in the higher frequency of sovereign default on foreign currency debt than on local currency debt. The ratio of sovereign issuer defaults on the two types of debt was 6:1 for the period 1975-1997 (Beers, 1998).

Rating agencies stress that the primary focus of local currency credit analysis is on the fiscal, monetary and inflation outcomes of government policies that support or erode incentives for timely debt service. When assessing default risk on foreign currency debt the agencies claim to place more weight on the interaction between fiscal and monetary policies, the balance of payments and its impact on the growth of external debt, and the degree of each country's integration in the global financial system. Consistent with this and with theoretical and empirical frameworks of sovereign debt service, the last two chapters, which examined local and foreign currency sovereign ratings separately showed that the determinants of foreign currency sovereign ratings are similar to those which indicate the level of sovereign risk measured in local currency. Nevertheless, they demonstrated that there are systematic differences in the determinants of each type of rating, as well as across rating agencies and geographic regions.

This chapter presents the first systematic analysis which directly examines the factors that account for the difference between the local and the foreign currency ratings assigned to sovereign borrowers by rating agencies, that is, examines the determinants of transfer risk. In examining the factors that determine transfer risk, the analysis focuses on six main areas: (1) the effect of the rating agency; (2) the impact of the sovereign's geographic region; (3) the relative importance of lagged and average historical values of macroeconomic variables; (4) the relative influence of macroeconomic and balance-sheet variables; (5) the relative robustness of ordered probit and OLS analysis techniques; and, (6) the differences in the statistically and quantitatively significant explanatory variables of transfer risk.

The findings suggest that, after controlling for the effect of the sovereign's foreign currency rating, the determinants of transfer risk are consistent with the indicators of currency crises identified by previous empirical literature. In particular, the fiscal balance, the rate of inflation, and the growth of GDP are found to explain transfer risk. Nonetheless, the external balance and the external debt profile of the sovereign, which have not been previously associated with the onset of currency crises, proved significant determinants of transfer risk. Furthermore, while rating agencies seem to broadly agree on the assessment of transfer risk, the results show that the factors incorporated into these assessments may vary across the agencies. Supporting evidence which suggests that currency crises are contagious and regional, it is found that the geographic region of the sovereign affects the perception of transfer risk. While, jointly considered, lagged variables do not contribute to explain transfer risk beyond the explanatory power of average-valued macroeconomic variables, individually, the lagged values of the income per capita and the external balance are found to affect perceived transfer risk. On the other hand, both individually and jointly, balance-sheet variables have a significant effect on sovereign transfer risk over and above the impact of macroeconomic variables. In particular, the level of foreign exchange reserves plays a significant role in explaining transfer risk. Only after controlling for the effect of the foreign currency rating did probit models perform better than OLS models succeeding in classifying correctly about half of the sample estimated. Finally, the quantitative analysis suggests that the variables which have a significant quantitative impact on transfer risk differ from those which are statistically significant. The indicators for the geographic region and the rating agency are also quantitatively significant, though at varying degrees.

The chapter is organised as follows. Section one discusses the nature of transfer risk and section two explains how transfer risk is proxied in this analysis. Section three summarises the data included in the sample. Section four outlines the hypotheses to be tested, while the estimation method is described in section five. Section six presents the results, and section seven compares the performance of ordered probit and ordinary least squares estimation techniques. Section eight presents the quantitative analysis and section nine provides some concluding remarks.

6.1 The Nature of Transfer Risk

When investors invest in the foreign currency denominated obligations of overseas borrowers they are taking a transfer risk. Even if the investment is with a prime quality government, an impeccable private sector bank or corporate, that borrower will still have to go through a two stage process to honour its debts. The first stage is to earn enough domestic currency to provide debt service. The second stage is to convert that domestic currency into the foreign currency used to denominate its debts. It is this second stage that gives rise to transfer risk.

While the nature of transfer risk, as defined here, is relatively unexplored, related literature can provide some background for the understanding of the conditions under which transfer risk may arise. Holders of debt denominated in the local currency of the sovereign issuer bear the risk that the value of the debt service may be impaired by a depreciation of the local currency in terms of foreign exchange. By investing in foreign currency denominated debt this foreign exchange risk is shifted to the borrower. Yet to the extent that changes in currency values affect the ability and/or willingness of sovereign borrowers to repay their foreign currency denominated debt, the exchange risk on such debt is converted into credit risk, that is, default risk. In this context, the possibility that exchange rate changes will alter the foreign currency amount of interest and principal the sovereign borrower should repay and increase it to an unsustainable level may result in a higher likelihood of sovereign default.

Shapiro (1985) has argued that the ability of a sovereign borrower to repay a foreign currency denominated loan will be determined by its capacity to extract the necessary quantity of foreign exchange from the public. Although the government can outbid any private economic unit for foreign exchange because it can print its own currency, what ultimately determines a nation's ability -and willingness- to repay foreign loans is its wealth, which, in turn, is based on the nation's terms of trade -i.e., the exchange rate between exports and imports. When a nation's terms of trade improve, foreign goods become relatively less expensive, the nation's standard of living rises, and consumers and business become more dependent on imports. When the terms of trade decline, the government will likely face political pressure to maintain the nation's standard of living. Such terms-of-trade risk can be converted into transfer risk if the government attempts to avoid the necessary drop in the standard of living by maintaining an overvalued currency, thereby reducing the nation's net inflow of foreign currency. This shortage of foreign exchange may result in a currency crisis since the government cannot create foreign currency; its ability to overcome such a shortage depends on its foreign exchange reserves and its ability to accumulate them through pertinent exchange rate and monetary policies.

Furthermore, Rogers (1992a,b, 1994, and 1996) has found supporting evidence to his "convertibility" -transfer- risk hypothesis according to which such risk arises from the possibility that full convertibility of foreign currency denominated bank deposits into actual foreign currency cannot be maintained. In this context, a rise in expected depreciation coincides with the perception that the current exchange regime is unsustainable. When the central bank runs low on foreign exchange reserves and expected depreciation is high, investors and the central bank realise that holders of foreign currency denominated bank deposits may be unable to convert their deposits into real foreign currency if they wanted. If depositors can correctly anticipate a breakdown of full convertibility, this may result in a run on such foreign currency denominated deposits and contribute to precipitate a currency crisis such as the Mexican crises of 1982 and 1994 (Gruben and Welch, 1996).

Given this relationship between transfer risk and currency crises, it follows that an examination of the theoretical and empirical literature on currency crises may provide valuable insights into the factors that are likely to give rise to transfer risk. Kaminsky, Lizondo and Reinhart (1997) provide an extensive review of such literature. So far as theoretical literature, the study identifies two approaches attempting to explain the causes of currency crises. The traditional approach -the "first generation" models-, which flourished following Krugman's (1979) model stresses that crises are caused by economic fundamentals, such as excessively expansionary fiscal and monetary policies, that result in a persistent loss of international reserves ultimately forcing the authorities to abandon the parity. More recently, however, this model has been expanded by a number of studies arguing that authorities may decide to abandon the parity for reasons other than a depletion of official international reserves. Instead, they may be concerned about the adverse consequences of policies needed to maintain the parity -such as higher interest rates- on other key economic variables -such as the level of employment. Thus, this approach suggest that the level of international reserves, fiscal imbalances, credit to the public sector, the evolution of the real exchange rate, the trade or current account balance, real wages, and domestic interest rates could serve as indicators of a looming currency crisis. The second approach -the "second generation" models-, on the other hand, perceives a crisis as developing without a significant change in the economic fundamentals (e.g., Obstfeld, 1986). This approach emphasises that the contingent nature of economic policies may give rise to multiple equilibria and generate self-fulfilling crises. A crucial assumption is that economic policies are not predetermined but respond instead to changes in the economy and that economic agents take this relationship into account in forming their expectations. At the same time, the expectations and actions of economic agents affect some variables to which economic policies respond. This circularity creates the possibility for multiple equilibria and the economy may move from one equilibrium to another without a change in the fundamentals. The main implication of models with self-fulfilling crises regarding the possibility of predicting currency crises is a negative one since, as the models suggest, crises may take place without previous significant change in fundamentals.

According to Kaminsky, Lizondo and Reinhart (1997), the results of empirical studies on currency crises suggest that an effective warning system of currency crises should consider a broad variety of indicators.(1) Currency crises seem to be usually preceded by multiple economic, and sometimes political, problems. The evidence reviewed points to the presence of both domestic and external imbalances which span both the real side of the economy and the domestic financial sector. The individual variables that have received ample support as useful indicators of currency crises include international reserves, the real exchange rate, credit growth, credit to the public sector, and domestic inflation. The results also provide support for the trade balance, export performance, money growth, M2/international reserves, real GDP growth, and the fiscal balance. Interestingly, the variables associated with the external debt profile did not fare well, nor did the current account balance receive much support as a useful indicator of crises. Furthermore, the issue of the empirical relevance of self-fulfilling crises is subject to debate.

Finally, some recent papers have focused on contagion effects as the cause of currency crises. Eichengreen, Rose and Wyplosz (1996) provide a critical survey and some early evidence. For instance, contagion effects may arise if investors pay little heed to countries' economic fundamentals, and thus do not discriminate properly among countries. If contagion effects are present, a crisis in a neighbouring

(1) The studies examine periods that run from the early 1950s to the mid 1990s and cover both industrial and developing countries. The studies vary with respect to how "crisis" is defined. Most of the studies focus exclusively on devaluation episodes. Some of them examine large and infrequent devaluations, while others include in their sample small and frequent devaluations that may not fit the mold of a full-blown currency crisis. A few studies include, in addition to devaluations, episodes of unsuccessful speculative attacks; i.e., attacks that were averted without a devaluation, but at the cost of a large increase in domestic interest rates and/or sizeable loss of international reserves.

country may be an indicator of a future domestic crisis (Calvo and Reinhart, 1996). Moreover, Glick and Rose (1998) argue that currency crises have been substantially, though not exclusively, contagious. Three recent currency crises, the wave of speculative attacks[(2)] to the European Monetary System in 1992-1993, the Mexican crisis of 1994-1995, and the Southeast Asian crisis of 1997-1998, were largely regional phenomena. Once a country had suffered a speculative attack -Thailand in 1997, Mexico in 1994, Finland in 1992-, its trading partners and competitors were disproportionately likely to be attacked themselves. Two explanations for why contagion spreads have been proposed. The first relies on macroeconomic or financial similarity. A crisis may spread from the initial target to another if the two countries share various economic features (Sachs, Tornell and Velasco, 1996). Thus, currency crises may be regional if macroeconomic features of economies tend to be regional. The alternative view is that a devaluation gives a country a temporary boost in its competitiveness, in the presence of nominal rigidities. Its trade competitors are then at a competitive disadvantage; the most adversely affected by the devaluation are likely to be attacked next (Gerlach and Smets, 1994). Since trade patterns are strongly negatively affected by distance (Leamer and Levinsohn, 1995), currency crises will tend to be regional. Eichengreen and Rose (1998) found both "macroeconomic" and "trade" channels of transmission to be empirically relevant mechanisms of contagion.

6.2 A Proxy for Transfer Risk

As mentioned before, the isolation and analysis of transfer risk and local currency credit risk -which together constitute foreign currency credit risk-, although a topic of considerable importance, is relatively unexplored. Domowitz, Glen and Madhavan (1998) attempt to isolate currency and country risk via interest rate comparisons between local and foreign currency denominated debt issued by an emerging market government -Mexico.[(3)] They argue that the two major components

[(2)] An speculative attack on a fixed or managed exchange rate is a sudden and massive restructuring of portfolios in which market participants attempt to reap gains or prevent losses from an expected change in the exchange rate regime (IMF, 1995b).

[(3)] This study also provides further references about similar literature.

of the risk premia demanded by investors on these two types of instruments allow for such isolation. The first component, the "currency premium", is measured as the yield spread between peso and dollar-denominated Mexican sovereign debt and represents the compensation for risks associated with adverse movements in the exchange rate. The second component, the "country (credit) risk premium", is measured as the yield spread between dollar-denominated Mexican government debt and US Treasury bills and represents the risk that the government might default on its obligations due to an impossibility or refusal to convert local currency into foreign currency. This second component may be seen as equivalent to the transfer risk referred to here. The study, however, does not attempt to account for the factors that explain transfer risk. It only examines the relative importance of the two components -currency and country risk- of risk premia. It is concluded that currency risk is the most important factor.

In a related work, Zhang and Johnson (1998) propose the decomposition of total (US dollar-denominated) return/risk into local return/risk and currency return/risk and ascertain the extent to which each of these components contributes towards total risk. Total return is the local asset return expressed in foreign currency. Local currency performance is a country's index return in local currency. Currency return refers to the percentage change in the spot currency rate. The decomposition of return provides guidance on country selection strategies. Two countries may offer the same dollar denominated returns, but one with higher local return and the other with higher currency return. A long-term investor may favour the first country, which has a strong domestic market over the second country, where return is mostly from favourable currency swings. The study concluded that currency risk contributes to a much smaller degree to overall -US dollar denominated- risk in most emerging countries compared with developed countries.(4)

In the analysis presented in this chapter, transfer risk is proxied in a different form. As discussed before (see 3.2.1), sovereign issuers are normally assigned local currency ratings that are higher than their foreign currency ratings, reflecting the government's greater willingness and ability to fulfil their domestic currency obligations.[5] This difference stems mainly from the fact that, unlike local currency ratings, foreign currency ratings incorporate an appraisal of the transfer risk borne by the sovereign borrower, that is, the risk of transferring local currency into foreign currency debt service (see 3.1.1 and 6.1). In a common cross-border transaction, while assets are generating cash in the local currency, they have to be repaid in a different -foreign- currency. In this situation there is a risk that the foreign currency would not be available, even though the assets generate local currency cash flows. This transfer risk is the major component of a sovereign foreign currency rating (Kranenburg, 1996a). It is a factor every time a debt is payable in a different currency than that generating the cash relied upon for payment. In effect, it has been recognised that a foreign currency sovereign rating is an assessment of the factors taken into account to assign the local currency rating, plus the transfer risk (Salem, et.al., 1995).

In this context, this analysis uses the difference between the local and the foreign currency ratings of a sovereign as an approximation of the transfer risk borne by the sovereign and investigates the factors that help to explain this risk, as perceived by the rating agencies. The term "transfer risk" is, therefore, used in this sense throughout this chapter.[6]

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[4] Nonetheless, since the currency risk analysed in the study refers to the transfer risk borne by investors, that is, the likelihood that changes in the exchange rate may impair investors returns, such risk is not directly comparable to the sovereign transfer risk analysed in this research work.

[5] Typical counter examples of sovereigns having higher local currency ratings are the sovereigns which have both "triple-A" foreign currency ratings and "triple-A" local currency ratings, such as Austria, France, Germany, Japan, the United States, and the United Kingdom.

[6] It should be noted that the term transfer risk applies to both sovereign and non-sovereign borrowers. It refers to both the risk that the sovereign will be unable to secure foreign exchange to service its foreign currency debt, and to the likelihood that the sovereign constrain or absolutely prohibit non-sovereign issuers' access to foreign exchange (see 3.1.1). In this chapter the former definition of transfer risk will be used.

6.3 Data

6.3.1 Dependent Variable

The dependent variable included in this analysis, transfer risk, is measured as the number of rating notches[7] by which the long-term local currency rating of a sovereign exceeds its long-term foreign currency rating. The sample includes the ratings of 5 different rating agencies assigned to 49 sovereign borrowers as of December 31 of each year, for the period 1992-1997. The total sample size is 303 observations.[8] The difference between the local and foreign currency ratings included in the sample ranged from 0 to 8 rating notches, where zero denotes identical local and foreign currency ratings.

Figures 6-1 and 6-2 show the transfer risk distribution for the sample included in this analysis both for the whole of the period considered and by year. It can be noted that the sample does not include any observation for which the local currency rating of the sovereign is lower than the foreign currency rating. Moreover, the ratings distribution is skewed to the left reflecting the preponderance of low levels of transfer risk in the sample. Differences between local and foreign currency ratings which exceeded two rating notches accounted for 30 percent of the sample. Moreover, sovereigns with both foreign and local currency "triple-A" ratings, and, therefore, zero transfer risk, represented a similar proportion, thereby contributing to the concentration of transfer risk in low levels. Nevertheless, over the years, and due in part to the entrance of emerging market sovereigns into the international financial markets, the transfer risk distribution has evolved to become more even. Figure 6-2 illustrates this. During the first half of this decade developed countries, such as Canada, Switzerland, the United States, and the United Kingdom, whose transfer risk

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(7) A rating notch is a one-level difference on a 16-category rating scale, such as the difference between A1 and A2 for Moody's or between A+ and A for Standard and Poor's, and IBCA.

(8) The foreign and local currency sovereign ratings used in this study are those used in Chapters 4 (4.6) and 5 (5.5). The sample size (303) is determined by the local currency ratings database, which is the smallest database of the two. Additionally, one observation is dropped for Jordan in 1995, since the country is not rated for its foreign currency obligations, while it is rated for its local currency debt. Countries included in the sample correspond to those listed in Table 5-1 in Chapter 5.

is perceived to be minimal, dominated the sample. By the second half of the decade the sovereign rating activity had expanded to include weaker credits such as Chile, Colombia, Hungary and Kazakhstan, thereby shifting the transfer risk distribution. This coincides with the trends described in the previous two chapters regarding the assignment of lower foreign and local currency ratings which have also resulted in more normally-distributed ratings in recent years.

Figure 6-1. Transfer Risk Distribution, 1992-1997

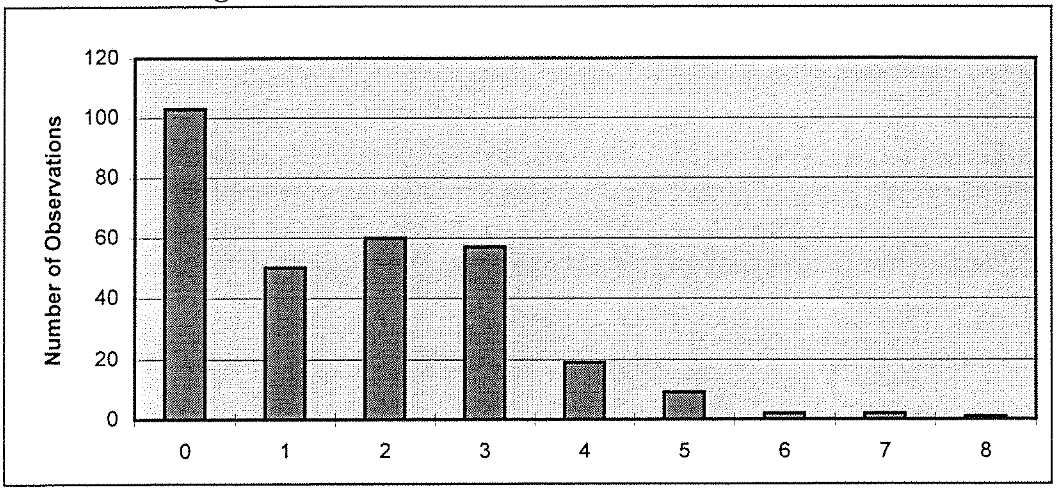
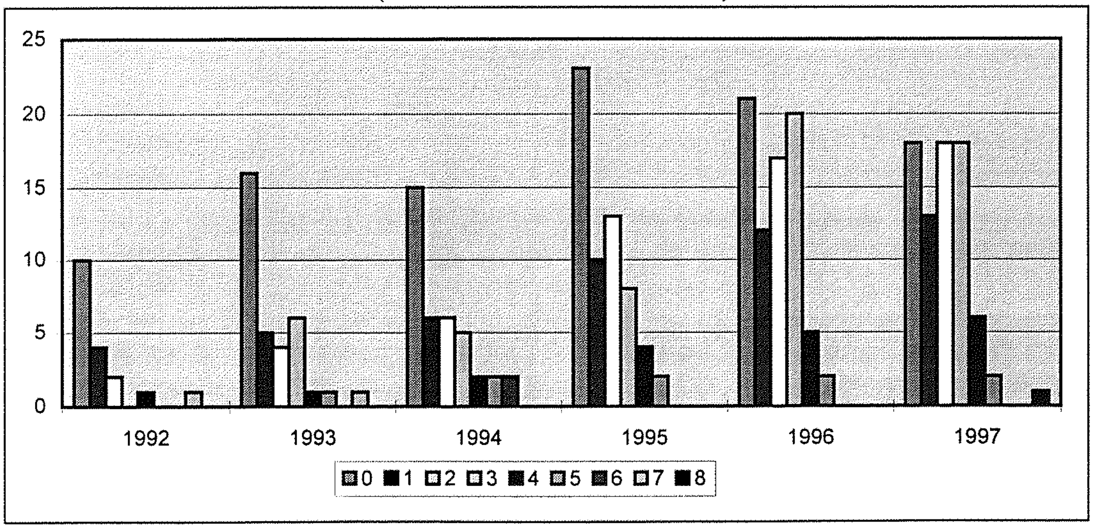


Figure 6-2. Transfer Risk Distribution, by Year (Number of Observations)



The changes in the distribution of transfer risk levels over the years imply, as in the case of local and foreign currency ratings, that the determinants of transfer risk and/or the weightings attached to them might have changed from one year to another. That is, the inferences from the models might differ if the sample were analysed for each year separately instead of using an estimation for the whole period -1992 to 1997. At the same time, if such differences were observed, this would imply that either the determinants of transfer risk or the weightings attached to them, or both, would vary depending on the ratings assigned to the sovereign. As mentioned before, the increase in the number of low credit quality sovereigns in the last few years has resulted in changes in the distribution of ratings and transfer risk levels. Therefore, differences in the weightings of the determinants of transfer risk levels would imply that such determinants vary between investment-grade and non-investment-grade sovereigns. On the other hand, changes in the factors that are perceived to be associated with sovereign transfer risk or their relative importance may trigger changes in the determinants of transfer risk over the years. It is, thus, recognised that inferences for a specific year may differ from the inferences drawn for the whole period.

Given that the sample used for the analysis of transfer risk is determined by the local currency ratings sample, the differences in the sub-sample size and distribution of transfer risk levels for each rating agency are similar to those described in the previous chapter for local currency ratings (5.5.1). In this context, the differences found across agencies regarding their assessments of transfer risk, the determinants of such risk and the weighting attached to each determinant cannot be completely generalised. For instance, given the similarity in the number and the credit quality of the sovereigns included in the sub-samples of Moody's, Standard and Poor's and IBCA, the inferences from the models which attempt to capture differences between these agencies are deemed valid. The greater variability between Duff and Phelps' and Thomson BankWatch's sub-samples as compared to Standard and Poor's -the reference agency-, however, hinders the validity of the findings regarding differences between these agencies. Nonetheless, results for Duff and Phelps and Thomson BankWatch are also reported.

6.3.2 Explanatory Variables

The choice of explanatory variables was dictated by theoretical and empirical considerations: they have been identified as indicators of currency crises (see 6.1). Consistent with the analyses described in Chapters 4 and 5, the explanatory variables included in this analysis are lagged by one year, unless stated otherwise, and are grouped into four different subsets: (1) macroeconomic variables; (2) balance-sheet variables; (3) agency indicator variables; and, (4) region indicator variables. The variables contained in each subset are listed below.(9) Additionally, the foreign currency rating of the sovereign is included in some of the models as an explanatory variable in an attempt to control for the effect of this rating on transfer risk, as described below.

Macroeconomic Variables

1) **External debt.** External debt relative to exports;

2) **Fiscal balance.** Government surplus (+) or deficit (-) relative to GDP;

3) **External balance.** Current account balance relative to GDP;

4) **Inflation.** Annual rate of inflation;

5) **Income.** GDP per capita;

6) **GDP growth.** Annual real GDP growth;

7) **Development Indicator.** IMF country classification;

8) **Default history on foreign currency debt,** since 1975;

9) **Default history on local currency debt**, since 1975.

Balance-Sheet Variables

1) Long-term bank debt relative to total bank borrowing;

2) Medium-term bank debt relative to total bank borrowing;

3) Short-term bank debt relative to total bank borrowing;

4) Country's total debt relative to total bank lending for the sample;

(9) Sections 4.3 and 5.3 in Chapters 4 and 5 respectively, describe in detail these subsets of variables and identify their relationship with foreign and local currency sovereign ratings.

5) Undisbursed credit commitments relative to total bank lending to a country;

6) Foreign exchange reserves relative to the IMF quota;

7) Use of IMF credit relative to the IMF quota;

8) Total bank borrowing relative to bank deposits.

Agency Indicators

1) Moody's Investors Service;

2) Standard and Poor's (reference agency);

3) IBCA;

4) Thomson BankWatch;

5) Duff and Phelps.

Regional Indicators

1) Africa/Middle East;

2) Asia/Pacific Central;

3) Eastern Europe;

4) Latin America;

5) West Europe/North America (reference region).

Foreign currency sovereign rating

An interpretation problem for transfer risk arises at the upper- and lower-end of the rating spectrum. Long-standing political stability, fiscal and monetary policies resulting in relatively low inflation, and a high degree of international economic integration are characteristics of sovereign issuers of triple-"A" rated local currency debt. The manageable public external debt burdens of these issuers, in turn, result in foreign currency debt ratings at the upper end of the investment-grade spectrum. The narrow differences between local and foreign currency ratings for these sovereigns result, in fact, from a low perceived transfer risk. At the lower end of the rating scale, however, such differences can also be narrow. Nevertheless, this should not be interpreted as a low transfer risk associated with such sovereigns. On the contrary, sovereigns in this category may have emerged from local or foreign currency debt default very recently, and still carry the risk of policy reversals that can result in renewed default. Other sovereigns in this category may not have defaulted, but face high inflation and other forms of social and political stress that carry a material risk of local currency default after which payment of foreign currency debt can no longer be assured. This also results in narrow differences between local and foreign currency ratings, but this does not reflect a low perceived transfer risk, but high risk of default on both local and foreign currency debt.

Given the difficulty of interpretation described above, the foreign currency rating of the sovereign was included in the models as an additional explanatory variable in an attempt to control for the effect of this rating on transfer risk. That is, lower foreign currency ratings should be associated with higher perceived transfer risk, even if the difference between the local and the foreign currency ratings of the sovereign is narrow. By isolating this effect, therefore, it is possible to ascertain the factors that determine transfer risk.

6.4 Hypotheses

The empirical literature reviewed above (6.1) has identified the indicators that perform best at predicting currency crises -which result from transfer risk- on the basis of the number of empirical studies in which each indicator resulted a significant determinant of currency crises. According to this literature, among the macroeconomic variables which have been chosen for this analysis, the rate of inflation should prove the best indicator of transfer risk. The growth of real GDP and the fiscal deficit should also play a role, while external debt and external balance are expected not to be related to transfer risk. The rest of the variables -income per capita, development indicator, and indicators of past default on foreign and local currency debt- have been included in a very small number of studies under review, or no study at all. Their relative importance to explain transfer risk, at least from previous empirical literature, cannot be anticipated. Hence,

Hypothesis 1: High rates of inflation and large fiscal deficits will result in higher perceived transfer risk, while positive rates of GDP growth are associated with lower transfer risk. This is observed in a positive coefficient for the rate of inflation, and negative coefficients for the fiscal balance and the growth of GDP. External debt and external balance are expected to have positive and negative coefficients, respectively, although not statistically significant.

The results of the analyses presented in last two chapters indicate that, while there are systematic differences across agencies regarding both local and foreign currency ratings assigned to sovereign borrowers, these differences are not consistent across the two types of ratings. That is, rating agencies that appeared to assign systematically different local currency ratings compared to other agencies, did not do so for foreign currency ratings. Therefore,

Hypothesis 2: The assessment of transfer risk is expected to vary systematically across agencies, and this is reflected in the significant coefficients of the agency indicator variables.

It has been found that sovereign creditworthiness on both local and foreign currency debt is perceived to be related to the geographic region of the sovereign. Furthermore, given the evidence supporting the presence of contagious currency crises (see 6.1), it is expected that neighbouring countries are perceived to pose similar transfer risk. This leads to expect that,

Hypothesis 3: Transfer risk varies systematically across geographic regions. This is reflected in the significant coefficients for the region indicators.

The results presented in the last two chapters have also shown that, while lagged variables play an important role in the determination of foreign currency sovereign ratings, these variables do not help to explain local currency ratings. It is therefore hypothesised that,

Hypothesis 4: Lagged variables help to explain the difference between local and foreign currency sovereign ratings, i.e., transfer risk.

Similarly, balance-sheet variables were found to have a significant joint effect on foreign currency sovereign ratings, but only a minor effect on local currency ratings. Moreover, the theoretical and empirical literature particularly and repeatedly emphasises international reserves as one of the leading indicators of currency crises. It is thus expected that these variables, considered together as a group, and the level of foreign exchange reserves, in particular, are included in the assessment of transfer risk. Hence,

Hypothesis 5: Balance-sheet variables play an important role in explaining the difference between a sovereign's local and foreign currency ratings, that is, in explaining sovereign transfer risk. Foreign exchange reserves, in particular, are expected to have a significant effect on transfer risk.

6.5 Estimation Method

To test the hypotheses outlined above, this empirical work uses ordered probit analysis and compares these results with those obtained using ordinary least squares (OLS) regression. The selection of ordered probit as the estimation model is driven by its usefulness in capturing the relationship between ordinal, discrete-valued dependent variables and continuous-valued regressors. Transfer risk, the dependent variable, is clearly not continuously distributed, and such lack of continuity suggests that pursuing models which treat a qualitative dependent variable as continuous can lead to serious errors in inference (Aldrich and Nelson, 1984). Long (1997) cites some examples of the risk of misleading results from using simple linear regression with limited dependent variables.

Additionally, transfer risk, is assumed to take on only a fixed number of discrete values of such an ordinal nature that a wider difference between local and foreign currency ratings represents a higher level of transfer risk. In this case, transfer risk is assumed to take nine discrete values, from 0 to 8 rating notches, being 0 the lowest level of transfer risk and 8 the highest.

The model used in this analysis was derived and estimated in the same form as the model utilised in Chapter 4 for foreign currency ratings,[10] but using the difference between local and foreign currency ratings -i.e., transfer risk- as the observed dependent variable.

OLS estimation has been included only for comparison purposes. Ordered probit and OLS models are compared in terms of the statistical significance of the explanatory variables, as well as in terms of the differences in the magnitude of the estimated coefficients between both techniques. The ability of both techniques to correctly classify and predict transfer risk levels is also compared. Additionally, the inclusion of OLS is consistent with the two previous chapters in that it allows for comparison between the results of this analysis and the analyses of those chapters.

6.6 Results

Maximum likelihood estimates for the ordered probit model and OLS estimates are presented in Tables 6-1 to 6-11. The results of this analysis are presented below and start with a description of the findings arising from the base model which includes only the nine macroeconomic explanatory variables. Improvements to the base model are subsequently made by the addition of agency and region indicators, as well as the addition of lagged and balance-sheet variables. As mentioned before (6.3.1), differences in the sub-samples of Duff and Phelps and Thomson BankWatch as compared to Moody's, Standard and Poor's and IBCA's sub-samples do not allow for generalisation of the findings regarding differences between agencies. Nonetheless, the similarity between the sub-samples of the latter three agencies suggests valid inferences for these agencies.

This section discusses the statistical significance of the explanatory variables, while their quantitative impact is described in section 6.8.

6.6.1 Base Model

To test hypothesis 1, a base model using the nine macroeconomic variables was estimated. The probit results for this model are presented in the first column of Table 6-1. Contrary to the findings of the empirical literature on currency crises, the external balance appears to have a significantly negative effect on transfer risk, indicating that higher current account surpluses result in narrower gaps between local and foreign currency sovereign ratings, that is, lower transfer risk. A significant negative impact on transfer risk is also found to be produced by the income per capita and the fiscal balance. This indicates that higher levels of government surpluses -i.e., lower deficits- and/or higher levels of income per capita are

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(10) See 4.5 in Chapter 4 for a full description of the estimation model.

associated with lower levels of transfer risk and will account for narrower differences between local and foreign currency sovereign ratings. Also negative, but not statistically significant, is the coefficient of the development indicator, reflecting the fact that sovereigns of industrial countries are perceived as borrowers with lower transfer risk. Industrial countries normally have high ratings, for both local and foreign currency debt, and this accounts for narrower rating differences.

Conflicting greatly with the expectations of hypothesis 1 and with the findings of empirical studies which predict currency crises, the coefficient on the rate of inflation is not statistically significant, and has an unexpected negative sign. This negative relationship between inflation and transfer risk reflects the fact that countries with high rates of inflation will normally have low local currency ratings which constrain their foreign currency ratings to even lower levels, thereby resulting in narrow rating differences.

The reputation of the sovereign also plays an important role in explaining the differences between its local and foreign currency ratings. While a history of default on foreign currency debt will result in a higher perceived transfer risk, defaults on local currency debt will narrow the difference between local and foreign currency ratings. The latter reflects the fact that the countries which have defaulted on local currency debt have both low local currency ratings and low foreign currency ratings.(11) Furthermore, these findings are consistent with the results reported in the last two chapters. The negative effect of the history of default on external debt is greater on foreign than on local currency ratings, thereby accounting for wider differences between the two types of ratings. The opposite effect is suggested for the history of default on local currency debt as reflected in the negative coefficient of this variable.

Positive, but insignificant coefficients are observed for external debt and GDP growth, indicating the lack of a statistically significant relationship between these variables and transfer risk. The finding for the GDP growth contrasts with empirical research which has found a significant role for this variable in predicting

(11) For instance, Argentina was rated B1 by Moody's for the period 1993-1995 for both local and foreign currency debt, thereby having a level of transfer risk of zero. Similarly Brazil was assigned BB(B+) and BB+(BB-) local(foreign) currency ratings by Standard and Poor's for 1996 and 1997, respectively, which accounted for a level of transfer risk of 2 in both years.

currency crises (Kaminsky, Lizondo and Reinhart, 1997). On the other hand, the lack of significance for external debt confirms the findings of previous research suggesting that the external debt profile of a country is not a useful indicator of financial crises.

The likelihood ratio statistic tests the joint significance of the explanatory variables, i.e., tests the hypothesis that all coefficients, except the intercept, are zero.[12] The null hypothesis is clearly rejected in each case according to the χ^2 (d.f.=9) distribution. It is therefore concluded that this subset of variables has significant power to explain the difference between the local and the foreign currency ratings of sovereign borrowers.

The fourth column in Table 6-1 shows the OLS regression estimates. On the whole, the *t*-statistics are similar to those of the probit estimates and, although there is a difference in the magnitude of the coefficients, for some variables the difference is minor. Moreover, there is almost no difference in the statistical significance of the coefficients estimated using OLS or ordered probit. A further analysis comparing the performance of both estimation techniques is given in section 6.7.

Thus far, the results give mixed support to hypothesis 1, in that, as expected, positive fiscal balances are related with lower transfer risk levels. Contrary to expectations, however, the external balance is found to be a significant determinant of transfer risk, while the rate of inflation proved statistically insignificant; both variables have an inverse relationship with transfer risk.

As mentioned before, low local currency ratings further constrain foreign currency ratings resulting in narrow differences between these two types of ratings. Therefore, low levels of transfer risk may sometimes reflect local and foreign currency ratings at the lower end of the rating spectrum rather than a "true" low level of transfer risk. Taking this into consideration, the foreign currency rating of the sovereign was included in the base model as an additional explanatory variable. This has the objective of testing for the influence of foreign currency ratings on transfer

[12] To test for the joint significance of subsets of explanatory variables, likelihood ratio (LR) tests are used. The LR statistic is given by $-2\ln(L_0/L_1)$ where L_1 is the value of the likelihood function for the model including all the variables with unconstrained coefficients, and L_0 is the value of the likelihood function for the model resulting from constraining the coefficients of the subset of variables of interest to zero. When the significance of the base model is tested, all coefficients

risk. Specifically, it would be expected that higher foreign currency ratings are associated with lower levels of transfer risk, and vice versa. The results for this test are shown in Table 6-2 under the heading Model 3. It can be noted that the relationship between the foreign currency rating of the sovereign and the perceived transfer risk associated with it resulted as expected. The negative and highly significant coefficient of the foreign currency sovereign rating indicates that higher foreign currency ratings result in lower levels of transfer risk, and vice versa. Moreover, the inclusion of the foreign currency rating has a significant effect on transfer risk over and above that of the base model which is reflected in the likelihood ratio statistic reported for Model 3 (LR=39.24; d.f.=1; $p<0.01$).[13]

Several differences in the determinants of transfer risk are observed after accounting for the influence of the foreign currency rating of the sovereign, as compared to the base model. Contrary to the findings of the base model and consistent with the empirical literature on currency crises, the level of growth of GDP and the rate of inflation resulted statistically significant. Nonetheless, the coefficients of both variables are of the unexpected sign: negative for the rate of inflation and positive for the growth of GDP. As explained before, the negative coefficient on the rate of inflation indicates low local currency ratings for countries with high rates of inflation which constrain their foreign currency ratings to even lower levels, thereby resulting in narrower rating differences. The positive coefficient of the GDP growth may reflect the fact that many developing economies, which face higher transfer risk, tend to grow faster than mature economies. Additionally, and also disputing the findings of the mentioned literature, the level of external debt proved statistically significant and inversely related to transfer risk. This is consistent with the results of the previous two chapters in that the level of external debt has a negative effect on both local and foreign currency ratings, thereby lowering the ratings and contributing to a narrower difference between them. Interestingly, after the inclusion of the foreign currency rating, the indicator of default on foreign currency debt proved insignificant reflecting that such information

except the intercept are zero. The LR statistic will follow a chi-squared distribution with degrees of freedom (d.f.) equal to the number of constraints imposed. See Aldrich and Nelson, 1984.

is already incorporated into foreign currency ratings. This is also consistent with the results of Chapter 4 which identified the indicator of past default on foreign currency debt as a significant determinant of foreign currency ratings. Finally, while the income per capita appeared to be significant in the base model, it has an insignificant coefficient after the addition of the foreign currency rating.

Column four in Table 6-2 presents the OLS estimates for Model 3. Except for the external debt and fiscal balance whose coefficients are significant in the probit analysis whereas they are statistically insignificant in the OLS analysis, the inferences remain unchanged and no other major difference in the magnitude of the coefficients and *t*-statistics is found as compared to the probit estimates.

The results of this sub-section show that, after controlling for the effect of the foreign currency rating of the sovereign, perceived transfer risk appears to be explained by the indicators which have proved useful to predict currency crises, as expected by hypothesis 1. These indicators include the fiscal balance, the rate of inflation, and the growth of GDP. Nonetheless, the external balance and the external debt profile of the sovereign, which have not been previously associated with the occurrence of currency crises (Kaminsky, Lizondo and Reinhart, 1997), resulted significant determinants of transfer risk, as perceived by the rating agencies. Further, higher foreign currency ratings reflect lower levels of transfer risk.

6.6.2 Agency Indicators

Model 1 in the second column of Table 6-1 presents further probit results from the test for the agency effect on transfer risk. The model adds the agency indicators to the base model and the results show that these indicators have a significant joint impact on the difference between local and foreign currency ratings, as reflected in the likelihood ratio statistic (LR=19.59; d.f.=3; $p<0.01$).(14) The joint impact of the set of agency indicators, therefore, is found important to explain transfer risk. Considered individually, however, the effect of the agency is not significant, as

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(13) This likelihood ratio statistic tests for the additional impact of the foreign currency rating on transfer risk relative to the impact of the variables included in the base model reported in Table 6-1.

(14) Due to the small number of observations for Thomson BankWatch (only one observation), its effect on the dependent variable could not be estimated and was therefore excluded from this analysis.

reflected in the statistically insignificant coefficients of the indicators for each agency.

These results, nevertheless, seem to be partly consistent with those found in Chapters 4 and 5. Relative to Standard and Poor's, Moody's and IBCA appeared to assign lower local currency ratings and broadly the same foreign currency ratings. Therefore, it would be expected to observe narrower differences between local and foreign currency ratings for the latter two agencies. This, in fact, is found as reflected in the negative coefficients for these two agencies in Model 1, but as mentioned above, the effect on transfer risk is not statistically significant. On the other hand, while Duff and Phelps assigns broadly the same local currency sovereign ratings as Standard and Poor's, it assigns higher foreign currency ratings. Contrary to expectations, it is found that, although statistically insignificant, the difference between local and foreign currency ratings is wider for Duff and Phelps than for Standard and Poor's.

The fifth column in Table 6-1 presents the estimates of the OLS regression. The inferences drawn from the probit results remain unchanged: there is almost no difference in the statistical significance of the coefficients of the agency indicators, and the magnitude of these coefficients and t-statistics are very similar. Judging from the inferences drawn from each technique, no major difference is observed between ordered probit and OLS.

To further investigate the effect of the agency on the transfer risk, the foreign currency rating of the sovereign was added to Model 1. The probit estimates are shown in Model 4 in Table 6-2. After the inclusion of the foreign currency rating, the effect of the agency on transfer risk remains practically unchanged. All coefficients have the same sign as in Model 1. Nonetheless, the negative coefficient of Moody's is statistically significant -though only moderately- indicating that Moody's assessments of transfer risk are systematically lower than those of Standard and Poor's. The likelihood ratio statistic, LR1, tests for the joint impact of the agency indicators on transfer risk as compared to Model 3. It is found that this subset of indicator variables added explanatory power to Model 3 which included the variables of the base model and the foreign currency rating (LR1= 24.31; d.f.= 3; $p<0.01$). The statistic LR2 tests for the impact of the addition of the foreign currency rating to Model 1. This impact is found to be highly significant as reflected in the value of the statistic (LR2=43.96; d.f.=1; $p<0.01$).

OLS estimates of Model 4 are presented in the fifth column of Table 6-2. There is no major difference in the magnitude of the coefficients and *t*-statistics of the agency indicators, relative to the probit estimates. Nevertheless, as in the last sub-section, the coefficients of external debt and fiscal balance proved statistically insignificant in the OLS analysis while they resulted significant in the ordered probit analysis. This contrasts with the probit and OLS estimates of Model 1 which proved very similar and resulted in virtually unchanged inferences.

Table 6-3 shows the probit and OLS estimates of the individual models which test for the differences between agencies regarding the determinants of transfer risk. Models 6, 7 and 8 correspond to Moody's, Standard and Poor's, and IBCA's ratings and include, in addition to the nine macroeconomic variables and the foreign currency sovereign rating, the indicator variables for the geographic region.(15) Since the emphasis of this sub-section is on the differences between agencies in the macroeconomic determinants of transfer risk, the inferences drawn from the region indicators are discussed in the next sub-section. The estimates show that, although the agencies' assessments of transfer risk are generally not significantly different -as suggested by Model 4-, there are significant differences in the factors that each agency considers to ascertain such risk. For instance, while the difference between the local and foreign currency ratings assigned by IBCA seems to be partly determined by the fiscal balance and the development indicator, the difference for Standard and Poor's ratings is not significantly affected by those variables. In particular, the weight attached by IBCA to the development indicator is considerably greater than that attached by Standard and Poor's. That is, to be classified as industrial country by the IMF will result in largely lower perceived transfer risk if the country is assessed by IBCA as compared to Standard and Poor's. On the other hand, a history of past default on local currency debt will result in systematically narrower differences between Standard and Poor's local and foreign

(15) The model for Moody's could not be estimated using ordered probit due to its small sub-sample size. Individual models for Thomson BankWatch and Duff and Phelps could not be estimated since in both cases the number of observations in the sub-samples (1 and 7 observations, respectively) was smaller than the number of parameters to be estimated.

currency ratings, whereas the effect of this factor is not significant on IBCA's ratings differences. This is consistent with the analysis of local currency ratings in the previous chapter (5.6.2 and Table 5-3) which suggested that Standard and Poor's placed greater weight on the local currency default record of the sovereign as a negative factor determining local currency ratings. As described before, previous default on local currency debt is associated with low local currency ratings which further constrain foreign currency ratings, thereby resulting in narrower differences between these two types of ratings. In general, and also consistent with the results of the previous chapter, Standard and Poor's and IBCA seem to agree most in the determinants of transfer risk, at least in terms of the statistical significance of the estimated coefficients. Given that some of the explanatory variables had to be excluded in order to estimate Moody's -OLS- model, a more detailed comparison between this and the former two rating agencies is not feasible.

Comparing the probit and OLS estimates given in Table 6-3 it can be noted that the differences in the magnitude of the coefficients and *t*-statistics are sizeable. Nevertheless, the statistical inferences remain practically unchanged regardless of the technique employed to analyse the data.

The results, therefore, provide evidence supporting in part hypothesis 2, and it is concluded that the difference between the local and the foreign currency ratings of the sovereign can be better explained by accounting for the joint effect of the rating agencies. Furthermore, while the agencies seem to broadly agree on their assessment of transfer risk, the results suggest that the factors which determine perceived transfer risk significantly differ between agencies. On the whole, Standard and Poor's and IBCA have the highest level of agreement regarding the factors they consider to ascertain sovereign transfer risk.

6.6.3 Regional Indicators

The third column in Table 6-1 presents probit estimation results for Model 2, where the effect of the geographic region of the sovereign on the transfer risk is directly tested. The results differ from those found for the effect of the rating agency presented above in that both, individually and collectively, the geographic region of the sovereign significantly affects the difference between local and foreign currency ratings.

To test for the joint significance of the region indicators a likelihood ratio test was carried out. It was found that the inclusion of the regional indicators added to the explanatory value of the base model, which is reflected in the highly significant likelihood ratio statistic (LR=42.45; d.f.=4; $p<0.01$).

Positive and highly significant coefficients are found for Asia, Pacific Central, Eastern Europe and Latin America. Also positive, but only moderately significant, is the coefficient on the Africa/Middle East indicator. The direct relationship between the geographic region and transfer risk indicates that the perceived transfer risk of sovereigns in these regions is the result not only of the different ability of the sovereigns to service local and foreign currency debt, as reflected in their individual economic characteristics, but it is also the result of the effect of their geographic region. Moreover, transfer risk is perceived to be higher for sovereigns in these regions than for sovereigns in West Europe or North America. This suggests that for a given local currency rating, it would be observed that sovereigns outside West Europe or North America have lower foreign currency ratings than their counterparts in these regions.[16] Nevertheless, the transfer risk associated with sovereigns in Africa and the Middle East seems to be more influenced by their stand-alone characteristics than by the geographic region.

These findings are consistent with evidence supporting the contagion effects of currency crises (Glick and Rose, 1998), thereby suggesting that rating agencies perceive transfer risk to be regional. As discussed earlier (6.1), macroeconomic or financial similarity between neighbouring countries, and the proximity of trading partners have been found relevant mechanisms of contagion. In this context, the transfer risk associated with a sovereign is perceived to be affected by the transfer risk associated with neighbouring countries in what is denominated "herd effect" in perceptions.

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(16) This, however, does not necessarily apply for a given foreign currency rating since most West European and North American sovereigns have foreign currency ratings at the upper end of the rating scale -i.e., double-A or triple-A-, and tripe-A local currency ratings. Therefore, for a given foreign currency rating, it would not be expected to observe sovereigns outside West Europe or North America having higher local currency ratings then their counterparts in these regions.

Comparing probit and OLS results, given in the third and last columns of Table 6-1 respectively, it is observed that although the magnitude of the estimated coefficients and *t*-statistics differs slightly between the two techniques, there is practically no difference in the statistical significance of the coefficients. The same inferences regarding the effect of the geographic region are obtained from both estimation techniques. Based on this estimation sample, at least, no major differences between ordered probit and OLS are found.

To further investigate the effect of the geographic region on transfer risk, Model 5 was estimated. The model includes the explanatory variables of Model 2 and, additionally, controls for the effect of the foreign currency sovereign rating by including it as an explanatory variable. The probit estimates for this model are shown in the third column of Table 6-2. It can be noted that the inclusion of the foreign currency rating curtailed, in general, the effect of the geographic region on transfer risk as reflected in the invariably smaller and generally insignificant coefficients of the regional indicators. The geographic region maintains a significant and positive effect only on the perceived transfer risk of Latin American countries. Interestingly, the coefficient of Africa/Middle East resulted of the opposite (negative) sign -as compared to Model 2-, indicating that, after taking into account the influence of the foreign currency rating, sovereigns in these regions have narrower differences between local and foreign currency ratings relative to sovereigns West Europe and North America.

The likelihood ratio statistic LR1, given at the bottom of the probit estimates of Model 5 in Table 6-2, tests for the joint impact of the subset of region indicators on transfer risk as compared to Model 3 which excludes such subset of variables. LR2 tests for the impact of the addition of the foreign currency rating to Model 2, which includes region indicators but excludes foreign currency ratings as explanatory variables. In both cases, Model 5 added significantly to the explanatory value of the reference models, thereby further supporting the findings that transfer risk is perceived by the rating agencies to be regionally influenced.

Comparing the ordered probit and OLS estimates of Model 5, no major differences between both techniques are found. The statistical significance of the variables and the magnitude of the coefficients and t-statistics is practically the same. Statistical inferences remain unchanged.

To examine differences across agencies regarding their perception of transfer risk for the different geographic regions Models 9 to 12 were estimated. The probit and OLS results are shown in Tables 6-4 and 6-5, respectively.(17) The probit estimates suggest that Standard and Poor's is more pessimistic than Moody's and IBCA about the transfer risk of sovereigns in Latin America, West Europe and North America, as reflected in the negative and significant coefficients of the indicators for the latter two agencies. Nevertheless, the coefficient of IBCA for West Europe and North America is statistically insignificant. By way of contrast, there seem to be systematic differences among these three agencies regarding the transfer risk associated with sovereigns in Asia and the Pacific Central. Further, Duff and Phelps seems to perceive a greater transfer risk than Standard and Poor's for Latin American sovereigns, although this effect is not statistically significant. Comparing these probit results with the OLS estimates presented in Table 6-5 it is observed that the inferences drawn from each technique are different in terms of the statistical significance of the variables and the magnitude of their coefficients and t-statistics. Given that ordered probit is more compatible with the ordinal, discrete nature of the transfer risk categories, the inferences from this technique are deemed superior.

The results, therefore, support hypothesis 3 and show that transfer risk is affected by the geographic region of the sovereign and this effect is supplementary to the effect of macroeconomic variables which account for the different risks associated with local and foreign currency debt. This is consistent with empirical evidence suggesting that currency crises are regional. Furthermore, the perceived transfer risk associated with a given geographic region varies across agencies being Standard and Poor's, in general, more pessimistic when assessing such risk.

(17) Due to the small sub-sample sizes individual models for regions 1 (Africa/Middle East) and 3 (Eastern Europe) could not be estimated using ordered probit analysis. Nonetheless, an individual model for region 3 could be estimated using OLS.

6.6.4 Average and Lagged Variables

As for hypothesis 4, it was expected that the lagged values of macroeconomic variables played an important role in explaining sovereign transfer risk. Table 6-6 presents the estimation results for the model (Model 13) including both average variables and variables lagged by one and two years.[18] From the probit results given in the first column of the table, it is found that the addition of the set of lagged variables does not seem to add significantly to the explanatory value of Model 3 - which includes only the average macroeconomic variables.[19] The likelihood ratio statistic is not significant (LR=14.34; d.f.=12; $p<0.90$) indicating that the joint impact of the set of lagged variables is not important.

The examination of the individual coefficients of the lagged variables, however, leads to contrasting findings. The coefficient of income per capita lagged by two years is negative and moderately significant, while the coefficient of the external balance lagged by one year is positive and its significance is low. This suggests that higher levels of income per capita are associated with a better ability of the sovereign to honour both local and foreign currency debt, which is reflected in narrower rating gaps. Furthermore, considering the income per capita as an indicator of the economic development of the country and given the fact that neither its average value nor the value lagged by one year proved significant, the results also suggest that the agencies react slowly to changes in the level of income. The positive coefficient of the lagged value of external balance together with the highly significant and negative coefficient of its average value suggest that high levels of current account surpluses account for lower perceived transfer risk only when these surpluses have been sustained for a period of time.

Of the base model and in addition to the average value of the external balance, the level of external debt relative to exports in the year previous to the

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(18) Kazakhstan was excluded from the sample due to the lack of observations for lagged variables. In addition, a model including lagged variables up to three years was estimated, but the model performed worse than the model with lagged variables up to two years presented here.

(19) In order to carry out this test, the Model 3 was re-estimated using the sample of 300 observations. The model included the external debt lagged by one year, the average fiscal balance, the average external balance, the average rate of inflation, the income per capita lagged by one year, the average GDP growth, the development indicator, the indicator for default on foreign debt, the indicator for default on local currency debt, and the foreign currency sovereign rating. The rest of the variables included in Model 13 comprise the subset of lagged variables.

rating, and the indicators of the history of default on local and foreign currency debt, remained in the model with a statistically significant effect. The positive coefficient for the foreign debt burden in the year previous to the rating suggests that higher levels of external debt in the recent past increase the perceived transfer risk of the sovereign. The sovereign's reputation for repayment also plays a role in the assessment of transfer risk. Other things being equal, a history of default on foreign currency debt results in higher perceived transfer risk, while a history of default on local currency debt accounts for narrower differences between local and foreign currency ratings for the reasons discussed before (6.6.1).

The second column of Table 6-6 presents estimates for the OLS estimation. Compared to the probit results, there is almost no difference in the statistical significance of the coefficients estimated using each technique. The *t*-statistics and the magnitude of the coefficients are similar, especially for the variables which were found significant. Based on this sample, it may be tentatively concluded that there are no major differences between the two estimation techniques.

As in the previous sub-sections, a test controlling for the influence of the foreign currency rating of the sovereign on transfer risk was carried out. Table 6-7 shows the estimates for Model 14 which includes, in addition to the average and lag-valued variables, the foreign currency rating of the sovereign as explanatory variable. The results from the ordered probit analysis show that the inclusion of the foreign currency rating added to the explanatory value of Model 13 as reflected in the likelihood ratio statistic LR1 (LR1=38.12; d.f.=1; $p<0.05$). Similar to previous results, the sign of coefficient of the foreign currency rating is negative and significant indicating that higher foreign currency ratings are associated with lower levels of transfer risk. On the other hand, the joint impact of the lagged variables remains insignificant even after controlling for the effect of the foreign currency rating of the sovereign (LR2=13.92; d.f.=12, $p<0.90$).[20] Individually, only the value of the income per capita lagged by two years appeared significant and with the anticipated negative sign suggesting that higher levels of income result in lower levels of perceived transfer risk. As in Model 13, the average value of the external balance proved significant and inversely related to transfer risk. Interestingly, the average value of the income per capita had a positive sign suggesting that higher levels of income result in higher perceived transfer risk. Moreover, after the inclusion of the foreign currency rating as an explanatory variable, the indicator of default on foreign currency debt became statistically insignificant indicating that this information is already incorporated into the foreign currency ratings.

Comparing the ordered probit and OLS estimates for Model 14 it is observed that, although the magnitude of the coefficients and *t*-statistics are, in general, very similar, there still are some differences in the statistical inferences drawn from each technique. Nonetheless, at least on this sample and in terms of the differences in the statistical significance of the estimates, both probit and OLS seem to fare in fairly like manner.

Further results for the test of the relative importance of average and lagged variables are given in Table 6-8. The table presents the estimated parameters for Model 14 estimated individually for Moody's, Standard and Poor's and IBCA - Models 15 to 17, respectively.(21) The results suggest that while Standard and Poor's assessments of transfer risk do not seem to rely greatly on lagged variables, IBCA appears to place a greater weight on such variables to assess transfer risk. This is consistent with the results on local currency ratings which showed that, among the agencies included in the analysis, IBCA seems to place the greatest emphasis on lagged variables in order to determine local currency ratings. However, this may indicate that the agency reacts more slowly than the other agencies to reflect in its ratings the changes in the economic fundamentals of a sovereign. In particular, IBCA seems to attach importance to the lagged values of the external and the fiscal balances, the income per capita, and the growth of GDP. Moreover, Moody's also appears to incorporate the lagged values of fiscal balance and income per capita into its assessments of transfer risk. Comparing the probit and OLS estimates of these models it is observed that while both techniques yield similar results in terms of the statistical inferences drawn from the models, there are significant differences in the

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(20) This likelihood ratio statistic was obtained by comparing the value of the likelihood function for Model 14 to the value of the likelihood function for Model 3 which was re-estimated using the sample of Model 14.

(21) Due to the small sample size, the model for Moody's could not be estimated using ordered probit.

magnitude of the coefficients and *t*-statistics for IBCA's model. Judging from these test, thus, differences between the two techniques cannot be disregarded.

In sum, mixed evidence is found to support hypothesis 4. While, jointly considered, lagged variables do not seem to significantly explain transfer risk beyond the explanatory power of the set of macroeconomic variables, there appears to be a small number of lagged variables which significantly contributes to determining transfer risk. In particular, lagged values of the income per capita and the external balance are found to significantly affect the perceived sovereign transfer risk. Furthermore, significant differences are found regarding the importance attached to lagged variables across rating agencies. IBCA and, to a lesser extent, Moody's seem to place a greater weight than Standard and Poor's on such variables when assessing transfer risk.

6.6.5 Macroeconomic and Balance-Sheet Variables

A final test was carried out to determine the extent to which sovereign transfer risk can be explained by a subset of balance-sheet variables as compared to the macroeconomic variables utilised in the base model. The probit estimation results are shown in Model 18 in Table 6-9. Similar to the test for local currency ratings, the sample used is smaller than in the models estimated thus far since BIS reporting countries (see Table 5-1), as well as Switzerland are excluded.[22]

The likelihood ratio statistic tests for the joint significance of the subset of balance-sheet variables. It is observed that the subset added to the explanatory value of the base model (LR=29.64; d.f.=8; $p<0.01$) indicating that, considered together, the balance-sheet variables have a significant effect on the agencies' assessment of transfer risk.

Positive and statistically significant coefficients are found for the ratios of long-term to total bank debt and total bank borrowing to total bank deposits. This indicates that higher levels of bank debt in general, and of long-term bank debt in particular, increase the perceived transfer risk, thereby widening the difference

(22) The balance-sheet data used in this test are obtained from the Bank for International Settlements who, at the time of this study, did not make publicly available such data for the BIS reporting countries nor for Switzerland. Therefore, these countries were excluded from the sample. Norway was included for the period 1992-1993, before becoming a BIS reporting country.

between local and foreign currency sovereign ratings. On the other hand, higher levels of foreign exchange reserves and undisbursed credit commitments result in lower transfer risk, as indicated by their negative and statistically significant coefficients. The negative coefficients on these variables suggest that they are deemed liquid assets denominated in foreign currencies which can be used should the sovereign face a shortage of foreign exchange, thereby lowering perceived transfer risk. The statistical significance of the foreign exchange reserves is consistent with empirical and theoretical literature which suggests that a depletion of official international reserves may serve as an indicator of a looming currency crisis (Krugman, 1979; Shapiro, 1985; and, Kaminsky, Lizondo and Reinhart, 1997).

Of the original variables -i.e., those included in the base model-, external debt, the rate of inflation, and the income per capita present negative and significant coefficients, indicating that increases in the value of these variables will lead to lower transfer risk and, consequently, narrower differences between local and foreign currency sovereign ratings. Conversely, higher levels of GDP growth will result in higher transfer risk. Similar effects of these three variables were found in the base model and their relationship with transfer risk has already been explained (see 6.6.1). The negative sign of external debt suggests that this variable has a significant negative effect on both foreign and local currency ratings, thereby constraining the two types of ratings to low levels and narrowing the difference between them. In agreement with the results of the previous chapters, the positive sign of GDP growth indicates that this variable has a greater positive effect on local than on foreign currency ratings which accounts for a wider difference between them.

Consistent with the findings of the previous sub-sections, it is found that probit and OLS estimates (Table 6-9) are similar in both the magnitude of coefficients and their *t*-statistics. No major difference in the statistical significance of these coefficients is observed and, therefore, the inferences are unchanged.

Table 6-10 presents the results for Model 19, which includes the foreign currency rating as an additional explanatory variable to the model with macroeconomic and balance-sheet variables (Model 18). The likelihood ratio statistic tests for the impact of the foreign currency rating as compared to Model 18. Contrary to the results of all the models estimated thus far in this chapter, which control for the effect of the foreign currency rating on transfer risk, it is found that the inclusion of this variable does not add significantly to the explanatory value of Model 18 (LR=0.95; d.f.=1; $p<0.90$). Furthermore, the coefficient of the foreign currency rating, although of the anticipated sign, proved not statistically significant. As a result, the statistical inferences drawn from Model 18 remain unchanged, as well as the statistical significance of the variables; there is almost no difference in the magnitude of the coefficients and *t*-statistics. Comparing the probit and OLS estimates for Model 19, it is concluded that there are no major differences between the two techniques.

To investigate the extent to which rating agencies differ in the importance they attach to balance-sheet variables in their assessment of transfer risk, Models 20 and 21 were estimated. The results are presented in Table 6-11 and show the estimated parameters for the individual models of Standard and Poor's and IBCA.(23) The probit estimates show that, in general, the model for Standard and Poor's (Model 20) resembles that for the whole sample (Model 19) reflecting the high proportion of Standard and Poor's ratings in the sample -about 60 percent. Taking into account that OLS has performed fairly similar to ordered probit in the previous tests and given that small sub-sample sizes allow ordered probit analysis only for Standard and Poor's, the OLS estimates may provide some insights into the relative importance attached to balance-sheet variables by the different rating agencies. The estimates suggest that, although both IBCA and Standard and Poor's seem to incorporate balance-sheet variables to ascertain the transfer risk associated with sovereign borrowers, such variables differ between the agencies. While IBCA seems to place greater emphasis on the maturity structure of the sovereign debt -the proportion of medium-term and short-term bank debt proved statistically significant-, Standard and Poor's considers additionally the level of foreign exchange reserves and undisbursed credit commitments as factors lowering the perceived transfer risk. However, recognising the fact that OLS suffers from the limitation of treating ordinal

(23) These models are the result of re-estimating Model 19 using sub-samples for each agency separately. Models for Moody's could not be estimated since the number of parameters to be estimated was larger than the number of observations available. Due to the small sub-sample size, the implementation of ordered probit for IBCA was hindered by a failure of the maximum likelihood estimates to converge.

values -such as the transfer risk categories included in this analysis- as cardinal variables, however, the interpretation of the results is only tentative.

The findings support, thus, hypothesis 5 and show that, both individually and jointly, balance-sheet variables have a significant effect on sovereign transfer risk over and above the impact of macroeconomic variables. In particular, and as expected, the level of foreign exchange reserves plays a significant role in explaining transfer risk. Although only tentatively, it is suggested that rating agencies incorporate different balance-sheet variables in their assessments of transfer risk.

6.7 Accuracy of Estimation Models

From the models estimated in this analysis, ten have been selected to test for their accuracy.(24) Five of these models include the base model, the model including agency indicators (Model 1), the model including region indicators (Model 2), the model including average and lagged variables (Model 13), and the model including macroeconomic and balance-sheet variables (Model 18). The remaining five models whose accuracy was determined comprise the models resulting from the inclusion of the foreign currency rating to the mentioned models, that is, Models 3, 4, 5, 14 and 19. The same accuracy tests conducted in the last two chapters have been employed here. Therefore, the accuracy of each model is measured by: (1) its ability to correctly classify transfer risk from the same data set on which the model was estimated; and, (2) the percentage of correct classifications of transfer risk in a holdout sample other than that used to estimate the model. The accuracy tests measure the transfer risk levels correctly classified as a proportion of total observations in the sample tested.(25) The rating intervals obtained from the probit analysis for each model are given in Tables 6-12 and 6-13. These intervals are used to determine the fitted transfer risk level for each observation, which is then compared to the actual transfer risk to obtain the number -proportion- of correct

(24) Since accuracy tests are intended to measure the ability of the models to correctly classify transfer risk levels in general, the models which utilise the full sample -i.e., all agencies- were selected to carry out such tests.

(25) For a description of the criteria for correctly classified transfer risk levels see notes at the bottom of Table 6-14 and Table 6-15.

classifications of the model within the sample. A similar procedure is employed for the test in the holdout sample using the corresponding intervals.

The accuracy rates for both measures -within sample and in holdout sample- and for both estimation techniques -ordered probit and OLS- are shown in Tables 6-14 and 6-15. Examining the models which do not control for the foreign currency sovereign rating (Table 6-14), the following results are obtained. Of the probit models and judging from the percentage of transfer risk levels correctly classified within the estimation sample, Model 2, including the region indicators, and Model 18, including balance-sheet variables, appeared to perform best of the five models. The levels of transfer risk correctly classified within the sample exceed 40 percent for each of these two models. In general, the accuracy rate of the probit models to correctly classify transfer risk within an error of one notch surpasses 80 percent. Furthermore, misclassifications by two rating notches seldom occurred. For instance, for the year 1997, Model 2 -the best performing model- assigns Korea a transfer risk level three rating notches higher than the actual level. This coincides with Korea's misclassification by the models for local currency ratings, which assigned Korea a rating seven notches higher than the actual local currency rating. This higher fitted rating may be the cause of the wider difference between Korea's local and foreign currency ratings, and, therefore, the misclassification of the country's transfer risk.

Given that no similar work has been done to date, no comparisons for these accuracy rates are possible. Nevertheless, the performance of the models estimated in this and the last two chapters can be contrasted. Comparing the above accuracy rates with those found in the last two chapters, it is found that transfer risk models fared, in general, slightly better than the models for foreign currency ratings. Further, while local currency rating models performed considerably better than transfer risk models at classifying ratings correctly, the percentages of correct classifications within one notch of the correct level are very similar between both analyses. The good performance of transfer risk models is, however, unanticipated since it would be expected that it is more difficult to explain the difference between two ratings -foreign and local currency ratings- than explaining the level of such ratings independently.

For the holdout sample, the difference between local and foreign currency ratings for 1997 was predicted using the models estimated on the sub-sample of the ratings assigned from 1992 to 1996. Except for Model 18, which includes the balance-sheet variables, the models perform better than within the sample to correctly classify perceived transfer risk, as reflected in the higher accuracy rates. This finding is unusual given the results for the determinants of foreign and local currency sovereign ratings. The results showed that the models normally perform better at classifying ratings -i.e., within sample tests- than at predicting ratings - holdout sample tests. The model including the region indicators (Model 2), once more, proved most successful in classifying correctly about half of the levels of transfer risk. The correct classification of transfer risk within one rating notch was approximately 80 percent, all models considered.

Comparing the results of probit and OLS models, it is observed that both techniques perform similarly. While OLS correctly classifies a slightly higher percentage of the transfer risk levels both within the sample and in the holdout sample, ordered probit was more successful at classifying correctly the transfer risk levels within an error of one rating notch. Based on these results, it is tentatively concluded that OLS seems robust and does not bias the equations. Hence, earlier studies which made use of this technique to analyse credit ratings may not present the shortcomings attributable to OLS.

Table 6-15 shows the accuracy rates for the models which control for the effect of the foreign currency rating of the sovereign. Examining the results it is found that, almost invariably, the accuracy of the models improved considerably after the addition of the foreign currency sovereign rating as an explanatory variable. In particular, ordered probit models presented the greater improvement in performance classifying correctly within the sample about 50 of the transfer risk levels and nearly 90 percent within an error of one notch -as opposed to 40 and 80 percent before the inclusion of the foreign currency rating. Interestingly, although the addition of the foreign currency rating to the model with balance-sheet variables (Model 19) did not add to the explanatory value of the model without the foreign currency rating (Model 18), it improved slightly the percentage of correctly classified transfer risk levels for the probit models. The accuracy rates for the holdout-sample tests, although higher after the inclusion of the foreign currency rating, are lower than for the tests within the sample. This contrasts with the results for the models without the foreign currency rating given above, but is consistent with the results for the analyses of the determinants of foreign and local currency ratings -Chapters 4 and 5, respectively. Comparing the accuracy between the probit and OLS models it is observed that, except for the proportion of transfer risk levels classified correctly within one notch error in the holdout sample, ordered probit models classified correctly a higher proportion of the samples.

6.8 Quantitative Analysis

In line with the previous two chapters, this section describes the quantitative analysis of the preferred model in an attempt to identify possible differences between the statistical and quantitative significance of the variables which help to explain transfer risk. The preferred model selected is the model with the highest rate of correctly classified transfer risk levels. The results given in the previous section indicate that Model 5, which includes the geographic region indicators and the foreign currency rating of the sovereign, performed best of the models employed, and is, therefore, chosen as the preferred model for this quantitative analysis.

The quantitative impact of the macroeconomic variables on transfer risk was measured in terms of the changes in the median transfer risk level produced by changes in the explanatory variables. A procedure similar to that used in the previous quantitative analyses (see 4.9 and 5.8) was used here. The probabilities of the predicted transfer risk level being classified in each of the nine (0-8) categories were calculated according to eq. (3) (see 4.5). The median transfer risk level is defined as the level at which the cumulative probability added to 0.5. For continuous variables -i.e., external debt, fiscal and external balance, inflation, income, and GDP growth- these probabilities were evaluated at the mean value of the regressors. The median transfer risk obtained using these probabilities was then compared to the median transfer risk which results from adding up to 0.5 the probabilities obtained by varying the value of the variable of interest, and holding the rest of the variables at their sample means. The variations in the value of the continuous variables were made in intervals of 10 percentage changes from a decrease in 50 percent to an increase of 50 percent in the variable. The quantitative impact was thus determined by the change in the median transfer risk level resulting from the change in the variable of interest. For dummy variables -i.e., the development indicator, the indicators of default history on foreign and local currency debt, and the agency indicators-, the quantitative impact was analysed by comparing the probabilities that result when the variables take each of their two different values -0 and 1-, while the other variables are held at their sample means. The quantitative impact was then given by the change in the median transfer risk level associated with the two values of the dummy variable.

It is found that, of the continuous variables, the income per capita has the greatest quantitative impact on transfer risk. Increments up to 40 percent in the level of income per capita will lower the median transfer risk level one rating notch from 2 to 1. Increases in the income per capita greater than 40 percent will equalise local and foreign currency ratings, thereby resulting in a transfer risk level of zero. Declines in the income per capita, however, would not quantitatively affect the median transfer risk level unless they exceed 40 percent, in which case the median transfer risk will increase one rating notch from 2 to 3. The rate of inflation and the level of external debt have a similar quantitative impact on the level of transfer risk. While reductions in the values of these variables do not affect the median transfer risk level -2-, higher levels of external debt and higher rates of inflation constrain both local and foreign currency ratings to low categories, thereby narrowing the difference between the two types of ratings. For instance, an increase in the ratio of external debt to exports equal or greater than 40 percent or an increment of 10 percent or more in the rate of inflation will have the same effect the median transfer risk level one rating notch from 2 to 1. The rest of the continuous variables -fiscal balance, external balance, and the growth of GDP- have a quantitative impact which is not significant since declines or increases in their values up to 50 percent do not affect the median transfer risk level -2.

The three dummy variables, on the other hand, quantitatively affect the level of transfer risk. The development indicator, for instance, produces a change in the median transfer risk of one rating notch, from 2 to 1, when it takes its two different values, 0 and 1, respectively. This suggests that, other things being equal, being classified as industrial country by the IMF results in a lower perceived transfer risk as compared to the perceived transfer risk of developing countries. The reputation of the sovereign for timely -or untimely- repayment of both local and foreign currency debt has also a quantitative impact on the difference between local and foreign currency ratings -i.e., the median transfer risk level. A history of previous default will contribute to narrowing this difference one rating notch in the case of foreign currency debt -median transfer risk level declines from 2 to 1- and two rating notches for local currency debt -a decline from 2 to 0 in the median transfer risk level.

Also significant is the quantitative impact of the foreign currency rating on transfer risk. Higher foreign currency sovereign ratings will result in lower perceived transfer risk, while lower ratings will increase the perceived transfer risk. For instance, other things being equal, AAA/Aaa and AA+/Aa1 foreign currency ratings result in a median transfer risk of zero, while AA/Aa2 and AA-/Aa3 ratings will increase this median to level 1 -a difference of one rating notch between local and foreign currency ratings. Foreign currency ratings from A+/A1 to A-/A3, and from BBB+/Baa1 to BB+/Ba1 will increase the median transfer risk to levels 2 and 3, respectively. Foreign currency ratings BB/Ba2 or lower will further increase the median transfer risk to level 4 or higher.

The quantitative impact of the geographic region of the sovereign on transfer risk is also significant, although it varies across regions. The difference between local and foreign currency ratings is found to be not quantitatively different between the sovereigns in West Europe, North America, Africa, the Middle East, and Eastern Europe, as reflected in the fact that the median transfer risk remains unchanged -level 1- regardless of the region of the sovereign. For sovereigns in Asia or the Pacific Central, however, this median will be one rating notch higher -level 2. But the greatest quantitative impact of the geographic region is for Latin American sovereigns for which the median transfer risk increases two rating notches relative to sovereigns in West Europe/North America, from level 1 to level 3, reflecting the higher perceived transfer risk for these sovereigns. This latter effect is confirmed by the fact that the probability of observing a difference of three rating notches or more between local and foreign currency ratings is 0.78 for Latin American sovereigns, whereas it is lower than 0.20 for sovereigns in other geographic regions.

In order to assess the quantitative impact of the rating agency on transfer risk, the effect of the agency indicators included in Model 4 was determined. It is found that, relative to Standard and Poor's, Moody's and IBCA's assessments of transfer risk are lower as reflected in the decline in the median transfer risk of one rating notch from level 2 to level 1 when the impact of these agencies is analysed. On the other hand, Duff and Phelps and Standard and Poor's seem to agree on their perceptions of transfer risk since the assessments of the former agency do not alter the median transfer risk. Furthermore, the probability of observing a difference of three rating notches or higher between a sovereign's local and foreign currency ratings -i.e., transfer risk- is 0.13 and 0.14 if it is rated by Moody's or IBCA, respectively, while the corresponding probability is 0.21 if the rating agency is Standard and Poor's. Interestingly, although it was suggested before that Standard and Poor's and Duff and Phelps' assessments of transfer risk are not quantitatively different, it is found that the probability of observing a transfer risk level of three notches or higher increases to 0.39 if the sovereign is rated by Duff and Phelps.

Comparing the quantitative and the statistical significance of the variables included in Model 5, it can be noted that while the income per capita, the development indicator, and the history of default on foreign currency debt did not proved statistically significant, they all quantitatively affect the perceived sovereign transfer risk. Similarly, the effect of IBCA on transfer risk is found to be quantitatively significant, but statistically insignificant in Model 4, as is the case for the region Asia/Pacific Central in Model 5. This contrasts with the quantitative analyses of the two previous chapters which found that, on the whole, all variables which have a significant quantitative effect on foreign and local currency ratings are also statistically significant -although not vice versa.

In sum, this section has shown that the income per capita, the rate of inflation, the foreign currency rating of the sovereign, the IMF classification of the country and the reputation of the sovereign for timely repayment of foreign and local currency debt have a significant quantitative impact on the sovereign's level of transfer risk as perceived by the rating agencies. The geographic region of the sovereign has also a role to play. Latin American sovereigns appeared to be the sovereigns with the highest perceived transfer risk. Furthermore, Moody's and IBCA seem to assess sovereign transfer risk more favourably than Standard and Poor's and Duff and Phelps. Finally, contrary to the results for foreign and local currency sovereign ratings, it is found that the group of quantitatively significant variables which help to explain transfer risk is different from the statistically significant variables, thereby reinforcing the need for using quantitative analysis to ascertain the determinants of transfer risk, as well as the determinants of sovereign credit ratings.

6.9 Conclusion

Any difference between a sovereign's local and foreign currency ratings reflects the distinctive risks of each type of debt. Transfer risk -i.e., the risk of the sovereign not being able to secure foreign exchange to service its foreign currency debt- would account for the difference observed between local and foreign currency ratings. Therefore, this difference is used here as a measure of the transfer risk associated with the corresponding sovereign.

This analysis uses ordered probit and OLS to examine the impact of different subsets of variables on the difference between local and foreign currency sovereign ratings, that is, to examine the determinants of transfer risk as perceived by the rating agencies. So far as the statistical significance of the explanatory variables, it is found that indicators which reflect that resources are or will be available to honour debt obligations, such as government fiscal balance, current account balance and per capita income, will result in lower perceived transfer risk and, therefore, narrower differences between local and foreign currency ratings. Additionally, a history of default on either foreign currency debt or local currency debt narrows the difference between local and foreign currency ratings by means of constraining both ratings to low levels. After controlling for the effect of the foreign currency sovereign rating, the inflation rate and the growth of GDP resulted significant determinants of transfer risk, consistent with empirical literature on currency crises. Nevertheless, the quantitative analysis of the preferred model showed that only the income per capita, the rate of inflation, the foreign currency rating of the sovereign, the IMF classification of the country, and the reputation of the sovereign for timely repayment of foreign and local currency debt have a significant quantitative impact on the sovereign's level of transfer risk as perceived by the rating agencies.

While the number and credit quality of the sovereigns included in the sub-samples of Moody's, Standard and Poor's and IBCA are very similar resulting in fairly similar transfer risk level distributions for each sub-sample, Duff and Phelps and Thomson BankWatch present major differences with Standard and Poor's -the reference agency. Therefore, inferences drawn from the three former agencies are more valid. The analysis suggests that, although judging from the statistical significance of the agency indicator variables there appear to be no systematic differences in the assessment of transfer risk across agencies, additional tests suggest significant differences between agencies. For instance, the quantitative analysis indicates that Moody's and IBCA appear to assess sovereign transfer risk more favourably than Standard and Poor's and Duff and Phelps. Moreover, Moody's and IBCA appear to place greater emphasis than Standard and Poor's on lagged values of macroeconomic variables. While both Standard and Poor's and IBCA incorporate balance-sheet variables in their assessments of transfer risk, the former places greater weight on the foreign exchange reserves of the country and the latter on the maturity structure of the sovereign's bank debt.

Transfer risk is found to be related to the sovereign's geographic region and to vary systematically across regions. Other things being equal, sovereigns in regions other than West Europe or North America are associated with higher levels of transfer risk. After controlling for the effect of the foreign currency rating, however, the effect of the geographic region is statistically significant only for sovereigns in Latin America considering the agencies both together and separately. Nonetheless, the quantitative impact yields somewhat contrasting results. It is found that only for sovereigns in Asia, the Pacific Central, and Latin America the geographic region quantitatively affects their perceived transfer risk. Latin American sovereigns are the most affected showing the highest perceived transfer risk. Moreover, while Moody's and IBCA's assessments of transfer risk are not systematically different from those of Standard and Poor's in Africa and the Middle

East, Standard and Poor's is more pessimistic about the transfer risk of Latin American sovereigns. Moody's perceives a higher transfer risk than Standard and Poor's and IBCA for sovereigns in West Europe and North America.

Although transfer risk cannot be better explained by lagged values than by average historical values of macroeconomic variables, it is found that, statistically, some of the lagged variables have a significant individual effect on transfer risk. In particular, it is suggested that the lagged values of external balance and income per capita contribute to explaining transfer risk.

On the other hand, balance-sheet variables appeared to play an important role in explaining transfer risk, over and above the role played by macroeconomic variables. It is concluded, therefore, that both macroeconomic and balance-sheet variables have a significant effect on transfer risk. These results are consistent with those of the two previous chapters in that balance-sheet variables also proved significant determinants of local and foreign currency sovereign ratings. Nevertheless, the specific variables that were significant differed in each of these analyses. For foreign currency ratings, higher proportions of both long- and short-term bank debt are perceived as a financial strength of the sovereign and result in higher foreign currency ratings, while higher levels of use of IMF credit are translated into lower ratings. Similarly, higher local currency ratings are related to higher proportions of long-term bank debt and higher levels of bank borrowing relative to bank deposits. Lower perceived transfer risk, by contrast, is associated with higher levels of liquid international assets such as foreign exchange reserves and undisbursed credit commitments. Higher levels of long-term bank debt relative to total bank debt and higher ratios of total bank borrowing to bank deposits will result in higher perceived transfer risk.

The inclusion of the foreign currency rating of the sovereign added to the explanatory value of all models except for the model including balance-sheet variables. It is found that lower foreign currency ratings are associated with perceptions of higher transfer risk. Given this relationship, controlling for the effect of the foreign currency sovereign rating on transfer risk facilitates the interpretation of the difference between local and foreign currency ratings at the lower-end of the rating spectrum, where low local currency ratings constrain foreign currency ratings to even lower levels resulting in narrow differences between the two types of ratings.

The effect of the foreign currency is also reflected in higher accuracy rates for the models. While approximately 40 percent of the transfer risk categories were correctly classified by the models excluding the foreign currency rating as explanatory variable, this proportion increased to about 50 percent after controlling for the effect of the foreign currency rating. Furthermore, ordered probit models fared better than OLS only after the inclusion of the foreign currency ratings, although accuracy rates for both techniques are relatively similar. Correct classifications of transfer risk within an error of one notch generally exceeded 80 percent both within the sample and for the holdout sample, and for both techniques. Compared with the results of the last two chapters, transfer risk models performed slightly better than the models explaining foreign currency sovereign ratings, but worse than the models for local currency ratings. Nevertheless, the performance of transfer risk models is remarkable since it would be expected that it is more difficult to explain the difference between two ratings than explaining the level of each rating -foreign and local currency ratings- separately.

Finally, contrary to the quantitative analyses for foreign and local currency sovereign ratings, it is found that the group of variables which quantitatively help to explain transfer risk is different from the group of statistically significant variables.

Table 6-1. Results. Base Model, Model 1 and Model 2.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS					
PERIOD	1992-1997	1992-1997	1992-1997	1992-1997	1992-1997	1992-1997
NO. OF OBSERVATIONS	303	302	303	303	302	303
NO. OF COUNTRIES	49	49	49	49	49	49
NO. OF AGENCIES	5	4	5	5	4	5
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**			**OLS**		
	BASE MODEL	**MODEL 1**	**MODEL 2**	**BASE MODEL**	**MODEL 1**	**MODEL 2**
INTERCEPT	6.768 *** (5.191)	7.817 *** (5.84)	9.041 *** (5.891)	7.278 *** (5.647)	8.095 *** (6.389)	8.686 *** (6.314)
EXTERNAL DEBT	0.001 (.535)	0.0002 (.252)	-0.002 (1.4)	0.001 (1.244)	0.001 (.952)	-0.001 (.989)
FISCAL BALANCE	-0.057 *** (3.277)	-0.057 *** (3.289)	-0.084 *** (4.396)	-0.048 *** (2.812)	-0.047 *** (2.808)	-0.075 *** (4.243)
EXTERNAL BALANCE	-0.088 *** (3.975)	-0.091 *** (4.048)	-0.061 *** (2.619)	-0.073 *** (3.6)	-0.073 *** (3.683)	-0.044 ** (2.234)
INFLATION	-0.131 (1.557)	-0.174 ** (2.045)	-0.331 *** (3.368)	-0.114 (1.339)	-0.154 * (1.853)	-0.274 *** (3.029)
INCOME	-0.652 *** (4.551)	-0.754 *** (5.148)	-0.929 *** (5.634)	-0.606 *** (4.286)	-0.689 *** (4.955)	-0.797 *** (5.422)
GDP GROWTH	0.042 (1.478)	0.046 (1.59)	0.036 (1.216)	0.040 (1.408)	0.041 (1.456)	0.028 (1.014)
DEVELOPMENT INDICATOR	-0.350 (.964)	-0.253 (.686)	0.188 (.438)	-0.422 (1.203)	-0.302 (.872)	0.060 (.158)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	0.757 *** (3.085)	0.857 *** (3.4)	0.162 (.56)	0.803 *** (3.222)	0.870 *** (3.526)	0.188 (.684)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-1.103 ** (2.431)	-0.984 ** (2.138)	-1.429 *** (3.017)	-1.516 *** (3.317)	-1.316 *** (2.922)	-1.708 *** (3.929)
MOODY'S		-0.174 (.991)			-0.174 (1.046)	
IBCA		-0.111 (.676)			-0.112 (.729)	
THOMSON BANK.						
DUFF AND PHELPS		0.643 (1.496)			0.665 (1.54)	
AFRICA/MIDDLE EAST			0.817 * (1.847)			0.724 * (1.749)
ASIA/PACIFIC CENTRAL			0.675 *** (2.749)			0.711 *** (3.18)
EASTERN EUROPE			1.284 *** (2.981)			1.120 *** (2.823)
LATIN AMERICA			2.814 *** (6.172)			2.686 *** (6.515)
- 2 ln L	785.29	765.70	742.84			
LR	222.06 ***	19.59 ***	42.45 ***			
Adjusted R-Squared				0.531	0.557	0.594
Standard Error				1.082	1.052	1.007

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-2. Results. Models 3-5.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS					
PERIOD	1992-1997	1992-1997	1992-1997	1992-1997	1992-1997	1992-1997
NO. OF OBSERVATIONS	303	302	303	303	302	303
NO. OF COUNTRIES	49	49	49	49	49	49
NO. OF AGENCIES	5	4	5	5	4	5
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**			**OLS**		
	MODEL 3	**MODEL 4**	**MODEL 5**	**MODEL 3**	**MODEL 4**	**MODEL 5**
INTERCEPT	5.278 ***	6.358 ***	7.931 ***	5.557 ***	6.328 ***	7.495 ***
	(3.954)	(4.638)	(5.082)	(4.421)	(5.159)	(5.606)
EXTERNAL DEBT	-0.002 **	-0.003 **	-0.005 ***	-0.001	-0.001	-0.004 ***
	(2.022)	(2.525)	(3.93)	(.989)	(1.437)	(3.28)
FISCAL BALANCE	-0.035 **	-0.035 *	-0.050 **	-0.026	-0.025	-0.042 **
	(1.975)	(1.955)	(2.454)	(1.546)	(1.522)	(2.355)
EXTERNAL BALANCE	-0.092 ***	-0.096 ***	-0.079 ***	-0.075 ***	-0.076 ***	-0.057 ***
	(4.129)	(4.232)	(3.315)	(3.898)	(4.027)	(3.005)
INFLATION	-0.264 ***	-0.328 ***	-0.404 ***	-0.219 ***	-0.265 ***	-0.316 ***
	(3.015)	(3.659)	(4.033)	(2.652)	(3.299)	(3.64)
INCOME	-0.005	-0.059	-0.216	-0.015	-0.075	-0.200
	(.029)	(.327)	(1.038)	(.09)	(.454)	(1.104)
GDP GROWTH	0.078 ***	0.082 ***	0.062 **	0.065 **	0.064 **	0.046 *
	(2.674)	(2.758)	(2.081)	(2.385)	(2.409)	(1.752)
DEVELOPMENT	-0.269	-0.179	-0.394	-0.285	-0.167	-0.351
INDICATOR	(.743)	(.485)	(.899)	(.855)	(.511)	(.944)
DEFAULT HISTORY	0.121	0.213	-0.263	0.230	0.300	-0.150
FOREIGN CURRENCY DEBT	(.455)	(.787)	(.881)	(.9)	(1.201)	(.554)
DEFAULT HISTORY	-1.973 ***	-1.909 ***	-2.395 ***	-2.219 ***	-2.032 ***	-2.424 ***
LOCAL CURRENCY DEBT	(4.136)	(3.939)	(4.731)	(4.937)	(4.622)	(5.53)
FOREIGN CURRENCY	-0.329 ***	-0.356 ***	-0.349 ***	-0.281 ***	-0.290 ***	-0.280 ***
CREDIT RATING	(6.242)	(6.587)	(5.623)	(5.84)	(6.176)	(5.216)
MOODY'S		-0.341 *			-0.267 *	
		(1.886)			(1.696)	
IBCA		-0.269			-0.218	
		(1.594)			(1.492)	
THOMSON BANK.						
DUFF AND PHELPS		0.515			0.547	
		(1.194)			(1.343)	
AFRICA/MIDDLE EAST			-0.428			-0.323
			(.862)			(.727)
ASIA/PACIFIC CENTRAL			0.167			0.258
			(.629)			(1.117)
EASTERN EUROPE			0.025			0.045
			(.051)			(.104)
LATIN AMERICA			1.887 ***			1.819 ***
			(3.876)			(4.247)
- 2 ln L	746.05	721.74	710.97			
LR1	39.24 ***	24.31 ***	35.08 ***			
LR2		43.96 ***	31.87 ***			
Adjusted R-Squared				0.579	0.607	0.628
Standard Error				1.025	0.990	0.964

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: (1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text. (2)Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-3. Results. Models 6-8.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS				
PERIOD	1992-1997	1996-1997	1993-1997	1992-1997	1996-1997
NO. OF OBSERVATIONS	171	68	56	171	68
NO. OF COUNTRIES	32	18	7	32	18
AGENCY	S&P's	IBCA	MOODY's	S&P's	IBCA
ESTIMATION TECHNIQUE	**ORDERED PROBIT**		**OLS**		
	MODEL 7	**MODEL 8**	**MODEL 6**	**MODEL 7**	**MODEL 8**
INTERCEPT	9.783 ***	24.585 ***	17.025 ***	7.725 ***	9.388 ***
	(4.705)	(3.835)	(3.378)	(5.064)	(3.342)
EXTERNAL DEBT	-0.006 ***	-0.061 ***	-0.010	-0.004 ***	-0.019 ***
	(3.863)	(4.757)	(1.671)	(3.283)	(5.585)
FISCAL BALANCE	-0.038	-0.163 **	0.041	-0.027	-0.093 ***
	(1.337)	(2.531)	(1.044)	(1.168)	(3.265)
EXTERNAL BALANCE	-0.101 ***	-0.190 **	0.010	-0.066 ***	-0.073 *
	(3.514)	(2.179)	(.132)	(3.211)	(1.786)
INFLATION	-0.492 ***	-1.163 ***	-0.422 *	-0.323 ***	-0.375 **
	(3.555)	(3.717)	(1.69)	(3.05)	(2.521)
INCOME	-0.227	-0.520	-0.934	-0.128	-0.156
	(.835)	(.727)	(1.658)	(.607)	(.397)
GDP GROWTH	0.052	0.187 *	-0.013	0.042	0.029
	(1.197)	(1.843)	(.166)	(1.231)	(.624)
DEVELOPMENT INDICATOR	-0.766	-7.173 ***		-0.477	-2.551 ***
	(1.436)	(3.479)		(1.205)	(2.809)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	-0.300	-1.150	2.605	-0.312	0.127
	(.78)	(.977)	(1.347)	(.994)	(.247)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-1.792 ***	1.096		-1.674 ***	-0.216
	(2.666)	(.705)		(3.151)	(.234)
FOREIGN CURRENCY CREDIT RATING	-0.420 ***	-0.782 ***	-0.424 ***	-0.324 ***	-0.294 ***
	(4.725)	(3.471)	(3.471)	(4.755)	(2.702)
AFRICA/MIDDLE EAST	-0.445	-3.480	-5.086 ***	-0.247	-2.330 *
	(.698)	(.487)	(3.613)	(.484)	(1.784)
ASIA/PACIFIC CENTRAL	-0.139	-0.655	0.433	0.012	-0.032
	(.4)	(.607)	(.851)	(.045)	(.051)
EASTERN EUROPE	-0.447	0.448		-0.218	-0.655
	(.67)	(.241)		(.414)	(.643)
LATIN AMERICA	1.827 ***	5.781 **	-1.896	1.620 ***	1.001
	(3.009)	(2.149)	(1.143)	(3.424)	(.873)
- 2 ln L	367.07	97.93			
LR					
Adjusted R-Squared			0.681	0.696	0.676
Standard Error			0.879	0.886	0.724

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-4. Ordered Probit Results. Models 9, 11 and 12.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS		
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**		
PERIOD	1992-1997	1992-1997	1992-1997
NO. OF OBSERVATIONS	49	38	181
REGION	2	4	5
	ASIA/PACIFIC CENTRAL	LATIN AMERICA	WEST EUROPE/ NORTH AMERICA
	MODEL 9	**MODEL 11**	**MODEL 12**
INTERCEPT	6.898 (1.348)	12.012 * (1.794)	37.193 *** (4.627)
EXTERNAL DEBT	-0.010 * (1.812)	0.003 (.973)	-0.001 (.06)
FISCAL BALANCE	-0.192 * (1.872)	-0.287 (1.311)	0.016 (.596)
EXTERNAL BALANCE	-0.145 (1.545)	-0.755 *** (4.074)	0.011 (.215)
INFLATION	0.202 (.332)	-0.259 (1.149)	-0.747 *** (2.822)
INCOME	0.081 (.104)	-1.732 * (1.792)	-1.171 ** (2.254)
GDP GROWTH	-0.273 * (1.99)	-0.055 (.389)	-0.031 (.412)
DEVELOPMENT INDICATOR	-3.198 ** (2.119)		1.258 (.191)
DEFAULT HISTORY FOREIGN CURRENCY DEB	-1.405 (1.178)	0.902 (.835)	
DEFAULT HISTORY LOCAL CURRENCY DEBT		0.507 (.426)	
FOREIGN CURRENCY CREDIT RATING	-0.250 (1.284)	0.447 (1.491)	-1.682 *** (10.125)
MOODY'S	0.497 (1.064)	-1.524 ** (2.091)	-1.202 *** (3.745)
IBCA	-0.513 (.818)	-1.285 ** (2.013)	-0.107 (.4)
THOMSON BANKWATCH			
DUFF AND PHELPS		0.495 (.692)	
- 2 ln L	108.11	92.76	190.89

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Note: the models were estimated using the transfer risk categories observed for each region: 0 to 4, and 8 for Region 2, 0 to 7 for Region 4, and 0 to 3 for Region 5.

Table 6-5. OLS Results. Models 9-12.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS			
ESTIMATION TECHNIQUE	**OLS**			
PERIOD	1992-1997	1996-1997	1992-1997	1992-1997
NO. OF OBSERVATIONS	50	22	38	181
REGION	2	3	4	5
	ASIA/PACIFIC CENTRAL	EASTERN EUROPE	LATIN AMERICA	WEST EUROPE/ NORTH AMERICA
	MODEL 9	**MODEL 10**	**MODEL 11**	**MODEL 12**
INTERCEPT	12.416 *** (3.089)	1.661 (.284)	10.836 (1.621)	16.570 *** (9.819)
EXTERNAL DEBT	-0.012 ** (2.59)	-0.004 (1.405)	0.003 (1.018)	0.003 (1.156)
FISCAL BALANCE	-0.051 (.721)	0.339 *** (3.226)	-0.151 (.797)	0.000 (.019)
EXTERNAL BALANCE	-0.047 (.953)	0.001 (.01)	-0.626 *** (4.111)	0.002 (.114)
INFLATION	0.322 (.602)	-0.963 (1.626)	-0.117 (.579)	-0.313 *** (3.177)
INCOME	-1.145 ** (2.155)	1.527 * (2.557)	-1.526 (1.576)	-0.775 *** (4.303)
GDP GROWTH	0.007 (.072)	-0.161 (1.112)	-0.094 (.703)	-0.016 (.606)
DEVELOPMENT INDICATOR	-0.467 (.519)			1.551 * (1.695)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	1.767 ** (2.101)	0.049 (.083)	0.674 (.647)	
DEFAULT HISTORY LOCAL CURRENCY DEBT			0.702 (.59)	
FOREIGN CURRENCY CREDIT RATING	0.018 (.124)	-0.865 *** (4.664)	0.442 (1.555)	-0.606 *** (14.431)
MOODY'S	0.934 ** (2.415)		-1.102 (1.613)	-0.296 *** (2.884)
IBCA	-0.038 (.072)	-0.244 (1.281)	-1.136 * (1.835)	0.037 (.385)
THOMSON BANKWATCH	-4.777 *** (4.435)			
DUFF AND PHELPS		-0.424 (1.217)	0.339 (.474)	
Adjusted R-Squared	0.616	0.662	0.634	0.522
Standard Error	0.970	0.408	1.122	0.754

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Note: the models were estimated using the transfer risk categories observed for each region: 0 to 4, and 8 for Region 2, 1 to 4 for Region 3, 0 to 7 for Region 4, and 0 to 3 for Region 5.

Table 6-6. Results. Model 13.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS	
PERIOD: 1992-1997	NO. OF COUNTRIES: 48	
NO. OF OBSERVATIONS: 300	NO. OF AGENCIES: 5	
ESTIMATION TECHNIQUE	**ORDERED PROBIT**	**OLS**
INTERCEPT	7.023 *** (4.907)	7.656 *** (5.466)
EXTERNAL DEBT (AVERAGE)	-0.011 (1.523)	-0.012 * (1.704)
EXT. DEBT (-1)	0.011 ** (2.212)	0.015 *** (2.986)
EXT. DEBT (-2)	0.002 (.226)	0.0003 (.038)
FISCAL BALANCE (AVERAGE)	-0.038 (.519)	-0.025 (.339)
FISCAL BALANCE (-1)	-0.005 (.161)	-0.009 (.259)
FISCAL BALANCE (-2)	-0.006 (.172)	-0.008 (.223)
EXT. BALANCE (AVERAGE)	-0.281 ** (2.241)	-0.248 ** (2.04)
EXT. BALANCE (-1)	0.084 * (1.753)	0.080 * (1.696)
EXT. BALANCE (-2)	0.103 (1.169)	0.090 (1.061)
INFLATION (AVERAGE)	0.013 (.043)	-0.054 (.184)
INFLATION (-1)	-0.171 (.918)	-0.144 (.775)
INFLATION (-2)	-0.007 (.036)	0.044 (.218)
INCOME (AVERAGE)	3.823 (1.632)	3.373 (1.489)
INCOME (-1)	-0.736 (.64)	-0.477 (.421)
INCOME (-2)	-3.756 ** (2.122)	-3.532 ** (2.111)
GDP GROWTH (AVERAGE)	0.036 (.588)	0.038 (.652)
GDP GROWTH (-1)	-0.012 (.306)	-0.015 (.414)
GDP GROWTH (-2)	0.031 (.799)	0.019 (.504)
DEVELOPMENT INDICATOR	-0.481 (1.278)	-0.521 (1.426)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	0.677 ** (2.522)	0.704 *** (2.601)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-1.603 ** (2.519)	-1.931 *** (3.06)
-2 ln L LR Adjusted R-Squared Standard Error	762.94 14.34	 0.540 1.075

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: (1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text. (2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-7. Results. Model 14.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS	
PERIOD: 1992-1997	NO. OF COUNTRIES: 48	
NO. OF OBSERVATIONS: 300	NO. OF AGENCIES: 5	
ESTIMATION TECHNIQUE	**ORDERED PROBIT**	**OLS**
INTERCEPT	5.721 *** (3.924)	6.130 *** (4.518)
EXTERNAL DEBT (AVERAGE)	-0.005 (.764)	-0.008 (1.1)
EXT. DEBT (-1)	0.005 (1.064)	0.010 ** (2.186)
EXT. DEBT (-2)	-0.001 (.178)	-0.002 (.376)
FISCAL BALANCE (AVERAGE)	0.019 (.256)	0.028 (.4)
FISCAL BALANCE (-1)	-0.024 (.707)	-0.025 (.778)
FISCAL BALANCE (-2)	-0.020 (.564)	-0.020 (.611)
EXT. BALANCE (AVERAGE)	-0.223 * (1.764)	-0.192 * (1.659)
EXT. BALANCE (-1)	0.068 (1.407)	0.063 (1.401)
EXT. BALANCE (-2)	0.059 (.665)	0.052 (.638)
INFLATION (AVERAGE)	-0.047 (.159)	-0.149 (.536)
INFLATION (-1)	-0.225 (1.194)	-0.150 (.853)
INFLATION (-2)	-0.033 (.164)	0.044 (.232)
INCOME (AVERAGE)	4.280 * (1.807)	3.267 (1.519)
INCOME (-1)	-0.007 (.006)	0.249 (.229)
INCOME (-2)	-4.310 ** (2.398)	-3.592 ** (2.261)
GDP GROWTH (AVERAGE)	0.081 (1.34)	0.067 (1.23)
GDP GROWTH (-1)	-0.018 (.436)	-0.017 (.476)
GDP GROWTH (-2)	0.024 (.607)	0.010 (.271)
DEVELOPMENT INDICATOR	-0.392 (1.041)	-0.374 (1.077)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	0.027 (.092)	0.145 (.527)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-2.550 *** (3.874)	-2.600 *** (4.258)
FOREIGN CURRENCY CREDIT RATING	-0.332 *** (6.15)	-0.274 *** (5.615)
-2 ln L	724.82	
LR1	38.12 ***	
LR2	13.92	
Adjusted R-Squared		0.586
Standard Error		1.020

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: (1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text. (2)Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-8. Results. Models 15-17.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS				
NO. OF OBSERVATIONS	170	67	56	170	67
ESTIMATION TECHNIQUE	**ORDERED PROBIT**		**OLS**		
AGENCY	S&P's	IBCA	MOODY's	S&P's	IBCA
	MODEL 16	MODEL 17	MODEL 15	MODEL 16	MODEL 17
INTERCEPT	5.849 ***	27.428 ***	11.449 **	5.106 ***	10.363 ***
	(3.289)	(3.611)	(2.501)	(3.471)	(3.471)
EXTERNAL DEBT	-0.004	0.068	0.080 *	-0.006	0.058 **
(AVERAGE)	(.425)	(1.087)	(1.925)	(.77)	(2.015)
EXT. DEBT (-1)	0.008	-0.104 ***	-0.004	0.012 **	-0.046 ***
	(1.287)	(2.872)	(.269)	(2.371)	(2.716)
EXT. DEBT (-2)	-0.006	-0.046	-0.069	-0.006	-0.041 *
	(.731)	(.969)	(2.21)	(.893)	(1.911)
FISCAL BALANCE	-0.057	0.766 **	0.732 ***	-0.042	0.187
(AVERAGE)	(.563)	(2.289)	(3.967)	(.483)	(1.557)
FISCAL BALANCE (-1)	0.012	-0.419 ***	-0.289 ***	0.012	-0.107 **
	(.258)	(2.66)	(3.968)	(.279)	(2.046)
FISCAL BALANCE (-2)	0.009	-0.401 **	-0.379 ***	0.009	-0.100 **
	(.177)	(2.649)	(3.153)	(.211)	(2.034)
EXT. BALANCE	-0.139	-1.823 ***	-0.539	-0.084	-0.662 ***
(AVERAGE)	(.891)	(3.299)	(1.336)	(.651)	(2.919)
EXT. BALANCE (-1)	0.035	0.906 ***	0.182	0.020	0.347 ***
	(.588)	(3.238)	(.976)	(.404)	(3.629)
EXT. BALANCE (-2)	0.005	0.722 **	0.300	-0.005	0.252 *
	(.048)	(2.21)	(1.283)	(.051)	(1.682)
INFLATION	0.0001	-1.841 *	-0.532	-0.064	-0.228
(AVERAGE)	(.0002)	(1.829)	(.934)	(.178)	(.561)
INFLATION (-1)	-0.058	0.284	-0.268	-0.029	-0.096
	(.213)	(.491)	(.899)	(.127)	(.359)
INFLATION (-2)	-0.154	0.363	0.034	-0.038	-0.004
	(.516)	(.664)	(.095)	(.148)	(.015)
INCOME	6.250 *	12.312	-7.557 *	4.684 *	7.908 **
(AVERAGE)	(1.905)	(1.49)	(1.861)	(1.711)	(2.258)
INCOME (-1)	-1.529	0.891	4.442 *	-0.969	-1.373
	(.934)	(.212)	(1.851)	(.693)	(.729)
INCOME (-2)	-4.670 **	-13.358 **	2.440	-3.656 *	-6.600 **
	(1.961)	(2.204)	(.846)	(1.878)	(2.529)
GDP GROWTH	0.077	0.710 ***	0.034	0.055	0.263 ***
(AVERAGE)	(.915)	(3.173)	(.351)	(.785)	(2.737)
GDP GROWTH (-1)	0.015	-0.306 *	0.071	0.011	-0.132 *
	(.291)	(1.942)	(.911)	(.266)	(1.791)
GDP GROWTH (-2)	0.015	-0.011	0.010	0.005	0.038
	(.274)	(.085)	(.153)	(.12)	(.604)
DEVELOPMENT	-0.693	-10.653 ***	1.234	-0.509	-3.613 ***
INDICATOR	(1.446)	(3.944)	(.859)	(1.29)	(5.023)
DEFAULT HISTORY	0.028	-2.262 *		0.048	-1.228 **
FOREIGN CURRENCY DEBT	(.074)	(1.947)		(.146)	(2.389)
DEFAULT HISTORY	-1.758 **	7.651 **	-5.385 ***	-1.668 **	1.992
LOCAL CURRENCY DEBT	(2.045)	(2.433)	(3.762)	(2.295)	(1.45)
FOREIGN CURRENCY	-0.374 ***	-0.981 ***	-0.321 ***	-0.288 ***	-0.357 ***
CREDIT RATING	(4.996)	(4.052)	(3.59)	(4.705)	(4.161)
-2 ln L	379.69	85.03			
Adjusted R-Squared			0.836	0.654	0.728
Standard Error			0.65	0.941	0.660

* significant at 10% level; ** significant at 5% level; *** significant at 1% level
Values in parentheses are absolute t-statistics

Table 6-9. Results. Model 18.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS	
PERIOD	1992-1997	
NO. OF OBSERVATIONS	132	
NO. OF COUNTRIES	33	
NO. OF AGENCIES	5	
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**	**OLS**
INTERCEPT	4.548 (1.57)	4.829 (1.533)
EXTERNAL DEBT	-0.003 *** (2.615)	-0.003 ** (2.023)
FISCAL BALANCE	-0.063 (1.63)	-0.066 (1.565)
EXTERNAL BALANCE	-0.036 (1.017)	-0.040 (1.033)
INFLATION	-0.246 ** (2.019)	-0.239 * (1.8)
INCOME	-0.602 *** (3.109)	-0.554 *** (2.678)
GDP GROWTH	0.132 *** (2.702)	0.117 ** (2.232)
DEVELOPMENT INDICATOR	0.217 (.484)	0.246 (.536)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	0.437 (1.482)	0.480 (1.491)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-0.134 (.204)	-0.258 (.363)
LONG TERM DEBT/ TOTAL BANK DEBT(%)	0.064 *** (2.718)	0.064 ** (2.533)
MEDIUM TERM DEBT/ TOTAL BANK DEBT(%)	0.049 (1.157)	0.037 (.793)
SHORT TERM DEBT/ TOTAL BANK DEBT(%)	0.023 (1.075)	0.023 (.997)
COUNTRY DEBT/ SAMPLE DEBT (%)	-0.004 (.059)	0.007 (.09)
UNDISBURSED C.M./ TOTAL BANK DEBT(%)	-0.045 ** (2.552)	-0.039 ** (2.102)
FOREX. RESERVES/ IMF QUOTA (%)	-0.0004 *** (2.699)	-0.0004 ** (2.494)
USE IMF CREDIT/ IMF QUOTA (%)	-0.001 (.613)	-0.001 (.678)
TOTAL BANK BORR./ DEPOSITS (%)	0.001 ** (2.016)	0.001 ** (2.082)
-2 ln L	367.98	
LR	29.64 ***	
Adjusted R-Squared		0.388
Standard Error		1.165

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-10. Results. Model 19.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS	
PERIOD	1992-1997	
NO. OF OBSERVATIONS	132	
NO. OF COUNTRIES	33	
NO. OF AGENCIES	5	
ESTIMATION TECHNIQUE	**ORDERED PROBIT ANALYSIS**	**OLS**
INTERCEPT	3.771 (1.254)	4.410 (1.347)
EXTERNAL DEBT	-0.004 *** (2.787)	-0.003 ** (2.049)
FISCAL BALANCE	-0.055 (1.372)	-0.061 (1.397)
EXTERNAL BALANCE	-0.039 (1.086)	-0.041 (1.058)
INFLATION	-0.278 ** (2.203)	-0.256 * (1.859)
INCOME	-0.475 ** (2.036)	-0.482 * (1.892)
GDP GROWTH	0.145 *** (2.857)	0.123 ** (2.278)
DEVELOPMENT INDICATOR	0.266 (.59)	0.263 (.572)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	0.316 (.988)	0.411 (1.165)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-0.226 (.341)	-0.313 (.433)
FOREIGN CURRENCY CREDIT RATING	-(.071) (.978)	-(.039) (.49)
LONG TERM DEBT/ TOTAL BANK DEBT(%)	0.071 *** (2.879)	0.067 ** (2.563)
MEDIUM TERM DEBT/ TOTAL BANK DEBT(%)	0.051 (1.217)	0.038 (.816)
SHORT TERM DEBT/ TOTAL BANK DEBT(%)	0.027 (1.245)	0.025 (1.066)
COUNTRY DEBT/ SAMPLE DEBT (%)	-0.006 (.082)	0.003 (.033)
UNDISBURSED C.M./ TOTAL BANK DEBT(%)	-0.043 ** (2.451)	-0.038 ** (2.039)
FOREX. RESERVES/ IMF QUOTA (%)	-0.0004 *** (2.638)	-0.0004 ** (2.452)
USE IMF CREDIT/ IMF QUOTA (%)	-0.001 (.716)	-0.001 (.727)
TOTAL BANK BORR./ DEPOSITS (%)	0.001 ** (2.081)	0.001 ** (2.093)
-2 ln L	367.03	
LR	0.95	
Adjusted R-Squared		0.383
Standard Error		1.168

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes:

1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text.

2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-11. Results. Models 20 and 21.

DEPENDENT VARIABLE	LOCAL MINUS FOREIGN CURRENCY SOVEREIGN RATINGS		
ESTIMATION TECHNIQUE	**ORDERED PROBIT**	**OLS**	
PERIOD	1992-1997	1992-1997	1995-1997
NO. OF OBSERVATIONS	82	82	24
AGENCY	S&P's	S&P's	IBCA
	MODEL 20	MODEL 20	MODEL 21
INTERCEPT	4.140 (1.026)	2.758 (.792)	-8.172 (.933)
EXTERNAL DEBT	-0.005 *** (2.94)	-0.003 ** (2.245)	0.003 (.325)
FISCAL BALANCE	-0.048 (.944)	-0.042 (.94)	-0.145 * (1.948)
EXTERNAL BALANCE	-0.024 (.599)	-0.020 (.559)	0.014 (.111)
INFLATION	-0.363 ** (2.166)	-0.247 * (1.695)	0.256 (.608)
INCOME	-0.375 (1.286)	-0.243 (.959)	-0.044 (.061)
GDP GROWTH	0.262 *** (3.724)	0.197 *** (3.384)	0.135 (1.585)
DEVELOPMENT INDICATOR	1.250 ** (2.036)	0.975 ** (2.052)	-0.921 (1.503)
DEFAULT HISTORY FOREIGN CURRENCY DEBT	0.360 (.833)	0.268 (.702)	-0.157 (.379)
DEFAULT HISTORY LOCAL CURRENCY DEBT	-1.295 (1.491)	-1.111 (1.508)	-0.113 (.038)
FOREIGN CURRENCY CREDIT RATING	-0.289 *** (2.802)	-0.208 ** (2.379)	0.334 *** (4.084)
LONG TERM DEBT/ TOTAL BANK DEBT(%)	0.116 *** (3.189)	0.093 *** (3.127)	0.042 (1.395)
MEDIUM TERM DEBT/ TOTAL BANK DEBT(%)	0.048 (.912)	0.031 (.671)	0.224 ** (2.081)
SHORT TERM DEBT/ TOTAL BANK DEBT(%)	0.029 (.932)	0.025 (.947)	0.065 ** (2.458)
COUNTRY DEBT/ SAMPLE DEBT (%)	0.145 (1.431)	0.126 (1.6)	-0.234 * (1.836)
UNDISBURSED C.M./ TOTAL BANK DEBT(%)	-0.063 *** (2.651)	-0.045 (2.299)	0.028 (.94)
FOREX. RESERVES/ IMF QUOTA (%)	-0.0005 ** (2.418)	-0.0003 (2.377)	0.00059 (1.425)
USE IMF CREDIT/ IMF QUOTA (%)	-0.001 (.431)	-0.001 (.343)	0.008 (1.703)
TOTAL BANK BORR./ DEPOSITS (%)	0.0002 (.284)	0.0002 (.548)	-0.0001 (.071)
-2 ln L	190.68		
Adjusted R-Squared		0.521	0.832
Standard Error		0.965	0.413

* significant at 10% level; ** significant at 5% level; *** significant at 1% level

Notes: (1) LR denotes the likelihood ratio statistic as defined in footnote 12 in the main text. (2) Values in parentheses are absolute t-statistics based on standard errors computed from analytical second derivatives (Newton method). Standard errors are also computed from covariance of analytic first derivatives (Berndt-Hall-Hall-Hausman method) and from analytic first and second derivatives (Eicker-White method), but the inferences are unchanged.

Table 6-12. Cutpoints Defining Intervals for Each Transfer Risk Level for Models not Controlling for Foreign Currency Rating[1] (Within-Sample Tests)

	BASE MODEL	MODEL 1	MODEL 2	MODEL 13	MODEL 18
μ_1	0	0	0	0	0
μ_2	0.64377	0.67048	0.69886	0.65242	0.43316
μ_3	1.50676	1.56784	1.62076	1.53744	1.56488
μ_4	2.73523	2.88186	2.96625	2.78831	2.88173
μ_5	3.43250	3.61423	3.87266	3.52506	3.75679
μ_6	4.04663	4.25382	4.59449	4.19601	4.54778
μ_7	4.31640	4.52173	4.85157	4.48905	4.86574
μ_8	4.85567	5.04445	5.29769	5.03574	5.35907

[1] $\mu_0=-\infty$; $\mu_9=\infty$

Table 6-13. Cutpoints Defining Intervals for Each Transfer Risk Level for Models Controlling for Foreign Currency Rating[1] (Within-Sample Tests)

	MODEL 3	MODEL 4	MODEL 5	MODEL 14	MODEL 19
μ_1	0	0	0	0	0
μ_2	0.71194	0.75022	0.74394	0.72559	0.42702
μ_3	1.66519	1.75760	1.73008	1.70841	1.56423
μ_4	2.95819	3.16540	3.15672	3.00858	2.89749
μ_5	3.65645	3.89477	4.09299	3.73424	3.77721
μ_6	4.24854	4.50296	4.79435	4.36703	4.56255
μ_7	4.48924	4.74017	5.03116	4.62040	4.87355
μ_8	4.97459	5.20302	5.46624	5.10951	5.36510

[1] $\mu_0=-\infty$; $\mu_9=\infty$

Table 6-14. Transfer Risk Levels Correctly Classified, by Model, without Controlling for Foreign Currency Rating
(Percent)

	BASE MODEL		MODEL 1		MODEL 2		MODEL 13		MODEL 18	
	Probit	**OLS**	**Probit**	**OLS**	**Probit**	**OLS**	**Probit**	**OLS**	**Probit**	**OLS**
A) WITHIN SAMPLE										
Total observations	303		302		303		300		132	
Correctly Classified	35.64	41.91	35.10	41.72	43.89	41.91	39.67	40.67	43.94	32.58
Within one notch of correct level	86.14	81.85	87.75	82.78	74.59	84.49	86.33	82.67	84.09	80.30
B) HOLDOUT SAMPLE										
Total observations	75		74		75		72		48	
Correctly Classified	37.33	42.67	36.49	40.54	49.33	46.67	40.28	41.67	37.50	37.50
Within one notch of correct level	82.67	78.67	81.08	78.38	82.67	81.33	75.00	73.61	79.17	72.92

Note: All figures are proportions of the total transfer risk observations in the sample analysed. Correctly classified transfer risk categories are fitted categories matching exactly the actual transfer risk level. Transfer risk categories which are classified correctly within one notch of the correct level are fitted transfer risk categories which: (1) match exactly the actual transfer risk level, or (2) are either one level higher or lower than the actual transfer risk level.

Table 6-15. Transfer Risk Levels Correctly Classified, by Model, Controlling for Foreign Currency Rating (Percent)

	MODEL 3		MODEL 4		MODEL 5		MODEL 14		MODEL 19	
	Probit	**OLS**	**Probit**	**OLS**	**Probit**	**OLS**	**Probit**	**OLS**	**Probit**	**OLS**
A) WITHIN SAMPLE										
Total observations	303		302		303		300		132	
Correctly Classified	50.50	45.88	49.00	46.02	55.45	46.87	50.33	46.67	45.46	31.06
Within one notch of correct level	90.10	83.50	90.40	84.11	91.42	84.49	90.67	86.00	85.61	80.30
B) HOLDOUT SAMPLE										
Total observations	75		74		75		72		48	
Correctly Classified	42.67	41.33	40.54	43.24	50.67	50.67	44.44	45.83	45.83	31.25
Within one notch of correct level	76.00	82.67	74.32	82.43	82.67	85.33	73.61	83.33	72.92	75.00

Note: All figures are proportions of the total transfer risk observations in the sample analysed. Correctly classified transfer risk categories are fitted categories matching exactly the actual transfer risk level. Transfer risk categories which are classified correctly within one notch of the correct level are fitted transfer risk categories which: (1) match exactly the actual transfer risk level, or (2) are either one level higher or lower than the actual transfer risk level.

7. Conclusions

Sovereign credit ratings are assessments of a government's capacity and willingness to repay debt according to its terms. Lately, sovereign ratings have been accorded considerable attention in financial markets and the media due to their increasing use as a benchmark measure of the default risk associated with other issuers under the sovereign's jurisdiction. Although sovereign defaults have declined since 1975, judging from the volume of bond issuance by emerging market sovereigns in the 1990s -many of these issuers with ratings in the speculative-grade categories-, it would not be surprising if the rate of sovereign defaults were to increase in the future. Furthermore, as the 1990s draw to a close, fiscal discipline, debt management, and the contingent liabilities arising from weak banking systems, in particular, represent significant policy challenges for many sovereigns, which may result in an increase in the associated credit risk. Given these factors, it is possible that a new sovereign default cycle will emerge over the next decade, thereby making the understanding of sovereign ratings and the criteria behind them more relevant than ever.

This study has presented a systematic analysis of the information content of foreign currency sovereign ratings, local currency sovereign ratings, and transfer risk using both ordered probit and OLS analysis. The main findings of this analysis are given below, as well as some of their implications.

7.1 Foreign Currency Sovereign Ratings

The empirical results presented in Chapter 4 indicate that economic fundamentals have played a key role in determining a sovereign's foreign currency credit rating. These fundamentals are linked to those variables that have been identified in the literature as important determinants of a sovereign's capacity and willingness to service external debt (Haque, et.al., 1996). Additionally, the results have shown that financial balance-sheet variables act as significant explanatory variables of credit ratings implying that models of foreign currency sovereign credit ratings which fail to include these variables in addition to conventional macroeconomic variables may be misspecified. Specifically, the ratios of short- and long-term bank debt to total bank debt, and the use of IMF credit relative to the country's IMF quota proved statistically significant out of the set of balance-sheet variables employed. Further, rating agencies seem to rely largely on average historical values of economic indicators to determine credit ratings. The sovereign's economic improvement or deterioration, as reflected in lagged variables, seems to play a role only when these variables are considered jointly.

This analysis also suggests that there are systematic differences in foreign currency sovereign credit ratings across rating agencies and across geographic regions. Inferences regarding differences between rating agencies are deemed valid only for Moody's, Standard and Poor's, IBCA and Thomson BankWatch due to the similarity in the ratings distribution of their sub-samples. The sub-samples for rest of the agencies have ratings distributions which are not comparable with the mentioned agencies. For this reason, results for Duff and Phelps, Fitch, the Japanese and the Canadian agencies are treated with caution. Rating agencies appear to apply different criteria and attach different weightings to them in order to determine credit ratings. Additionally, the results suggest that the agencies differ in the ratings they accord to sovereigns within specific geographic regions and that they rate issuers from their own region more favourably. Although, according to previous research (Beattie and Searle, 1992b), the latter could reflect greater leniency, judging from the nature of the rating process, higher ratings for sovereigns in the same geographic region of the rating agency are more likely to be the result of the agencies' greater understanding of such sovereigns. Analysing the agencies individually it is found that identical foreign currency ratings from different agencies may convey different information. This seems to be the case for Standard and Poor's and IBCA. Further, although rating agencies appear to incorporate both macroeconomic and balance-sheet variables in their ratings, they differ in the specific variables they include and in the weightings attached to those variables. In particular, IBCA appears to place the least emphasis while Standard and Poor's the greatest emphasis on balance-sheet variables in their rating processes. Furthermore, it is found that, examining the agencies both together and individually, the determinants of foreign currency sovereign ratings are sensitive to the sample of countries analysed, as well as to the definition of the explanatory variables. In this respect, Moody's proved the most consistent of the agencies analysed.

The probit models are successful in classifying correctly approximately 60 percent of the sovereigns at the broad letter rating. Although this is a slightly lower accuracy rate than that reported in previous research (Cantor and Packer, 1996a), it is still quite remarkable taking into account the differences between the two works: (1) this study uses a considerably larger sample -1003 observations as opposed to 49-, including more rating agencies -11 as compared to only 2-; (2) the longer time period -9 years instead of 1- results in a greater variability in the ratings included in the sample; and, (3) the ratings used in this study were not averaged. Further, about two-thirds of a holdout sample of sovereigns and three-quarters of the estimation sample are correctly classified within one rating notch of the correct rating. The robustness of the ordered probit analysis is tested by comparing its performance with that of the OLS regression. While, within the sample and for broad letter ratings, ordered probit performs slightly better, classifying correctly a higher proportion of the sample, its usefulness becomes evident for classifying ratings at the notch-level for which the models perform considerably better than OLS estimations. Probit models classify correctly roughly 40 percent of the ratings, whereas OLS does so for only less than a quarter of the sample. On the other hand, for prediction purposes and at the broad-letter level, OLS estimations fare slightly better than probit models, but at the notch-level probit proved better, once again classifying correctly more than one-third of the holdout sample, as opposed to only one-quarter for the best of the OLS models. The higher accuracy of ordered probit models, particularly at the rating-notch level, suggests that the ordered probit technique is more robust than OLS since it is more compatible with the structure of the rating process. Nevertheless, further research is needed to determine the reasons for the failure of the models to replicate all ratings.

The quantitative analysis of the preferred model -the model including the agency indicators- demonstrated that not all the statistically significant variables which determine foreign currency sovereign ratings have a significant quantitative impact on the ratings -as measured by the change in the median rating produced by changes in the explanatory variables. It is found that the default history on foreign currency debt and the level of income per capita have the strongest negative and positive quantitative impact on foreign currency ratings, respectively. A history of past default decreases the median rating by three rating notches, whereas an increase in 10 percent in the level of income per capita upgrades the median rating two rating notches. The ratio of external debt to exports, the rate of inflation, and the IMF classification of the country have a smaller impact. The agency indicators suggest that Moody's, Standard and Poor's and IBCA broadly assign similar foreign currency ratings, while the rest of the agencies, except for Thomson BankWatch, assign higher ratings than Standard and Poor's. JCRA's and Duff and Phelps' foreign currency ratings are one notch higher than Standard and Poor's -in terms of the median rating-, whereas the ratings of JBRI, Nippon Investors Service, and the two Canadian agencies are two notches higher. Fitch tends to assign the highest ratings, being these three rating notches higher than Standard and Poor's. Only Thomson BankWatch appeared to assign systematically lower ratings than Standard and Poor's, by one rating notch. Nevertheless, differences in the ratings sub-sample of each agency suggest that these findings are valid only for Moody's, Standard and Poor's, IBCA and Thomson BankWatch.

The analysis of the quantitative impact of the region indicators suggests that sovereigns from Africa, the Middle East, and Latin America are more likely to obtain lower foreign currency ratings. The median rating of these sovereigns is five rating notches lower than the median rating of sovereigns in West Europe and North America. While Eastern European and Asian sovereigns also receive lower ratings, their median is only three rating notches lower compared to West European and North American sovereigns.

7.2 Local Currency Sovereign Ratings

The analysis described in Chapter 5 investigates the determinants of local currency sovereign credit ratings. Rating agency assessments of local currency sovereign creditworthiness are found to be explained by a small number of variables reflecting the economic performance of the country, and, contrary to the analytical framework adopted (Guidotti and Kumar, 1991), it is found that, although the fiscal performance and the rate of inflation -which are closely related- have a statistically significant impact on local currency ratings, their quantitative impact is not significant.

The fiscal balance and the per capita income of the country are found to be the most important determinants of local currency sovereign ratings in terms of statistical significance. Both variables have a positive impact on local currency ratings, indicating the direct relationship between these two variables and the current and future levels of government revenues. Higher government revenues result in greater ability to meet both current and future domestic obligations, and, therefore, higher local currency ratings.

On the other hand, local currency ratings are inversely related to the rate of inflation and the level of external debt. This suggests that domestic and foreign debt are perceived to enter the statement of sovereign liabilities on an equal footing. That is, both types of debt have equal claims on government resources and domestic debt is not deemed senior relative to foreign debt. This is consistent with the fact that sovereign defaults on local currency debt are often preceded by default on foreign currency debt by a number of years, resulting in a higher perceived default risk on local currency obligations when a high foreign debt burden exists (Beers, 1998).

The findings show that there are significant differences between the determinants of local and foreign currency ratings. While the external balance and the development indicator have a statistically significant and positive effect on foreign currency ratings, they proved not statistically related to local currency ratings. Moreover, the quantitative impact of external balance proved not significant for neither of the two types of ratings, whereas the development indicator has a weak quantitative impact only on foreign currency ratings. On the other hand, although the statistical significance of the fiscal balance was higher for foreign currency ratings, the quantitative impact of this variable was not significant for neither foreign nor for local currency ratings. The indicator of the sovereign's history of default on foreign currency debt was found to have a greater impact on foreign than on local currency ratings in terms of both statistical and quantitative significance. A history of default on foreign currency debt downgrades the median foreign currency rating by three rating notches, while the median local currency rating declines by only one rating notch. The quantitative impact of the income per capita, although the greatest on both types of ratings, still presents some differences. While improvements in this indicator do not produce any change in the median local currency rating, they upgrade the foreign currency median rating by two or three notches for increases of 10 and 20 percent, respectively. Nevertheless, decreases of 10 and 20 percent in the level of per capita income affect similarly the local and foreign currency median ratings downgrading them one and three notches, respectively. Furthermore, the ratio of external debt to exports and the rate of inflation have a significant quantitative impact only on foreign currency ratings. Finally, a history of default on local currency debt downgrades the median local currency rating by six rating notches.

The determinants of local and foreign currency ratings are also different in that while the foreign currency ratings of Moody's and IBCA were not significantly different from those of Standard and Poor's, only Moody's appears to assign systematically local currency ratings -one notch lower than Standard and Poor's. On the other hand, Thomson BankWatch assigns foreign currency ratings which are one rating notch lower than Standard and Poor's ratings and it is suggested that Thomson's local currency ratings are also lower than Standard and Poor's. Additionally, it is found that Duff and Phelps assigns local currency ratings which are not systematically different from Standard and Poor's ratings, but it assigns foreign currency ratings which are higher by one rating notch. On the whole, the coefficients of the agency indicators were larger for the local than for the foreign currency ratings model. Although this would suggest greater disagreement between Standard and Poor's and the rest of the agencies in the local currency ratings assigned to sovereign borrowers, this is not supported by the quantitative analysis. Furthermore, the agency-specific models show that Moody's and Standard and Poor's seem to agree most on the criteria for foreign currency ratings, while IBCA and Standard and Poor's appear to do so for local currency ratings. Interestingly, while the latter two agencies appear to broadly assign the same ratings -both local and foreign currency- in every region of the world, their ratings seem to convey different information, this being difference greater for foreign currency ratings.

An observation regarding the differences across agencies is noteworthy. Differences in the number and credit quality of the sovereigns rated by each agency results in differences in the ratings distribution of each sub-sample. For foreign currency ratings it is observed that Moody's, Standard and Poor's, IBCA and Thomson BankWatch rate roughly the same sovereigns and have, therefore, similar ratings distributions. For local currency ratings this is observed for Moody's, Standard and Poor's and IBCA only. This suggests that the inferences and the results presented in this study regarding differences across agencies may be deemed valid for the above mentioned agencies, and results for the rest of the agencies should be treated with the corresponding caution given the differences in the dependent variable -i.e., the ratings.

Further examining the effect of the geographic region, it is found that except for the local currency ratings of Latin American sovereigns, relative to sovereigns in West Europe and North America, sovereign borrowers receive both lower local currency ratings and lower foreign currency ratings. Sovereigns in Africa and the Middle East are the most affected receiving local and foreign currency ratings which are three and five rating notches, respectively, lower than sovereigns in West Europe and North America. Asian sovereigns are the least affected being assigned local and foreign currency ratings which are one and three rating notches lower relative to West European and North American sovereigns. Eastern European sovereigns receive both local and foreign currency ratings which are three rating notches lower, while Latin American sovereigns have local currency ratings one rating notch lower and foreign currency ratings five notches lower. Additionally, region-specific models suggest that differences in the ratings assigned to sovereign borrowers by different rating agencies depend upon the currency of denomination of the debt evaluated and the geographic region of the sovereign.

Also contrasting is the effect of the lagged and balance-sheet variables. While, relative to average historical values, lagged variables have a statistically significant effect on foreign currency ratings, their impact is not significant on local currency sovereign ratings. Further, while Moody's and IBCA seem to place a greater weight on lagged variables for local currency ratings than for foreign currency ratings, the opposite is found for Standard and Poor's. So far as balance-sheet variables are concerned, these proved more statistically significant determinants of foreign currency ratings than of local currency ratings. Both individually and jointly, balance-sheet variables help to explain sovereign credit ratings over and above the explanatory power of macroeconomic variables. Nonetheless, the specific balance-sheet variables which were significant differ between local and foreign currency ratings models. For local currency ratings, two balance-sheet variables, namely the ratio of long-term debt to total bank debt and the ratio of total bank borrowing to total bank deposits have a significant effect on the ratings, although the explanatory value added by this subset of variables is only moderately significant relative to the explanatory value of macroeconomic variables. For foreign currency ratings, the ratios of short- and long-term bank debt relative to total, and the use of IMF credit relative to the country's IMF quota, proved statistically significant. The joint impact of this set of variables on foreign currency ratings is found to be highly significant relative to macroeconomic variables.

From the analysis of local currency ratings it is tentatively concluded that the use of OLS regression for analysing ordinal, discrete dependent variables such as credit ratings may convey misleading results. The estimations show that, in general, the differences between the two techniques are greater for local currency ratings than for foreign currency ratings in terms of both the statistical significance and the magnitude of the estimated coefficients. This may reflect the smaller sample of local currency ratings. While the inferences drawn from either OLS or ordered probit remained practically unchanged for foreign currency ratings, OLS estimates produced misleading results for local currency ratings as compared to ordered probit estimates. Ordered probit analysis is deemed more robust due to its greater compatibility with the nature of credit ratings.

The accuracy of the models was measured in terms of the proportion of total ratings correctly classified both within the sample on which the models were estimated and in a holdout sample. On the whole, ordered probit proved more robust than OLS showing higher accuracy rates in both the analysis of local currency ratings and the analysis of foreign currency ratings. Nevertheless, considered separately, ordered probit fared better for local currency ratings, while OLS did so for foreign currency ratings. Although both techniques perform similarly at classifying ratings within an error of one rating notch -about 80 and 70 percent for local and foreign currency ratings, respectively-, the percentage of ratings correctly classified at both the rating-notch level and the broad-letter level is higher using ordered probit analysis. For local currency ratings and for the test within the estimation sample, ordered probit models classify correctly about three-quarters of the ratings at the rating-notch level, and more than 80 percent of the broad letter ratings, while OLS correct classifications amount to about one-third and 45 percent, respectively. However, the ability of both techniques to classify correctly the ratings in the holdout sample is inferior. OLS performed better in the holdout sample than within the sample, although the accuracy of ordered probit remained higher. About 60 percent of the ratings are classified correctly at the rating-notch level and approximately 80 percent at the broad letter rating using probit models compared to 40 and 55 percent for OLS regressions. The analysis of foreign currency ratings brings forward different results. Within the estimation sample, probit models classify correctly roughly 40 percent of the ratings at the notch level, whereas OLS does so for less than one-quarter of the sample. For the holdout sample and at the rating-notch level, probit models also proved better, classifying correctly more than one-third of the sample as opposed to only one-quarter for the best of the OLS models. At the broad-letter level both techniques succeeded in predicting correctly about 60 percent of the ratings within the estimation sample as well as in the holdout sample. The superiority of ordered probit over OLS is, therefore, evidenced principally by the former's invariably higher rates of correctly classified ratings at the rating-notch level, the most rigorous of the accuracy tests employed. In general, probit models' accuracy rates were about 50 percent higher than OLS rates except for the test within the sample of local currency ratings where these rates were almost twice as high. Additionally, it has been shown that the robustness of ordered probit prevails regardless of the sample distribution. For example, for the sample of local currency ratings, which presents a high concentration of ratings in the "edge" categories, the accuracy rates of the ordered probit models within one notch of the correct rating and at the broad-letter level are virtually the same, while the latter accuracy rate declined considerably for OLS compared to the former.

7.3 Transfer Risk

The difference between local and foreign currency ratings has been used here as a measure of transfer risk, that is, the risk of the sovereign not being able to secure foreign exchange to service its foreign currency denominated debt.

Examining the statistical significance of the explanatory variables of the preferred model, it is found that indicators which reflect that resources are or will be available to honour debt obligations, such as government fiscal balance, current account balance, and per capita income, will result in lower perceived transfer risk and, therefore, narrower differences between local and foreign currency ratings. Additionally, a history of default on either foreign currency debt or local currency debt narrows the difference between local and foreign currency ratings by means of constraining both ratings to low levels. After controlling for the effect of the foreign currency sovereign rating, the inflation rate and the growth of GDP resulted in significant determinants of transfer risk, consistent with empirical literature on currency crises (Kaminsky, Lizondo and Reinhart, 1997).

Quantitatively, however, the income per capita has the greatest impact. Increments between 10 and 40 percent in the income per capita will lower the median transfer risk by one rating notch. Declines in the level of this variable, however, do not affect the median transfer risk unless they exceed 40 percent, in which case the median transfer risk will increase by one rating notch. Similarly, reductions in the rate of inflation or the level of external debt do not affect quantitatively the level of transfer risk, while increases greater than 40 and 10 percent in these variables, respectively, will narrow the difference between local and foreign currency ratings by one notch. Furthermore, other things equal, being classified as an industrial country by the IMF results in a one-notch lower perceived transfer risk as compared to the perceived transfer risk of developing countries. The reputation of the sovereign also has a significant quantitative impact on transfer risk. While a history of default on foreign currency debt will contribute to narrowing the median transfer risk by one rating notch, a previous default on local currency debt will lower this median two rating notches. Finally, also significant is the quantitative impact of the foreign currency rating on transfer risk such that lower foreign currency ratings will result in higher perceived transfer risk. For instance, relative to AA+/Aa1 or higher foreign currency ratings, AA/Aa2 and AA-/Aa3 ratings result in an increase of one notch in the level of transfer risk. Foreign currency ratings between A+/A1 and A-/A3, and between BBB+/Baa1 and BB+/Ba1 increase the median transfer risk two and three rating notches, respectively.

Furthermore, although globally there seem to be no systematic differences in the assessment of transfer risk across agencies, individual tests suggest significant differences between agencies. Differences in the sub-sample for each agency, however, hinder the comparability between all the agencies included in the sample. Nevertheless, similar transfer risk levels distributions for Moody's, Standard and Poor's and IBCA allow tentative conclusions on the differences in the transfer risk assessments of these agencies and in the determinants of such risk. For instance, on the whole, Standard and Poor's seems to be more pessimistic than Moody's and IBCA about sovereign transfer risk since the former agency's assessments result in a median transfer risk one rating notch higher. Moreover, Moody's and IBCA appear to place greater emphasis than Standard and Poor's on lagged values of macroeconomic variables as determinants of transfer risk. While both Standard and Poor's and IBCA incorporate balance-sheet variables in their assessments of transfer risk, the former places greater weight on the foreign exchange reserves of the country and the latter on the maturity structure of the sovereign bank debt.

Consistent with the notion that currency crises are contagious, transfer risk is also found to be related to the sovereign's geographic region and to vary systematically across regions. Other things being equal, sovereigns in regions other than West Europe or North America are normally associated with higher levels of transfer risk. However, in terms of statistical significance and after controlling for the effect of the foreign currency rating, the effect of the geographic region is significant only for sovereigns in Latin America considering the agencies both together and separately. The analysis of the quantitative impact of the geographic region yields fairly different results. The effect of the geographic region for sovereigns in Eastern Europe, Africa, and the Middle East is not quantitatively significant since their ratings result in the same median transfer risk as for sovereigns in West Europe and North America. For sovereigns in Asia and the Pacific Central, on the other hand, this median will be one rating notch higher, whereas Latin America is perceived as the region of the world posing the greatest transfer risk. Sovereigns in the latter region have a median transfer risk two rating notches higher than sovereigns in West Europe and North America. Moreover, while Moody's and IBCA's assessments of transfer risk are not systematically different from those of Standard and Poor's in Africa and the Middle East, Standard and Poor's is more pessimistic about the transfer risk of Latin American sovereigns. Moody's perceives a higher transfer risk than Standard and Poor's and IBCA for sovereigns in West Europe and North America.

Although transfer risk cannot be better explained by lagged values than by average historical values of macroeconomic variables, it is found that some of the lagged variables have a significant individual effect on transfer risk. In particular, it is suggested that the lagged values of external balance and income per capita contribute to explaining transfer risk.

On the other hand, balance-sheet variables appeared to play an important role in explaining transfer risk, over and above the role played by macroeconomic variables. It is concluded, therefore, that both macroeconomic and balance-sheet variables have a significant effect on transfer risk. These results are consistent with those for foreign and local currency ratings in that balance-sheet variables also proved significant determinants of the two types of ratings. Nevertheless, the specific variables that were significant differed in each of these analyses. For foreign currency ratings, higher proportions of both long- and short-term bank debt are perceived as a financial strength for the sovereign and result in higher foreign currency ratings, while higher levels of IMF credit are translated into lower ratings. Higher local currency ratings are related to higher proportions of long-term bank debt and higher levels of bank borrowing relative to bank deposits. Lower perceived transfer risk, by contrast, is associated with higher levels of liquid international assets such as foreign exchange reserves and undisbursed credit commitments. Higher levels of long-term bank debt relative to total bank debt and higher ratios of total bank borrowing to bank deposits will result in higher perceived transfer risk.

The inclusion of the foreign currency rating of the sovereign added to the explanatory value of all models except for the model including balance-sheet variables. It is found that lower foreign currency ratings are associated with perceptions of higher transfer risk. Given this relationship, controlling for the effect of the foreign currency sovereign rating on transfer risk facilitates the interpretation of the difference between local and foreign currency ratings at the lower-end of the rating spectrum, where low local currency ratings constrain foreign currency ratings to even lower levels resulting in narrower differences between the two types of ratings.

The effect of the foreign currency is also reflected in higher accuracy rates for the models. While approximately 40 percent of the transfer risk categories were correctly classified by the models excluding the foreign currency rating as an explanatory variable, this proportion increased to about 50 percent after controlling for the effect of the foreign currency rating. Furthermore, ordered probit models fared better than OLS only after the inclusion of the foreign currency ratings, although accuracy rates for both techniques are relatively similar. Correct classifications of transfer risk within an error of one notch generally exceeded 80 percent both within the sample and for the holdout sample, and for both techniques. Transfer risk models performed slightly better than the models for foreign currency sovereign ratings, but worse than the models for local currency ratings. Nevertheless, the performance of transfer risk models is remarkable since it would be expected that it is more difficult to explain the difference between two ratings than explaining the level of each rating -foreign and local currency ratings- separately.

Finally, contrasting with the quantitative analyses for foreign and local currency sovereign ratings, it is found that the group of variables which quantitatively help to explain transfer risk may be different from the group of statistically significant variables.

7.4 Implications and Future Research

The findings of this study have important implications for both sovereign borrowers and users of credit ratings. First, regarding the implications for sovereigns, the findings suggest a possible incentive for "rate-shopping". Given the suggested systematic differences between rating agencies across regions and that agencies tend to assign more favourable ratings to sovereigns in their own region of the world, sovereign borrowers may wish to contract with rating agencies which seem likely to provide more favourable ratings, such as rating agencies recently undertaking sovereign rating activities or agencies headquartered in their own geographic region. Moreover, sovereigns seeking to improve their credit ratings should aim not only at implementing policies that improve their economic fundamentals but also at reducing information asymmetries between them and the agencies in an attempt to compensate for geographical distance and possible lower understanding of the ratee by the rater.

Second, the determinants of local currency sovereign ratings suggest that rating agencies perceive a higher risk of default where the domestic debt burden is low if, at the same time, the ratio of external debt to exports is high or the current or future fiscal position -present value of anticipated future revenues- is weak. It follows, that the domestic debt situation is not analysed in isolation from the external debt situation and that adjustment programmes designed for the long-term sustainability of improvements in the fiscal balance of a country will result in improved perceived creditworthiness for local currency debt.

Third, insofar as the implications for the users of ratings, the findings suggest that uses of ratings which presuppose comparability may prove inadequate since it is suggested that the information conveyed by a given credit rating category may vary across agencies. The possibility that some agencies assign consistently lower or higher ratings than others suggests that individual rating scales may differ from agency to agency. In this case, the systematically lower local currency ratings of Moody's and the lower foreign currency ratings of Thomson BankWatch, relative to Standard and Poor's, support the view of different individual rating scales. On the other hand, even if no systematic difference is observed between the ratings of two agencies, individual rating scales may still differ if the default risk associated with the credit ratings of a given agency is higher or lower than the default risk associated with the ratings of another agency only for some rating categories. In this respect, IBCA's and Standard and Poor's scales of local currency ratings may differ even if the local currency ratings of these agencies were found to be not systematically different. Similarly, Moody's, IBCA's, and Standard and Poor's foreign currency ratings, which proved not systematically different, may still suggest different rating scales between these agencies.

The findings of this study gain relevance after the reform to capital adequacy standards proposed in June 1999 by the Basle Committee on Banking Supervision. The new proposal bases the capital adequacy ratios of banks on the credit ratings of borrowers and, contrary to the findings of this study, presumes equal credit risk for identical rating categories of different agencies. Under this proposal, a difference of one notch in the credit rating of a sovereign, such as between BBB-/Baa3 and BB+/Ba1, or between A-/A3 and BBB+/Baa1, would represent an increase in the risk weighting from 50 to 100 percent and from 20 to 50 percent, respectively, for the bank exposed to the credit risk of such sovereigns. Since the New Capital Adequacy Framework does not distinguish between the ratings of different agencies, this may also provide sovereign borrowers with an incentive for "rate-shopping" in an attempt to obtain better borrowing terms. This implies that without further and rigorous research, it cannot be assumed the default risk associated with a given rating category to be equal across agencies.

Additionally, under this new capital adequacy approach, claims on sovereigns denominated in local currency will be assessed in respect of the sovereign's long-term foreign currency rating, although a modified, preferred treatment may be available at the discretion of the pertinent supervisory authorities. However, the differences in the information content of foreign and local currency ratings found in this study suggest that the use of foreign currency ratings as an indication of sovereign credit risk of local currency denominated obligations may prove inadequate. Moreover, since local currency ratings are deemed a more accurate measure of the credit risk of local currency denominated claims, they have been proposed as the criteria for the determination of the risk weight for such exposures (Ostrovsky, 1999a). Nevertheless, the systematic differences across agencies - though inconsistent across types of ratings- found in this study raise questions about the superiority of local currency ratings for such purposes.

Fourth, the analysis of the quantitative impact of the explanatory variables has shown that there are differences between the statistical and quantitative significance of the regressors. In general, the variables which proved quantitatively significant were also statistically significant in the analyses of foreign and local currency ratings. However, not every statistically significant variable produced a significant quantitative impact on the dependent variable. On the other hand, the set of variables which showed a significant quantitative impact on transfer risk was found to be different to the set of statistically significant variables. This implies, therefore, that differences in the statistical and quantitative significance of explanatory variables should not, a priori, be disregarded. Further, the assumption that only the statistically significant variables contribute to explaining the dependent variable -sovereign credit ratings or transfer risk levels, in this case- may prove inaccurate.

Fifth, the robustness of ordered probit relative to ordinary least squares analysis to model discrete, ordinal dependent variables such as sovereign credit ratings is found to be sensitive to the sample analysed. While, for foreign currency ratings and transfer risk, in particular, OLS was found not to suffer from the shortcomings attributable to it, on the whole, ordered probit proved more appropriate in classifying correctly a higher proportion of the samples analysed. Moreover, the use of OLS for analysing local currency ratings produced misleading results. Therefore, the greater theoretical compatibility of ordered probit for modelling such dependent variables cannot be ignored.

Sixth, although the models succeeded in explaining sovereign credit ratings, they failed to fully replicate the ratings. This may imply that rating agencies incorporate private information, not available to the markets, into their credit ratings, thereby making the informative role of rating agencies clear. On the other hand, this may reflect the need for investigating the improvement to the explanatory power of the models produced by additional sets of possible determinants of credit ratings. Either case, further research is required to provide more evidence which may shed light on this issue.

Seventh, it has been demonstrated that qualitative characteristics of the sovereign in question constitute a very important element of the rating process. In particular, the reputation for timely repayment of the sovereign's debt has proved to be greatly weighted by the rating agencies in the assignment of a sovereign's local and foreign currency ratings, as well in its assessment of transfer risk.

Finally, several avenues for future research are identified, which will improve the understanding of sovereign credit ratings in particular, and the rating process in general. These include: (1) the incorporation of qualitative political variables as a set of determinants of sovereign credit ratings and transfer risk in order to assess directly the relative importance of these variables as compared to indicators of the economic performance of a country; (2) the use of the "average" credit rating as the dependent variable in an attempt to test for the appropriateness of using such an average as an indicator of the sovereign's overall creditworthiness as opposed to the use of individual -and often split- credit ratings given by different agencies; (3) further tests for the differences across rating agencies regarding their determinants of local currency credit ratings and transfer risk assessments when a larger sample permits the use of ordered probit for agency-specific models; (4) the exploration of alternative measures of transfer risk, such as the spread between local and foreign currency denominated securities -as opposed to the difference between local and foreign currency ratings- in order to compare what markets perceive as causing transfer risk and what rating agencies deem to contribute towards this risk; and, (5) further tests for the sensitivity of the models to changes in the definition and calculation of the explanatory variables.

APPENDIX I

Expansion of Credit Rating Agencies

Table I-1. Expansion of Rating Agencies in Emerging Markets

Credit rating agency	Home Country	Non-home offices (year of establishment)	
Standard and Poor's Ratings Group	US	London (1985) Melbourne (1990) Stockholm (1988) Paris (1990) Toronto Singapore	Tokyo (1986) Frankfurt (1992) Madrid (1992) Mexico City (1993) Hong Kong
Moody's Investors Service	US	Tokyo (1985) London (1986) Paris (1987) Sydney (1987) Frankfurt (1991)	Madrid (1993) Hong Kong (1994) Singapore (1994) Cyprus (1994) Toronto (1994)
Duff and Phelps Credit Rating Co.	US	London Mexico City (1992) Venezuela (1994)	Hong Kong Chile (1988) Argentina (1992)
Thomson BankWatch Inc.	US	Sydney Malaysia Hong Kong (1994)	London Cyprus
IBCA Limited[1]	UK	Paris New York Tokyo Sao Paulo Malaysia Chile	Brisbane Barcelona Argentina South Africa Singapore Hong Kong

[1]IBCA Limited and Fitch Investors Service merged in January 1998 to become FitchIBCA. Nevertheless, given that the period included in this study is prior to the merger (1989-1997), these two agencies are analysed separately in the empirical work.

Source: Financial Times Credit Ratings International, July 1998
Financial Times Credit Ratings in Emerging Markets, November 1997

Table I-2. Local Rating Agencies in Emerging Markets

Name	Acronym	Home Country	Year of Found.	Ownership
Duff & Phelps de Argentina Sociedad Calificadora de Riesgo, S.A.	DCR Argentina	Argentina	1992	DCR and Individual investors
Standard & Poor's Argentina Branch	PCA	Argentina	1997	S&P
IBCA Argentina Calificadora de Riesgo, S.A.	RARC	Argentina	1992	IBCA and Individual Investors
Value Calificadora de Riesgo	VALUE	Argentina	1992	Individual Investors
IBCA Chile	IBCA Chile	Chile	1988	Individual Investors
Duff and Phelps Chile Clasificadora de Riesgo	DCR Chile	Chile	1988	DCR and ENCONSULT Ltd.
Feller Rate Clasificadora de Riesgo Ltda	F&R	Chile	1993	Individual Investors
Credit Analysis and Research Ltd.	CARE	India	1993	Financial Institutions
The Credit Rating Information Services of India Ltd.	CRISIL	India	1988	Financial Institutions
ICRA, Ltd.	ICRA	India	1991	Financial Institutions
PEFINDO Credit Rating Agency	PEFINDO	Indonesia	1993	Financial Institutions
MAALOT-The Israel Securities Rating Company Ltd.	MAALOT	Israel	1991	Financial Institutions
Korea Investors Services Inc.	KIS	Korea	1985	Financial Institutions
Korea Management and Credit Rating Corporation	KMCC	Korea	1983	Financial Institutions
National Information & Credit Evaluation, Inc.	NICE	Korea	1986	Financial Institutions
Rating Agency Malaysia, Berhad	RAM	Malaysia	1990	Financial Institutions
Clasificadora de Riesgos S.A. de C.V.	CLASE	Mexico	1992	Individual Investors
Dictaminadora de Valores, S.A. de C.V.	DICTA	Mexico	1992	Individual investors
Duff and Phelps de Mexico, S.A. de C.V.	DCRMEX	Mexico	1992	DCR and Individual Investors
Standard and Poor's S.A de C.V.	S&P-CaVal	Mexico	1990	S&P
The Pakistan Credit Rating Agency (Pvt) Limited	PACRA	Pakistan	1994	IBCA and Financial Institutions
Credit Information Bureau, Inc.	CIBI	Philippines	1982	Financial Institutions
Companhia Portuguesa de Rating, S.A.	CPR	Portugal	1988	Individual investors
CA-Ratings	CA-Ratings	South Africa	1993	Individual investors
IBCA South Africa (Pty) Ltd.	IBCA-SA	South Africa	1990	IBCA
Thai Rating and Information Services Company Ltd.	TRIS	Thailand	1993	Financial Institutions
Duff and Phelps de Venezuela, S.A. Sociedad Calificadora de Riesgo.	DCR-Venezuela	Venezuela	1994	DCR and Individual Investors

Sources: Financial Times Credit Ratings in Emerging Markets, November 1997.

Table I-3. Number of Issuers Rated, by Industry and Rating Agency

	Moody's	S&P	JBRI	JCR	NIS	Duff & Phelps	Fitch	IBCA	TW[1]	Total
Manufacturing	1,289 (26.5)	1,085 (26.3)	380 (49.0)	256 (51.1)	320 (54.5)	160 (19.3)	62 (14.5)	37 (7.0)	0 (0.0)	2,176 (27.5)
Non-manufacturing	1,117 (24.2)	1,089 (24.7)	192 (24.8)	138 (27.5)	148 (25.2)	259 (31.2)	157 (36.8)	35 (6.6)	1 (0.2)	1,742 (22.0)
(Utilities)	374 (7.7)	371 (9.0)	21 (2.7)	10 (2.0)	11 (1.9)	188 (22.7)	132 (30.9)	6 (1.1)	0 (0.0)	494 (6.2)
Financial institutions, structured securities	2,152 (44.3)	1,807 (43.8)	179 (23.1)	95 (23.1)	112 (19.1)	399 (48.1)	199 (46.6)	418 (78.7)	586 (99.0)	3,561 (45.0)
Sovereigns, municipal bonds	242 (5.0)	218 (5.3)	24 (3.1)	12 (2.4)	7 (1.2)	12 (1.4)	9 (2.1)	41 (7.7)	5 (0.8)	436 (5.5)
Total	4,860 (100.0)	4,129 (100.0)	775 (100.0)	501 (100.0)	587 (100.0)	830 (100.0)	427 (100.0)	531 (100.0)	592 (100.0)	7,915 (100.0)

[1]Thomshon BankWatch

Notes: (1) Based on ratings in coverage as of July, 1995; (2) figures in parentheses are percent; (3) each issuer has been counted only once in the totals; (4) Moody's Investors Service, S & P= Standard and Poor's, JBRI = Japan Bond Research Institute, NIS = Nippon Investors Service; JCR= Japan Credit Rating; Duff & Phelps= Duff and Phelps Credit Rating Co.; Fitch= Fitch Investors Service, and (5) all nine of the agencies shown are recognised by Japan's Ministry of Finance.

Source: Nomura Research Institute, 1996.

APPENDIX II. Ratings in Regulation

Increasingly, many governments consider rating agencies to be useful in fostering the growth of domestic capital markets and in furthering regulatory objectives. However, academics and practitioners have warned against the regulatory uses of ratings arguing that these uses have brought about fundamental and unhealthy changes in the economic incentives structure of the credit rating industry, thereby undermining the independence, objectivity, and reliability that has underpinned the rating agencies' economic role in the credit markets for nearly a century. The criticism of the regulatory uses of ratings comprises two main areas of debate: (1) the unsuitability of credit ratings for regulatory purposes; and (2) the need for prudential oversight of the agencies' rating process. This appendix summarises the different policy issues pointed out by the critics of the regulatory uses of ratings.

II.1 Regulatory Uses of Ratings

As far as regulation is concerned, although it is doubtless the fact that rating-based financial regulation has encouraged the growth of the rating industry, regulatory uses of credit ratings may undermine their independence, objectivity and reliability - factors which have been regarded as crucial in ratings' actual acceptance.

First, by using ratings as a tool for regulation and assuming they are comparable, governments could subvert market demand by changing the priority of issuers' motivations to request ratings. Problems such as issuers "shopping" for the highest ratings at the lowest price, rather than the ratings that best reflect their credit quality, may be inadvertently created when issuers buy ratings primarily as a means of obtaining the approval of a government, rather than looking for gaining credibility with the investor community.(1) Clearly, the conscientious agency must place a high value on its reputation in order to overcome the short-run incentive to satisfy the client by issuing a high rating.

Second, the weakness of evidence in favour of the use of credit ratings as a measure of market risk exposure, such as the inclusion of ratings in capital adequacy requirements for investment and credit institutions, makes inappropriate the current use of ratings as a measure of non-credit risks. (McEnnally and Ferri, 1982; Stock and Schrems, 1984; Mackintosh, 1995; and Fridson, 1989).

Third, the regulations implicitly assume that credit ratings provide rank orderings and absolute measures of default risks that are consistent across instrument types, time and agencies. Although ratings appear to assess relative risk correctly and consistently, the evidence on the precision with which absolute risks are measured is not conclusive (Altman, 1989; Artus, Garrigues and Sassenou, 1993; and Cantor and Packer, 1994).

For the aforementioned reasons, the incorporation of ratings of private agencies in regulation has been severely criticised and has prompted some observers -including the rating agencies- to suggest the elimination of the regulatory uses of credit ratings (Cantor, 1995 and Selzer, 1997).

II.2 Regulation of Agencies

Some observers have suggested the need for some degree of oversight of credit rating agencies (Bottini, 1993). Several reasons have led to this proposal. First, by introducing the 'nationally recognised' agency designation, regulators have created a barrier to entry into the rating business, sheltering the government approved agencies from new entrants and from foreign competition. This protection, in turn, undermines the benefits of competition, such as continuous improvement of services and products, by assuring -to a certain extent- market demand for the nationally recognised agencies (Groenfeldt, 1995). Nonetheless, the demand for ratings relies on agencies' reputation for accurate ratings and this may compensate for the lower competition.

Second, by designating a number of agencies whose ratings can be used interchangeably for regulatory purposes, regulators implicitly assume that their

(1) However, only mixed evidence about "rate-shopping" has been found (Billingsley, et.al., 1985; Ederington, 1986; Cantor and Packer, 1996b and 1997).

rating scales are comparable and substitutable. Rating scales are, contrary to this regulatory assumption, not comparable (Beattie and Searle, 1992a,b; and Cantor and Packer, 1996b and 1997). Moreover, disagreement between agencies -split ratings- has raised doubts regarding the comparability of their methodology. Although this may call for regulatory oversight of the agencies' rating process, in practice, attempts to oversee the rating agencies in order to ensure a certain quality of service have led to investors' scepticism about the quality of such credit ratings (Selzer, 1997). Investors may regard the regulatory oversight of the rating process as an attempt to control the opinions that are issued.

Third, the use of unsolicited ratings -considered to be unbiased because no rating fee is involved in the assessment- may prove hazardous practice (Bottini, 1993). Either they can provide misleading ratings resulting from incomplete information or they can be used to force issuers to hire the agencies' services. Furthermore, rating-based regulations do not discriminate between solicited or unsolicited ratings, and nor do most of the agencies when disclosing their ratings. Therefore, unsolicited ratings may interfere with rules, such as those using ratings for disclosure exemptions or investment eligibility. For instance, in case an unsolicited rating be lower than the minimum regulatory requirement for disclosure exemption or investment eligibility, it may lead to the unfair rejection of a security to the detriment of the issuer.

Finally, ratings are accompanied by disclaimers which state that they are not recommendations to purchase, sell or hold securities. This tries to shield the agencies from any responsibility for the consequences that the release of their ratings may have in the capital markets, especially for investors who base their investment decisions on ratings. An expanded legal liability on rating agencies has been suggested, but it has been argued that this would result in an increase in the costs of ratings while reducing the quantity and quality of ratings available (Husisian, 1990; and Ebenroth and Dillon, 1993).

APPENDIX III

Ratings Criteria

Table III-1. Sovereign Rating Profile

Political Risk - Form of government - Orderliness of leadership succession - Extent of popular participation - Integration in global trade and financial system - Internal and external security risks
Income and Economic Structure - Living standards and income distribution - Market and non-market economy - Resources endowments, degree of diversification
Economic Growth Prospects - Size and composition of savings and investment - Rate and pattern of economic growth
Fiscal Flexibility - General government operating and total budget balances - Tax competitiveness and tax-raising flexibility - Spending pressures
Public Debt Burden - General government financial assets - Public debt and interest burden - Currency, composition, structure of public debt - Pension liabilities - Contingent liabilities
Price Stability - Trends in price inflation - Rates of money and credit growth - Exchange rate policy - Degree of central bank autonomy
Balance of Payments Flexibility - Structure of the current account - Adequacy and composition of capital inflows - Impact on external accounts of fiscal and monetary policies
External Debt and Liquidity - Size and structure of gross and net external debt - Debt service burden - Adequacy of international reserves - Importance of banks and other entities as contingent liabilities of the sovereign

Source: Standard and Poor's, 1997

Table III-2. Key Indicators. Sovereign Ratings

Economic Statistics
- Gross domestic product (GDP) per capita
- Real GDP growth
- Real gross fixed investment growth
- Consumer price inflation
- Unemployment rate
Government finance statistics
- Budget balance / GDP
- Central government debt / GDP
- Government interest payments / budget revenue
- Tax revenue (including SS) / GDP
Balance of payments
- Current account balance / GDP
- Int. reserves / imports of goods and services (G&S)
- Real exports of G&S growth
- Exports of G&S/GDP
External debt statistics
- Gross public external debt/exports of G&S plus private transfers
- Gross external debt/ exports of G&S plus private transfers
- Net external debt/ exports of G&S plus private transfers
- Net interest payments/ exports of G&S plus private transfers

Source: Standard and Poor's

Table III-3. Corporate Rating Profile
(continued on pag. 302)

Country Risk and Importance - Sovereign risk of country of domicile - Sovereign risk of other countries of significance - Geographic mix of business - Company's relationship with government - Importance of company's industry to country - Importance of company as employer and generator of foreign exchange - Government support of private sector Industry Risk - Domestic Industry characteristics: nature, competition, cyclicality, maturity - Demand/supply factors - Federal, state, foreign regulation - Significance of legislation - Barriers to entry Market Position - Dominant and stable market shares - Major product importance - Product diversity - Significance of R&D - Dependence on major customers/diversity of customer base - Marketing/distribution needs Management - Record to date in financial terms - Planning - Commitment, consistency and credibility - Overall quality of management - Performance vs. Peers Accounting Quality - Auditor's qualifications - Non-consolidated subsidiaries - Stock valuation policies - Depreciation policies - Recording of revenues - Goodwill and intangibles treatment

Source: Standard and Poor's and FitchIBCA

Table III-3. Corporate Rating Profile (continued)

Earnings - Profit margins - Tax environment - Ability to finance growth internally - Returns on capital - Pre-tax coverage ratios
Capital and Debt Structure - Gearing (debt/equity) measures - Leverage (total liabilities/equity) measures - Off-balance sheet assets - Nature of assets - Appropriateness of capital structure for business - Debt structure: type, maturity, currency
Cash Flow Adequacy - Volatility of cash flow over time - Cash flow relative to total debt - Size and scope of total capital requirements - Working capital management and measurements - Restrictions on cash flow
Financial Flexibility - Relative financial needs - Projected financing plan - Ability to attract capital - Banking relationships - Debt service schedule

Source: Standard and Poor's and FitchIBCA

Table III-4. Bank Rating Profile

Risk
- Bank's loan portfolio
- Counterparty credit/exposure assessment procedures
- Trading and investment securities portfolio
- Investment risk management policies
- Derivative products activities
- Banks interest rate/currency sensitivity and policies

Funding
- Principal sources
- Volatility

Capital, 'hidden' reserves and loan loss/risk reserves
- Hidden/inner reserves
- Capital/weighted risk ratio
- Capital adequacy ratio
- Movements on loan loss/risk reserves/allowances/accumulated provisions

Performance/earnings
- Annual earnings
- Net interest revenues
- Net interest margins
- Operating expenses

Market environment and planning
- Competitive position
- Expansion/diversification plans

Prospects
Ownership
Audit control by national banking supervisory authority
Contingent liabilities

Source: FitchIBCA

APPENDIX IV.
A New Challenge for Ratings: The European Monetary Union

Sovereign Ratings

The most immediate impact of the creation of the European Monetary Union (EMU) on the credit ratings of both public and private sector issuers within the region is that the single currency has *eliminated the distinction between local currency debt and foreign currency debt ratings.* National monetary policy could be -and at times was- used as a tool to cushion local economic shocks, an option no longer available to sovereigns joining EMU. As a result, sovereigns inside EMU will have no more privileged access to debt denominated in euro -the new common currency -than they will to foreign currency debt. Therefore, their obligations have been rated identically, regardless of currency of denomination reflecting that the default risks on euro and foreign currency are perceived to be the same.

Because monetary and exchange rate policies will be formulated at the supranational level within EMU -by the European Central Bank- sovereign ratings no longer constrain ratings of corporate and financial institutions, as was the case prior to the creation of EMU. Ratings of regional and local governments could also be higher than the sovereign having jurisdiction over them. Ratings assigned to issuers within EMU will fully reflect their stand-alone credit characteristics, regardless of the country in which they are based.(1) Fiscal -rather than external- analysis will now be the dominant criterion for differentiating the credit quality of sovereigns inside EMU. In the spring of 1998, the rating agencies announced the convergence of local and foreign currency credit ratings for all EMU issuers. Sovereigns with local currency debt rated "triple-A" and foreign currency debt rated below this level have been the most affected; the ratings assigned to euro debt that

(1) Direct intervention of the European Central Bank will be limited according to the "no-bailout" clause -Article 104b of the Maastrich Treaty- which states that "the Community shall not be liable for or assume the commitments of Central Governments, regional or local authorities, other bodies governed by public law, or public undertakings of any Member State, without prejudice to mutual financial guarantees for the joint execution of a specific project."

replaces the local currency debt of EMU sovereigns are now the same as those for their foreign currency obligations (Beers, 1996b; Truglia and Levey, 1998b; and Beers, Veverka and Cavanaugh, 1998).

Corporate Ratings

The distinction between local currency and foreign currency credit ratings, as previously noted, will also end for all EMU-based private sector issuers. With opportunities to trade currency and interest differentials closed within the EMU zone, credit factors will gain greater significance. It is therefore likely that investor appetite will stretch further down the credit spectrum than in the past, opening opportunities for weaker credits to directly access the capital markets. Offsetting this is the fact that smaller and weaker corporate borrowers may lose the beneficial effect of name of recognition in their domestic market, and have to pay higher margins as a consequence. Since the sovereign ceiling for the EMU area is be “AAA”, for strong corporates domiciled in jurisdictions with a less-than-”AAA” foreign currency ratings, this offers the potential to borrow on better terms than their governments for the first time.

The most straightforward benefits of a single currency for a corporate stem from the reduction in cross-border financial transaction costs within the EMU zone, via the elimination of foreign exchange risks and costs. The EMU in itself is not likely to trigger substantial changes in corporates ratings, however (Atkinson, 1996).

Bank Ratings

One of the primary goals of the single European currency is to increase economic efficiency by simplifying cross-border transactions within EMU. Savings will come from the elimination of currency risk and the reduction of transaction costs. Since banks are the main intermediaries for cross-border transactions, the banking sector will bear the brunt of the cost savings, both from the loss of foreign exchange trading and transfer revenues, and the need to retool information management and delivery systems. However, investment banks will see greater potential to introduce lower-quality credit to capital markets, as institutional investors look to replace lost opportunities of investments based on currency and inflation differentials.

Creation of the EMU will result in less government intervention in the financial sector, reinforcing a trend of the past decade. European states will have less authority, and less incentive to support ailing banks in a huge single market. Deposit insurance schemes, or other support structures may be created to compensate for the shrinking scope of direct government intervention to support problem banks. However, these factors alone are unlikely to give rise to rating changes (Bugie, 1996).

APPENDIX V.
Exchange Controls and Transfer Barriers Imposed by Sovereign Governments

A sovereign under severe economic or financial pressure seeking to retain valued foreign currency reserves in the country and that may not be able to meet, or already has not met, its timely obligations on foreign debt, could impose many constraints on other governmental or private sector borrowers, including (Chambers, 1997):

1) limits on availability to foreign exchange;
2) maintenance of dual or multiple exchange rates for different types of transactions;
3) making it illegal to maintain offshore and/or foreign currency bank accounts;
4) requiring the repatriation of all funds held abroad or the immediate repatriation of proceeds from exports and conversion to local currency;
5) seizure of physical or financial assets if foreign exchange regulations are breached;
6) requiring that all exports (of the goods in question) be conducted through a centralised marketing authority of the posting of a significant bond prior to the export of goods to assure immediate repatriation of proceeds;
7) implementation of restrictions on inward and outward capital movements;
8) refusal to clear a transfer of funds from one entity to another;
9) revocation of permission to utilise funds to repay debt obligations;
10) a government-mandated moratorium on interest and principal payments, or required rescheduling or restructuring of debt; and,
11) nationalisation of the debt of an issuer and making it subject to the same repayment terms or debt restructuring as that of the sovereign.

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