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**COUNTRY RISK ASSESSMENT:
AN APPLICATION FOR TURKEY**

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İstanbul, 2005

PREFACE

In the last 20 years country risk assessment has become increasingly important in the world of business transactions because of globalization. In this ambient, countries are more relevant with each other that we could see the contagion effect on their economic activities. So this thesis based upon country risk assessment and focus on a country that is Turkey.

I would like to express my sincere gratitude to Associate Professor Ceyda R. Y. Öztürk for supervising my work and guidance. I also would like to thank Saruhan Hatipođlu, the director of BERI and Stephen J. Weber from BERI, for their support to my work. Finally I wish to express my special thanks to my family for their patience, support and sensibility.

İstanbul, 2005

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ABBREVIATIONS

LDCs	Less Developed Countries
ISDA	International Swaps & Derivatives Association
IMF	International Monetary Fund
BIS	Bank of International Settlement
WB	World Bank
IIF	The Institute of International Finance
UN	United Nations
OECD	Organization for Economic Co-operation and Development
USA	United States of America
CDS	Credit Default Swap
IRB	Internal Ratings Based
PD	Probability of Default
EAD	Exposure at Default
LGD	Loss Given Default
D	The Amount Lent to Debtor
P	Maximum Repayment the debtor is willing to make
GDP	Gross Domestic Product
GNP	Gross National Product
EL	Expected Loss
ISE	Istanbul Stock Exchange
EX	Export
GE	Government Expenditure
DE	Defence Expenditure
MC	Monte Carlo
Var	Value-at-Risk

MCDA	Multicriteria decision-aid
MCPs	Multicriteria Classification Problems
MHDIS	Multi-Group Hierarchical Discrimination
UTADIS	Utilities Additives Discriminates
ANNs	Artificial Neural Networks
LA	Logit Analysis
PA	Probit Analysis
DA	Discriminant Analysis
PRS	Political Risk Services
ICRG	International Country Risk Guide
CPFER	Composite Political, Financial and Economic Risk Ratings
PR	Total Political Risk Indicators
FR	Total Financial Risk Indicators
ER	Total Economic Risk Indicators
WCF	Worst Case Forecast
BCF	Best Case Forecast
BERI	Business Environment Risk Intelligence
BRS	Business Risk Service
HRRP	Historical Ratings Research Package
ORI	Operations Risk Index
PRI	Political Risk Index
EUI	The Economist Intelligence Unit
II	Institutional Investor

SYMBOLS

r	Interest Rate
S	Sanctions
D	The Amount Lent to Debtor
P	Maximum Repayment The Debtor is Willing to Make
σ	Standard Deviation
C_1	Rescheduling Group
C_2	Non-Rescheduling Group
Z	Discriminant Function
x_i	Predictors
w_i	Discriminant Coefficient
m	Number of the Explanatory Variables
n	Number of Observations
Φ	Standard Cumulative Normal Probability Distribution
xb	Probit Score or Index
β	Beta
ϵ	Error Term
ψ	Sigmoid Cumulative Function

1. INTRODUCTION

In the last 20 years country risk assessment has become increasingly important in the world of business transactions because of globalization that have been settled in our vitas like breathing. For the so-called globalization an increasing number of companies are taking advantage of foreign trade. Thus, it could be easily said that the multinational firms have more serious part in this process. They trade in foreign countries, invest there, borrow from them and sometimes give debt to them. Also banks are getting more important part while fulfilling their lending duties to multinational firms or sometimes to governments. As it is usual to meet some conflicts in human body while breathing, we could meet some problems in this process. As a result of globalization, financial markets spread ahead from the continent of America to Asia with its fraught like contagion risk and ambiguity. So people try to prevent themselves from these problems or guess how serious it is. Here we discuss hazards of this process and narrowly risks of relationship with other countries especially analysis and assessment of country risk as a crucial component of valuation in recent years.

As we mention about its components, country risk is so broad concept that includes political risk, currency risk, transfer risk, cultural and institutional risk etc. In the case of high country risk, a company or a country may be exposed to the risk of default an obligation, bankruptcy, failure to pay, restructuring, obligation acceleration, repudiation /moratorium as defined credit events by International Swaps & Derivatives Association (ISDA)¹.

After having an entry of country risk subject, the following section seeks some answers to following questions. What are the elements of a comprehensive country risk methodology? What are the major challenges you'll encounter when performing country risk measurement analysis? What constitutes country risk events? So we commence country risk analysis with identifying the subject of country risk and predicting the credit worthiness of countries in the light of different techniques. In that

¹ ISDA, EXHIBIT A to 2003 ISDA Credit Derivatives Definitions, 2003, <http://www.isda.org>, (03 April 2005).

section we also mention about crisis, which are believed as an important factor in assessing country risk and look at previous studies about predicting debt crises. In the next chapter some country risk assessment techniques are ranked before country risk assessment techniques are discussed.

Finally we discuss a useful assessment technique of country risk for Turkey. The most appropriate indicators are found to make an assessment of country risk for Turkey by using multiple regression analysis.

To make more accurate analysis about country risk an analyst needs a diverse source of data including those provided by the public offices of the related country and international institutions. Thus, the complete transparency is essential and nowadays demand for disclosure is so strong².

A researcher should use the following sources as public offices then financial institutions to complete his study if he desires full of transparency.

- IMF,
- BIS,
- World Bank,
- IIF,
- UN,
- OECD,
- The central banks of related countries,
- And private offices to provide different views,
- Credit Rating Agencies like Standard & Poor's, Fitch, Moody's, Euromoney, Institutional Investor,

² Renato Donatello Ribeiro, "Country Risk Analysis", GWU-IBI-MINEVRA Program, Spring 2001, The George Washington University, <http://www.gwu.edu/~ibi/minerva/spring2001/renato.ribeiro.pdf>, p.6

- Specialized Ranking Firms such as Business Environmental Risk Intelligence, Control Risks Information Services, Political Risk Services, International Country Risk Guide, Economist Intelligence Unit,
- International banks in general and other institutions,
- Export Credit Agencies such as Coface.



2. COUNTRY RISK ASSESSMENT

As financial markets expand around the world and banks, companies and investors globalize, people are increasingly faced with forecasting questions about risk associated with this globalization. People may take more return when invest in Asia, Latin America and Eastern Europe Markets but are exposed to an additional risk: *country risk*. Country risk can be thought according to lenders and borrowers who give loans or borrow from a foreign country. So in these markets there should be an additional risk premium when valuing equities. If not, why investors invest in Brazil or in Argentina and why do not they invest in USA or in Japan?³ At this point there is something we should notice whether less-developed countries or developed countries could meet country risk. Surprisingly, advanced economies may also generate a substantial degree of country risk as in emerging economies. Terrorist violence, environmental laws, unfair competition, exchange rate volatility, war treats, antiglobalization movement, cyberattacks, etc. may arise both in emerging markets and advanced markets.

The risk premium is one of the components of country risk assessment and there are various components such as default risk, loss given default, credit default swap (CDS) and so on. We should assess these components separately to judge country risk in related countries. So, at the beginning of the study, we could say that the subject of country risk has so broad area and cannot be explained simply. In this study these components are disclosed separately and sometimes in some measurement techniques. Before applying these techniques, country risk is defined in various sides and terminologies exist to deal with the risk related doing business abroad. Because, it is necessary to know the subject before assess it.

The assessment of country risk can be analyzed in three main sections: qualitative, quantitative and rating approach, which analyzes country risk using both approaches. Quantitative risk analysis generally focuses on factors related to a country's

³Aswath Damodaran, "Measuring Company Exposure To Country Risk: Theory and Practice" Stern School of Business, September 2003,
<http://pages.stern.nyu.edu/~adamodar/pdfiles/papers/CountryRisk.pdf> (11.07.2004), p.2-4.

ability to earn foreign exchange to honor the debt. Qualitative analysis focuses on to ascertain a country's willingness to repay the debt⁴.

These methods help to make best forecasting about country risk but because of uncertainties, there is no comprehensive country risk measurement technique, which exactly evaluates country risk. Nonetheless, the limited history of bond market prices in emerging markets makes it impossible to ascertain any long-term trends in statistical methods.

In this section some important variables in assessment methods are discussed to make clear the analysis meaningful. These are standard variables and the more are presented in the World Bank's Development Indicators⁵. Then we make an entry into country risk measurement techniques. Here also some components, which are presented by BIS in Internal Ratings Based (IRB) approach, are discussed. Inherently BIS establish these risk assessment components for the use of banks. Their intention with setting IRB approach is to align more accurately capital requirements with the essential amount of credit risk to which a bank is exposed. They believe that this approach provides two key objects, which are "risk sensitivity" and "incentive compatibility". The IRB approach is based on four key parameters used to estimate credit risks that are *probability of default*, *loss given default*, *exposure at default* and *maturity*. For a given maturity these parameters are used to anticipate the expected loss⁶.

$$EL = PD * LGD * EAD$$

2.1 What is Country Risk Measurement?

With an increased focus on enterprise risk management, the need to analyze country risk has been growing subject. Country risk assessment is the evaluation of whether default problems will arise or not.

⁴ Duncan H. Meldrum, "Country Risk And Foreign Direct Investment", **Business Economics**, Vol.35, Iss.1 (January, 2000), p.34.

⁵ World Bank, World Development Indicators 2004, www.worldbank.org (12.03.2005).

⁶ BIS, "The Internal Ratings-Based Approach", Consultative Document, 31 May 2001, www.bis.org (11.12.2004), p.1-3.

Measuring country risk gives us a chance to foresee the potential for risks, which decrease the expected return of a cross-border investment or default risk of a borrower who causes a loss for lender.

2.2 Country Risk

2.2.1 Various Definitions

In the literature we commonly meet “political risk” when dealing with the risk of doing business in abroad. The other terms according to its frequent are “country risk”, “sovereign risk” and “cross-border risk”. Some authors define the country risk as a component of political risk and some are define it as a subject that includes political risk. In this study it is accepted that country risk involves political risk.

A general definition given by Ries states that country risk is an expectation that changes in business environment will occur that reduce the profitability of doing business in abroad. These changes adversely affect operating profits as well as the value of assets⁷.

Related with this definition Nagy also notices the loss from the lenders side, which is caused by events under the control of the government of the borrowing country. Here Nagy mention about country risk as an exposure to loans in a cross-border lending⁸.

These definitions are broad concepts than sovereign risk, which is the risk of lending directly to the government of a sovereign nation. Moreover according to this definition, commercial risk is defined as exposure to a loss due to events, which are under the control of private company or individual but not under the control of government⁹. So it could be said that country risk covers both sovereign risk and commercial risk.

⁷ John Ries, “Country Risk Definition”, *Credit Topics*, 1995-2004 by Creditworthy Co., Wilsonville, http://www.creditworthy.com/topics/countryrisk_define.asp (09 July 2004).

⁸ P. J. Nagy, **Country Risk: How to Assess, Quantify and Monitor It**, London: Euromoney Publications Ltd., 1979 Indorser: Anna Micaela Ciarrapico, **Country Risk: A Theoretical Framework Of Analysis**, 2nd Edition, England: Dartmouth Publishing Company Ltd., 1997, p.4.

⁹ Anna Micaela Ciarrapico, **Country Risk: A Theoretical Framework Of Analysis**, 2nd Edition, England: Dartmouth Publishing Company Ltd., 1997, p.4.

In the BIS site country risk is taken to refer to possibility that sovereign borrowers of a particular country may be unable or unwilling and other borrowers unable, to fulfill their foreign obligations for reasons beyond the usual risks which arise in relation to all lending. A very wide several factors may prevent borrowers of a given country from fulfilling their foreign obligations, which makes country risk a difficult concept to define with precision¹⁰. Every country has different conditions and could behave the same events differently.

Country risk has several definitions according to who defines it or who use it. Here it is defined in three dimensions:

From the borrowers' and lenders' side it is the ability to fulfill their debt obligations to lenders and it is the possibility of unwillingness to repay their debts. With the word of unwillingness, it is meant that the debtor make a comparison about the cost of honoring his debt and decides not to repay his debt because of the sanction cost is lower than his total debt cost. In other words when the debtor's obligation, which consists of principal and interest payment is higher than the cost of defaulting on the loan, the debtor may choice not to honor his debt.

To make the definition clear we may benefit from the study of Eaton's explanation. He describes a two-stage strategic game. First a contract (D, r) is signed, where D is the amount of a loan and with an obligation to repay in the second period r (F), where r is the interest rate on loan.

If the borrower fails to honor the obligation, he suffers a penalty, \dot{P} . The welfare of the borrower's is a function of $U[D,x]$, which increases with the amount borrowed and decreases in the obligation imposed by the loan, x , when

$x = r(D)$ in the case of repayment,

$=\dot{P}$ in the case of default.

¹⁰ BIS, "Management of Banks' International Lending: Country Risk Analysis and Country Exposure Measurement and Control", [Electronic Version] *Basel Committee Publications*, 9 March 1982 (10 May 2004), p.1.

In the case of servicing the debt as agreed, the utility of the borrower is

$$U_p = U[D, r(D)]$$

The borrower who defaults receives total utility of

$$U_d = U[D, \dot{P}]$$

In the second period. Eventually, the borrower chooses

$$U_p > U_d, \quad \text{to repay}$$

$$U_p < U_d, \quad \text{not to repay,}$$

$$U_p = U_d \quad \text{to be impassive.}$$

At the first stage, the maximum repayment the debtor is willing to make is P . The maximum money flow \dot{D} which the lender is willing to lend is computed from the condition $r(D) = (1+i) D$, leading to $\dot{D} = P / (1+i)$ ¹¹.

In this explanation, we have seen the punishments are driving force behind international lending. This is a necessity in integrating into world trade¹².

Now, we could add the spill-over effect to our definition. Because of living in a globalized world, we should not think a country apart from its neighbor even from the other countries, which is far from it.

From the investors' side it is the possibility of loosing money due to invest foreign projects.

All in all, the country risk assessment can be used by various analysts whether they are investors or bankers or creditors and could be used for their special transactions or for a company, which trades abroad. But this study is not for only individual demand

¹¹ Jonathan Eaton and Mark Gersovitz and Joseph E. Stiglitz, "The Pure Theory of Country Risk," **European Economic Review: International Seminar on Macroeconomics**, Vol. 30, No. 3 (June 1986), pp.486-487, Social Sciences Network Database, (10 January 2005).

¹² Dominik Egli, "Hoe Global Are Global Financial Markets? The impact of Country Risk", **BIS Conference Papers**, 29 February 2000, <http://www.bis.org/publ/confer08n.pdf> (16 August 2004), p. 279.

so did not stem from only bankers' or investors' views. To include every unit who interested in country risk evaluation, this study take country risk assessment according to a country involving multinational companies, banks, rating agencies or export agencies and individuals and focus on both assessing creditworthiness of a country with its domestic counterparties and investment side. To assess creditworthiness, banks and rating agencies need a country risk assessment systems. Investors also may use their evaluations or look some criteria, which are aligned in this study to make their individual judgments.

2.2.2 Historical Perspective

2.2.2.1 An Overview of Debt Crises

The wide debt crises root goes to 1970s when many oil-exporting countries had extra money since increase in crude oil prices. But, this increase in prices has huge negative effects on other countries, especially on developing countries and impels these countries to borrow. Inherently lenders was keen on giving loan them because oil exporting countries were holding their money at their banks¹³.

From the 1970s till now the structure of lending has changed so much. The system have been more complicated and the volume of debt has increased. When the date reached to 1971, the total debt of third world countries reached approximately \$100 billion from \$29 Billion in 1970¹⁴. Nonetheless, we faced more problems like default on debts or rescheduling. One of the significant reasons was that interest rates increased above export growth rates, so the debtors could not honor their debts. Assessing country risk was not a popular subject because people did not need this reaction till the end of 1980s. Especially in 1980s, the default events have been more critical condition even the countries have started to announce their inability to service their external debts. But there was another problem that requires more intention was the contagion effect.

¹³ FDIC, "An Example of the Banking Crises of the 1980s and Early 1990s", December 1997, Vol.1, p.192 http://www.fdic.gov/bank/historical/history/191_210.pdf (12 November 2004).

¹⁴ M. James Boughton, **Silent Revolution: International Monetary Fund, 1979-1989**, First Edition, Washington: International Monetary Fund, Publication Services, 01 October 2001, p.268-274.

After Brazil and Mexico announced their inability to service their external debt, a chain effect was triggered to other debt-laden countries. Subsequently there was a decline at the level of credit worthiness for LDCs and further access to international capital markets. This default on the major debtor countries indicates a country risk and caused a drastic decline in net capital flows. These situations increased the events of debt and banking crises. Three important developments emerged from the international bank crisis of the 1980s; these would have prominent impact on bank lending beginning in the early 1990s. The first was a confirmation of lending countries to assess country risk (sovereign and credit) more methodically. The second was the regulatory measures of Basle Agreement of July 1988, which required a minimum of 8% ratio of capital to risk weighted credit exposure. This was one of the means of ensuring banks of having sufficient buffer against loan loss and the threats to solvency. The third was the series of debt reduction plans beginning with the Baker Plan in 1986 and culminated in 1989 as the Brady Plan that required debt reduction and access to additional foreign capital conditional upon market oriented economic reforms. The extent to which banks consider country risk in international lending after the crisis is an empirical issue¹⁵. However, very soon to these events, there had been other problems in Asia and Mexico. The currency crisis occurred in Mexico and in Turkey in the following years – in 1994. Because of their strong economic performance especially for Indonesia, Thailand, Korea and Malaysia, throughout the early 1990s, the Asian countries were in denial when problems began to surface. Once the crisis broke out in Thailand in July 1997, the Asian countries were all vulnerable¹⁶.

There are some inherent differences between current crisis and past crisis since the unsteady conditions that the countries encounter. In the past, the destructive domestic events caused crises mostly consisting by current account of the balance of payments, while today particularly various crashes in international business could trigger crises and their chaos mostly destroy emerging markets since these markets are

¹⁵ Harri Ramcharran, "International Bank Lending To Developing Countries: An Emprical Analysis Of The Impact Of Country Risk", **Multinational Business Review**, Vol.7, No.1, (Spring, 1999), p.84-85.

¹⁶ Bijan B. Aghevli, "The Asian Crises: Causes and Remedy", **Finance & Development**, Vol. 36, No: 2, (June 1999), p.28.

more sensitive¹⁷. In recent years, capital restrictions in emerging markets have been substantially reduced as a result of increased international financial flows. Most emerging markets with pegged exchange rate system can finance their current account deficit from its reserves or by borrowing from abroad without decreasing monetary base or reducing public deficit that makes countries more vulnerable to shocks in international capital markets¹⁸.

2.2.3 Sources of Risk Classification

Every country has different feature like cultural differences or the system of legal differences, etc. Because of these differences, the impact of various events in each country could be dissimilar. In the table, the sources of risks are classified.

Table 2.1
Sources of Risk Classification¹⁹

Economic Risk (country-specific)
*Macroeconomic : Any macroeconomic risk specific to host country *Microeconomic: Any microeconomic risk specific to host country
Socio-Political Risk
* Political: Democratic or non-democratic change in the government * Government policy: Change in the policy of the local authorities * Social: Social movement related to influence foreign business or host country business
Natural Risk :
• The natural disasters like earthquake

¹⁷ Bruno H. Solnik, **International Investments**, 4th Ed., Boston: Addison-Wesley, 2000, p.317.

¹⁸ Marcelle Chauvet and Fang Dong, "Leading Indicators of Country Risk and Currency Crises: The Asian Experience", [Electronic Version] *Federal Reserve Bank of Atlanta- Economic Review*, First Quarter 2004, Vol. 89, No:4, (10 January 2005), p.25.

¹⁹ Michel H. Bouchet & Epraim Clark & Bertrand Gros Lambert, **Country Risk Assessment: a Guide to Global Investment Strategy**, First Edition, England: John Wiley & Sons Ltd., 2003, p.16.

2.2.4 Types Of Country Risk

There are several types of risk that lenders assess when they want to give loans whether it is domestic or multinational. But when we mention about multinational enterprises, there are additional types of risks, which they should assess. As a whole the subject of country risk involves all of them. There is another specification that many of these categories overlap each other.

Types of Country Risk

- Political risk
 - ➔ Firm-specific risks: Business risks, foreign exchange risk, governance risk.
 - ➔ Country-specific risks: Transfer risk, cultural and institutional risk.
 - ➔ Global-specific risks: Antiglobalization movement, terrorism and war, environmental concerns, poverty, cyberattacks.
 - Transfer risk (country-specific risk): Blocked funds
 - Commercial risk
 - Economic risk
 - Contagion risk
 - Sovereign Risk
 - Currency risk

The requirement of analyzing these risks varies according to who needs it. Sovereign, political and currency risks analysis is more useful when the borrower is a private enterprise. Contagion, economic and transfer risk is more relevant when the borrower is a country.

We could define political risk in three dimensions; firm- specific and country-specific and global specific. From the viewpoint of a multinational firm, political risk is to anticipate the effect of political changes on activities of a specific firm. So it is appropriate to make political risk analysis for private firms. But if we mention about a country trades with foreign countries, these analysis get insufficient. We should extend the analysis. We still make a political risk analysis due to have country-specific risk dimension²⁰. Here it will be better to mention about transfer risk. It is defined as the ability of borrowers to honor foreign debt obligations. Its results can be a moratorium, repudiation and rescheduling²¹.

Economic risk often overlaps with political risk in some measurement systems since both deals with policy. In the measurement of economic risk we meet traditional measures of fiscal and monetary policy such as the size and composition of government expenditures, the government debt structure and growth rate, etc.

Some quantitative measures used to identify transfer risk and also currency risk since a sharp depreciation of the currency can reduce some of the imbalances that cause to increase transfer risk.

Contagion risk can be called as location risk that caused by problems in a region, in countries with similar perceived characteristics or a trading partner of the country. The Asian contagion in 1997-1998 can be given as example. This category provide analyst with one of the difficult risk assessment problems²².

²⁰ David K. Eiteman, **Multinational Business Finance**, 10th Edition (International Edition), Pearson Education, Addison-Wesley Series in Finance, 2004, p.443.

²¹ Ramcharran, p.83.

²² Meldrum, p.35.

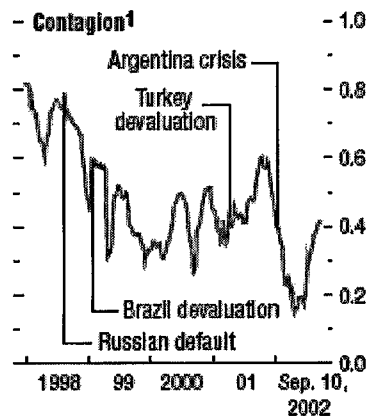


Figure 2.1 Average of 60-day rolling cross-correlation of emerging debt markets.
Source: IMF

We can also call currency risk as foreign exchange risk that arises from the possibility that an unexpected change in exchange rates that shift the home currency value of repayment of loans by foreign debtors. When the currency of loan is denominated as home currency, the risk passes to borrower²³.

There is a pattern for an application of these risks for Turkey, which is formed by ONDD at the Appendix 2 part.

²³ David K. Eiteman, **Multinational Business Finance**, 7th Edition, Pearson Education, Addison-Wesley Series in Finance, 1995, p.427.

3. COUNTRY RISK ASSESSMENT TECHNIQUES

3.1 Some Indicators for Country Risk Assessment

Every assessment technique for cross-border risk involves some variables in other words indicators, which provide us to forecast crises. A qualitative method use them when making judgment that look their results according to a base values and a quantitative method use them to form models about risk related to country risk. But before this, the analyst should make some assumptions about the proxied variables. Nonetheless the rating agencies and other institutions, where the countries are ranked according to their creditworthiness, apply these data that are linked.

Manasse and Roubini and Schimmelfennig, in their study, generalize the evolution of variable before crises and at the eve of crises. For example the measure of external debt is relatively low in noncrisis years followed by a noncrisis year. They increase in the year of before crisis entry, and most measures increase even further within crisis. Unless the country exists from crisis, the ratio will not drop, but when it begins to decrease, it will not reach under the previous levels of the country. The macroeconomic variables indicate a worsening of the macroeconomic situation in the run-up to a crisis and within a crisis, and an improvement in the situation when exiting from crisis. For example, the current account deficit increases in the eve of a crisis, stabilizes within the crisis, and improves further in the year before exiting a crisis. Real growth falters in the year before crisis entry while inflation spikes²⁴.

There is a useful way to classify these variables according to their utilization by external and internal sector that is formed by Ribeiro in 2001, addition to other indicators. External sector interests in balance of payments that contain exports, imports, direct investments, loans in general, debt services, repayments of loans, external debt and flow of foreign reserves and also the exchange rate. Internal sector is interest in interest rates, level of investments, public debt and its payback, budgeted equilibrium, internal savings, consumption, GDP/GNP, inflation rate, money supply,

²⁴ Paolo Manasse and Nouriel Roubini and Axel Schimmelfennig, "Predicting Sovereign Debt Crises", *IMF Working Paper-03/221*, November 2003, <http://www.imf.org/external/pubs/ft/wp/2003/wp03221.pdf> p.10.

etc. The country risk analysis requires at least five years macroeconomic ratios (domestic and external) to provide information about its evaluation²⁵. These ratios are more significant with the qualitative indicators like population growth, adult literacy rate, life expectancy, composition of the population (age, gender, and labor force), and geographic position.

3.1.1 Domestic side

Gross National Product (GNP; according to new terminology of World Bank Gross National Income; GNI²⁶). GNP refers to the all goods and services produced by a country in a given period. In most analysis it is used in comparing with other economic variables. For example, in 1996, Turkey's consolidated fiscal deficit widened from 4,0 percent to 8,8 percent of GNP, while the public sector borrowing requirement rose from 5,4 percent to 9,6 percent of GNP. The primary surplus shrank from 3,3 percent of GNP in 1995 to 1,8 percent in 1996. The budgetary debt service ratio also rose from 7,3 percent to 10.1 percent of GNP in 1996. All these changes were cited by credit rating agencies as reasons for downgrading Turkey's rating²⁷.

GDP Growth Rate This annual ratio points out the sector/products that have been having a particular behavior for better understanding the economy's trend.

GNP per Capita (GNI Per Capita) This ratio highlights about country's productivity. In the long run this ratio helps explaining the efficiency of country's growth rate so especially the rating systems use it. GNP per capita is more meaningful with GINI index, which measure the income inequality in a country. Combined with the evaluation of GDP per Capita could bring a view about how strength or weak or attractive the internal market is becoming.

²⁵ Ribeiro, p.17-45.

²⁶ World Bank, Data and Statistics, <http://www.worldbank.org/data/changinterm.html> (10 February 2005).

²⁷ Gazi Erçel, "Approaches to Upgrading Turkey's Creditworthiness", The Speech in Istanbul Chamber of Industry by the Governor of the Central Bank of the Republic of Turkey, 26 March 1997, www.tcmb.gov.tr (30 January 2005).

Unemployment Rate The rate of unemployment tells us about the health of the state's economy. It is calculated as the rate of Total Number of Unemployed / Total Labour Force.

Internal Savings / GDP This ratio and its evolution work with the propensity of saving of the whole economy. For a better understanding, if necessary, gross domestic savings could be broken by economic agents (householders, firms and government).

Propensity to Invest In the long run, the ratio of gross investment to GDP offers a vision about how strong and bigger could be the economy in the future because it gives a potential rate of capital improvement, named the *gross fixed capital formation*.

Gross Domestic Savings / Gross Domestic Fixed Investment This important ratio explains the domestic savings is enough to support the investment made at the economy. The difference between investment and savings –*the resource gap* should be provided by external funds (savings from the rest of the world).

Budget Deficit / GDP Its size and evolution represents amount of an increase in resource gap by dissavings. In case of budget deficits it is relevant knowing what are the main causes that justify the deficit, as current expenditures or the debt services.

Internal Debt / GDP This ratio offers a vision about how much the public sector is using the country's savings. The size of the internal debt is a key issue always focused by everyone in charge of country risk analysis. If it is a huge ratio, investors will be certainly concerned.

Inflation, consumer prices (annual %) Inflation as measured by the consumer price index reflects the annual percentage change in the price of goods and services. Higher inflation means higher country risk.

Money Supply Growth It offers a vision over how policy makers are dealing with the variations on the stock of currency that could be taken into account when analyzing the government budget to identify whether or not the public sector is

pressuring the supply of currency in order to support current deficits. Obviously the percentage must be compared with the *Inflation Rate*.

Real Interest Rate A powerful measure about the confidence of economic agents, which deals with their expectations about the future of the economy. The price of the currency has an inverse correlation with the investment and commonly when it rises, usually, the whole economy shows a downturn on its performance. The real evolution of the rate should be measured after extracting the effects of the inflation during the period. On the other hand and according to the needs, the future behavior of the inflation could be projected to measure the future real return of an asset.

Government Expenditure / GNP Government expenditure as a share of GNP is an indicator of the government's size; government expenditure as a share of GNP in developing countries is less in poor countries than it is in rich countries. This ratio is defined as the ratio of government expenditures to GNP. The ratio of government expenditures to GNP is used as a determinant of debt rescheduling in order to measure the relative size of public sector. The larger public sector the higher probability of debt rescheduling²⁸.

3.1.2 External Side

Export and Import Growth Rate For most countries, especially emerging economies, exports have a significant place to earn foreign exchange. Countries are more likely to service their external debt if they have high export growth rates²⁹. An increase in import growth rate worries lenders about their rights.

Strategic Imports / Imports Some risky countries have a few strategic import goods which maintain a future output. For example a bad news could cause a crisis in those countries. So the high ratio is not desirable.

²⁸ Erdal Karagöl and Selami Sezgin, "Do Defence Expenditures Increase Debt Rescheduling in Turkey? Probit Model Approach", **Defence and Peace Economics**, Vol.15, No.5 (October 2004), 478.

²⁹ Jean-Claude Cosset, Yannis Siskos and Constantin Zopounidis, "Evaluating Country Risk: A Decision Support Approach", **Global Finance Journal**, Vol.3, Iss.1 (Spring 1992), p.3.

Export/ Import It is a ratio that matches the unit value of imports which one unit of exports can buy. Named as *terms of trade*, its behavior could explain changes in the *trade balance* that could affect the performance of the external side of the economy.

Trade Balance To keep the trade balance between imports and exports is important policy to avoid balance of payments crises³⁰. The structural factors that usually change the outcome of trade balance are, for instance, the activity levels of the country and world economies, the exchange rate and the terms of trade.

Total External Debt / GNP a measure of the degree of indebtedness, and the indicator helps to assess the external debt situation (and debt carrying capacity) of a country. The ratio measures the outstanding obligations in relation to the broadest measure of the income-generating power of an economy.

Trade Openness Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. There are some hypotheses that trade openness increase the economic growth. Trade openness can be thought in two sights, one is openness to investment - the treatment of foreign direct investment and the repatriation of profits and dividends - is a positive factor in the assessment of the country's growth potential and hence its capacity to service debt. The other one is openness of the economy to international influences and innovations. An open trade policy will tend to go hand in hand with competitive industries, since companies protected behind high tariff barriers will tend to be inefficient³¹.

Current Account Balance / GDP This medium-term ratio has been identified as one of the most important tools to predict crisis. The deficits or surpluses in the current account are direct associated with the ability to pay external liabilities and, also, with the level of international reserves. In case of Asian crisis, some of the involved countries have faced current account deficits.

³⁰Amelia Santos-Paulino and Tony Thirlwall, "Developing Countries Should Liberalize Exports First – or Risk a Balance of Payment Crises", 2004, <http://www.res.org.uk/society/mediabriefings/pdfs/2004/feb04/santos-paulino-thirlwall.pdf> (23 April 2005), p.1.

³¹Fitch, "Fitch Sovereign Ratings: Rating Methodology" http://www.fitchratings.com/corporate/reports/report.cfm?rpt_id=116361 (16 March 2005).

International Reserves The amount of the reserves represents the stock of foreign strong currency that a country has to compensate deficits in the balance of payments. Usually, in the analysis, the amount of reserves constituted by gold is not taken into account because it does not have the same liquidity of other assets. The amount of international reserves and its volatility is always a key variable in country risk analysis indicating how powerful is the economy to deal with imbalances in the external sector.

International Reserves / Total Debt This liquidity ratio measures a country's ability to maintain debt levels with disposal current cash. Foreign reserves serve as a shock absorber against sudden adverse shocks and indicate the liquidity capacity of a sovereign borrower. A strong international reserve position shows the ability to respond to foreign currency demands in cases of adverse shocks. So with a larger ratio of reserve to total debt, one expects higher debt servicing capacity and less need to demand a rescheduling over external obligations³².

External Debt Higher external debt means higher default risk. The weight of debt burden increases as a country's foreign currency debt rises relative to its foreign currency earnings³³.

External Debt / GDP Sort of financial leverage ratio that shows the whole external debt importance to one year flow of production. The lower the ratio, the better the economy's external financial position. This ratio provides a measure of current and future ability of an obligor to service debt.

External Debt Services / Exports This financial ratio brings a practical application of the country's ability to pay resembling a cash flow coverage ratio. In fact, it is not exactly a complete cash flow analysis because there are other variables like imports and the outcomes from the capital balance that, also, might have to be taken

³² Timur Han Gür, "A Country Risk Assessment Model and the Asian Crisis", *Central Bank Review*, 2001, Vol.1, No.1 <http://www.tcmb.gov.tr/research/cbreview/may01-3.pdf> (12 July 2004), p.53.

³³ Richard Cantor and Frank Packer, "Determinants and Impact of Sovereign Credit Ratings", Federal Reserve Bank of New York Research Paper, No:9806, October 1996, http://www.newyorkfed.org/research/staff_reports/research_papers/9608.html (22 November 2004), p. 39.

into account when dealing with country's cash flow. Some authors support a ratio at about 10%, but anything over 30% is something to be concerned about. These percentages are comparative numbers and they must be analyzed among other variables because of the particular macroeconomic profile of each country at a given moment, its financial structure and the ability to generate enough foreign currency to match its international commitments.

Capital Inflows (predictions) It could be difficult to find information about this data, because it deals with expectations that could not be well estimated. However it is strongly relevant to figure out the future's balance of payments profile and how its equilibrium will be achieved. The forecasts of capital inflows should contribute to drive the actions of both risk takers and policy makers.

Exchange Currency Rate The most ubiquitous and best-known type of country risk. The "right" price of the currency in market terms (supply and demand for the currency) is essential for reaching out the economic stability and the growth of any country. Whatever exchange rate regime adopted by a country – fixed, flexible or any derivation of both long-term success depends on a commitment to sound economic fundamentals supported by the authorities.

Interest Payments / Exports A traditional indicator of creditworthiness, which is used in many country risk studies. Together with amortization, the interest service ratio itself is sometimes used as a rule of thumb for country risk assessments and seen as a single most important factor driving sovereign borrowers into debt rescheduling process. Therefore, a high interest service ratio indicates a heavy burden on the economic resources of a country and increases rescheduling risk³⁴.

Debt Service Ratio It is the ratio that compares debt service payment proportionate to export earnings, reflecting the ability to service debt. Export earnings comprise of income from export of goods and services and remittance of income from

³⁴Gür, "A Country Risk Assessment Model and the Asian Crisis", p.53.

oversea employees so can be classified as total foreign exchange revenue³⁵. Debt service is the amount of annual interest and principal payments on debt.

An increase in the debt service ratio indicates increased vulnerability to foreign exchange crises. Any shortfall in foreign exchange earnings or capital imports, which is not covered by exchange reserves must be met by reducing imports that debt service is fixed obligation. The higher the debt service ratio, the greater is the relative burden on import reduction for a given shortfall in foreign exchange³⁶.

3.1.3 Disclosure Adequacy

In the Ahmed Riahi's study, the disclosure adequacy is discussed as the determinant of country risk. He uses two multiple regression models, one with the weighted disclosure score and the other with the unweighted disclosure score as the independent variable were tested to investigate the relationship between country risk and disclosure levels in different stock exchanges. Consequently, the level of disclosure requirements of stock exchanges was positively related to country risk³⁷. Honestly its importance is very high due to make a proper assessment of cross-border risk.

3.1.4 Country Risk Premium

Because of we could not diversify additional risk of investing in emerging markets; there should be an additional risk premium. So an analyst could look at the risk premiums of related countries to assess that country. Two approaches could be considered to estimate country risk premiums as "historical risk premium" approach and "implied premium" approach³⁸.

³⁵ Bank of Thailand, Databank, <http://www.bot.or.th>, (12 May 2005).

³⁶ Charles R. Frank and William R. Cline, "Measurement of Debt Servicing Capacity: An Application of Discriminant Analysis", *Journal of International of Economics*, 1971, 1, p.329-330.

³⁷ Ahmed Riahi, **International Accounting and Economic Development: The Interaction of Accounting, Economic, and Social Indicators**, Edition: Hardcover, Westport, Conn.: Quorum Books, 2002, p.219-222.

³⁸ Damodaran, p.5-15.

3.1.4.1 Historical Premium

In this approach, we look at what we would earn as investors by investing in equities in risk free assets. But the historical premium may be useless by a standard error which makes it very large especially in emerging markets due to they have so volatility in stock returns. So this is not completely proper for emerging market because it is difficult to obtain reliable data in these countries.

To estimate the country equity risk premium, however, we need to measure country risk and convert it into a country risk premium. Three approaches will be useful here such as country bond default spreads, relative equity market standard deviation or mixing both of them.

3.1.4.2 Implied Equity Premiums

There is an alternative to estimating risk premiums that does not require historical data or corrections for country risk, but does assume that the market, overall, is correctly priced.

3.1.5 Country Bond Default Spreads

The simplest and most widely used measure of country risk comes from looking at the yields on bonds issued by the country in a currency (such as the dollar) where there is a default free bond yield to which it can be compared. So an analyst who use default spreads as a measure of country risk add them on to both the cost of equity and debt of every company traded in that country.

Some analysts believe that the equity risk premiums of markets should reflect the differences in equity risk, as measured by the volatilities of these markets. A conventional measure of equity risk is the standard deviation in stock prices; higher standard deviations are generally associated with more risk.

$$\text{Relative Standard Deviation}_{\text{Country X}} = \frac{\text{Standard Deviation}_{\text{Country X}}}{\text{Standard Deviation}_{\text{US}}}$$

This relative standard deviation when multiplied by the premium used for U.S. stocks should yield a measure of the total risk premium for any market.

$$\text{Equity risk premium}_{\text{Country X}} = \text{Risk Premium}_{\text{US}} * \text{Relative Standard Deviation}_{\text{Country X}}$$

Suppose that you are using a equity risk premium for the United States of 4.53%. The annualized standard deviation in the S&P 500 between 2001 and 2003, using weekly returns, was 18.59%, whereas the standard deviation in the Bovespa (the Brazilian equity index) over the same period was 33.37%. Using these values, the estimate of a total risk premium for Brazil would be as follows.

$$\text{Equity Risk Premium}_{\text{Brazil}} = 4.53\% * \frac{33.37\%}{18.59\%} = 8.13\%$$

The country risk premium can be isolated as follows:

$$\text{Country Risk Premium}_{\text{Brazil}} = 8.13\% - 4.53\% = 3.60\%$$

However, there are problems with using Standard deviations computed in markets with widely different market structures and liquidity. There are very risky emerging markets that have low standard deviations for their equity markets because the markets are illiquid. The second problem is related to currencies since the standard deviations are usually measured in local currency terms; the standard deviation in the U.S. market is a dollar standard deviation, whereas the standard deviation in the Brazilian market is a nominal Brazilian Real standard deviation. This is a relatively simple problem to fix, though, since the standard deviations can be measured in the same currency – you could estimate the standard deviation in dollar returns for the Brazilian market³⁹.

³⁹ Damodaran, p.8-10.

3.1.6 Default Spreads + Relative Standard Deviations

The country default spreads still only measure the premium for default risk. Intuitively, we would expect the country equity risk premium to be larger than the country default risk spread. To address the issue of how much higher, we could look at the volatility of the equity market in a country relative to the volatility of the bond market used to estimate the spread. This yields the following estimate for the equity risk premium.

$$\text{Country Risk Premium} = \text{Country Default Spread} * \left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}} \right)$$

Unlike the equity standard deviation approach, this premium is in addition to a mature market equity risk premium. Note that this country risk premium will increase if the country rating drops or if the relative volatility of the equity market increases⁴⁰.

3.1.7 Default Risk

Default risk is the uncertainty surrounding a firm's abilities to service its debts and obligations. Prior to default, there is no way to discriminate accurately between firms that will default and those that won't. As a result of default risk, firms generally pay a spread over the default-free rate of interest that is proportional to their default probability to compensate lenders for this uncertainty.

In addition to knowing the default probability and loss given default, the portfolio management of default risk requires the measurement of default correlations that measure the degree to which the default risks of the various borrowers and counterparties in the portfolio are related.

⁴⁰ Damodaran, p.11.

The key elements to measure the default probability are;

- The market value of firm's assets. The value of asset measures the firm prospect and gives an idea about the industry and economy in which the firm operates.
- Asset Risk. The uncertainty or risk of the asset measure of the firm's industry or business risk.
- Leverage. The extent of the firm's contractual liabilities. Whereas the relevant measure of the firm's assets is always their market value, the book value of liabilities relative to the market value of assets is the pertinent measure of the firm's leverage, since that is the amount the firm must repay.

Because the default risk affects virtually every financial contract, there have been lots of studies about it one of them was made by Duffee. The study tries to estimate the price of default risk consisting of month-end observations on noncallable corporate bonds from January 1985 through December 1995 and uses the extended Kalman filter to fit yields on bonds issued by individual investment-grade firms to a model of instantaneous default risk. The results provide support for the idea that claims that the class of instantaneous default risk models can price default-risky claims successfully⁴¹. Crosbie and Bohn have found that in general, firms do not default when their asset value reaches the book value of their liabilities while some certainly default. They claim that the default occur when the asset value lies between total liabilities and current liabilities⁴².

The probability of default (PD) of a borrower or groups of borrowers is the central measurable concept on which the IRB approach is built. The creditor should have an idea about the probability of default of the counterside.

⁴¹ Gregory R. Duffee, "Estimating the Price of Default Risk", *The Review of Financial Studies*, New York:Spring 1999, Vol. 12, Iss. 1, p. 198 and 223, Proquest Database (03 March 2005).

⁴² Peter Crosbie and Jeffrey R. Bohn, "Modeling Default Risk", Moody's KMV Company, 18 December 2003, <http://www.moodyskmv.com/research/whitepaper/ModelingDefaultRisk.pdf> (14.03.2005).

3.1.8 Loss-Given Default

The loss given default (LGD) is the credit loss incurred if an obligor defaults. LGD is determined in one of two methods that are foundation methodology in which banks input their own assessments of the default risk of the obligor and advanced methodology which allows banks to use their own internal assessment of additional risk components such as loss given default, exposure at default and the effect of risk guarantees and credit derivatives on the risk of the derivatives⁴³.

The loss given default is usually defined as the percentage of exposure at default. When the default event has occurred, loss given default involves three types of losses:

- The loss of principal,
- The carrying cost of non-performing loans e.g. interest income foregone,
- Workout expenses e.g. collections.

There are three ways to measure LGD for an instrument:

Market LGD. In the condition that loans and bonds are defaulted after the trade has actually occurred in the market, one may observe prices directly. The rating agency recovery studies are based on this approach. The actual prices rely on par = 100 (cents on dollar) so can be easily translates into recovery percentage (LGD as 1 minus the percentage recovery). These prices provide a reflection of market sentiments at that time and reflect the investor's expected recovery, suitably discounted. For example, in the Moody's data set they are observed in the market after a month later of the default event first occurs.

Workout LGD. In this method the timing of the cash flows from the distressed assets has the core role. The exact discount rate is not obvious but the cash flows should be discounted. For example when an obligor defaults, the bank use its hurdle rate to value the defaulted asset.

⁴³ BIS, "The Internal Ratings-Based Approach", p.2.

Implied Market LGD. In this approach the credit spreads on non-defaulted risky bonds that are currently traded are important to estimate LGD. The spread above the risk free bonds is an indicator of the risk premium demanded by investors. Also these risk premiums reflects the expected loss (EL)⁴⁴.

3.1.9 Exposure at Default

Loss is contingent upon the amount that bank was exposed to the borrower at the time of default, commonly called as exposure at the borrower's default (EAD).

To estimate EAD, two methods is used like LGD. First one is foundation approach that applies to a supervisory-imposed methodology. Second one is an advanced approach that contemplates use of own estimates⁴⁵.

3.1.10 Maturity

Maturity is a key factor that influences the credit risk of a loan or bond. Other things are the same –*ceteris paribus*- shorter the maturity of a loan, the less its underlying credit risk, vice versa. A shorter maturity increases the flexibility of a bank to limit future losses to customers whose financial conditions break down abruptly by denying credit. Creditors give their attention to maturity as a driver by pricing, in internal assessment of capital adequacy. They charge tougher internal requirements on longer maturity loans and impose limits on maturity for certain borrowers and transactions⁴⁶.

3.1.11 Financial Market Efficiency

We could add the efficiency of financial markets especially capital markets to the list of country risk indicators. As it could be seen from the history of financial crises countries with less efficient financial markets have more country risk at international business transactions so that pay more additional risk premiums when they borrow.

⁴⁴ Til Schuermann, "What Do We Know About Loss Given Default?", Federal Reserve Bank of New York, February, 2004, Wharton Financial Institutions Center Working Paper No. 04-0 http://www.ny.frb.org/research/economists/schuermann/Schuermann_LGD-What_do_we_know_1.5.pdf, (11.12.2004), p.1-8.

⁴⁵ BIS, "The Internal Ratings-Based Approach", p.23.

⁴⁶ BIS, "The Internal Ratings-Based Approach", p.25.

In Turkey example, there are various beliefs, but the dominant opinion is that it has not an efficient financial market. By using direct Granger-causality tests in their study, Balaban and Kunter find Turkish financial market is not informationally efficient and do not fully reflects publicly available information on liquidity⁴⁷.

Also Çevik and Yalçın claim that the capital market in Turkey is weak-form efficient in Turkey, concluded in their study. In their paper, the weak efficiency of the Istanbul Stock Exchange (ISE) was investigated using weekly data between 1986 and 2002 employing Random Walk Process⁴⁸.

3.1.12 Credit Default Swaps

Credit default swaps are most popular credit derivatives. It is a contract similar to an insurance contract, providing the buyer with the protection against specific risks. Most often, corporate bond investors buy credit default swaps against the risk of default by the issuer of the corporate bond. The most common type of CDS involves physical delivery, while other type settled in cash⁴⁹.

The buyer of the CDS makes periodic payments to the seller until the end of the life of the insurance or until a credit event, which may be happened as a form of bankruptcy, debt restructuring or repudiation. The swap is then settled by in cash or physical delivery⁵⁰.

The credit default spreads are important while having ideas about related country. The high level of CDS means high risk for that country. Because they are more sensitive to market events, they are good and rapid reflectors of the market situation.

⁴⁷ Ercan Balaban and Kurşat Kunter, "Financial Market Efficiency in a Developing Economy: Evidence From Turkey", *Central Bank of Republic of Turkey: Discussion Papers*, 1996, <http://www.tcmb.gov.tr/> (05.05.2005).

⁴⁸ Ferhan Çevik and Yeliz Yalçın, "İstanbul Menkul Kıymetler Borsası (İMKB) İçin Zayıf Etkinlik Sınaması : Stokastik Birim Kök ve Kalman Filtre Yaklaşımı", *Journal of Economics and Administrative Science of Gazi University*, vol.5, Iss.1 (2003), p.1.

⁴⁹ Pimco, Bond Resources, January 2005, "Bond Basics: What are Credit Default Swaps and How Do They Work?", <http://www.pimco.com>, (04.February 2005), p.1.

⁵⁰ John C. Hull, *Options, Futures, and Other Derivatives*, Fifth Edition, New Jersey: Pearson Education, Inc., 2003, p.637.

However, there have been made a study about determinants of credit default swap rate by Naifar and Abid who claim that the credit rating is the most determinant⁵¹. As it will be conclude that ratings are generally lagged components reflecting the previous events in the economy. So we can make a comment that ratings have an influence on the future of the economy.

3.2 The Qualitative Approach

Qualitative risk analysis refers to the assessment of economic, financial and socio-political fundamentals that can affect the investment return prospects in a foreign country. Qualitative analysis deals with development process of a country to shed light on the underlying strengths and weaknesses instead tackling with a range of ratios, ratings or indices. But this approach cannot ignore numerical data⁵².

Qualitative risk systems are distinguished as fully qualitative systems which consist a country evaluation report about country's economic, political and social conditions and structured qualitative systems which generate country reports according to a standardized format that provides cross-country comparisons possible and include some statistics.

Analysts generally use a country spread sheet table where all the information given by various indicators when writing country report. According the Hefferman model, there are six sections in the country spreadsheet:

Section A: Internal economic indicators

Section B: Balance of payments

Section C: Foreign Assets

Section D: Debt structure

Section E: Gross new debt

⁵¹ Nader Naifar and Fathi Abid, "The Determinants of Credit Default Swap Rates: An Explanatory Study", May 2005, http://defaultrisk.com/pp_crdrv_76.htm (04 June 2005), p.1.

⁵² Bouchet, p.50.

Section F: Debt indicators

Internal economic indicators include indicators of the size of economy (GDP, GDP per capita, population growth); growth indicators (GDP growth, unemployment rate) and inflation indicators such as price index etc.

Balance of payments includes trade balance, capital account and change in reserves.

The last four sections seek to give how creditworthy a country is. To analyze the country's vulnerability it is important to measure the openness of the economy and external indicators are useful.

Section C reports data on international reserves. Section D reports data on external debt aggregate of public and private. Gross new debt also includes public and private. Debt indicators include the debt service ratio, debt as percentage of GDP, the debt export ratio and foreign assets as a percentage of external debt⁵³.

3.2.1 The Indicators of Qualitative Approach

For a comprehensive country risk analysis a qualitative approach should include the following subjects⁵⁴:

3.2.2 The Social Welfare Dimension For Development Strategy

The development and growth could be thought as integrated and cannot apart from each other.

The indicators for a comprehensive country risk analysis can be studied at two areas. First area is basic environment indicator such as geographic situation, natural resource endowment, and physical infrastructure. Second area is a social indicators such as population growth, human capital, unemployment, age and gender structure of the population, health care and education.

⁵³ Ciarrapico, p.8-10.

⁵⁴ Bouchet, p.51-72.

3.2.3 Macroeconomic Structure

Macroeconomic indicators which are explanatory variables behind growth success and economic development includes budget and monetary policy, national accounts, trade openness, government finance, legal environment, etc. When these variables are effected by external and internal influences there is possibility of growth crisis.

3.2.4 External Indebtedness Appraisalment and Structure

To understand the relationship between external debt and domestic growth provide an advantage to deal with complex debt crisis. Simply the external debt is an impetus for domestic savings and this is one of the serious affect on growth augmentation.

3.2.5 Domestic Financial System

In a financial system of a country, some factors influence the efficiency. For example the banking system, level and structure of interest rates, financial liberalization secondary market in government securities, accounting infrastructure and stock market structure are financial system's institutional efficiency factors.

3.2.6 The Governance and Transparency

Albeit the country risk analysts focus on the development of growth rates and debt ratios, the relatively new subject that is governance take a central place in the process of development. Governance includes issues such as transparency, sound and efficient administration, government accountability for the use of public funds and social inclusion. At the opposite side the idea that corruption is a sort of informal and supplementary tax payable in developing countries has now been entirely discredited. The OECD's work has shown that corruption is, rather, a tax on development⁵⁵. Because the corruption increase uncertainty and good governance make a country more

⁵⁵ OECD, "Institutions, Governance and Developments", *Developments Working Papers*, http://www.oecd.org/topic/0,2686,en_2649_33941_1_1_1_1_37405,00.html (12 February 2005).

strength these issues are new field in country risk analysis. Corruption lowers country risk ratings while good governance raises it.

3.2.7 Assessment of Political Stability

The qualitative approach to risk takes political risk as byproduct of an “imbalanced” development process. After the recent terrorist attacks have increased its popularity and displayed the country risk is not the problem only for underdeveloped countries.

3.2.8 Religious Heritage

Religious freedom has grown with its importance in recent years since it is recognized that religion permeates politics, economics, cultural, social concerns and even, business. International business should be concerned about violations of religious freedom because such violations affect general business environments, political relationships between countries and consumer sentiment toward companies doing business in these countries. So because religion has influence on international business and plays role in armed conflicts within and among nations and because religious freedom is viewed as a universal right, religious freedom is important for country risk analysis⁵⁶.

3.3 The Quantitative Approach

Quantitative risk analysis generally focused on factors related to a country’s ability to earn foreign currency to honor the debt⁵⁷.

In this section the most common techniques used in country risk assessment are discussed. Firstly the frequent statistical techniques including discriminant, logit, probit and principal component analysis, which are techniques that seek to determine the outcome, are presented. Then regression analysis, model building and Monte Carlo

⁵⁶ Ilan Alon and John Spitzer, “Does Religious Freedom Affect Country Risk Assessment?”, *Journal of International and Area Studies*, Vol.10, Iss. 2 (December, 2003), p.52.

⁵⁷ Meldrum, p.36.

Simulation and value at risk are arranged. Finally, we conclude relatively new techniques that are multicriteria decision aid, artificial hybrid neural networks.

3.3.1 Statistical and Mathematical Methods

3.3.1.1 Discriminant Analysis

Discriminant analysis is a technique that builds a predictive model of group membership based on observed characteristics of each case and makes it feasible to classify an observation into one of several *a priori* groupings, usually by a dichotomy. This technique can be used for country risk analysis to know if a borrowing country reschedules its debt or not. Firstly it is necessary to build a "model" of how we can best predict to which group a country belongs so each country classified to their characteristic then collected datas for each group. For rescheduling group (C_1) and non-rescheduling group (C_2) the linear function of discriminant analysis is

$$Z = \sum_{i=1}^n w_i x_i, \quad i = 1, 2, \dots, n$$

Z: Discriminant function, x_i : predictors (the vector of independent variable),

w_i : discriminant coefficient (the weights)

To choice the explanatory variables called as predictors to insert in the discriminant function, first a general function is estimated. For this, rescheduling is the dependent variable and the independent variables are those believed to be relevant in explaining why debt problems arise such as debt service ratio, export to GNP ratio. Then the most significant variables are added to the discriminant function.

By the evaluation of the discriminant function, the Z-value for each borrowing countries under study could be computed. A critical Z –value, Z^* determination is now required to differentiate if the country belong to the group C_1 when $Z < Z^*$; or belong

to the group C_2 when $Z^* < Z$. Here the classification process is vulnerable to two different types of errors which caused from misclassification.

In the first type of error, one of the C_2 countries may expose to rescheduling and in the second type error one of the C_1 country may not reschedule the debt. Finally an expected cost function is formulated inserting costs and probabilities to these two types of error.

In their study in 1971, Frank and Cline find some variables of likelihood that the less developed countries will experience debt-servicing difficulties, using a modified form of discriminant analysis. According to them, other things being equal, a low value of this indicator will be compounded with a high probability of rescheduling. They compiled data for 26 countries over nine years on eight factors but found only three of them are best explanatory variable: The debt service ratio, the amortization/debt ratio and the imports/reserve ratio. Also, because of absence of data the number of countries decreased to 8 countries included 13 rescheduling: Argentina, Brazil, Chile, Ghana, India, Indonesia, Turkey and the U.A.R.⁵⁸.

3.3.1.2 Logit and Probit Models

Logit and probit models are dichotomous statistical models, which deal with binary events that variables take a value of 1 or 0. Applying these models to country risk assessment means designating binary event whether or not country reschedules.

$$y = \begin{cases} 1; & \text{if rescheduling occur} \\ 0; & \text{if rescheduling does not occurs} \end{cases}$$

In logit analysis the probability of rescheduling is related to several economic variables. The formula can be written as

$$y_i = \sum_{i=1, j=1}^{m, n} b_j x_{i,j}$$

⁵⁸ Charles R. Frank and William R. Cline, p.329-330.

m: number of the explanatory variables,

n: number of observations

In a logit model after estimating this equation, the resulting dependent variable, y , may be transformed into an indicator of the probability of rescheduling in the following way⁵⁹:

$$\text{Prob}(y_i=1)= \frac{1}{1+e^{-y}}$$

Higher values of predicted y indicate a higher probability of rescheduling.

These two logit and probit analyses are very similar to one another. But in logit analysis is based on log odds while probit uses the cumulative normal probability distribution.

$$\text{Prob}(y_i=1)= \int_{-\infty}^{\infty} (t)dt \quad \text{or the same formula } \text{Pr}(y=1|\mathbf{x}) = \Phi(\mathbf{x}\mathbf{b})$$

where Φ is the standard cumulative normal probability distribution and $\mathbf{x}\mathbf{b}$ is called the probit score or index.

Since $\mathbf{x}\mathbf{b}$ has a normal distribution, interpreting probit coefficients requires thinking in the Z (normal quantile) metric. The interpretation of a probit coefficient, b , is that a one-unit increase in the predictor leads to increasing the probit score by b standard deviations.

One drawback of the logit and probit models is that their power to discriminate is most sensitive near the midpoint when the probability is equal to 0.5. When the probability moves away from 0.5, changes in independent variables have less impact on the probability that y_i equals 1.

Karagöl and Sezgin investigate the importance of financial and political variables in determining debt-rescheduling probabilities with using probit model for Turkey. In their model the independent variables are assumed to be non-stochastic and

⁵⁹ Ciarrapico, p. 14.

they test the correlation between the predictor variables and debt rescheduling summarized as

$$y_i = \sum_{j=1}^n \beta x_{ij} + e_i$$

y_i is dichotomous/ binary choice random variable. x_{ij} is financial ratio and structural ratio of country i in the year of t .

They list the financial variables such as debt service ratio (DS/EX) and the exports to GNP ratio (EX/Y) and political variables such as the ratio of government expenditures to GNP (GE/Y), the ratio of the defense expenditure to government expenditures (DE/GE) and the ratio of the defense expenditure to GNP (DE/Y). In their study four models are estimated and the variables are used in various combinations. According to the estimation results, political variables (GE/Y, DE/GE, DE/Y) are not significant and the financial variables are found significant. Thus, according to the study defense variables are not important factor for determining rescheduling in Turkey⁶⁰.

Also Hernandez and Trillo have applied logit analysis in order to assess rescheduling probabilities in their paper in 1995. They develop a model to estimate the probability of default in sovereign credit markets. The model incorporates the sanctions play an important role in deterring a country from defaulting. The empirical results suggest that economic liberalization decreases the probability of default, which implies that such a policy enhances creditworthiness. Also, they suggest that external conditions have contributed substantially to the financial crisis that major borrowers face today; in particular, unluckiness and the persistence of shocks are shown to be important when explaining the probability of default⁶¹. Roubini, Manasse and Schimmelpfennig have also applied logit analysis in their paper of "Predicting Sovereign Debt Crises"⁶².

⁶⁰ Karagöl and Sezgin, p.479-80.

⁶¹ Fausto Hernandez –Trillo, "A Model-Based Estimation of the Probability of Default in Sovereign Credit Markets", *Journal of Development Economics*, Vol.46, Iss.1 (February 1995), p.163.

⁶² Manasse, p.1.

3.3.1.3 Principal Component Analysis

Although there is not much the sample of using principal components analysis in country risk analysis, it is explained here briefly.

Principal components analysis is a way of identifying patterns in data, and expressing the data as to highlight the similar and different characteristics. It is a mathematical technique and uses historical variance or covariance matrix of a data set off indices to extract a set of indices.

A component is defined as

$$C_i = b_1x_1 + b_2x_2 + \dots + b_nx_n$$

Essentially, a set of correlated variables is transformed into a set of uncorrelated variables, which are ordered by reducing variability. The uncorrelated variables are linear combinations of the original variables. The methodology best explains the variance of the original data generate first index which called the first principal component. After the first index selection, a second index is selected which explains the variance that the first index did not explain. This process can continue until the number of indices equals to the number of variables in the data set. In these steps each index should be uncorrelated with each of the previously extracted indices. At this point, principal components can exactly reproduce the historical variance or covariance matrix.

We face the drawback of this technique, when component selection is made. Sometimes some components can be discarded if they are thought to be useless in capturing the variance of the explanatory variables. Nevertheless, they can be serious component in explaining the dependent variable of second step⁶³.

⁶³ Bouchet, p.124-125.

3.3.1.4 Regression Analysis

In simple linear regression models, the relationship of two variables, x and y , which are independent and dependent variables are displayed as

$$Y = \beta_0 + \beta_1 x + \varepsilon$$

The equation is represented in the Figure 3.1.

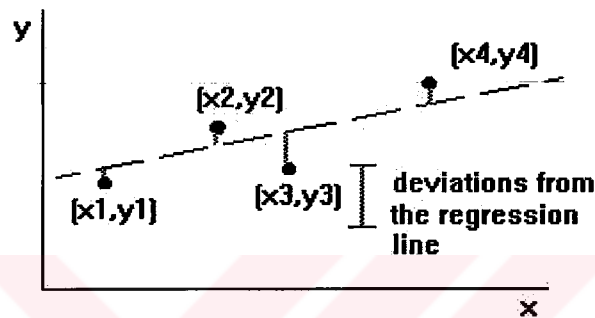


Figure 3.1 Equation of linear regression

But many times several independent variables are included in regression equation so that the simple linear regression model becomes insufficient and this leads to multiple regression in which the dependent variable is predicted by a linear combination of the possible explanatory variables.

Multiple regression models is used to account for the variance in an interval dependent, based on linear combinations of interval, dichotomous, or dummy independent variables. Multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (significance test of coefficient of determination, R^2), and can establish the relative predictive importance of the independent variables. The significance of difference of two R^2 's can be tested to determine if adding an independent variable to the model helps significantly. Of course, the estimates of b coefficients and constant can be used to construct a prediction equation and generate predicted scores on a variable for further analysis.

The multiple regression equation takes the form

$$y = b_1x_1 + b_2x_2 + \dots + b_nx_n + c.$$

b: the regression coefficient which is the beta weights, representing the amount the dependent variable y changes when the independent variable changes 1 unit so show the relative predictive power of the independent variables.

c: the constant, where the regression line intercepts the y axis, representing the amount the dependent y will be when all the independent variables are 0. Associated with multiple regression is R^2 , multiple correlation, which is the percent of variance in the dependent variable explained collectively by all of the independent variables⁶⁴.

In the study of Hummer, Kogan and Lejeune, a country risk rating system is tried to establish with using two models one of them is multiple linear regression technique. They use the Standard & Poor's country risk ratings to develop a non-recursive multiple regression model for the ratings considered as the dependent variable, regressed on a set of economic and political variables (considered as the predictor variables). They select seven variables to insert in their model and establish their model as

$$Y = \alpha + \sum_{i=1}^M \beta_i * X_i + \varepsilon .$$

From the dependent variable Y is the country risk rating given by Standard & Poor, the independent variables X_i are the economic and political variables, and ε is the error term. In view of the desired non-recursiveness of the model, the independent variables do not include directly or indirectly ratings of previous years. They derive results by using the SPSS statistical package⁶⁵.

⁶⁴ G. David Garson, "Multiple Regression", North Carolina State University, *Social Science Computer Review*, College of Humanities and Social Sciences, <http://www2.chass.ncsu.edu/garson/pa765/regress.htm> (12 February 2005).

⁶⁵ P.L. Hammer and A. Kogan and M.A Lejeune, "Country Risk Ratings: Statistical and Combinatorial Non-Recursive Models", March 2004, Rutgers University, Rutgers Center for Operations Research, Rutcor Research Report, http://rutcor.rutgers.edu/pub/rrr/reports2004/8_2004.pdf (12.02.2005), p.12.

In his study, Ramcharran observed the lending behavior of banks after crisis using regression analysis. Central of his methodology is the use of country risk data so he forms his model with country risk indices as the independent variables and the amount of loan as the dependent variable thus providing a more accurate estimate of impact of country risk. He used some of Euromoney's country risk indicators in the light of the issue that his study is focused. According to the results, in the period of three years, the significant increase in bank lending was associated with a drop in political (transfer) risk. The other variables, which are access to capital markets and debt in default or reschedule are not significant for any period⁶⁶.

Riahi has applied multiple regression analysis in his studies. In the study of "The Effects of Country Return and Risk Differences on Prediction Performance of Earnings Forecasts", he studied with Alvertos and that study consists of multiple regression of the mean square forecast errors (MSFE) per country risk and return. The results are statistically significant. The independent variables of country return and risk have statistically significant coefficients⁶⁷.

When the dependent variable is a dichotomy the assumptions of multiple regression cannot be met and discriminant analysis or logistic regression is used instead.

3.3.1.5 Monte Carlo Simulation

The expression "Monte Carlo Method" is actually very general. Monte Carlo (MC) methods are stochastic techniques--meaning they are based on the use of random numbers and probability statistics to investigate problems. You can find MC methods used in everything from economics to nuclear physics to regulating the flow of traffic⁶⁸.

In several studies the analysts use this technique like in Hammond and Sun in the study of Monte Carlo simulation of macroeconomic risk. Under the assumption of

⁶⁶ Harri Ramcharran, "International Bank Lending To Developing Countries: An Emprical Analysis Of The Impact Of Country Risk",p.8.

⁶⁷ Ahmed Riahi and Dimitri K. Alvertos, "The Effects of Country Return and Risk Differences on Prediction Performance of Earnings Forecasts", **Managerial Finance**, Vol.24, Iss.6, 1998, p.4.

⁶⁸ Joy Woller, "The Basics of Monte Carlo Simulations", Spring 1996 University of Nebraska-Lincoln Physical Chemistry Lab (Chem 484), <http://www.chem.unl.edu/zeng/joy/mclab/mcintro.html> (23 March 2005).

all agents face independent and identically distributed random shocks they extend the Monte Carlo method in order to simulate macroeconomic uncertainty when many agents face individual risk which is modeled by a process of continuum of random variables⁶⁹.

Monte Carlo simulation techniques are very popular especially in economic and financial applications. The process briefly involves three steps⁷⁰:

- First step is to give the computer an accurate model of the project under consideration thus the variables are defined,
- In the next step the forecast error probabilities must be drawn up.
- In the last step, the computer samples for errors, calculates the resulting cash flows for each period and then records them.

The shortcomings of Monte Carlo simulation are about requiring large number of variables. It is difficult and costly in programming. It is more appropriate in large projects.

3.3.1.6 Value-at-Risk

As it is mentioned, the country risk is particular for investors who has diversified portfolio including both domestic and foreign stocks. So when they assess the risk of their portfolio the value-at-risk is conceivable one of the risk that should be measured.

Value-at-risk (Var) is one of the modern risk measurement techniques that measure the worst expected loss under normal market conditions in a specific period at a given confidence level. The basic time period t and the confidence level (the quantile) q are the two major parameters that should be chosen to measure risk and the third parameter is loss amount. The time horizon can differ from a few hours for an active

⁶⁹ Peter J. Hammond and Yeneng Sun, "Monte Carlo Simulation of Macroeconomic Risk with a Continuum of Agents: The Symmetric Case", Republic of Singapore Stanford University Department of Economics Working Paper, 01- 15 October 2001, <http://www.econ.stanford.edu/faculty/workp/swp01015.html> (14 December 2004).

⁷⁰ Bouchet, pg. 121.

trading desk to a year for a pension fund. The VaR estimation can be done for a single-asset portfolio or for more than one asset portfolio.

Value-at-risk is commonly used by banks, security firms and companies that are involved in trading energy and other commodities. For example several important agencies use VaR such as Institutional Investor, JP Morgan, to evaluate portfolio risk.

There are three methods to calculate Var, which includes historical method, the variance-covariance method, and Monte Carlo simulation⁷¹.

It was selected by the Basle Committee as the basis for calculating regulatory capital for market risk, because it has desirable properties.

3.3.1.6.1 Historical Method

In the historical method actual historical returns are simply re-organized by putting them in the rank of worst to best. The main idea under this behaviour is the history is thought as a repetition from a risk perspective.

⁷¹ David Harper, “ Introduction to Value at Risk -Part 1”, 29 September 2004
<http://www.investopedia.com/articles/04/092904.asp> (21 December 2004).

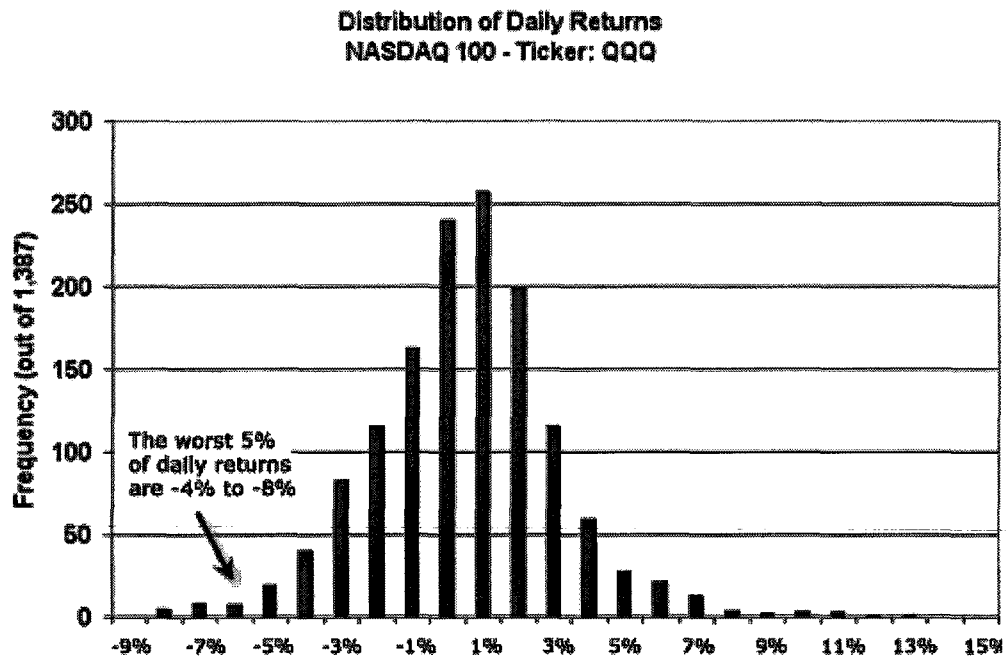


Figure 3.2 Distribution of daily returns

As an example of this method it is used Nasdaq-100 index, which trades like a stock under the ticker QQQ. Each daily return is putted to the histogram, which begins trading in March 1999. The highest bar in the histogram there were more than 250 days when the daily return was between 0% and 1%. There are the lowest 5% daily returns (since the returns are ranked from left to right; the worst are always the left tail. The left (red) bars run from daily losses 4% to 8%. Because these bars are the lowest 5% daily returns, we can say with the 95% confidence that the worst daily loss will not exceed 4%.

3.3.1.6.2 The Variance-Covariance Method

This method assumes that stock returns are normally distributed and requires to estimate only expected return and standard deviation. Here the normal curve is plotted against same actual returns.

**Distribution of Daily Returns
NASDAQ 100 - Ticker: QQQ**

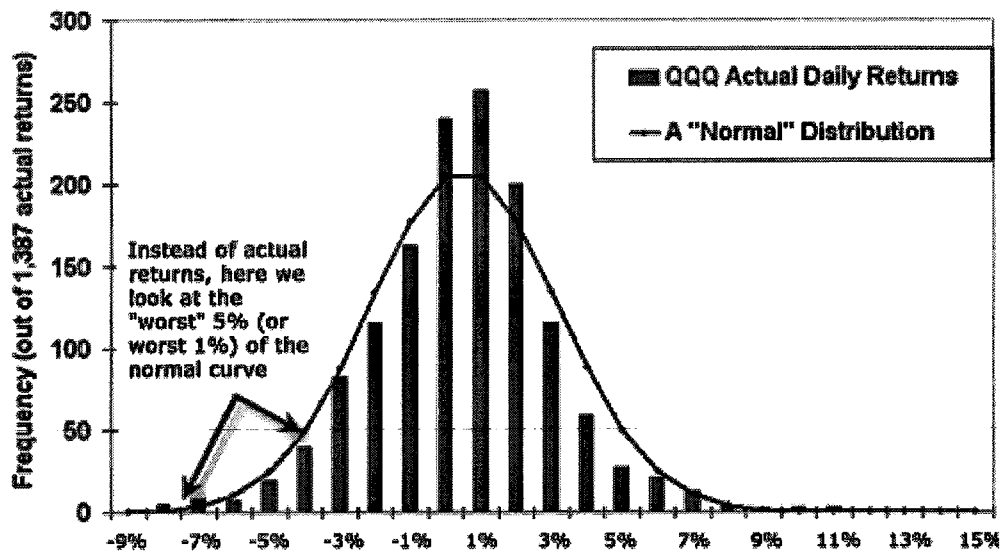


Figure 3.3 Distribution of daily returns

This curve benefits us to know where worst 5% and 1% lies. They are the function of desired confidence and the standard deviation (σ). At the level of 95% and 99% confidence, number of standard deviation is equals to;

Table 3.1

The Variance-Covariance Method for a Single Stock

Confidence Level	The Maximum Loss-- below the Expected or Average Return--as a Function of Standard Deviation (σ) and Time (T)
95% confidence	$- 1.65 \times \sigma \times \sqrt{T}$
99% confidence	$- 2.33 \times \sigma \times \sqrt{T}$

Confidence	# of σ	Calculation	Equals:
95% (high)	$- 1.65 \times \sigma$	$- 1.65 \times (2.64\%) =$	$- 4.36\%$
99% (really high)	$- 2.33 \times \sigma$	$- 2.33 \times (2.64\%) =$	$- 6.16\%$

2.64 is actual daily standard deviation of QQQ on the blue curve and 1.65 and 2.33 are t values at the 5% and 1% critical values

(But keep in mind that two of our methods calculated a daily VAR)

3.3.1.6.3 Monte Carlo Simulation

In Monte Carlo simulation, we can specify the individual distributions of the future values of the market factors in the portfolio and generate random samples from the assumed distribution. Monte Carlo simulation determines the final value of the portfolio and put in order the portfolio values and finds the appropriate percentile to find VaR⁷².

There are also other techniques for calculating VaR like ARCH/GARCH methodology. The goal of this model is to provide a volatility measure – like a standard deviation -- that can be used in financial decisions concerning risk analysis, portfolio selection and derivative pricing⁷³.

3.3.1.7 Non-Linearities and Non-Parametric and Parametric Estimation

The linear and non-linear models have very popular for last decade.

In general terms, nonlinear estimation will compute the relationship between a set of independent variable (x) and a dependent variable (y), which leaves it up to you to specify the nature of relationship; for example you may specify y , to be logarithmic function of the x or an exponential function⁷⁴.

Non-linear forcing processes have been used to a limited extent in macroeconomic models. Most applications, however, involve non-linearities arising from conditional heteroskedasticity as modeled by ARCH / GARCH type processes. An important application of non-linear forcing processes in macro models (not involving

⁷²Stephen D'Arcy, "Financial Risk Management of Insurance Enterprises", 2002, Illinois University, <http://www.business.uiuc.edu/~s-darcy/fin343/2002/FALL-Lecture/Lectures/Lecture27.ppt> (10 February 2005), slide 16.

⁷³ Robert F. Engle, "Garch 101", University of California Santa Barbara, Department of Economics econ.ucsb.edu/~seo/Garch101.doc, New York University.(04.03.2005).

⁷⁴ StatSoft, Textbook, 2003, <http://www.statsoft.com/textbook/stathome.html>, (11 April 2005).

conditional heteroskedasticity) pertains to the use of Hamilton's (1989) Markov switching process⁷⁵.

Non-linearities are examined by using a variety of parametric and non-parametric estimations. But non-parametric estimation is highly data intensive and generally not effective for small samples and also cannot be easily overcome by statistical methods. *The artificial neural network* is a parametric model and is an alternative to non-parametric estimation.

$$y_t = \Phi \left(\lambda_0 + \sum_{j=1}^q [\lambda_j \Psi(\delta_0 + \sum_{k=1}^p \delta_{jk} y_{t-k})] \right) = g(x, \pi)$$

where

$x = (y_{t-1}, \dots, y_{t-p})'$, $\pi = (\lambda', \delta)'$, $\lambda = (\lambda_0, \dots, \lambda_q)'$, $\delta = (\delta_{10}, \dots, \delta_{1p}, \delta_{q0}, \dots, \delta_{qp})'$ and g is flexible function of ψ (a sigmoid cumulative function) and $\Phi(\Phi=1)$, and q may be chosen arbitrarily⁷⁶.

Probit, logit, exponential growth and breakpoint regression are some of the most common nonlinear models.

3.3.1.8 Multicriteria Decision Aid

Multicriteria decision-aid (MCDA) aims to give decision-makers a tool which should enable them to advance in solving decision problems where several points of view must be taken into account like in assessing country risk⁷⁷. In this new method the analysts' judgements are very important.

⁷⁵ Prasad V. Bidarkota, "On the Economic Impact of Modeling Non-Linearities: The Asset Pricing Example", 24 October 2004, Florida International University, Department of Economics, www.fiu.edu/~bidarkot/apnl.pdf, (10.02.2005).

⁷⁶ Alan E. H. Speight, "Non-linear Time Series Models in Economics: A selective Survey", September 2002, University of Wales Swansea, Department of Economics, www.swan.ac.uk/economics/cware/ecm08/Nonlinearity.pdf (21 March 2005), p.8.

⁷⁷ Philippe Vincke, Description, **Multicriteria Decision-Aid**, March 1992, John Wiley & Sons, Inc.

The contributions of MCDA are generally focused on the study of multicriteria classification problems (MCPs). MCPs are different from traditional classification problems studied within the statistical and machine learning framework. They assume decision criteria provide both description and additional information and defined in ordinal terms. Implementation of MCDA classification methods mainly regarding the existing criteria aggregation forms, as well as model development and evaluation issues. MCDA several criteria aggregation forms have been proposed for developing decision models, which include relational forms, value functions, and rule-based models.

Relational models are based on the construction of an outranking relation that is used to compare the alternatives with some reference profiles characterizing each class. Some methods are ELECTRE TRI, PROAFTN, PAIRCLAS and PROMETHEE TRI.

Value functions approach provides a straightforward methodology to perform the classification of the alternatives.

Rule-based models are function-free and they are usually expressed in symbolic forms, such as “if ... then ...” decision rules.

Each approach has advantages and disadvantages, but it is difficult to be certain which is the most appropriate form. This depends solely on the requirements of each decision situation and the nature of the classification problem that is considered⁷⁸.

In the country risk classification two method of multicriteria decision aid may be used that are MHDIS (multi-group hierarchical discrimination) and UTADIS (Utilities Additives Discriminates) methods. UTADIS determines the risk level of a country in one stage while MHDIS uses a sequential and hierarchical process to decide it.

To estimate the utility function the simplest and common utility function takes the following additive form:

⁷⁸ Constantin Zopounidis and Michael Doumpos, “Multicriteria Decision Aid in Classification Problems”, EWG-MCDA Newsletter, Series 3, No. 10, Fall 2004, <http://www.inescc.pt/~ewgmcda/OpZopounidisDoumpos.html> (13 March 2005).

$$U(g_1, \dots, g_n) = \sum_{i=1}^n U_i(g_i),$$

where each $U_i(g_i)$ is a strictly increasing function.

Assuming that any subset of the criteria, G , is independent for any four countries a, b, c, d is presented as following form:

$$\begin{aligned} U(a) - U(b) &= \sum_{j \in G} [U_j(g_j(a)) - U_j(g_j(b))] \\ &= \sum_{j \in G} [U_j(g_j(c)) - U_j(g_j(d))] \\ &= U(c) - U(d) \end{aligned}$$

For a factor of i , the composition function $U_i(g_i(x_i))$ is called as *marginal utility function* for country c . when utility function is normalized, the highest value of each marginal utility function is a percentage that indicates relative importance of factor in the country risk classification model⁷⁹.

MHDIS is a non-parametric discrimination approach based on multicriteria decision aid concepts and mathematical programming techniques. The countries are described along with a set of m attributes $\bar{X}=(x_1, \bar{x}_2, \dots, \bar{x}_m)$. The countries are defined in an ordinal way like $C_1 > C_2 > \dots > C_q$ in which C_1 is preferred to C_2 , C_2 is preferred to C_3 etc. In the MHDIS method decides if the process can be done when a country C is its in level of C_1 . If not MHDIS continue to decide whether the country C is in the level C_2 . This continues until the stage of $q-1$ (q is risk level). MHDIS uses

⁷⁹ Xijun Wang, "Country Risk Classification and Multicriteria Decision-Aid", Published Thesis for Master Degree, McMaster University, August 2004, p.28-34.

the similarity function of $U^k(X) = \sum_{i=1}^m p_i^k u_i^k(x_i)$ and the dissimilarity function $U^{-k}(X) = \sum_{i=1}^m p_i^{-k} u_i^{-k}(x_i)$,

if $U_k(c) > U_{-k}(c)$ then C is in C_k otherwise is in C_{-k} .

3.4 Artificial Hybrid Neural Networks

The hybrid neural network is relatively new technique formed by integrating the variables selected by statistical models and the outputs of the statistical models. Yim and Mitchell investigated whether hybrid artificial neural networks (ANNs) can outperform traditional classification models such as discriminant analysis (DA), logit analysis (LA) and probit analysis (PA) and ordinary neural networks for predicting country risk rating. They combine ANN's and statistical models because ANN's have problems when dealing with large numbers of variables, which are the time taken for this selection and the possibility of overfitting. According to the results except for logit and probit models, DA and ANNs worked very well for predicting country risk in the holdout sample. But, the hybrid ANN, ANN-Logit-Probit, produced the best results in the holdout sample⁸¹.

Also Cooper explores the relative success of ANNs to DA, LA and PA in identifying countries likely to see a rescheduling of their sovereign debt in his study. He used 70 countries on 22 of which rescheduled their debt during 1983. The variables selected were the average annual increase in real GNP per capita over 1960–1982, the externals debt due within one year as percentage of the exports goods and services, the interest on total external debt plus amortization on long-term debt as percentage of the export of goods and services and international reserves divided by total imports.

⁸⁰ M. Doumpos and K. Pentaraki and C. Zopounidis, "Assessing Country Risk Using a Multi-group Discrimination Method: A Comparative Analysis", *Managerial Finance*, Vol.27. No.7-8 (2001), p.18.

⁸¹ Juliana Yim and Heather Mitchell, "Comparison of Country Risk Models: Hybrid Neural Networks, Logit Models, Discriminant Analysis and Cluster Techniques", *Expert System with Applications*, Vol.28, No.1 (January 2005), p. 137, Social Sciences Database, (22 March 2005).

According to the results DA, logit, probit and ANN correctly classified approximately 80, 85, 85 and 90% of the cases, respectively⁸².

3.5 Checklist Systems

According to results of surveys, checklist systems are most commonly used by banks to evaluate country risk. It is simply a list of statistics or questions to assess a borrowing country's creditworthiness. After fulfilling this step, each country is rated with respect to various indicators or to general questions whose answers need personal judgment. Each indicator has scores so these are aggregated into a summary rating for the country. By the weighted checklist approach, each score is assigned subjectively determined weight. In the Table 3.2 indicators are presented that checklist systems include⁸³.

⁸² John C. B. Cooper, "Artificial Neural Networks Versus Multivariate Statistics: An Application From Economics", **Journal of Applied Statistics**, Vol.26, No.8 (December 1999), p.909.

⁸³ Ciarrapico, p. 10-11.

Table 3.2.

Indicators Included in Checklist Systems

Domestic Economy	Social and Political Variables
GNP	Political Stability
GNP Per Capita	Past Trend in Unemployment
Growth in GNP per Capita	International Banking Division's Region Rating
Money Supply Growth	
Net Budget Position	
Inflation Rate	
Investment-to-Income Ratio	
Income Growth Fixed Capital Information Ratio	
GDP growth (annual %)	
External Economic Variables	
Exports of goods and services	Debt Service Payments
International Reserves	Principal Payments Total External Debt Ratio
Imports and Imports Growth	Share of Gold in Reserves
Reserves Import Ratio	Share of Trade in GDP
Trade and Current Account Balances	Share of Short Term Credit in Total Credit
Debt Service Ratio	Total External Debt
IMF Borrowings	Exports as a capacity to import
Current Collection Experience of US Suppliers	

3.6 Ratings

Rating the risk of a country is one of the last steps of country risk analysis. An analyst use scores, then forms the ratings and may begin to make conclusions about the related country. But generally in most agencies the fees charged for information.

Ratings are intended for both investors and creditors. The country risk ratings of an institution can be different from the others because of the different purpose or scope. So it will be better to classify the rating according to the target audience and

purpose. On this account, in this section the rating methods are divided into two groups such as *country risk ratings* and *country credit ratings*.

3.6.1 Country Risk Ratings

Country risk ratings summarize the conclusions of the country risk analysis process and they are significant components of country risk management. But as it is noticed that the various foundations may have various country risk ratings since they attach importance to distinct subjects, for example to transfer risk⁸⁴.

Political Risk Services (PRS)

Political Risk Services (PRS) provides country reports updated for quarterly for 100 countries type. These reports assess the potential economic, political and financial risks to business investments and trade in qualitative and quantitative types. As the PRS system is mostly appropriate for the use of investors, the assessments are made in micro level. PRS' unique system provides only industry specific forecasts. The PRS system uses two stages to forecast risk for investors. First, it identifies the three most likely future regime scenarios for each country over two time periods and then assigns a probability to each scenario over each time period, 18 months and five years. For each regime scenario, PRS' expert consultants then establish likely changes in the level of political turmoil and 11 types of government intervention that affect the business climate. The PRS method defines 17 risk components. The twelve component covers their 18 month forecasting including political turmoil* and the rest covers five years forecasting⁸⁵.

The PRS method is built from the Couplin-O'Leary Rating System depending on the Prince Model. This allows you to plan for the most likely risks you may encounter, but prepare for the best or worst/case scenarios. PRS usually applies three experts from each country and every expert looks at the following 17 components and

⁸⁴ *Country Risk Management*, Comptroller of the Currency Administrator of National Banks, October 2001, <http://www.occ.treas.gov/handbook/countryrisk.pdf>, (10 November 2004), p.6-7.

*See Appendix 1.

⁸⁵ The PRS Group, Methodology, <http://www.prsgroup.com>, (10 July 2004).

then they evaluate the current degree of risk on four types of scores: 0 (low risk), 1 (moderate risk), 2 (high risk), 3 (very high risk)⁸⁶.

18-Month Risk Factors:

1. Turmoil
2. Equity Restrictions
3. Operations Restrictions
4. Taxation Discrimination
5. Repatriation Restrictions
6. Exchange Controls
7. Tariff Barriers
8. Other Import Barriers
9. Payment Delays
10. Fiscal and Monetary Expansion
11. Labor Policies
12. Foreign Debt

Five-Year Risk Factors:

Turmoil is included in both the 18-month and the five-year forecasts.

13. Investment Restrictions
14. Trade Restrictions
15. Domestic Economic Problems

⁸⁶ Bouchet, p.83-84

16. International Economic Problems

They use these factors in their summary of risk ratings and after determine current risk factors; they forecast the change in its risk level under each of the three most likely regime scenarios. The numerical equivalents of these current and forecast levels are then used to calculate the risk scores⁸⁷.

International Country Risk Guide (ICRG)

The ICRG model for forecasting financial, economic, and political risk was created in 1980 by the editors of International Reports, the widely respected weekly newsletter on international finance and economics. In 1992, its editor and analysts moved ICRG from International Reports to The PRS Group, becoming an integral part of the company's services to the international business community.

The International Country Risk Guide (ICRG) rating comprises 22 variables in three subcategories of risk: political, financial, and economic, with political risk comprising 12 components, financial risk five components, and economic risk five components. A separate index is created for each of the subcategories. The Political Risk index is based on 100 points, Financial Risk on 50 points, and Economic Risk on 50 points. The total points from the three indices are divided by two to produce the weights for inclusion in the composite country risk score. The composite scores, ranging from zero to 100, are then broken into categories from Very Low Risk (80 to 100 points) to Very High Risk (zero to 49.5 points).

The components are ranked with the subcomponents and they are assigned with the highest points that they could take which mean lowest potential risk levels. And also each subcomponent takes the average of the score point as mathematically. For example, the risk point of government utility is 4.

⁸⁷ PRS, p.4-5.

Political Risk Components:

- **Government Stability (Max. 12 points).** Government unity, legislative strength, popular support
- **Investment Profile (Max. 12 points).** Contract viability/expropriation, profits repatriation, payment delays
- **Socio-economic Conditions (Max. 12 points).** Unemployment, consumer confidence, poverty.
- **Internal Conflicts (Max. 12 points).** Civil war/coup threat, terrorism/political violence, civil disorder
- **External Conflicts (Max. 12 points).** Cross-border conflict, war, foreign pressures
- **Corruption (Max. 6 points).** Corruption is a threat to foreign investment.
- **Military in politics (Max. 6 points).** An increasing the defense budget at the expense of other budget allocations can be taken an example of its implication.
- **Religious Tensions (Max. 6 points).** Determined by religious freedom.
- **Law and Order (Max. 6 points).** The Law sub-component is an assessment of the strength and impartiality of the legal system, while the Order sub-component is an assessment of popular observance of the law.
- **Ethnic Tensions (Max. 6 points).** The degree of tension within a country attributable to racial, nationality, or language divisions.

- Bureaucracy Quality (Max. 4 points). The institutional strength and quality of the bureaucracy is another shock absorber that tends to minimize revisions of policy when governments change.
- Democratic Accountability (Max. 6 points). This is a measure of how responsive government is to its people.

Overall, to assess a political risk rating of 0.0% to 49.9% indicates a Very High Risk; 50.0% to 59.9% High Risk; 60.0% to 69.9% Moderate Risk; 70.0% to 79.9% Low Risk; and 80.0% or more Very Low Risk. However, a poor political risk rating can be compensated for by a better financial and/or economic risk rating.

Financial Risk Components:

- Foreign Debt as a Percentage of GDP (max. 10 points). The lower the risk point, the higher the ratio and risk.
- Foreign Debt Service as a Percentage of XGS (max. 10 points). The lower the risk point, the higher the ratio and riskier the country.
- Current Account as a Percentage of XGS (max. 15 points). The lower the risk point, the lower the ratio and risk.
- Net Liquidity as Months of Import Cover (max. 5 points). This provides a comparative liquidity risk ratio that indicates how many months of imports can be financed with reserves. The lower the risk point, the shorter the period and riskier country.
- Exchange Rate Stability (max. 10 points). The more volatile, the riskier the country.

To assess the financial risk, overall, a financial risk rating of 0.0% to 24.5% indicated a Very High Risk; 25.0% to 29.9% High Risk; 30.0% to 34.9% Moderate Risk; 35.0% to 39.9% Low Risk; and 40.0% or more Very Low Risk. Once again,

however, a poor financial risk rating can be compensated for by a better political and/or economic risk rating.

Economic Risk Components:

- GDP per Head of Population (max. 5 points). The country is supposed to be riskier with the lower GDP per capita.
- Annual Inflation Rate (max. 5 points). The country is supposed to be riskier with the higher annual inflation rate.
- Budget Balance as a Percentage of GDP (max. 5 points). The country is supposed to be riskier with the more deficit.
- Current Account Balance as a Percentage of GDP (max. 5 points). The country is supposed to be riskier with the lower current account balance.

Overall, an economic risk rating of 0.0% to 24.5% indicates a Very High Risk; 25.0% to 29.9% High Risk; 30.0% to 34.9% Moderate Risk; 35.0% to 39.9% Low Risk; and 40.0% or more Very Low Risk. Once again, however, a poor economic risk rating can be compensated for by a better political and/or financial risk rating.

The composite risk rating. To calculate the composite political, financial and economic risk, the formula is presented below:

$$\text{CPFER (country X)} = 0.5 (\text{PR} + \text{FR} + \text{ER})$$

where

CPFER = Composite political, financial and economic risk ratings

PR = Total political risk indicators

FR = Total financial risk indicators

ER = Total economic risk indicators

The political risk rating contributes 50% of the composite rating, while the financial and economic risk ratings each contribute 25%.

The ICRG team also produces one- and five-year forecasts for each of the risk categories, in addition to the current forecasts of Political, Financial, Economic, and Composite Risk, using the same methodology.

Two forecasts are produced for each time period those are a Worst Case Forecast (WCF) is produced by extrapolating the worst-case trend for each risk component in each risk category to produce a WCF for Political, Economic, and Financial Risk and a Best Case Forecast (BCF) is produced by extrapolating the best-case trend for each risk component in each risk category. Consequently, the WCF and BCF represent “reasonably possible” outcome if the trends identified are allowed to persist.

One advantage of the ICRG model is that it allows users to make their own risk assessments based on the ICRG model or to modify the model to meet their specific requirements for example using some of the components such as internal or external conflicts. If particular risk factors have greater bearing on business or investments, composite risk ratings can be recalculated by giving greater weight to those factors⁸⁸.

Business Environment Risk Intelligence (BERI)

BERI S.A. is the private source for comprehensive ratings, analyses, and forecasts for over 140 countries and was founded in 1966. Its clients are mostly banks and companies conducting international business. Three times a year, BERI produce its **Business Risk Service (BRS)** provides qualitative analyses and forecasts for fifty countries. Ratings offer a comprehensive assessment of operating conditions, political risk, and the foreign exchange/ external accounts position for 50 important countries and these three perspectives are combined in a **Composite Score**. An **Historical Ratings Research Package (HRRP)** providing details for the 1980-2003 period includes four ratings: Operations Risk Index (ORI), Fifteen criteria; Political Risk Index

⁸⁸ Llewellyn D. Howell, About ICRG, ICRG, www.icrgonline.com, (26 January 2005)

(PRI), Eight causal criteria, Two symptomatic criteria; Remittance & Repatriation Factor (R Factor), Four subindexes; and Composite Score⁸⁹

Risk Index Definitions⁹⁰:

Operations Risk Index (ORI): The objective of ORI is to gauge the operations climate for foreign businesses. There are two variables being measured: First one is the degree to which nations are given preferential treatment and the second one is the general quality of the business climate, including bureaucratic and policy continuity.

A permanent panel of approximately 105 experts around the world rate present conditions for 15 criteria that measure the country's business environment.

Table 3.3
Weights of Criteria

<u>Criteria</u>	<u>Weighting</u>	<u>Criteria</u>	<u>Weighting</u>
Policy Continuity	3	Labor Cost/Productivity	2
Attitude: Foreign Investors and Profits	1.5	Professional Services and Contractors	0.5
Degree of Privatization	1.5	Communications and Transportation	1
Monetary Inflation	1.5	Local Management and Partners	1
Balance of Payments	1.5	Short-Term Credit	2
Bureaucratic Delays	1	Long-Term Loans and Venture Capital	2
Economic Growth	2.5		
Currency Convertibility	2.5		
Enforceability of Contracts	1.5		

⁸⁹ BERI, Business Risk Service, 2004, Publications, <http://www.beri.com> (19 July 2004).

⁹⁰Stephen J. Weber, (info@beri.com) BERI, a personal e-mail to Sevinç Kıvılcım, [sewinckiwilcim@hotmail.com] (23 May 2005).

The Experts rate each variable from zero (highest risk) to four points (lowest risk), summing up to a total score between zero and 100. Categories are formed in five group in which 70-100 (low risk), 55-69 (moderate risk), 40-54 (high risk) and 0-39 (unacceptable business conditions for foreign-owned businesses).

Political Risk Index (PRI): The concept focuses wholly on sociopolitical conditions in a country. The experts rate the present conditions from zero (highest risk) to seven points (lowest risk), summing up to a total involves maximum of 70 for perfect country.

Six internal causes of political risk:

- Fractionalization of the political spectrum and the power of these factions.
- Fractionalization by language, ethnic and/or religious groups and the power of these factions.
- Restrictive (coercive) measures required to retain power.
- Mentality, including xenophobia, nationalism, corruption, nepotism, willingness to compromise, etc.
- Social conditions, including population density and wealth distribution.
- Organization and strength of forces for a radical government.
- Two external causes of political risk
- Dependence on and/or importance to a major hostile power.
- Negative influences of regional political forces.

Two symptoms of political risk

- Societal conflict involving demonstrations, strikes and street violence.

- Instability as perceived by nonconstitutional changes, assassinations and guerilla wars.

After this step, expert rate possible additional causes up to a total 30 points and thus could receive 100 points in total. Interpreting of the ratings is same with ORI.

R Factor: The purpose of the R (for remittances and repatriation of capital) Factor is to estimate a country's capacity and willingness for private foreign companies to convert profits and capital in the local currency to foreign exchange and transfer the funds and have access to convertible currency to import components, equipment, and raw materials. Instead expert opinions, it relies on a computer program manipulates over 14,000 cells of data and makes hundreds of calculations for each R rating and the four subindices: legal framework (20% of the R factor), Foreign Exchange Generation Subindex (30% of R), Accumulated International Reserves Subindex (30% of R) and Foreign Debt Assessment Subindex (20% of R).

The Combined Score is a simple average of the PRI, ORI, and R factor.

The Economist Intelligence Unit (EUI)

The Economist Intelligence Unit was founded in 1949 and provides country analysis for the world's 195 markets and economic forecasts on the world's 149 largest markets. For the major OECD economies, they subscribe to electronic databases providing national statistics, and for some countries where this database is patchy, they apply their central banks and statistical offices. For lessdeveloped countries, where statistical bulletins are issued infrequently or delivery is chaotic, they employ "note-senders" who collect publications and data releases from the statistical office or central banks. The EIU method based on the experts' answers to a series of 77 predetermined qualitative and quantitative questions.

Their forecasting portfolio draws on five models:

- A model, customized for each country, providing economic forecasts for 117 countries;

- A global econometric model that verifies, “top down”, their country-by country models;
- A model to measure and rank the quality of the business environment in 60 countries;
- A model to rate the risk of sovereign debt default in 100 countries;
- A model to assess operating risks in 60 countries.

The EIU also separately owns The Economist newspaper⁹¹.

The experts assign factors and according to total score the country is decided whether risky or not (higher score, higher the risk). Four general risk categories are analyzed (political risk, economic policy and structure risk, and liquidity risk) and then generated a composite risk index. These four risk indices are aggregated into an overall rating with a 22%, 28%, 27%, and 23% weighting respectively⁹².

3.6.2 Export Credit Rating Agencies

The International traders observe that even they work in secure firms; they are exposed to risks because of business transactions with risky countries. So that overall risk will depend not only on a company's qualities but also on those of the country in which it operates.

For the purpose of facilitating international trade and encourage their exports, several countries develop the creation of multilateral or official credit export agencies. They provide country risk insurance and they assist exporters through financial support and funding⁹³.

The export credit rating agencies can be assembled in three categories. Multilateral credit export agencies are African Export-Import Bank (Afreximbank, Africa), Corporación Andina de Fomento (CAF, Andean Countries), European Bank for

⁹¹ EIU, Methodology, http://graphics.eiu.com/files/ad_pdfs/2003_Methodology.pdf

⁹² Bouchet, p.87-88

⁹³ Bouchet, p.88

Reconstruction and Development (EBRD, Central and Eastern Europe), Inter-American Development Bank (IADB, Latin America), Islamic Corporation for the Insurance of Investment and Export Credit (ICIEC, part of the Islamic Development Bank), Multilateral Investment Guarantee Agency (part of the World Bank). The most famous official credit export agencies are Compagnie Francaise d. Assurance pour le Commerce Extérieur (COFACE, France), Export Credits Guarantee Department (ECGD, UK) Export-Import Bank of the United States (EXIM, US), Hermes Kreditversicherungs-AG (Hermes, Germany), Export Development Canada (EDC, Canada), Istituto per i Servizi Assicurativi e il Credito all'Esportazione (SACE, Italy), and Export Credit Bank of Turkey (Turk Eximbank, Turkey). Private Export Credit Insurances are CNA Credit (USA) CPRU (UK) and Crédito y Caución (Spain).

As a sample of how these export credit agencies operate, the methodology of *Coface* is discussed. Coface provides ratings based on twofold expertise that are macroeconomic and microeconomic expertise. Macroeconomic expertise depends on financial and political indicators and microeconomic expertise use Coface databases covering 44 million companies worldwide.

Coface groups the indicators in seven families and rates each one individually. These families are:

- Growth vulnerability
- Foreign currency liquidity crisis
- External over indebtedness
- Sovereign financial vulnerability
- Banking sector's fragilities
- Political and institutional instability
- Companies' payment behaviour.

Coface determines an overall rating for each of the 150 countries monitored. Like rating agencies, Coface ranks country ratings on seven risk levels:

A1: Very weak default risk

A2: Default probability is still weak but the economic and political environment is not as good as a country in A1.

A3: Adverse political and economic circumstances may lead to worse payments. But default probability is still low.

A4: An already patchy payment record could be further worsened by a deteriorating political and economic environment.

B: An unsteady political and economic environment is likely to affect further an already poor payment record.

C: More unsteady political and economic environment could deteriorate an already bad payment record.

D: The high-risk profile⁹⁴.

3.6.3 Country Credit Ratings

Country credit rating methods aim at assessing the ability and willingness of a related country to service its debts. To achieve this goal, credit rating agencies (CRAs) measure the creditworthiness of countries even companies which operate in the country. The CRAs classify the credit ratings and give an opinion about the given economy.

Inherent in this definition of ratings is the notion that they are an ordinal measure of risk, but not necessarily a cardinal one. Accordingly, all CRAs express the outcome of their assessments in the form of symbols, such as Aaa, BBB, etc., which more or less correspond to each other across agencies. This methodology essentially reflects the judgment and experience of rating agency staff, supplemented in some areas

⁹⁴ Coface, Credit Rating Methodology, <http://www.trading-safely.com> [16.03.2004]

by the use of models⁹⁵. So, it should be emphasis that there is no precise formula is used to set the ratings; all factors listed, plus others taken in a mathematically precise manner⁹⁶.

Rating agencies typically focus on default event. Standard & Poor's and Moody's classified countries when they are expected to exposed debt crises⁹⁷. Because a bond's rating is indicator of its default risk, the rating has a direct influence on the bond's interest rate and the firm's cost of debt⁹⁸. For instance, Moody's;

- There is a missed or delayed disbursement of interest and/or principal, even if the delayed payment is made within the grace period, if any;

- A distressed exchange occurs, where

- the issuer offers bondholders a new security or securities that amount to a diminished financial obligations such as new debt instruments with lower coupon or par value or
- the exchange had the apparent purpose of helping the borrower avoid a “stronger” event of default (such as missed interest or payment).

Similarly, Standard and Poor's defines default as the failure of an obligor to meet a principal or interest payment on the due date (or within the specified grace period) contained in the original terms of the debt issue. The agency notes that;

- For local and foreign currency bonds, notes, and bills, each issuer's debt is considered in default either when scheduled debt

⁹⁵ Fernando Gonzalez and Others, “Market Dynamics Associated with Credit Ratings: A Literature Review”, European Cenral Bank Publications, June 2004, <http://www.ecb.int/pub/pdf/scpops/ecbocp16.pdf> (21 February 2005), p.3

⁹⁶ Scott Besley and Eugene F. Brigham, **Essentials of Managerial Finance**, 12th Edition, USA: Dryden Press, 2000, p. 674.

⁹⁷ John Chambers and Daria Alexeeva, “Rating Performance 2002, Default, Transition, Recovery, and Spreads”, Standard and Poor's, Transferred by: Andrea Pescorati and Amadou N. Sy, “Debt Crises and the Development of International Capital Markets”, March 2004, *IMF Working Papers* ,p.6 <http://www.imf.org/external/pubs/ft/wp/2004/wp0444.pdf> p.6 (2 March 2005).

⁹⁸ Besley, p.675

service is not paid on the due date or when an exchange offer of new debt contains less favorable terms than the original issue; and

- For bank loans, when either scheduled debt service is not paid on the due date or a rescheduling of principal and/or interest is agreed to by creditors at less favorable terms than the original loan. Such rescheduling agreements covering short- and long-term bank debt are considered defaults even where, for legal, or regulatory reasons, creditors deem forced rollover or principal to be voluntary.

Although by their nature agency ratings are not necessarily the most exact measures of time variations in country risk, they provide a good benchmark to assess its cross-sectional distribution and preferable to credit spreads since they are very volatile and available for short terms⁹⁹.

In addition to provide information about the scale of economies the rationale of using ratings is to solve principal-agent problem. Consciously most credit rating agencies, including Fitch, Standard & Poor's and Moody's provide required information to investors at favorable cost.

Fitch

Fitch Ratings was founded in 1913. In 1997, Fitch merged with IBCA Limited, headquartered in London, significantly increasing Fitch's worldwide presence and coverage in banking, financial institutions and sovereigns. Through the merger with IBCA, Fitch owned by Fimalac S.A.

Fitch Ratings provides an opinion on the ability of an entity or a securities issue to meet financial commitments such as interest, preferred dividends, or repayment of principal, on a timely basis. Ratings can apply to a variety of entities and issues, including but not limited to sovereigns, governments, structured financings, and

⁹⁹ Claudio Borio and Frank Packer, "Assessing New Perspectives on Country Risk", BIS quarterly Review, December 2004, http://www.bis.org/publ/qtrpdf/r_qt0412e.pdf (10 March 2005), p.51

corporations; debt, preferred/preference stock, bank loans, and counterparties; as well as the financial strength of insurance companies and financial guarantors.

Fitch provides both long term (one year and above) and short-term (less than one year) ratings. Credit ratings are used by investors as indications of the likelihood of repayment in accordance with the terms on which they invested. The international long term notes 'AAA' - 'BBB' categories; and the short term notes short-term 'F1' - 'F3' are assigned as low probability of default, while international long-term 'BB' - 'D'; short-term 'B' - 'D' may signal a higher probability of default or that a default has already occurred¹⁰⁰.

In the methodology of rating of Fitch includes the questioning of sovereign analysts about factors, which make the economic and politic circumstances unusual and special. Their rating of sovereign depends more on political economy rather than econometrics.

Standard & Poor's

A Standard & Poor's 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 program.

Standard & Poor's issue credit ratings can be either long-term (more than a year) or short-term (below one year). Short-term ratings are also used to indicate the creditworthiness of an obligor with respect to put features on long-term obligations. The result is a dual rating, in addition to the usual long-term rating. Medium-term notes are assigned long-term ratings.

Long term ratings notes are AAA means the obligor's capacity to meet its financial commitment on the obligation is extremely strong; AA means it is very strong; A means it is strong; BBB means it is adequate. Obligations rated 'BB', 'B', 'CCC', 'CC', and 'C' are regarded as having significant speculative characteristics. 'BB' indicates the

¹⁰⁰ Fitch, Fitch Ratings Definitions, 2005, http://www.fitchratings.com/corporate/fitchResources.cfm?detail=1&rd_file=intro (16 March 2005).

least degree of speculation and 'C' the highest. Short-Term Issue Credit Ratings are A-1(strong capacity), A-2(satisfactory), A-3(adequate), B (vulnerable), C (currently vulnerable), SD (selective default) and D (default) A Standard & Poor's Rating Outlook assesses the potential direction of a long-term credit rating over the intermediate to longer term. In determining a Rating Outlook, consideration is given to any changes in the economic and/or fundamental business conditions. An Outlook is not necessarily a precursor of a rating change or future CreditWatch action which focuses on identifiable events and short-term trends that cause ratings to be placed under special surveillance by Standard & Poor's analytical staff¹⁰¹.

- Positive means that a rating may be raised.
- Negative means that a rating may be lowered.
- Stable means that a rating is not likely to change.
- Developing means a rating may be raised or lowered.
- N.M. means not meaningful.

Moody's

Moody's was founded in 1900, but sold three months later and did not recover till 1909. The company issued its first rating in 1909.

Moody's Corporation (NYSE:MCO) comprises two subsidiaries: Moody's Investors Service and Moody's KMV. Moody's KMV, provides of quantitative products for credit-sensitive investors. Moody's KMV's models provide current default probabilities, recovery estimates, valuations, and correlations that are widely used to assess portfolio risk/return. Moody's Investors Service is among the world's most respected, widely utilized sources for credit ratings, research and risk analysis.

¹⁰¹ S&P, "Rating Definitions and Terminology", 18 March 2003, <http://www.standardandpoors.com> (17 March 2005).

Moody's Credit ratings and researches help investors analyze the credit risks associated with fixed-income securities. In addition to its ratings services, Moody's publishes investor-oriented credit research, including in-depth research on major debt issuers, industry studies, special comments and credit opinion handbooks.

Because it involves a look into the future, credit rating is by nature subjective. Moreover, because long-term credit judgments include such factors unique to particular industries, issuers, and countries, they believe that any attempt to reduce credit rating to a formulaic methodology would be misleading and would lead to serious mistakes¹⁰².

Moody's Credit Policy function promotes improvement and consistency in Moody's credit analysis. The group is divided into two units and reports to committee. First group focus on improving rating methodology and practices related to specific credit concerns; and the Credit Policy Research team, which, conducts research on defaults, loss-given-default, and rating transitions, and develops quantitative tools to support ratings and analysis. The group reports to the Credit Policy Committee¹⁰³.

Moody's ratings are determined through the rating committee process aiming to reach a proper rating opinion in an efficient manner¹⁰⁴.

Moody's credit rating methodology has evolved over the last few years i.e. explicitly differentiates between local and foreign currency ratings.

A local currency rating provides information about an issuer's ability to meet its local currency obligations and there is no need to add the sovereign ratings to the analysis. But the local currency rating can be a useful tool for revealing more complete credit assessments of issuers based in countries with low foreign currency country ceilings. For a given country the *country ceiling* indicates the highest foreign currency rating that can be assigned to an issuer in a given country, and it is usually the same as the government's rating in foreign currency. For example, in a country like Brazil which had a foreign currency bond ceiling of B2 in 1999, all issuers' foreign currency

¹⁰² Moody's, About Moody's, 2005, <http://www.moodys.com> (18 March 2005).

¹⁰³ Moody's, Credit Policy, 2005, <http://www.moodys.com> (17 March 2005).

¹⁰⁴ Moody's, "Opening The Black Box: The Rating Committee Process At Moody's", New York: Moody's investors Service, July 1999c, No:46995, p.3, www.moodys.com (10 March 2005).

obligations were rated B2 or below, allowing for almost no differentiation among Brazilian issuer. This is the case in any country with a low country ceiling. However there is a possibility that an issuer can be assigned higher than its local currency rating if the company has strong cash flow generating ability. This is the case in countries with low local currency government ratings¹⁰⁵.

Moody's Rating Scale		
Long Term	Short Term	
Aaa	Prime-1	Investment Grade
Aa1		
Aa2		
Aa3	Prime-2	
A1		
A2		
A3	Prime-3	
Baa1		
Baa2		
Baa3	Not Prime	Speculative Grade
Ba1		
Ba2		
Ba3		
B1		
B2		
B3		
Caa1		
Caa2		
Caa3		
Ca		

Figure 3.4 Moody's rating scale
Source: Moody's Investors Service

Moody's ratings of the foreign-currency bonds of governments have generally served as ceilings for ratings of foreign-currency debt obligations of domestic issuers under the rationale that all domestic issuers are potentially subject to foreign currency transfer risk because of a country wide crisis. However, recent crises— especially in Dominican Republic, Uruguay, Ecuador, Pakistan, Russia, and Ukraine — has shown that governments across-the-board debt moratoria were not used to stop foreign currency payments on some favored classes of obligors or obligations. This may apply, for example, to large, internationally recognized entities that have relied significantly on access to international capital markets and whose default would inflict substantial damage on the economy. This suggests that the traditional country ceiling policy may

¹⁰⁵ Moody's, "The Usefulness of Local Currency Ratings in Countries with Low Foreign Currency Country Ceilings", New York: Moody's Investors Service, No: 46073, July 1999b, p.1-4

be too rigid and should be relaxed¹⁰⁶. For instance, in all 6 instances, despite government defaults on foreign currency bonds, and in the cases of Ecuador and Uruguay, government imposed defaults on foreign currency bank deposits, no generalized debt moratorium was declared. In fact, in recent years, only Argentina has instituted a generalized debt moratorium following the government's own default¹⁰⁷.

Another rating methodology in Moody's is National Scale Ratings (NSRs). Moody's National Scale Ratings are intended as relative measures of creditworthiness within a narrowly defined peer group, as compared to the full universe of Moody's rated entities, and thus differ from Moody's global scale ratings¹⁰⁸.

3.6.4 Country Rankings Published in Magazines

Institutional Investor (II)

Institutional Investor magazine has been publishing industry-standard rankings for the global financial community for nearly 40 years.

Institutional Investor publishes risk rankings semi annually based on a survey of leading international bankers and economists who rank each country on a scale from 0 to 100 and 100 represent least chance to default. Survey participants are asked to rank the factors they considered important in assessing country risk¹⁰⁹. They are ranked below and the ranking for emerging markets are in importance order.

- Debt service
- Political outlook
- Economic outlook

¹⁰⁶Moody's, "Revised Country Ceiling Policy: Rating Methodology", New York: Moody's Investors Service, No:67679, June 2001a, p.1-3, <http://www.securitization.net/pdf/revcountryceiling.pdf> (15 March 2005).

¹⁰⁷ Moody's, "Piercing the Country Ceiling: An Update", New York: Moody's Investors Service, No:91215, January 2005, p.1.

¹⁰⁸ Moody's, "Moody's National Scale Ratings", New York: Moody's Investors Service, No:87042, May 2004, p.1, www.moodys.com (15 March 2005).

¹⁰⁹ Solnik, p.318.

- Financial reserves and current account
- Trade balance
- Foreign direct investment
- Fiscal policy
- Inflows of foreign portfolio investment
- Access to capital markets

Euromoney

Euromoney defines itself as “The most authoritative source of information on the trends and developments in international banking and the capital markets¹¹⁰”.

Euromoney publishes country risk ranking semi-annually usually in the March and September issues. It is a ‘rating of the political and economic performances of 185 sovereign countries’. There are also regional rankings. Euromoney assigns a weighting to nine categories to obtain the overall country risk score. These are political risk (25% weighting), economic performance (25%), debt indicators (10%), Debt in default or rescheduled (10%), credit ratings (10%), access to bank finance (5%), access to short-term finance (5%), access to capital markets (5%), forfeiting (5%)

- Political risk (25% weighting): the risk of non-payment or non-servicing of payment for goods or services, loans, trade-related finance and dividends, and the non-repatriation of capital. Risk analysts give each country a score between 10 and zero - the higher, the better.

- Economic performance (25%): based (1) on GNI (Atlas Method) figures per capita and (2) on results of Euromoney poll of economic projections.

- Debt indicators (10%): calculated using these ratios from the World Bank's World Development Indicators 2004: total debt stocks to GNP, debt service to exports;

¹¹⁰ Euromoney, About Euromoney Magazine, 2005, <http://www.euromoney.com> (19 March 2005)

current account balance to GNP. Developing countries, which do not report complete debt data get a score of zero.

- Debt in default or rescheduled (10%): scores are based on the ratio of rescheduled debt to debt stocks, taken from the World Bank's World Development Indicators 2004. OECD and developing countries which do not report under the debtor reporting system (DRS) score 10 and zero respectively.

- Credit ratings (10%): nominal values are assigned to sovereign ratings from Moody's, Standard & Poors and Fitch IBCA. The higher the average value is better. Where there is no rating, countries score zero.

- Access to bank finance (5%): calculated from disbursements of private, long-term, unguaranteed loans as a percentage of GNP¹¹¹.

- Access to short-term finance (5%): takes into account OECD consensus groups (source: ECGD) and short-term cover available from the US Exim Bank and Atradius UK

- Access to capital markets (5%): heads of debt syndicate and loan syndications rated each country's accessibility to international markets.

- Discount on forfaiting (5%): The data obtained from certain international investment banks. Countries where forfaiting is not available score zero.

- Regional rankings

To obtain this ranking the overall Global Country Risk results were broken down by region. In addition Transparency International's Corruption Perception Index was combined with the overall ranking to create a score out of 105. This combined total was then scaled down to a score out of 100. The difference in ranking and overall score

¹¹¹World Bank, 2005, World Bank's World Development Indicators 2004., www.worldbank.org (22 May 2005).

between the original ranking and that incorporating the CPI data has been incorporated in the results¹¹².

3.7 An Overview of Country Risk Assessment Techniques

Experiencing quite a few shortfalls required new ways to protect them at least to minimize the default effects of their economic systems. Thus, people try to anticipate the turning points when a crisis is unavoidable. It is so difficult to foresee these points; however, some variables are very helpful giving an early warning before a crisis realized. This is the reason why analysts give their importance to country risk analysis.

But, does it really work? Is there any method, which really forecast the crises before being real? If there is why we still meet crises? As this study based on the main idea that there is no model, no approach or no method that could exactly give comprehensive analysis about country risk and could exactly forecast what is the country's risk. As we could see when we look at the history, the most acceptable approaches like applying rating agency valuation have made serious mistakes about their future forecasts about countries as happened in Asia Crisis. As the *appendix 2* emphasizes Thailand and the Republic of Korea were still rated "Investment grade" in June 1997, the eve of the crisis. But when the time reached September – October 1997, these countries are downgraded that was too late because the crisis was full in swing. There have also made lots of studies about the efficiency of variables if they could explain the default risk, debt rescheduling (as Frank and Cline made), unwillingness to pay (Clark and Zeanidi developed in 1999¹¹³) or in broad view country risk researches made to find several variables which have dominant role when clarify the risk.

But still, none of the major studies have yet tested the ratings agencies' performance as a leading indicator of a currency crisis. No doubt this is due in part to the ratings not being generally available except to subscribers of the ratings agencies. Therefore there is no empirical basis on which to judge their suitability for use in early

¹¹² Euromoney. 2005. "Country risk: Methodology", [Electronic Version] *Euromoney Magazine*, (18 March 2005).

¹¹³ Epraim A. Clark and Amel Zeanidi, "Sovereign Debt Discounts and the Unwillingness to Pay", *Finance*, vol.20, No:2, 1999, p.185

warning systems. Nevertheless, they should be useful at least as a measure of an economy's vulnerability¹¹⁴.

The most used method in assessing country risk is statistical method. An analyst could construe about the country's conditions by looking the statistical results although to classify the results whether are good or bad is also a subjective concept.

There are some critiques about statistical methods related to their failings in the country risk assessments, which are¹¹⁵:

- 1- These models are incapable interpreting social-political fundamentals
- 2- Inappropriate judgments about selecting proxies of default. For example, using debt service ratio may be better than using rescheduling in a country.
- 3- Sometimes the definition of an important dependent variable could be weak that cause to downplay it.
- 4- There may be a multicollinearity problem between independent variables.
- 5- Small databases and inadequate number of dependent variables.
- 6- The lack of a well defined theoretical foundation. The lack of theoretical underpinning weakens their credibility¹¹⁶.

The limited history of bond market prices in emerging markets makes it impossible to ascertain any long-term trends in statistical methods. Although this drawback an analyst would obtain efficient results with available and reliable data and could do his forecasts more correctly.

Currently, logit models are more popular than probit models due to two reasons; 1) the exponentiated logistic coefficients can be interpreted as odds ratios, and

¹¹⁴ UNESCAP, "Economic and Social Survey of Asia and the Pacific, 2000", Poverty and Development Division, 27 April 2000, http://www.unescap.org/drrpad/publication/survey2000/ch5_9.htm, (15 March 2005).

¹¹⁵ Ciarrapico, pp.29-30

¹¹⁶ Timur Han Gür, **External Debt and Empirical Models For Country Risk Assessment**, First Edition, Ankara: Pelin Offset, 1998, p.22

2) there are more diagnostic tools available in logistic regression. Although, this last reason can be a chicken-egg issue, that is, there might be more diagnostic tools because it is being used more often¹¹⁷.

Identifying the relationship between rating agencies factors and actual ratings is somewhat difficult that some criteria are not quantifiable. Moreover determining relative weights for quantifiable factors by agencies is also difficult because they rely on such a large number of criteria.

Some ratings agencies put much more weights on subjective political factors than others like ICRG (50%). But the some studies about these areas emphasis that political variables add little value in measuring country risk as we could see in Haque, Mark and Mathieson's study in 1999. They examine the relative importance of political and economic variables in determining a country's credit rating and find that creditworthiness appears to be determined primarily by economic events.¹¹⁸

Recognize Sezgin and Karagöl find political variables (GE/Y, DE/GE, DE/Y) are not significant and the financial variables are found significant to determine debt rescheduling probabilities.

In addition to these results, there are some adverse results founded by other researchers as in the study belongs to Ramcharran. He finds that the political risk is more significant than debt in default and access to international capital market. He also ranks the possible reasons of why they are found insignificance. First reason might be about their low weights and the second might be because of political risk is based on the experts' polled opinions¹¹⁹.

¹¹⁷ *Probit Regression Models*, Applied Categorical & Non Normal Data Analysis , Education 231C, updated 12 September 2004, <http://www.gseis.ucla.edu/courses/ed231c/notes3/probit1.html> (27.02.2005).

¹¹⁸ Nadeem U. Haque and Nelson Mark and Donald J. Mathieson, "The Relative Importance of Political and Economic in Creditworthiness Ratings", IMF Staff Papers, 1999, <http://www.imf.org/external/pubs/ft/wp/wp9846.pdf> (8 October 2004), p.3-4.

¹¹⁹ Ramcharran, p. 88

However, it is worth to notice that the weight the Euromoney gives to the political risk is increased from 15 % to 25% as time goes. But EIU decreases it to 22% from 40%.

Albeit rating agencies have such defects, it is irrefutable that they are most applied and effective approach in the world. The inevitable result as Cantor and Packer stress on those rating agencies' opinions independently affect market spreads¹²⁰.

To temper the problems described above, it is sometimes advocated to use yield spreads instead of sovereign ratings as a proxy for default risk, since large yield spreads correspond to high risk. Yield spreads refer to the difference between sovereign yields and risk free Treasury bill yields of the same maturity.

Indeed, for Asian countries, spreads have substantially widened after the crisis. Spreads were roughly of the same order of magnitude before the crisis. While spreads of non-crisis countries have increase by less than 100% after the crisis, spreads of crisis countries have more than tripled. Consequently, we conclude that spreads provide about the same information as sovereign ratings do, and are much more volatile. This conclusion can be extended to the Brazilian and the Russian crises. This discussion implies that yield spreads are characterized by a lack of predictive power and cannot be used to obtain a reliable early warning of country insolvency. This latter conclusion is confirmed by Mathieson and Schinasi (1999)¹²¹.

3.7.1 Descriptive Analysis

This section focuses on the main characteristics of country risk assessmnet techniques.

In the table, the process includes the general features, are ranked next to the main titles and they are mostly applicable for all other sub-analyses, which are aligned.

¹²⁰ Richard Cantor and Frank Packer, p.39.

¹²¹ Hammer and Kogan and Lejeune, p.4.

Table 3.4
Descriptive Analysis

	<i>Feature & Objectivity</i>	<i>Problems</i>	<i>Comparison</i>	<i>For EMs</i>	<i>For Turkey</i>	<i>Limits For Country Risk Analysis</i>
STATISTICAL METHOD*	Prospective, most objective	Choice of dependent variable, Effect of explanatory variables can differ in various countries	Objective	Not very useful for some emerging markets	Applicable (sometimes limited)	*neglect in explaining social and political factors *considers supply side factors *Inappropriate perception about creditworthiness *The poor definition of dependent variable
Discriminant Analysis		Errors in classification				*Multicollinearity problem between independent variables *Lack of a well defined theoretical foundation *Small database & inadequate of dependent variables
Logit Analysis	Maximum likelihood technique	Difficult to interpret results, out of sample forecasting tool proved to be unreliable	For small $\alpha'x_i$, give large probability of $y=0$, When the dependent variable is not evenly distributed between two outcomes-relative to probit and there are more diagnostic tools in logistic regression			
Probit Analysis	Normal distribution		For larger $\alpha'x_i$ of logit analysis smaller $y=0$ than probit			
Principal-to-Component Analysis		May discard some important variables				
Non-Parametric Analysis		Highly data intensive, generally not effective for large samples, prone to overfitting cannot easily overcome by statistical methods				
Non-Linear Estimation	Probit and logit models are most common nonlinear models	Limited extent in macroeconomic models	The interpretation of nonlinear relationship is not as easy as simple linear relationship			
Multicriteria						

	<i>Feature & Objectivity</i>	<i>Problems</i>	<i>Comparison</i>	<i>For EMs</i>	<i>For Turkey</i>	<i>For Country Risk Analysis</i>
VaR	For normal market conditions, has three methods for calculating it		More specific			
Regression Analysis			The most common method		We apply it for Turkey	
Monte Carlo Simulation	Appropriate in large projects	Requiring large number of variables, difficult in programming	Very expensive			
Checklist System	Consist of indicators and questions, involve both objective and subjective judgements		More subjective			
QUALITATIVE METHOD	Retroactive, consist of interpretation of economic, political and social fundamentals, subjective Integrated model	Due to fallacy in judgments cause to direct wrong sides	More subjective than quantitative methods	Applicable	Applicable	*Perception of an analyst could cause shortfalls in assessing country risk
Hybrid ANN		With large number of variables	Superlative than some econometric models			
RATINGS	Retroactive & Prospective, both objective and subjective	In determining weights, lagged assessments	Saving in time	Applicable	Applicable	*Most appealing source in country risk assessment

When comparing two magazines, which are Euromoney and Institutional Investor, the classification of Euromoney seems more appropriate and reliable for analyzing risk associated with international banking. It has political, economic, default and credit risk divisions and its reliability based on a poll of professional risk analysts, risk insurances brokers and bank credit officers, and Standard and Poor's and Moody's ratings. The Institutional Investor's analysis includes solely the credit ratings of countries¹²².

BERI is a more valuable source of political risk advice than other journalistic sources¹²³.

In the comparison of more recent method that is MHDIS method and traditional methods like discriminant analysis, logit analysis and probit analysis, Zopounidis *et al* find how superior the MHDIS than others in their study in 2001. According to the results, the overall classification accuracy of MHDIS is significantly higher than MDA, LA, and PA (97.60% for MHDIS vs. 75.79% for MDA, 69.90% for LA, and 69.01% for PA)¹²⁴.

In contrast to early warning system, Sy claimed that after 1994, credit ratings predict debt crises but fail to anticipate currency crises in his study of the *Rating the Rating Agencies: Anticipating Currency Crises or Debt Crises* in 2003. The main reasons are that the ratings may not have timely and accurate information on the borrower's creditworthiness. And also there is a moral hazard problem which hinders to make reliable assessment. A third reason is that rating agencies may not have enough encouragement to decrease country ratings when they release a likelihood crisis because they receive fees from the sovereign borrowers they rate and because such downgrades can precipitate a crisis¹²⁵. Reinhart, in his study published in 2002, suggests that sovereign credit ratings systematically fail to anticipate currency crises, but do

¹²² Ramcharran, p.85.

¹²³ Llewellyn D. Howell and Donald Xie, "Asia at Risk: The Impact of Methodology in Forecasting", *Management Decision*, Vol.34, No.9 (1999), p.16.

¹²⁴ M. Doumpos and K. Pentaraki and C. Zopounidis, "Assessing Country Risk Using a Multi-group Discrimination Method: A Comparative Analysis", p.24.

¹²⁵ Amadou N. Sy, "Rating Agencies: Anticipating Currency Crises or Debt Crises", *IMF Working Paper*, June 2003, <http://www.imf.org/external/pubs/ft/wp/2003/wp03122.pdf>, p.1.

considerably better predicting debt crisis. Emerging market sovereigns are downgraded usually follow the currency crisis.¹²⁶ As point out here the concept of currency crisis and debt crisis are not same, and early-warning-system literature has paid little attention to debt crisis on the basis of bank defaults in 1980s happened at the same time with currency crises¹²⁷.

Till now we have seen the failure of rating agencies predictability of currency crises, it would be better to follow some indicators, as international reserves, the real exchange rate, domestic credit, credit to the public sector and domestic inflation to make more reliable forecasts. Such several indicators allow us to interpret a warning “signal” that a currency or a debt crisis may take place within the following 24 mounths, when an indicator exceeds a certain threshold value¹²⁸.

¹²⁶ Carmen M. Reinhart, “Default, Currency Crises and Sovereign Credit Ratings”, *NBER Working Paper*, No. 8738, January 2002, <http://www.nber.org/papers/w8738>, (3 March 2002), p.1.

¹²⁷ Andrea Pescatori and Amadou N. Sy, “Debt Crises and the Development of International Capital Markets”, March 2004, *IMF Working Papers*, p.4.

¹²⁸ Graciela Kaminsky, and Saul Lizondo and Carmen M. Reinhart, “Leading Indicators of Currency Crises”, IMF Working Paper, July 1997, <http://www.imf.org/external/pubs/ft/wp/wp9779.pdf> (11 November 2004) p.4.

4. AN APPLICATION FOR TURKEY

The necessity of country risk assessment has been raised especially in the last decades, since the announcement of countries about failure to pay their debt, which had more effects on the world economy because of contagion effect.

As it could be recognized from the definition and history sections, country risk assessment is mainly concerned with the behavior of the related counterpart about its debt. Moreover the history about debt attitudes of that country gives us an opinion for the future tendency about that country's debt. Also we should emphasize that Reinhart finds that debt crises are very much linked to currency crises in developing countries with the 84% probability¹²⁹.

On this account, it is preferred to focus on indicators, which are more related to measure the ability of fulfilling the debt obligations of Turkey. Looking to those indicators, we aim to assess the country risk of Turkey, even to foresee any crises before or on the eve of it realize. So, we apply to the rating results of some rating agencies since the ratings are most applied and effective way in country risk evaluation. Also, with this analysis we obtain an opportunity to confirm the methodology of these rating agencies of which indicators they prefer.

Before starting the analysis, a brief country risk summary is presented.

4.1 Turkey: Country Risk Summary

According to the EIU, Turkey is still vulnerable to external shocks¹³⁰. A Japan rating agency, JFK has turned the rating remark of economic outlook to positive from stable¹³¹. Also Fitch has turned the rating outlook into positive from stable in 2004 and turned country ceiling into BB- in 2005¹³². Standard and Poor's has raised credit rating

¹²⁹ Carmen M. Reinhart, "Default, Currency Crises and Sovereign Credit Ratings", p.12.

¹³⁰ EIU, Turkey: Country Risk Summary, *Eiu Viewswire*, New York :Sep 1, 2004. Proquest Database (8 January 2005).

¹³¹ Sabah Daily Paper, "JFK: Türkiye'nin Notu Artabilir", *Economics*, 12 March 2004..

<http://www.sabah.com.tr/2004/04/12/eko119.html> (12 October 2004).

¹³² Fitch, Ratings (Public Finance), 2005, <http://www.fitchratings.com/corporate/search/results.cfm> (10 May 2005).

(in foreign currency) to BB- from B+ in 2004¹³³. According to the assessment of ONDD, Turkey has high political risk in medium/long term and relatively low political risk in short term and high commercial risk as presented in Figure 4.1 (Appendix2). Finally Moody's upgrades the outlook on all of Turkey's ratings to positive from stable in light of the country's considerable economic progress since 2001 and the prospects for a significant deepening of economic, financial, and even political integration with the European Union (EU) and upgrades the rating to B1 from B2 in recognition of improved domestic debt sustainability¹³⁴.

4.2 Methodology

Assessing country risk is so broad concept and needs to identify various related subject to make a comprehensive analysis. Till now, we have defined the country risk concept and discussed the assessment techniques. In that part firstly the requisite components have been introduced and then tried to put forward the measurement techniques that apply them. Eventually an appropriate technique is applied to Turkey.

This section examines some approaches in providing to choice indicators in country risk assessment those could be used as early indicators of debt crises such as budget deficit to GNP, government expenditure to GNP, debt service ratio, interest payments to exports, the external debt service to exports and total external debt to GNP ratio. The analysis comprises the period between 1983-2004 to learn how those indicators impact country risk. We applied to Euromoney and BERI which are found earlier than most of current rating agencies and the reasons of their superlative qualifications than others as discussed afore. The techniques of country risk measurements of Euromoney and BERI is discussed earlier. We have especially used the ORI indices for the analysis that is thought more appropriate, which we are looking for. Because we give more attention to debt related indicators because we believe that an increase in country risk is more related with debt problems. The gloss of the indicators is also arranged before. However, we give a brief explanation about them. The reasonable logic under selecting debt service ratio is that it reflects the ability of

¹³³ S&P, Credit Ratings, 2005, www.standardandpoors.com (10 May 2005).

¹³⁴ US Report on Middle East, 2005, <http://www.usrom.com/Countries/turkey.htm> (13 March 2005).

related country's debt service and any rise on it makes us to think about a likelihood of a crisis. Total external debt to GNP ratio provides a measure of current and future ability of an obligor to service debt. The External Debt Service to Exports ratio brings a practical application of the country's ability to pay resembling a cash flow coverage ratio. Interest Payments to Exports ratio is seen as a single most important factor driving sovereign borrowers into debt rescheduling process. Budget Deficit to GNP ratio is also an early warning in risk evaluation. Government Expenditure to GNP ratio is used as a determinant of debt rescheduling in order to measure the relative size of public sector.

We use the Euromoney and BERI country risk ratings to develop a multiple regression model for the ratings considered as the dependent variable, regressed on a set of economic and political variables, which are considered as the predictor variables. We select six variables to insert in our model and establish the model as

$$Y = \alpha + \sum_{i=1}^M \beta_i * X_i + \varepsilon .$$

From the dependent variable Y is the country risk rating given by Euromoney and BERI separately, the independent variables X_i are the economic and political variables which we select in the light of the issue we are focusing on and the situation of Turkey and ε is the error term. Results can be derived by using the SPSS statistical package and Regfor.

4.3 Data

The rating agencies, central bank indicators, previous studies, WB and IMF indicators are applied to choice the independent variables. We have found the data of the indicators from Central Bank of Turkey, Treasury, Ministry of Finance, State Planning Organization, State Institute of Statistic, International Monetary Bank, Undersecretariat of Prime Ministry for Foreign Trade, Rating agencies and World Bank.

4.4 Results and Conclusion

In this study, the main analysis consist of BERI as dependent variable and six independent variables those are The Debt Service Ratio, Interest Payments to Exports ratio, the External Debt Service to Exports ratio and the Total External Debt to GNP and Budget Deficit to GNP ratio and the Government Expenditure to GNP ratio.

According to the results of the analysis, a 91% of the change in BERI can be explained by the change in the six independent variables and the analysis is also significant according to the F-statistic. Here we constitute our hypothesis that

$H_0: \rho = 0$ (no autocorrelation)

$H_1: \rho = 1$ (autocorrelation).

We do not reject the null hypothesis of no autocorrelation at 5% level when we look at the Durbin-Watson statistic.

When we look at the results of the our additional analysis that involves Euromoney as dependent variable and the four independent variables that are Government Expenditure / GNP, External Debt Service / Exports, Interest Payments to Exports and Debt Service Ratio and we do not reject the null hypothesis of no autocorrelation at 5% level when we look at the Durbin-Watson statistic. 50% of the change in Euromoney can be explained by the change in the four independent variables. According to the F-statistic, the analysis is significant.

Under the light of those results, it is important to look at those variables for Turkey when we want to have an idea about its risk situation. When we remember the aim of the rating agencies about countries, they try to foresee the crises or serious economic problems before they realize. So we can say that these variables are important when we make an assessment about Turkey and also those variables are very helpful when we want to foresee a crisis or some serious economic problems. Because evolutions in these six variables affect the rating of BERI for Turkey and it helps an analyst when assessing country risk by looking any change in these variables.

When we compare the results of those two analyses, it is obvious that the explanatory power in BERI is higher than Euromoney analysis because we use an ORI factor, which mainly have debt-related criteria. Different from BERI, Euromoney involves political risk factors. As we mention before, the scopes of rating agencies are different and looking to these two results we reach this conclusion. On the other side, all the same indicators are not significant for Euromoney and also an autocorrelation is detected. However, the model consist four of them that provides significance.





APPENDIX

Appendix 1 – Definitions

Turmoil. Actions that can result in threats or harm to people or property by political groups or foreign governments, operating within the country or from an external base:

- Riots and demonstrations
- Politically motivated strikes
- Disputes with other countries that may affect business
- Terrorism and guerrilla activities
- Civil or international war
 - Street crime that might affect international business personnel
 - Organized crime having an impact on political stability or foreign business

Not included in turmoil are legal, work-related labor strikes that do not lead to violence.

Credit Spread. The spread between Treasury securities and non-Treasury securities that are identical in all respects except for quality rating.

Principal-Agent Problems. Another way in which the use of ratings affects the market is the pervasive “hardwiring” of rules and guidelines to ratings. In all cases, the principal motivation for hardwiring to ratings is the same: to formulate a simple and verifiable rule with low transaction costs, so as to be able to monitor and constrain the actions of agents. In economic terminology, ratings are used to solve principal-agent

problems, that is, a principal's problem of maximising incentives for agents to perform well when it is hard to observe or directly control their actions¹³⁵.



¹³⁵ Fernando Gonzalez and Others, "Market Dynamics Associated with Credit Ratings: A Literature Review", European Central Bank Publications, June 2004.

Appendix 2 – Risk Assessment

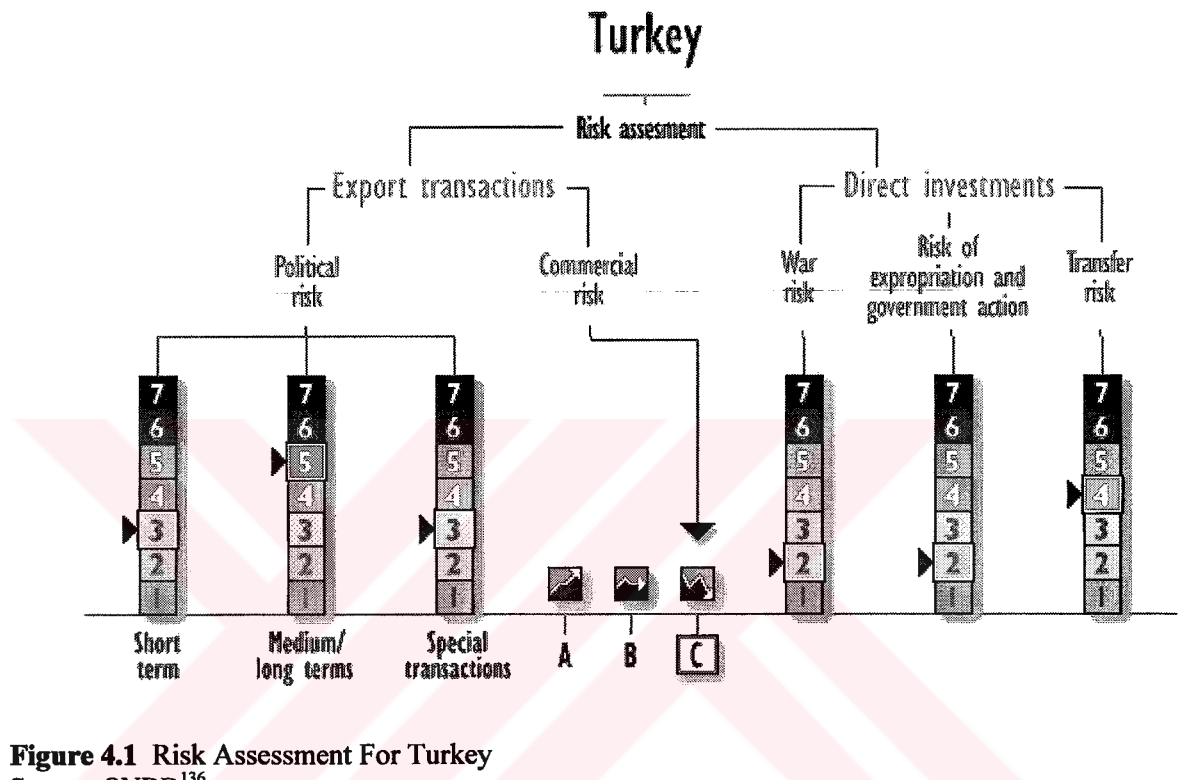


Figure 4.1 Risk Assessment For Turkey
Source: ONDD¹³⁶

¹³⁶ ONDD; Belgian Export Credit Agency, 27.06.2005, <http://www.ondd.be> (05 July 2005).

Appendix 3 - Ratings For Three Asian Countries

Table 3.5
Ratings For Three Asian Countries During The Crisis

Indonesia					
Moody's			Standard & Poor's		
<i>Date</i>	<i>Rating</i>	<i>Change</i>	<i>Date</i>	<i>Rating</i>	<i>Change</i>
25/6/97	Baa3	-	25/6/97	BBB	-
27/12/97	Ba1	-1	10/10/97	BBB-	-1
9/1/98	B2	-5	31/12/97	BB+	-2
			9/1/98	BB	-3
			27/1/98	B	-6
Republic of Korea					
Moody's			Fitch IBCA		
<i>Date</i>	<i>Rating</i>	<i>Change</i>	<i>Date</i>	<i>Rating</i>	<i>Change</i>
25/6/97	A1	-	25/6/97	AA-	-
27/11/97	A3	-2	11/11/97	A+	-1
10/12/97	Baa2	-4	26/11/97	A	-2
21/12/97	Ba1	-6	11/12/97	BBB-	-6
			23/12/97	B-	-12
Thailand					
Moody's			Standard & Poor's		
<i>Date</i>	<i>Rating</i>	<i>Change</i>	<i>Date</i>	<i>Rating</i>	<i>Change</i>
25/6/97	A3	-	25/6/97	A	-
1/10/97	Baa1	-1	3/9/97	A-	-1
27/11/97	Baa3	-3	24/10/97	BBB	-3
21/12/97	Ba1	-4	8/1/98	BBB-	-4
Source: "Credit ratings and the East Asian financial crisis", a presentation by Frank Packer at the Workshop on Economic Monitoring of Financial Systems in East and South-East Asia, organized by the ADB Institute and PECC Manila, 25-26 June 1998.					
Note: Change is measured by the number of rating steps between the former and the new rating. A negative sign shows a downgrading.					

Appendix 3- Ratios

Table 4.1
Ratios

Years	Total External Debt / GNP	Government Expenditure/ GNP	External Debt Service/ Exports (Fob)	Interest Payments / Exports (Total)	Budget Deficit/GNP	Debt Service Ratio
1983	23,26%	18,75%	66,90%	39,11%	2,20%	38,16%
1984	23,42%	17,07%	52,30%	30,68%	4,40%	30,95%
1985	26,72%	15,03%	52,97%	26,57%	2,30%	30,66%
1986	29,56%	15,95%	62,83%	25,59%	2,80%	35,84%
1987	34,00%	16,92%	54,14%	22,23%	3,46%	32,33%
1988	37,36%	16,26%	61,38%	22,03%	2,99%	36,17%
1989	41,98%	16,52%	61,78%	28,62%	3,26%	32,43%
1990	46,08%	16,92%	56,35%	23,42%	3,35%	28,55%
1991	44,76%	20,53%	55,62%	24,00%	5,28%	29,20%
1992	38,42%	20,08%	59,35%	25,01%	4,30%	29,90%
1993	32,18%	24,29%	53,61%	25,19%	6,70%	27,00%
1994	33,14%	23,08%	55,19%	25,31%	3,91%	32,00%
1995	34,58%	21,78%	54,99%	23,37%	4,30%	31,00%
1996	37,01%	26,31%	49,16%	23,29%	8,27%	22,00%
1997	51,55%	27,19%	47,29%	21,67%	7,20%	21,24%
1998	42,61%	29,15%	61,22%	19,89%	7,30%	26,38%
1999	42,95%	35,89%	68,89%	18,08%	11,90%	34,63%
2000	43,32%	37,40%	78,98%	17,47%	10,90%	37,09%
2001	78,60%	46,00%	78,58%	17,88%	16,90%	43,90%
2002	71,60%	42,87%	79,42%	20,50%	15,20%	48,20%
2003	58,85%	39,38%	58,80%	22,68%	11,30%	37,80%
2004	55,09%	31,77%	48,40%	11,34%	7,10%	32,20%

Source: CBT, WB, IMF, Ministry of Finance, State Planning Organization, Undersecretariat of Prime Ministry for Foreign Trade, State Institute of Statistic

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