EXPLAINING THE DURATIONS IN COUNTRIES INVESTMENT RISK RATINGS: A COMPETING RISK MODEL WITH RANDOM-EFFECTS

Manitra A. Rakotoarisoa
Economist,
Consultative Group of International Agricultural Research
m.rakotoarisoa@cgiar.org
manitrak@yahoo.com

Selected Paper for the International Conference on Policy Modeling (EcoMod), Sao Paolo, Brazil, July 11-13 2007.

Abstract

The differences in length of time before an upgrading or a downgrading in investment rating across countries and across rating categories have puzzled analysts and policy makers and undermined the planning of efforts to attract investment. This paper estimated whether path-dependent and heterogeneity effects along with fixed country characteristics have caused these differences. A competing risk model with multiple spells and random-effects was used. Path-dependent effect was measured by the sign of the coefficient on the baseline hazard. Heterogeneity effect, included as a multiplicative random-effect, was measured by its variance. A unique feature of the estimation procedure is that it takes into account the five ranked exit destinations from each rating category. Another innovation is that fixed characteristics based on geography, history and culture of each country are included among the model's covariates to control for some of the unobserved heterogeneity linked to country characteristics. Time-varying macroeconomic indicators were also included in the model. The data were a panel that consists of monthly observations on durations and on investment risk rating split in five ranked rating categories for 145 countries between 1984 and 2003.

Results revealed strong heterogeneity effects on upgrading and downgrading despite controlling for fixed-country characteristics. Also the exit rates to upgrading or downgrading are not the same across categories: there is a positive path-dependent effect on upgrading and a negative path-dependent effect on downgrading in all rating categories, except in the highest rating category where the inverse applies. Results also showed that large territory size, long coastline, location far from the equator, and the country's age since independence count as advantages in investment ratings. High ethno-

linguistic fractionalization also plays a positive role in investment rating except on the upgrading towards highest rating category for which less diversity seems to be needed.

These results are robust to functional form of the hazard functions and to correction of censoring and selection biases. The concluding evidence is that (i) heterogeneity effects including unobserved country characteristics and graders' subjective assessment, (ii) path-dependent effect specific to each level of categories, and (iii) fixed-country indicators based on geography, history and culture contribute to differences in upgrading of investment rating across countries and across rating categories. Macroeconomic indicators such as high increase in GDP per capita, low inflation, increased trade openness and undistorted exchange rates also induce upgrading. The implication is that improvement of investment ratings requires a combination of efforts to improve macroeconomic performance, to offset natural and history shortcomings, and to influence graders' perception and assessment.

Keywords: investment ratings, competing risks, hazard rate, random-effects, fixed country indicators

Short Abstract

This paper determines whether path-dependent and heterogeneity effects along with fixed country characteristics have caused the differences in the exit rates to upgrading or downgrading in investment ratings across countries and across rating categories. A competing risks model with multiple spell and random-effects was used. Ranked exit destinations from duration in a rating category are taken into account. Model included time-varying macroeconomic indicators and country fixed indicators. Results show that (i) heterogeneity effects including unobserved country characteristics and graders' subjective assessment, (ii) path-dependent effects specific to each level of rating categories, and (iii) fixed country indicators based on geography, history and culture contributed to the differences in the ability and speed to upgrade across countries and across rating categories.

1- Introduction

Country investment risk ratings have long served foreign investors in deciding whether and how much to invest in a country. Using information on the economic, social, and political conditions in each country, independent professional organizations periodically assign specific investment ratings, generally ranging from a *very high risk* category to a *very low risk* category. The rating methods entail both objective and subjective assessments and investors remain sovereign in their investment decision. But countries devote all efforts to improve their ratings to attract investment flows. These efforts, for instance, consist of bringing political stability and of conducting various reform policies such as reduction or removal of firm/corporate taxes; reduction of foreign exchange and interest rate risks; tariff abatement for imported inputs; letting foreigners buy and own land; and establishing treaties, and agreements to protect investment.

It is however puzzling why countries differ in their length of time spent at an investment rating category and in the speed to upgrade their ratings and to attract investment. After enduring about the same levels of political or economic crisis, some countries may recover more quickly and attract more investment than other countries. Moreover, countries that, after the same shocks, provide about the same level of efforts to attract foreign investment may not reap the same improvement in investment risk ratings or the same amount of investment inflow[1]. Likewise, little is known if the speed of transition from one rating category to another is the same or it is different across rating categories.

[1] The extreme cases are countries such as China and Egypt where risk ratings have little to do with the huge flow of foreign aid and investment that these countries receive in comparison to other countries.

For instance, it is unclear whether the effort to get out of the lowest rating category and that of getting into the highest rating category are equal or not in intensity and content.

The literature has still no explanation on the sources of such differences in duration and in speed to upgrade rating across countries and across rating categories when levels of efforts and actual investment climates are about the same. The idea of 'value of waiting' (Pindyck, 1991; Dixit 1992) linked to investment uncertainty may only explain the timing of the decision to invest based on objective assessment of the risks or the expected returns but has no implication on why the timing could differ among countries when the risks or expected profit appear to be the same. The subjective assessments of risks or the expected returns from graders and investors that partly determine the ratings and investment flows may have been ignored but may have contributed to the differences. Likewise, no research has confirmed if these differences in timing and duration could arise from unexplored characteristics specific to the country or specific to the level of rating category, independent of the country's efforts to attract investment. The lack of knowledge of what determines the ability and speed to improve in investment risk ratings and of what causes the differences in the amount and timing of investment flow impaired decisions of analysts and policy makers. On these decisions however rely the design and timing of important policies aimed at attracting investment for job creation and economic growth. This paper intends to contribute to filling such a knowledge gap.

The objective of this study is to determine and to explain the main sources of the differences in countries' duration of stay at the various rating categories and especially in

the speed at which they transit, through an upgrading or a downgrading, from a risk rating category to another. The analysis is based on the observations of monthly investment risk ratings from 145 countries between January 1984 and February 2003. The ratings are split into five different categories from *very high risk* to *very low risk* for investment. Such a unique dataset provides an insight on what determines countries' duration and exit rate out of a rating category before being upgraded or downgraded into another category.

Three specific differences in the approach to explain country's duration at and exit rate out of a rating category distinguish this study from what previous work had pursued:

(i) Firstly, this study employs the multi spell and competing risk model of duration which fits the features of the data. This model grows out of the duration model literature, which was first developed in engineering, biomedical and health sciences and later found expansion in labor economics. But duration models, and especially the multi spell and competing risk model have not so far found many applications in the study of the durations in investment rating that influences investment inflow. The multi spell and competing risks (Heckman and Honore, 1989; Han and Hausman, 1990; Narendranathan and Stewart 1993b) model particularly takes into account the countries' repeated movements in and out of a given risk rating category and the possibility that exit from any given rating category could have more than one destination.

(ii) Secondly, the use of the duration model in this paper invokes the *heterogeneity* hypothesis (Heckman, 1991) that has not been tested in explaining the spells of the failure to improve the ratings and attract investment. This hypothesis implies that some country characteristics, or shocks (Happe, Hussai and Redifer, 2003) that a country has endured, influence the amount and timing of investment ratings and investment flow. Such influence is called an *heterogeneity* effect. Past studies and policies aimed at reversing a low investment rating and lack of investment flow have taken into account mostly time-varying covariates such as demography, level of education and major macroeconomic indicators. These time-varying covariates could already account for some of the country's main characteristics that are part of heterogeneity variables.[2] But these past studies left out sources of heterogeneity that may arise from time-invariant or fixed factors that include information on geography (e.g. territory size, length of the country's border lines or coastlines, and latitude), history (e.g. year of independence, foreign influence), or culture (ethno-linguistic). Several studies (e.g. Sachs 2001 and 2000; Dahl and Tufte, 2003; Easterly and Levine, 2002; Alesina and Spolaore, 2003; Rodrik et al., 2004, Rose, 2005; Hansson and Olsson 2006) have indeed highlighted the debate on the impact on economic development of these time-invariant (or fixed) factors. But there has been little or no specific investigation on how they affect change in investment ratings.

[2] Some of these information are somewhat captured (e.g. through autoregressive model in a time-series analysis that include information on initial conditions) in current risk ratings and in studies that define the

Graders' or investors' subjective motivations and preferences are hard to detect and to control but they could contribute also to the unobserved heterogeneity. Controlling for the fixed factors based on geography, history, and culture presents the advantage of further isolating and identifying the remaining heterogeneity effects other than country characteristics including heterogeneity arising from graders' or investors' subjective assessment. The use of time-invariant and heterogeneity covariates received little consideration in past studies; this study chooses to focus on these covariates to help determine why failure to attract investment takes longer for some countries than for others.

(iii) Thirdly, the use of the duration model also invokes another hypothesis, the *path-dependent* hypothesis, (Eblbers and Ridder, 1982; Heckman 1991; Parsley and Wei, 1993) that has not been tested yet in explaining the spells of the failure to improve in rating and attract investment. This hypothesis implies that repeated failures to attract investment, especially over a relatively long period may have built a negative reputation (i.e. it signals some deeply-rooted conditions that are unfavorable to investment) and may also have tampered with any exposure and development of skills to secure and manage investment in both public and private sectors. This describes the so-called negative '*state dependent'* or '*path-dependent*' effects.[3] This hypothesis on '*the hand of past*', as Heckman (1991) put it, remains unchecked in the determination of spells in investment risk ratings; this paper intends to focus on it.

---

causes of investment flow.

Using the multi spell competing risk model to test the two separate hypotheses on heterogeneity and negative path-dependent effects, this study attempts to draw implications on how developing countries especially least developed countries can attract more investment flow. The aim is to specifically assess whether current efforts have limitations as other country-fixed characteristic (or time-invariant) factors (such as geography, culture and history) and graders' perception are influential in attracting investment. These implications would increase the knowledge of how to overcome all these obstacles to investment flow and would provide policy makers with better information on how to allocate limited resources (or provide a synergy) among the efforts to advertise a country's comparative advantages and the country's external image and the efforts to improve its internal investment climate.

2. Data

Investors refer to several investment risk ratings when making investment decision abroad. These ratings are often consistent across the professional organizations that calculate and publish them although the data and methods used are not always the same. This study employs one of the most widely used risk rating indicators, the *Composite Risk Rating* of the International Country Risk Guides (ICRG) produced by PRS Group,

[3] Negative path-dependent effect or persistence in trade has numerous theoretical and application references in the literature (e.g. Baldwin and Krugman, 1989)

Inc. Other ratings include the "COFACE" ratings by the COFACE Insurance Group and FDI confidence index by A.T. Kearney Inc.[4]

The ICRG produces three separate ratings: political, financial and economic ratings for each country. From these three ratings ICRG creates a *composite rating* to grade countries' overall investment attractiveness. Political rating is calculated on subjective assessment of information such as political stability, level of corruption, conflicts and level of bureaucracy. Financial rating is established from an assessment of country's ability to meet its financial obligations and to maintain stable exchange rate; the assessment is based on indicators such as foreign debt, balance of payment and exchange rate variation. Economic rating is an assessment of the state of country's economy (strength and weakness); the assessment is based on indicators such as GDP per capita and annual GDP growth, inflation, and fiscal and trade balances.

The *Composite Risk Rating* of ICRG is a weighted average of the political, financial and economic ratings. This composite rating is appealing for the estimation of the duration analysis in investment risk ratings because of the rich details and the wide country coverage it provides. This rating include both subjective (e.g. in some of the political indicators) as well as more objective (e.g. in some of the financial and economic indicators) assessments of countries' ability to attract investment. The ICGR assigns every month a score on the composite rating for each country as a result of the

[4] The 'COFACE' index for instance is assigned (discretely) based on seven criteria: (i) vulnerability to shocks, (ii) foreign currency shortage risks, (iii) debt levels, (iv) government treasury, (v) risks in banking (vi) risks from political institutions (vii) government payments (Coface, 2003).

assessment of country's ability to attract investors. The score ranges form 0 (the riskiest) to 100 (the safest for investment). Alternatively, the ICRG distributes these scores into five distinct rating categories as shown in table 1. Countries in rating category 5 are the most attractive and least risky while those in category 1 are the least attractive and the riskiest for investment.

(Table 1, insert here)

This paper uses the five risk rating categories described in table 1 because investors more likely look into these categories rather than the actual scores in judging if and how much they will invest in a country.[5] Also using the rating categories rather than the actual score increases the likelihood of convergence between the ICGR ratings and ratings category from other agencies that use different methods and publish at various frequencies. This makes the data closer to being representative of all investment ratings so that results of the analysis would apply to data from other sources and be less specific to a single data origin. The data cover 145 countries and monthly observations between January 1984 and Febuary 2003, i.e, 230 months per country. Some observations are missing especially for countries that ceased to exist because they had merged with other countries (e.g. East and West Germany which were officially reunified in 1990). Also countries that gained independence or split with their former block (e.g. countries from the former Soviet block) after January 1984 have missing observations. Appendix 1 shows the list of countries covered in this study and the distribution of countries' spells across 5 rating categories during the entire observation period.

(Figure 1 insert here)

(Figure 2 insert here)

Figure 1 shows how the number of countries at each rating category varies over time. The figure reveals that the number of countries staying in categories 3 and 4 has increased while the number of those in category 1 has declined. The same information is

[5] The ratings category gives unequal importance to a marginal increase in score. A one point score increase

presented in figure 2 but is adjusted to indicate the number of countries in each rating category per month over the total number of countries in all categories during that month. Figure 2 shows that the proportion of countries with 'very high' investment risks in category 1 has decreased over time while the proportions of countries with 'moderate' and 'low' risks (category 3 and 4) have clearly expanded. This inspires optimism that more countries have moved toward the improvement of their risk ratings to attract investment over time. The proportion of countries staying in the highest ratings, the *very low risk* (category 5) appears to be stable at below 20% especially between 1996 and 1999 but drops significantly below 20 % since 2000-2001. Such a figure on the category 5 follows the movement in the world economy for these periods. An economic expansion with growing investment in the 90's (dot com bubble, and low energy price) kept the number of the *very low risk* countries stable. But the US and world recession starting in 2000 and the event of September 11, 2001 may have caused the percentage of *very low risk* countries to fall after these events.

Because there are five risk rating categories, exit from any category has four possible destinations. Such a feature of the data matches the multi spell, multi stage competing risks framework. The direction of the exit out of the boundary categories, 1 (*very high risk*) and 5 (*very low risk*), is known: moving up for category 1 and moving down for 5. Although it is possible the jump or fall may skip a category or two (i.e. from 1 to 3 or from 5 to 3), the monthly data have not shown such as a big skipping. For these boundary-categories, the movements are limited to a hike from category 1 to 2 and a fall from category 5 to 4. On the contrary, exits from intermediate categories 2 (*high risk*), 3

within a category is for instance less important than a 0.5 increase at the category's upper boundary.

(*moderate risk*) and 4 (*low risk*) may go in either direction, up or down. These types of exit are carefully examined in multiple spells and competing risk analyses.

3. Framework: Duration Model

Duration in this study is the number of months during which a country stays in one of the five rating categories before the country is upgraded or downgraded to another category. The overall goal is to estimate the hazard rate, i.e. the probability at which the stay in a given rating category ends at a time *t* after a country stayed in that category until *t*. This paper and model explore three main areas of interests. The first main interest is in determining how the hazard rate varies with the time spells (path-dependent effect) and with the values of relevant covariates, after controlling for heterogeneity effects that may arise from country or group characteristics. The second is in identifying whether the baseline hazard rates of the transitions from one category to another is the same across the five rating categories. The third is in determining whether the transitions are symmetric or not, i.e. whether the hazard rate of exiting out of category 3 to category 4 (an upgrade) is higher or lower than that of moving from category 3 to category 2 (downgrade).

The estimation of the hazard rate of country's investment risk rating however had to confront three major related challenges in this paper. The first challenge is on choosing the covariates entering the model. The data series on composite risk ratings are already the outcome of a series of assessments based on a large set of explanatory, and mostly,

time-varying covariates. To account for the remaining covariates and to eventually reduce the chance of having unobserved heterogeneity in the model, we have to introduce some fixed indicators. The fixed indicators should be those which are expected to have direct impacts on investment ratings. Three types of fixed indicators are chosen, in light of the debate on the effects of country-fixed indicators on development highlighted in studies such as those of Mellinger, Sachs and Gallup (2001), Sachs (2001, 2003), and Easterly and Levine (2002). These three types of indicators are geography (territory size, lengths of border and coastline, distance from the equator), history (foreign language influences, year of gaining independence or creation as a modern state[6], and culture (level of cultural diversity).

The second challenge is on choosing the functional forms of the hazard rate. For the hazard functional form, one solution is to use non-parametric method such as the Kaplan-Mayer method and to infer from the feature of the graphs of the hazard curve or integrated hazard curve the closest functional form. Another solution is to use parametric method, i.e, estimating the hazard rate using known functional distributions and choose the best models based on a goodness of fit criteria such as the value of log-likelihood function. For this study, both methods are tried to compare the results.

The third challenge is on choosing the distribution that represents the unobserved heterogeneity in the 'frailty' model. This is important because ignoring the heterogeneity effect would lead to three major biases: (i) overestimation of the negative duration

[6] This is somehow to reflect country's 'age', i.e. years of experience as a modern state. We scaled this variable *age* as equals to 2001-year of independence, to represent such country's age. Such a scaling does

dependence; (ii) unstable coefficients for covariates; and (iii) biased coefficients for covariates (Jenkins, 2005). The Gamma and Inverse Gaussian distributions for continuous time-model and Gamma Normal (Gaussian) for discrete time-model are most commonly used to represent the distribution of unobserved heterogeneity. This paper follows these traditions. The analysis in this paper therefore entails two main steps: an exploratory step using non-parametric estimation of the survival and hazard rates and an analysis using competing risk multi spell model with frailty to estimate relevant parameters of the hazard functions.

(a) Non-parametric estimation of the survival functions and hazard rates

The analysis first borrows the Kaplan-Meyer method to determine the shapes of the survivor and hazard rate functions per risk category. This method is non-parametric in the sense that no functional form is assigned to the hazard rates (or equivalently to the distribution) in determining some characteristics of the hazard function. Multiple spells are taken into account as country moves in and out of a given level of risk category a number of times during the period of the analysis. Then, the analysis delves into the comparison of the shapes of the survival and hazard functions by relevant covariates such as regions and foreign influence.

To have meaningful results and interpretation, this analysis using non-parametric method is confined mostly to study the duration in the boundary categories 1 and 5. The reason is that the direction of the exits from categories 1 and 5 is known with certainty and

---

not change the nature of the variable although some countries ceased to exist before 2001.

therefore easier to interpret; exit from rating category 1 (the lowest rating) can be only an upgrading and that for category 5 (the highest rating) only a downgrading. Also because of the high frequency of the spells in category 3 (see Appendix 1), non-parametric method is used to study the exit from category 3 although the analysis at this stage does not determine if such an exit is an upgrading or a downgrading. Any exit from these categories (1, 3 and 5) is considered as a 'failure' in duration term. Prior to the estimation the data are re-arranged for each of these three categories as the example shown in Table 2.

(Table 2, insert here)

From table 2 the usual *lifetable* (Kieffer, 1988; Cleves 1999a and 1999b; Smith, 2006) in duration analysis can be created. The durations (the *t*'s) are ordered from low to high and we call t_j the duration t for the jth order. At each t_j, N_j is the number of observations that neither completed nor censored before tj. Likewise H_j is the number of observations that 'fail' (exit) at duration t_j. The estimate of the hazard rates at t_j is

$$(1a)\ \hat{\lambda}(t_j) = \frac{H_j}{N_j}.$$

An equivalent expression of the same distribution is the *Kaplan-Meier* estimator of the survivor function at t_j is

$$(1b)\ \hat{S}(t_j) = \prod_{i=1}^{j} \frac{N_i - H_i}{N_i},$$

where

- j is the order of the duration; and j=1, 2,3,…230; i is a subset of j as i= 1,2, 3,…j

- t_j is the duration (number of months) t_j=0,1 .., 230. t_j=end-begin when there is a failure (exit)

- N_i is the number of observations that are neither completed nor censored before duration t_i for i= 1, 2,3, …j.

- H_i is the number of completed spells (exits) at duration t_i for i=1, 2…, j.

The estimator in (1b) can also be interpreted as a maximum likelihood estimator. We plot functions (1a) and (1b) and observe the shapes of the curves. The slope of the hazard rate function particularly informs on the type of path-dependent effect in the duration data.

(b) Multi-spell and competing risk approach with random-effects

Estimation of the hazard rates for this study employs the time-discrete model of multi spells and competing risks. The main reason is that these spells are measured in an interval censored of length of one month. Another important reason is that there is likely to be strong correlations of the hazard parameters among destinations and, the exit for instance from category 1 directly to category 5 in a month interval, though possible, seems improbable. The 'separability' property to calculate the log-likelihood function (Jenkins, 2005) may not apply because unlike the case of continuous-time model, the log-likelihood function cannot be viewed as the direct sum of the contribution of each log-likelihood for each destination-specific.

Cleves (1999b) provides a summary of different methods that handle competing risks models with ordered (timing and sequence of the exit matter) and unordered (timing and sequence of the exits do not matter) events. [7] The ordered event model of Prentice, Williams and Peterson (1981) particularly considers that an exit to any category is conditional to previous sequence of exits. Such a model may fit the monthly data in this study as, for instance, exit into category 4 cannot occur unless the country have entered category 3 or category 5 initially. These methods however are not able to include time varying covariates especially in a discrete case.

Jenkins (2005) method[8] was used and the data were arranged in an 'episode-splitting' manner so that each country has one observation per month (for all 230 months period) indicating their rating status. The 'episode-splitting' model takes into account the timing and the sequences of all spells and exits over the 230 months period (including repeated spells when a country moves in and out of a category). To this newly organized dataset, the covariates the values of which can vary per month were added. The duration data then become a panel data with the countries as sectional units.

As in Jenkins (2005), the parameters of hazard function is estimated using the complementary log-logistic distribution for panel data (xtcloglog) in which the exit into a given rating category (from above or from below) is estimated treating the duration time as a discrete variable. Also following Kieffer (1989) and especially Heckman (1991) and Horowitz (1999) it is assumed that the hazard function separates heterogeneity effect

[7] An application of the method on political data is found in Box-Steffensmeier and Zorn (2002).
[8] Jenkins (2005), lesson Chapters 3 and 6

from path-dependent effect. The hazard rate *p(t)* at the end of duration *t* is written as follows:

(2) $Log\{-Log(1-p(t))\} = c(t) + \beta' \mathbf{X} + \log(v)$

or

$$p(t) = 1 - \exp\{-\beta' \mathbf{X}.\exp\{c(t) + \log(v)\}\}.$$

where β is a vector of parameters, **X** is a vector of covariates, and $c(t)$ is the baseline hazard and a function of the duration from which the path-dependent effect will be estimated. Heterogeneity, which is the unobserved difference between countries and group of countries, is represented in the equation by the term *v*. In the expression in (2), the heterogeneity *v* enters the hazard function in a multiplicative form and assuming that *v* is with known distribution and finite variance.

Since there are K destination categories (K=4) for an exit out of a rating category, the general expression of the log-likelihood function for competing risks models (Narendranathan and Stewart 1993b) for the *i*th individual country for an exit type κ and can be written in general form as:

(3) $$\ln L_i = \alpha_i \ln p_{\kappa i}(t_i) + \sum_{\tau_i=1}^{t_i-1}\left[\sum_{k=1}^{K} \ln\{1 - p_{ki}(\tau_i)\}\right],$$

where α_i is a dummy which is equal to one if the spell is completed and to zero when the spell is censored; t_i is, as before, the duration in number of months and τ_i is a unit change in duration. The hazard rate *p(t)* is of the form in (2). (For the particular case of a study

on an upgrading or a downgrading only, the use of cloglog assumes K=1, a single destination.)

For the estimation, the vector **X** in (2) includes the following covariates:

- Macro-economic indicators (time-varying): GDP per capita; inflation rate; an index of distortion of the real exchange rate[9] ; and trade openness index.

- Geography indicators (fixed): territory size; length of border; length of coastline; and latitude (absolute value of the distance from the equator scaled 0 to 1).

- History indicator (fixed): time elapsing from the year of gaining independence or of the return of sovereignty or creation as a modern state; we will call this variable as the *age* of the country since independence.

- Culture indicator (fixed): ethno-linguistic fractionalization index.

The macro-economic indicators are time-varying covariates, hypothesized to affect the rate of exit from (or entry to) a rating category. GDP per capita controls for the country's wealth; high GDP per capita assumes a healthy economy with high productivity which can attract investment. Inflation intends to capture efficacy and consistency in monetary policy of the country. Low and stable inflation attracts investor in that it implies low production costs (high competitiveness) and reduced financial risks.

Real exchange rate distortion index controls for overvaluation (and undervaluation) of currency and accounts for country's exchange rate policies (see appendix A2 on how the indicator is constructed). Overvalued currency often occurs under fixed exchange rates and high inflation, hurts competitiveness and turns away foreign investors. Openness is the percentage of trade over GDP an indicator of low barriers to trade and is expected to affect the chance of an upgrading in investment ratings.

The fixed indicators are time-invariant and their impacts on development and eventually on investment still stir an unending debate. Some authors (e.g. Rodrik, 2004; Rose, 2005) argue that geography indicators do not play much role in development. They refer to the evidence that both small and large territories could become economic powerhouses. They also argue that geography and other fixed indicators may only affect development through institutions. But others (Sachs, 2001, 2003) argue that fixed indicators do have direct influence on development while institution may not matter much. This second line of thought contends that *territory size* reflects the availability in natural resources, and the ability to organize economic activity and to install and enforce rules of law (e.g. Alesina and Spolaore, 2003; Hanson and Olsson, 2006). Similarly, *length of coastline* could be an indicator of the ability to trade with the outside world at a lower cost. Longer coastline could increase the chance of efficient transactions, and hence can facilitate an upgrading of investment ratings and can eventually attract investment.

[9] As defined in Dollar (1992) and Easterly and Levine (2002) and explained in Appendix 2.

Latitude, or distance from the equator, in development studies is an indicator of the climate that affects productivity and economic activities and is included in several studies (Sachs 2003; Easterly and Levine 2002; La Porta et al 1999). A country on or near the equator, where it is hot and humid, is theoretically prone to tropical diseases and harsh climate that reduce productivity and slow economic activities. Closeness to the equator could therefore lessen countries' attraction to investment. On the contrary, temperate climate prevailing in regions relatively far from the equator favors a more productive agriculture, and entices economic activities (Landes, 1998); this could be an attraction for investment. *Latitude* has then the potential to affect investment ratings and investment decision.

The history indicator, period elapsing since the year of gaining independence or creation as a modern state, may reflects a country's experience and maturity in governance including the building of strong institutions and enforcing of rules of law. 'Older' countries or states can govern well; they can inspire the confidence of foreign investors. Thus, country's *age* can be taken as a factor that influences the likelihood of an upgrade or a downgrade in risk ratings.

Ethno-linguistic fractionalization, a 'culture' indicator, measures the level of population diversity based on ethnic origin and language[10]. High ethno-linguistic fractionalization index may indicate richness in culture, and ability to communicate and cohabit among

[10] See Easterly and Levine (1997), La Porta et al. (1999). The values of this index range from 0 to 1. The index is an average of five different indices: (i) probability that two randomly selected individuals from a given country will not belong to the same ethno-linguistic group, (ii) probability of two randomly selected people speaking different languages, (iii) probability that two randomly selected individuals do not speak

different ethno-linguistic groups. This could be an attraction for investors looking to exploit their clients' diversity, for instance, by differentiating their products for higher gain (e.g. phone companies selling services in different languages, restaurants industries selling ethnic foods) in a single place. Also such a high index, in this case, can also imply a functioning society obeying, willingly or unwillingly, to strong rules of law that protect individual rights amidst diversity. These advantages inspire foreign investors' confidence in that they expect that law would protect and guarantee their investment.

However, high ethno-linguistic index may also indicate permanent rifts and rivalries among the factions in the society. This fractionalization could constitute a pre-condition for political instability and power struggle or even civil war (Alesina, Easterly and Baqir, 1999; Easterly and Levine, 1997). In this case, high fractionalization could frighten investors. Under the two opposing arguments, ethno-linguistic fractionalization index is expected to affect the transitions in risk ratings categories for investment.

Choice of the baseline hazard functional form

The baseline hazard function $c(t)$ in (2) can take different forms such as $\log(t)$, polynomial in time, piece-wise constant and fully non-parametric. This study chooses $c(t) = (q\text{-}1).\log(t)$, as the expression of the baseline hazard to simplify interpretation of the parameter values as in Jenkins (2005) and Smith (2005). The coefficient q-1 has a particular meaning in that the sign of it indicates how the hazard changes with the length

the same language, (iv) percent of population not speaking the official language, and (v) percent of population not speaking the widely used language.

of the duration. In this regard, if q-1>0 , i.e q>1 , then there is a positive path-dependent effect: the longer a country stays in a rating the higher is the chance of exiting out of that rating category. Conversely if q-1<0, i.e q<1 it can be concluded that there is a negative path-dependent effect (persistence): the longer a country stay in a rating category the lower is the chance of getting out of that category.

Remarks on continuous versus discontinuous time-model

Estimation results from using discrete vs. continuous time-model in survival analysis may differ significantly except, as Jenkins (2005) reported, when the time interval are what he called 'intrinsically' discrete or when the transition to the other destination categories occur at the boundary of the interval (month). Under these two exceptions, the results from using discrete time-model should not differ much from the results from using continuous time-models assuming they both use the same type of distribution, (e.g. both are derived from proportional hazard models). As the time interval is measured in number of months, it can be assumed that the transition occurs at the boundary (end) of the month. But for the sake of comparison to see whether the discrete model approximates the continuous-time model, first the multinomial logit (*mlogit*) model for competing risks within the continuous time-model framework is employed:

$$(4)\ h(t) = \left[1 + \exp\left(\sum_i (-c_i(t) - \beta_i' \mathbf{X} + \log(v_c)\right)\right]^{-1}$$

where as before we choose $c_i(t)=(q_i-1).\mathrm{Log}(t)$.

The error component v_c is assumed to be follow a *log-normal* distribution and the maximum likelihood method is employed to estimate the parameters of the models for both the multinomial logit and the complementary log-logistic models.

4. Results and Interpretation:

(a) On the non-parametric analysis

Figure 3a 3b 3c display the smoothed hazard rates for exits from category 1, 3 and 5. The upward trend of the curves indicates that hazard rates increases as the length of the duration increases. This means that there is in general a positive path-dependent (no persistence) effect in upgrading from category 1, and for the downgrading from category 5. For the exit from category 1, this can be a piece of good news: the longer the spells in the lowest rating, the higher the chance to improve (no persistence). But for category 5, the results warn that reputation may not be enough to maintain the status at the highest rating: the longer the stay in that highest rating category is, the higher also is the chance to downgrade to lower rating categories.

(Figure 3a 3b 3c, insert here)

Although the trends of the hazard rates are all upward, the curves are not linear. For the exit out of category 1, Figure 3a shows that the hazard rate first increases with the duration up to 50 months, and then declines (negative path-dependent effect) for duration between 50 and 150 months. But the exit rate rises sharply after about 150 months of spells. In other words, countries in lowest ratings improve either at a relatively early

time (after 50 months of spells) or relatively late (beyond 150 months). Such result is puzzling especially in identifying what causes the persistence (negative path-dependent effect), i.e. lesser chance to improve, when durations last between 50 and 150 months. Countries that exit at a relatively early period (after 50 months of stay) are perhaps those which have already had the foundation to improve (they are perhaps the ones which have been recently downgraded from other categories). But loss of exposure to handle investment and perhaps bad reputation take over when the duration lasts between 50 and 150 months. The high exit rate after 150 months (12 and a half years) of spells indicates that reform of the investment climate may have finally taken roots and bore fruits and prevailed over any negative reputation or shortcomings to increase the chance of an upgrading.

The rate of exit, a downgrading, from category 5 as shown in figure 3b is non-linear in duration but shows little evidence of a negative path-dependent (persistence) effect. A slight bump or a slight trough seems to appear every 50 months (roughly 4 years) which may correspond to business cycles. The downgrading appears to take a slower rate but then takes a high speed after about 175 months (about 15 years) of spell. It can be assumed that beyond 175 months, good reputation (of being at the top) wears down and countries in the highest ratings become more vulnerable to shocks with some 'investment fatigue' that precipitate the downgrading.

To investigate further, especially to examine whether these patterns hold, the same analysis is conducted within country groups defined by region, and foreign influence.

By region

The 145 countries were first separated into eight different regions: Sub-Saharan Africa (SSA); Middle-East and North-Africa (MENA); Latin America and Caribbean (LAC); North America (NA); East Europe and Central Asia (ECA); West Europe (WE); East Asia and Pacific (EAP); and South Asia (SA). The panel Figure 4 shows the results of the non-parametric estimation of the hazard rates functions for the exit from categories 1, 3 and 5.

(Figure 4a 4b 4c, insert here)

In figure 4a, the exits from category 1 (upgrading) for each of the 8 regions show different patterns. 'East Europe and Central Asia' and 'Sub-Saharan Africa' countries' upgrading rates are higher than the rest. Also 'Sub-Saharan Africa' and 'West Europe' countries have straighter hazard lines compared to the rest of the regions; the regions other than 'Sub-Saharan Africa' and 'West Europe' are main responsible for the non-linearity of the overall upgrading rates shown in figure 3a. A negative path-dependent effect between 50 and 150 months duration is observed except for 'Sub-Saharan Africa', 'West Europe', 'East Asia and Pacific', and 'South Asia' regions.

In figure 4b, 'East Europe and Central Asia', 'East Asia and Pacific' and especially 'West Europe' regions downgrade faster from category 5 than other regions. For 'West Europe' and 'East Asia and Pacific' countries, the hazard rate starts to decline slightly or durations beyond 180-200 months indicating that persistence may have prevailed in these regions that are among the most destination of foreign investment flow. On the contrary, the 'Sub-Saharan Africa', 'Middle-East and North Africa' and 'Latin America and

Caribbean' regions downgrade faster from the highest rating category after just about 150 months of duration.

Figure 4c confirms that there is no negative path dependent effect (no persistence) in the exit out of category 3 even after splitting the countries by regions. The first pattern is that countries in 'Sub-Saharan Africa' are slower to exit the *moderate risk* (category 3) than countries in 'Latin America and Caribbean' and 'North America'. This is no surprise as many of the poor countries in 'Sub-Saharan Africa' region stagnate under failure to attract foreign investment for many years. The second pattern is that former communist bloc in 'East Europe and Central Asia' was the quickest to move out of category 3 among all countries in the region. The relatively fast pace of economic reforms in 'East Europe and Central Asia' may have been an explanation if such an exit is confirmed as a transition to higher ratings category. However, the non-parametric analysis at this stage does not allow any confirmation on the direction of the exit out of category 3.

By foreign influence

Each country is assigned to one of four groups of foreign languages having the most influence on the country's legal or economic or political system: English; French; Spanish; and "Other languages". The latter group includes countries speaking languages such as Chinese, Dutch, German, Italian, Portuguese, and Russian as well as and countries that have no known foreign language of influence. Figure 5a and 5b and 5c present the result of the estimation of hazard rates.

(Figure 5a 5b 5c, insert here)

The figure in 5a shows that the "other" and the 'French- influenced' countries upgrade faster from category 1. Also only 'French' group, unlike the rest, does not exhibit any negative path-dependent effects between 50 and 150 months of duration. The sharp rise in regional hazard rates after 150 months of duration is also noted.

Figure 5b shows that the shapes of the hazard rates by foreign influence present many similarities: a slower downgrading as duration increases then a sharp increase in the downgrading speed starts when duration reaches 150- to 200 months of stay in the highest category. The exception is the hazard rate of the 'French' group. 'French' countries resist to downgrading (negative path-dependent effect) for duration equal or less than 120 months (10 years). But the downgrading speeds up when duration exceeds 150 months.

Figure 5c shows that all hazard rates slope upward indicating that there is no or little negative path-dependent effect in the exit from the *moderate risk* rating category for the entire range of durations. But hazard rates of the exit from category 3 differ by foreign influence. Countries with 'Spanish' influence and countries that have influences other than English, French and Spanish, exit much faster out of the *moderate risk* than the rest does. But, countries with 'French' and 'English' influences stay the longest in *moderate risk* category.

Why 'Spanish' countries exit faster than the other groups is puzzling. The period since 1983-2003 witnessed the rising success of economic reforms in Spain and in some Spanish speaking countries in Latin America such as Chile, Argentina, and Mexico; these countries have become more favorable to investment. But the same period also marked

political instability and especially economic decline of many 'Spanish' countries such as Ecuador, Honduras and Nicaragua that have become less attractive to investors. These two opposite movements within the Spanish group may have caused the group's overall high exit rate out of the *moderate risk* category.

(b) On competing risk and multiple spell model

Multinomial logit model versus complementary log-logistic model.

Table 3 reports and compares preliminary results on the parameters estimates of the complementary log-logistic (cloglog) function in (3) and on the estimates from multinomial logit (or mlogit) model in equation (4), but without the heterogeneity terms.[11] The cloglog model treats duration time as discrete while the mlogit model assumes that duration time is a continuous variable. At least based on the Log-likelihood ratio, the results show that the cloglog formulation produces better fit. This result supports the treatment of the duration time as a discrete variable. Nevertheless, it is necessary to mention a few differences in the results.

The results show that the hazard rate of entry to each category differs among categories under the two different functional forms. The cloglog functional form indicates that there is some persistence in the downgrading to category 1 and in the upgrading toward category 5, the highest rating, based on the signs and values of the baseline hazard. The path-dependent effect in the downgrading to category 1 indicates sustained efforts to build better investment climate preventing countries from sliding back to the lowest

[11] From this point onward, the following countries are excluded from the analysis because of lack of consistent macroeconomic data: Brunei, Cuba, Chzecqoslovakia, Iraq, North Korea, Qatar, Somalia, and

rating. On the contrary, access to the highest ratings requires specific efforts but time spent too long in the categories below it would lessen countries' ability to access the highest rating.

The mlogit form indicates however that entries to each of the four categories (category 1 served as basis) present no negative path-dependent effects (all baseline hazard $q-1>0$), at least compared to the rate of exit to category 1 (chosen as the basis), contradicting the results from the cloglog functional form.

(Table 3, insert here)

Coefficients on both macroeconomic covariates and fixed indicators are mostly significant. Under both models, increases in GDP per capita, openness, size of territory, latitude, length of coastline, country 'age' and less cultural diversity precipitates upgrading to category 5. These results come as expected. However the two models disagree over the role of exchange rate distortion on upgrading to the highest category.

Besides, the clogolog model confirms that downgrading to category 1 is associated with a decrease in GDP, higher inflation, high exchange rate distortion, less openness, smaller territory size, being far from equator, relatively younger age since independence, and less diversity.

The results under the two models present similarity for the entry to category 3 and 4 based on the signs of coefficients although the values of the estimates differ significantly. The most noticeable disagreement is however on the entry to category 2 where for

---

Taiwan. Also the USSR, as a single country, was dropped, but most of the newly independent states from the Soviet Union are included as individual countries in the analysis.

instance, the mlogit indicates positive path dependent effect while the cloglog model points to a negative path dependent effect.

These preliminary results turn in favor of the cloglog model and of the assumption that the duration time is discrete (rather than continuous). But these results offer only limited insight into the rate of entry into category 2, 3, and 4 and no clues on whether the entries are an upgrading or a downgrading. These estimates have not included heterogeneity variables.

Complementary log logistic model with covariates and heterogeneity as random effects

To estimate the path dependent-effect and the upgrading and downgrading rates, the focus is on the characterization of the exits out of a given category. The hazard model for the exit out of each of the five risk categories is estimated using equation (2) and (3). Since the random effects are included, the estimation employs the command xtloglog that treats the data as a panel. Table 4 summarizes the results of the estimation.

(Table 4, insert here)

It is noticed that in all cases, the heterogeneity terms are all significant indicating the importance of country characteristics other than those mentioned in the covariates in determining the rate of exit out of a given risk category. Comparing the results in table 4 with the cloglog estimates in Table 3, it appears that including heterogeneity parameter does improve the fit, based on the likelihood ratio.[12]

[12] It is acknowledged that some of criteria for ratings are based on available, not perfect, information and some information comes entirely from subjective assessment. But even when that data are from objective

The heterogeneity effects represent some other unobserved country characteristics. Differences in countries' reactions to shocks they previously endured, i.e. the difference in the degree of hysteresis (Dixit 1989, 1991, and 1992), can be an explanation for the strong heterogeneity effects.[13] Another explanation is the subjective risk assessment from graders' perception or investors' own preference. The strong heterogeneity effects across all rating categories explain why countries with the same macroeconomic, geography, history or culture conditions may still not receive the same reward or the same setback in their investment ratings.

In table 4, the coefficients of the baseline hazard are positive (so that $q>1$) for the transitions from category 1 and 2, i.e. there is no persistence in the stays at these lower ratings. The longer a country stays in category 1 (the least attractive ratings for investment) the higher is the chance to improve to rating category 2 and above. This is consistent with the earlier findings from the non-parametric method. Likewise exit out of category 2 is highly probable the longer a country stay in that category. But the direction of the exit remains ambiguous at this point.

However, there is a negative path-dependent (persistence) effect in categories 3 and 4 as the coefficient of the baseline hazard are negative (i.e. $q<1$). This negative path-dependent effect implies that the longer a country stays in categories 3 and 4, the lower is the chance for such a country to exit. The persistence in category 3 and 4 is also hard to

---

sources, the weights used in calculating the score to make up the index can sometimes be subjective and chosen arbitrarily out of the graders and especially investors' discretionary assessment.

[13] Baldwin (1988) and Baldwin and Krugman (1989) use the term 'hysteresis' in trade to explain how initial shocks (exchange rate fluctuations) have lag effects even long after the shock had been reversed.

explain at this stage of the analysis unless it is known exactly whether the exit refers to an upgrade or a downgrade.

As for the effects of the covariates on the hazard rate, it is found, as expected, that an increase in GDP per capita induces the upgrading from category 1 to higher rating categories, and also the exits out of the other categories. Also, increased openness boosts the rate of upgrading from category 1 ('very high risk' ratings) to higher ratings categories as expected. Moreover, lower inflation and lower exchange rate distortion favor an upgrade from category 1 to higher ratings. But high inflation and high real exchange rate distortion strongly increase the exit rates (direction unknown) out of categories 2, 3 and 4.

Also, larger territories are likely to upgrade faster from category 1 to higher ratings than smaller territories. For the rest of the categories, the effect of *territory size* on hazard rate of exit is mixed: positive for category 3 but negative for category 2 and not statistically significant for category 4. The *length of coastline* is slightly negatively correlated with the exit from category 1, which is puzzling. But it is positively correlated to the hazard rate for category 2 and 3 and not correlated to the exit rates from category 4.

Besides, *latitude* has no effect on the speed of an upgrade from category 1 and on the exit out of category 2. But *latitude* has positive effect on the rate of exit from category 3 and negative effect on that of category 4. Moreover, 'older' countries, perhaps because of the maturity of their institution, also have higher chance of upgrading from category 1 ('very high risk') faster than 'younger' countries.

Higher ethno-linguistic fractionalization index favor a quick exit from each ratings category. For category 1 (very high risk), this means that higher diversity based on ethnicity and language is not a barrier but could be a tool to an improvement in investment ratings. This is perhaps because it implies cultural diversity attracting a large span of investors from different origin, or perhaps it is a symbol of an ability to cohabit, therefore guaranteeing safety for investment. The coefficient on the ethno-linguistic fractionalization index for the exit out of category 1 is the highest among all others.

These results highlight particularly the usual macro-economic performance that countries at a *very high risk'*(category 1) for investment must achieve to improve their ratings: promoting higher GDP growth; controlling inflation and correcting for the overvaluation of currency through sound monetary and exchange rate policies; and removing trade barriers. But the results also indicate that fixed factors such as larger territory size, longer period elapsing since independence, and cultural diversity could boost the chance to improve from the lowest ratings. Heterogeneity effects accounting for other country characteristics and graders' perception also play an important role in pulling these countries out of the worst investment rating category.

Direction of the exit from categories 2, 3 and 4

For categories 2, 3, and 4, the analysis using the parametric method has allowed only so far the mentioning of the rate and conditions of exits (transitions) out of these categories without any specification on what the direction of each of the exits was: an upgrade or a downgrade. This was not a problem for categories 1 and 5 for which exits have only one direction: an upgrade for category 1 and a downgrade for category 5. This section aims

to determine the direction of the transitions from categories 2, 3, and 4 and the impacts of the covariates on the exit rates.

The approach is to collapse all rating categories in only two groups of ratings at each category level: observations with ratings below (or above) a category versus the rest of the observations. As an example, to examine the 'upgrading' towards categories higher than category 3 (namely categories 4 and category 5), all observations (countries) in rating categories 1, 2 and 3 are gathered into one group, and the hazard rate of exit from such a group towards category 4 or 5 is estimated. Similarly, to examine the 'downgrading' towards low ratings (category 1 and 2) from higher ratings (category 3 4 and 5), all observations that have ratings categories 3 or 4, or 5 are gathered into one group and the hazard rate of exit from such a group towards category ratings 1 and 2 is estimated. Both estimations use the same functional form of complementary log-logistic distribution with random-effects as in equation (2). The results on the exits to an upgrading are presented in table 5 while the results on the exits to a downgrading are in table 6.

(Table 5, insert here)

(Table 6, insert here)

Upgrading

Table 5 indicates the strong heterogeneity effects in upgrading which confirm the hypotheses that some other factors associated with country characteristics (other than

already controlled for in the regression) or graders' subjective assessment have significant influence on the upgrading of countries in investment ratings.

Results also show that there was no negative path-dependence (no persistence) in the upgrading towards higher categories for countries from category 1, from categories 1 and 2 combined, and from categories 1, 2 and 3 combined. These results mean the longer countries stay in lower ratings categories, the higher is the chance that these countries transit to higher ratings categories. This brushes asides any idea of a negative reputation attached to being at lower ratings for long period. Also, these results offer hope for countries willing to improve: there is a reward for perseverance for the day-to-day efforts to build better investment climate.

The only exception is on entry to category 5, the highest rating category. It appears that the hazard rate for an upgrading towards category 5 decreases with the length of stay in a lower category as the coefficient on the baseline hazard is negative (i.e. $q<1$). This is an indication that it remains difficult to get to the highest ratings (the *very low risk* category). The few countries which succeed to get into category 5 are limited in number and the negative dependence effects in accessing category 5 could be linked to 'not having the reputation' to be in the top category. This result does not exclude the fact that some countries do manage to get to the highest ratings category after a long period of time with intensive efforts and to build their reputation as a safe place for investment.

On the effects of the covariates, results in table 5 shows that the increase in GDP per capita, and more openness in trade increase the rate of exit towards an upgrading at all

categories. However, increased inflation would unambiguously reduce the chance to an upgrading of risk ratings. These results come as no surprise.

Real exchange rate distortions have mixed effects on hazard rates of upgrading. The effect is negative on upgrading from category 1 to higher categories and on upgrading from category 2 to higher categories. That an overvaluation of currency would reduce the chance of an upgrading from countries in categories 1 and 2 finds support in the case of low-income countries that constitute the bulk of these lowest rating categories. These low-income countries, mostly in Sub-Saharan Africa, South Asia and Latin America have had overvalued currency in the past. Lack of productivity and competitiveness along with high inflation, under a fixed exchange rate regime, had caused currency overvaluation and reduced the chance of securing foreign investment.

But and increase in the currency overvaluation index appears to quicken the upgrading towards categories 4 and 5. An interpretation of this somehow puzzling result is to consider that countries that have upgraded faster in category 4 and 5 include transition economies in Eastern Europe (see Holzner 2006) and some newly industrialized countries in Asia (Russia, China, Japan, South Korea) where currencies are often undervalued. Undervaluation of currency in the host country has made local inputs and labor costs cheaper while keeping export price lower; this has created an advantage for foreign investment. But keeping currency undervalued has now been widely criticized as a source of an artificial trade deficit for trading partners (such as the United States). Moreover, undervalued currency has local downside implication in that it raises the costs of imported inputs (such as car parts, and fossil fuel); these costs will continue to raise as

the transition and newly industrialized economies shifts toward the use of more imported inputs (semi-processed) and away from the use of raw materials.

So any move to more undervaluation (i.e. more distortions) of the currency could raise the costs of imported inputs that at some point may outweigh the benefits from undervaluation (such as low labor costs), and harm countries' upgrading to high rating categories. On the contrary any correction of the initial undervaluation, (i.e. a move towards a realignment or reevaluation of the currency) could send a signal of willingness to stop central bank manipulation of the currency, to reduce inefficiencies and to curb costs of imported inputs. Such a realignment can be favorably viewed by analysts and investors and boost these countries upgrading. This may explain why an increase in the overvaluation index for some countries may quicken the pace to upgrading in categories 4 and 5.

The effect of *territory size* is mixed. For countries in low rating categories (such as category 1 and countries in category 3 and below), the chance of an upgrading increases with the size of territory. But *territory size* does not affect upgrading to category 5, the highest rating. One explanation is that abundant natural resources and labor (certainly of lower skill) in large territory countries have helped these countries to get passed their low ratings. But factors (abundant natural resources and unskilled labor) associated with territory size become less relevant in getting to the highest ratings. This can be seen in the evidence of many relatively small territories (Hong Kong, Taiwan, Singapore, South Korea, and Mauritius) staying among countries in the highest ratings category.

Recently, Hansson and Olsson (2006) have revived the debate on the role of territory size and find negative correlation between country size and rule of law, an institutional variable. They offered two interpretations that have also direct implications on investment ratings in the present study. One interpretation is that there is a lack of incentive to uphold propriety rights and protection against expropriation in large territory because of the large expected rents form the vast land and eventually natural resources that come with the large territory size. The other interpretation is that the strength of an institution diminishes with the radial distance from the central physical location of the institution. In other words, the strength of an institution is, in general, more felt in the entirety of a small territory than in the entirety of a large territory with eventually many remote areas. Again, the evidence in the high investment ratings of small (moslty island, or peninsula) countries such as Hong-Kong, Singapore, South Korea, and Mauritius compared to their large neighboring territories could back these arguments.

However, the drawback of these interpretations are that they lack precision on the exact definition of large or small size territories, and they ignore other influential factors such as the degree of decentralization of the administration and the roles of information technology and communication. A large territory (such as the U.S. or Australia) with highly structured and decentralized political power and with strong communication facilities may have less problems in establishing and enforcing rules of law than a small and disorganized territory. Beside the argument that larger territory size may be synonymous of abundant natural resources and labor, Dahl and Tufte (2003) argue that larger territory also may imply lower per capita cost of non-rival public good, and larger internal markets. These advantages could weigh favorably on investment ratings.

The results also show that *length of coastline* generally boosts the chance of an upgrading to all categories. This indicates that trade capacity such as longer coastline is an advantage for investment as it may reduce transactions costs, a trade barrier. The exception is upgrading from category 1 where the coefficient on the length of coastline has a slightly negative impact on upgrading.

The further a country is from the equator, the higher the chance of an upgrading especially for upgrading to category 3, 4 and even 5. This result is consistent with the view that temperate climate entices high agricultural and economic activities (Landes 1998), hence facilitates an attraction to investment. Also the result is consistent with the evidence of a positive correlation between the distance from the equator and property rights (La Porta et al., 1999), an important requirement to which foreign investors pay their utmost attention.

Country's *age* is unambiguously and positively associated with upgrading at all levels. If country *age* is proportional to the country's experience in governance and maturity of its institution, then as the result shows, *age* is certainly an advantage working in favor of high ratings and eventually more investment inflow.

Ethno-linguistic fractionalization has a positive effect on upgrading for riskiest categories 1 and 2 but a negative effect on upgrading towards categories 4 and 5. This result is puzzling but can be interpreted as follows. Diversity appears to be an advantage at lower ratings because perhaps it provides the image of an attractive society that is rich in culture and able to cohabit with their differences. But upgrading to high ratings categories requires less fractionalization because better communication, less rivalries and

little conflict between ethno-linguistic groups are perhaps more relevant than richness in culture in maintaining stability in securing high ratings and hence large inflow of investment.

Downgrading

From table 6 the presence of significant heterogeneity effects in downgrading is noted. Table 6 also indicates that there is some persistence (reluctance) in downgrading as the coefficients on the baseline hazard is negative (i.e. $q<1$). The longer a country stays in investment rating categories 2, 3, and 4, the smaller the chance that the country is downgraded. This boosts this paper's earlier finding in that staying longer in a category does not affect the chance of being downgraded but increases the chance of an upgrading. This is also good news for countries that persevere. Time spent and efforts devoted to reform the economy and to strengthen the institutions have paid off; these efforts lead to a robust and attractive investment climate able to fend off shocks in the economy and prevent slides in ratings.

Table 6 also shows that the rate of exit towards downgrading decreases as per capita GDP and *openness* rise. But, as expected, downgrading rate increases with inflation. Overvaluation of the currencies pushes countries to downgrade to categories 2 and 1. And moves towards more undervaluation could increase the chance for a downgrading to categories 3 and lower.

The negative coefficients on country's *territory size* in table 6 indicate that, small countries are more prone to being downgraded faster than large countries are. This also

reinforces earlier finding on some of the advantages of large territory: having a 'large territory' helps maintain and, even in some cases, improve risk ratings.

Longer coastline prevents the downgrading of countries staying at high rating categories namely, category 4 and 5. This also reinforces the argument on the *length of coastline* being one of many indicators of trade capacity and of relatively low transaction costs. However, longer coastline appears to increase the likelihood that countries in category 2 or 3 downgrade into category 1. This result is puzzling but could be used as a reminder that *length of coastline* itself could not be turned into an advantage unless the coastline has accessible and well-equipped harbors facilitating trade and transactions.

Results also show that the farther is the country's distance from the equator, the smaller is the chance that countries downgrade from the highest ratings (category 4 and 5). This result reinforces the positive role of *latitude* in investment ratings that the analysis pointed out earlier in the case of an upgrading.

Besides, country's *age* unambiguously reduces downgrading at all levels. This again supports the idea that country's *age* reflects the maturity of its institutions and of its governance. Finally the ethno-linguistic fractionalization appears to halt the slide towards lowest ratings (category 1 and 2) but has no impact on downgrading from highest category. The explanation coincides with earlier remarks on upgrading, in that higher cultural diversity could be an advantage only for countries at low ratings if for instance investors view cultural diversity as more of an opportunity (e.g. tourist attraction) and less of a handicap.

Breakdown by region and by foreign language of influence

The presence of a strong heterogeneity effect assumes that important differences in countries characteristic remain unaccounted for. To further reduce unobserved heterogeneity the same analysis is conducted but within the region and foreign influence clusters.

By regions

Each country is assigned into one of eight different regions defined earlier: Sub-Saharan Africa (SSA); Middle-East and North Africa (MENA); Latin America and the Caribbean (LAC); North America (NA); East Europe and Central Asia (ECA); West Europe (WE); East Asia and Pacific (EAP); and South Asia (SA). Model in equation (2) is estimated within each group and takes into account the direction of the exit at each category. The results are reported in table 7 and table 8. For some categories and for some regions the estimation cannot be conducted because the number of observations in the group is too small.

Table 7 insert here

Table 8 insert here

The heterogeneity effect seems to vanish in the 'Middle-East and North Africa' region, but remains strong in other regions such as the 'Sub-Saharan Africa' and 'Latin America and the Caribbean' regions. This could be the case because 'Middle-East and North

Africa' countries share more similarities than 'Sub-Saharan Africa' and 'Latin America and the Caribbean' countries do in many aspects such as economy, culture and language, history, geography and climate.

There appears to be no persistence (no negative path-dependence) on the upgrading from lower categories as indicated by the positive coefficient on the baseline hazard. Only the upgrading of 'East Europe and Central Asia' countries from category 1 and especially the upgrading of 'West Europe' and 'East Asia and Pacific' countries from category 4 to category 5 presents some persistence (negative path-dependent effect). The results generally support earlier finding from aggregated data. The longer countries in 'West Europe' and 'East Asia and Pacific' stay in categories 4 and below, the harder it is for them to upgrade to category 5. The persistence in lower categories against getting into category 5 for countries in 'West Europe' and 'East Asia and Pacific' indicates that getting the highest rating is difficult, a reason why only a few countries reach the highest category.

Conversely, there is negative path-dependent effects (persistence) against downgrading from higher categories, confirming previous result. The only exception being 'East Europe and Central Asia' s downgrading to category 1 and 'West Europe' and 'East Asia and Pacific' s downgrading from category 5. For countries in 'West Europe' and in 'East Asia and Pacific' most of which occupy category 5, downgrading rate increases with the length of stay in category 5. This reinforces also earlier findings from the non-parametric methods and confirms the difficulties to access and maintain the stay in category 5, the highest rating.

Impacts of macroeconomic variables such as GDP per capita, and openness are consistent across regions. Higher GDP and low trade barriers speed up upgrading while holding countries not to downgrade. Increase in inflation generally boosts the chance towards an upgrading and reduces the likelihood of downgrading to lower categories. The only exception is the 'Middle-East and North Africa' region where the increase in inflation appears to benefit their upgrading and works against their downgrading. One explanation could be that some inflation is linked to hike in energy price and countries in 'Middle-East and North Africa', most of which are oil producers benefit rather than lose from such a rise in price in terms of investment in the eyes of investors.

Real exchange rate distortions have also mixed impacts across regions. Overvaluation of the currency seems to hurt countries' chance to upgrade towards category 2 and 3). But for upgrading towards categories 4 and 5, overvaluation of the currency seems to help especially in 'West Europe' and 'East Asia and Pacific'. This confirms argument earlier that in 'East Asia and Pacific' region (which includes China, Japan, South Korea) currencies are already undervalued (making export cheaper and import more expensive, i.e. a growing trade surplus) so a further undervaluation (a decrease in the real exchange rate distortion index) would jeopardize upgrading. Graders and investors see the correction of the undervaluation (less managed currency) as an advantage, boosting these countries' ratings.

Territory size appears to work in favor of an upgrading while preventing a downgrading across regions. The only exceptions are 'Sub-Saharan Africa' and 'Latina America and Caribbean' regions. In these two regions the lack of communication and infrastructure

and difficulty to enforce rules of law may have prevailed over the advantages of vast natural resources and cheap labor.

The impact of *length of coastline* also is mixed when the analysis controls for region. The *length of coastline* is an advantage only for the upgrading of countries in 'Sub-Saharan Africa' region out of category 1 and for the upgrading of 'East Asia and Pacific' countries towards categories 4 and 5. But for the remaining regions, *length of coastline* is negatively (positively) correlated with the exit rate to the upgrading (downgrading) rate. This result per region contradicts earlier findings pointing to *length of coastline* as an advantage for all. One possible reason is the strong disparity in length of coastline between countries in the region making it difficult to assess an overall impact.

Latitude has also a mixed impact across the region clusters. Further distance from the equator appears to slow upgrading except in three occasions: for 'Middle-East and North Africa' countries in category 1; for 'Latin America and the Caribbean' countries within ratings category 3 or below and for 'East Asia and Pacific' countries in category 4 or lower (exiting to category 5).

But country's *age* plays favorably for investment ratings by boosting an upgrade and preventing a downgrade in all cases except for 'Middle-East and North Africa' countries. Controlling for region also shows that high ethno-linguistic fractionalization has negative impacts on investment ratings. The few exceptions are the 'Sub-Saharan Africa' countries in category 1, 'Latin America and the Caribbean' countries in categories 1 and 2, and 'East Asia and Pacific' countries in category 4 and lower (exiting to category 5).

Also, for ‘East Asia and Pacific’ countries, fractionalization helps prevent the downgrade from category 5 to lower category.

The results of the breakdown per region present similarities to the results from the more aggregated data. This can be particularly seen in confirming the presence of positive path-dependent effect on the upgrading (except towards category 5) and the reluctance to downgrade to low categories and in confirming the role of openness and inflation. But the breakdown also reveals important regional differences in how some fixed indicators work in favor or at the expense of the quest for better investment ratings.

By foreign influence

Initially, each country was assigned into to one of eight foreign languages having the most influence on the country’s legal or economic or political system: Dutch or German; English (UK and US); French; Portuguese; Spanish; Russian; Italian and ‘Other languages’. But after a first run of estimation the number of groups has to be narrowed to four because some groups have too few continuous observations to be meaningful in the estimation and comparison. The four groups of influence retained are English, French, Spanish, and all the rest, called “Other”. Tables 9 and 10 summarize the results of the estimation of exit rates for an upgrading and a downgrading broken down by foreign influence.

Table 9 insert here

Table 10 insert here

The still strong presence of heterogeneity effect is noted, especially on the first three groups of influence (English, French, and Spanish). This indicates that unobserved characteristics linked to the countries and to the graders' perception remain unaccounted for and these characteristics still weigh heavily on the determination of countries' ratings.

As in earlier result, there is a positive path-dependent effect on the upgrading by group of foreign influence except for the upgrading to category 5. Also, there is persistence against downgrading as countries stay longer in a risk category, except the downgrading from category 5. The impacts of macroeconomic variables also follow the results from the estimation on aggregated data. The exit rate to an upgrading and the resistance against any downgrading increase with GDP per capita, and trade openness while decrease with inflation.

The only macroeconomic variable that has slightly mixed impact on the hazard rate is real exchange rate distortions. Overvaluation of currency appears to be an advantage in investment ratings for any groups at any level. But there are exceptions such as the cases of the upgrading (downgrading) of countries of 'English' and 'Spanish' influences initially staying at categories 1 or 2 (from categories higher than 2) , and the cases of the downgrading of countries of 'French' influence from high categories to category 1 and 2. More importantly, overvaluation appears to help countries on the verge of being admitted to high categories or at least to hold on their ratings and repeal any downfalls. An explanation is that countries in these high categories may have undervalued currency and any correction that increases the overvaluation index benefits the countries' ratings.

Territory size and *latitude* seem to have positive correlations with countries of 'English' influence's exit to an upgrading and reluctance against a downgrading. For the other three groups, *territory size* and *latitude* have the opposite effects. This result implies that 'English' influence associated with the attributes of large territory and temperate climate attracts investors more than other types of associations. Perhaps the language or legal system that comes with the 'English' influence facilitates ways of mobilizing the vast natural and human resources, large internal markets and high productivity that a large territory with favorable weather condition offers (e.g South Africa, USA, Canada). It is perhaps not a coincidence that English has become the most widely spoken language in the business world.

On the contrary, *length of coastline* strongly plays positive role in improving ratings and in avoiding any downgrading for all groups of influence at all levels of ratings, except for the isolated case of some countries of 'English' influence in category 1. This result implies the advantage of having longer coastline that can accommodate trade in goods at a lower transaction, hence an attraction to investment.

Country's *age* in general has mostly strong positive effects on upgrading and it also reduces the chances of downgrading all across the various groups of influence. This again reinforces the view that the countries' experiences in governance and in running institutions matter. The only slight exception having the opposite effects is in the upgrading of the 'Spanish' group to categories 4 and 5 and in the downgrading of 'French' group from category 4 and 5 to lower category.

High ethno-linguistic fractionalization proved to have significant and positive roles in preventing countries in various foreign influence groups to downgrade in their investment ratings. Moreover, fractionalization also boosts the exit towards an upgrading for countries under each group of influence. This result comes against some belief that diversity hurts more than it helps. The only clear exceptions being the upgrading of countries that have neither 'English', nor 'Spanish', nor 'French' influence in category 1, and the upgrading of 'English' countries towards category 5. In the latter case, low fractionalization supported by the use of 'English' influence, including use of English as an official language could have helped increase the image of a stable society with little rivalries, perhaps one of many specific pre-conditions of access to the highest ratings category. ('English' language influence prevails in low fractionalization?).

Controlling for foreign influence has produced results similar to the findings under aggregate data and those from analysis by region. This is true for the heterogeneity test, the direction of path-dependent effects and the impacts of macro-economic indicators on hazard rates. However, stronger conclusions could be drawn on the role of fixed indicators than under the regional divide.

(c) Correcting for the selection bias

One aspect of the duration model in this study is that of selection bias. Duration data in this study are only observed for countries that are in or switching between the five categories during the period of study. But little is known about the 'censored' observations, i.e. observations for countries that have exited a given category (before the

study) and never come back to that category again during the period of the study.[14] For instance little is known about what the hazard rate of exit out of ratings category 3 could be if one takes into account many countries in West Europe which had moved to and stayed permanently in categories 4 or 5 already before the beginning of the observation period on January 1984. Also, the results on the breakdown by regions and by foreign influence indicate that some groups of countries have more presence in some categories than in others. For instance category 1 tends to include many least developed countries while category 5 encloses mostly developed and industrialized countries. This implies that participation or selection (or adherence) to a category even at the beginning of the period of study is not random but primarily based on some criteria such as country's wealth status, or investment's cost.

The parameters estimated so far can be called "local treatment" effects because the values of true parameters based on all countries at each category could not be tracked due to the limited observation period. One option to correct for this selection bias is to follow Heckman's two step method of correction, also called the *selectivity model* (Heckman, 1974, 1976 and 1979) to include information from censored observations in the estimation of the hazard function.

The first step is to estimate a selection (or participation) equation, a probit model, that includes information on all countries to determine why a country is 'selected' or not into a given ratings category. From this first step the inverse of Mill's ratio is calculated. The second step is to estimate the parameters of the hazard rate equation (outcome

[14] Similarly, little is known also for countries that have not exited to any categories before the end of the period. This lends the name of censoring bias also but in the sense of a 'Heckman censoring' of non-

equation) as in section (b), except that information from the participation equation, through the inverse of Mill's ratio, is also included among the independent variables. The challenge lies in choosing the variables entering the participation and the outcome equations. Estimates of the outcome equation using Heckman's method are asymptotically efficient.

Let a latent (unobservable) variable e* for participation be associated with the dummy variable e, where e = 1 (participation) when e* exceeds some values and e=0 otherwise. Then the participation equation is

(3) $e^* = \mathbf{Z}\beta_2 + \varepsilon_2$,

and the outcome equation is:

(4) $Log(-Log(1-p(t)) = c(t) + \mathbf{X}\beta + \rho\sigma_v.\lambda + Log(v_2)$

Where ε_2 is the error terms. The vector **Z** includes the following macroeconomic variables: GDP per capita; inflation (% change in Consumer price index); trade openness index; and real interest rate. β_2 is a vector of parameters. The term ρ in (4) is the correlation coefficient between the error terms in equation (2) and (3). The term σ_v represents the standard deviation of the error terms in (2).

In (4) the outcome equation with the vector **X** is in the same form as in (2) except that the inverse of Mill's ratio, $\lambda = \frac{\phi(Z\beta_2 / \sigma_e)}{\Phi(Z\beta_2 / \sigma_e)}$ is added in it as a covariate, for which the

randomness in being at a given rating category.

functions $\phi(.)$ and $\Phi(.)$ are the density and cumulative distribution of the normal distribution. The term σ_e represents the standard deviation of the error terms in (3).

Table 11 and table 12 summarize the results of the estimations of the hazard rates using the Heckman two-step model for upgrading and downgrading in investment risk ratings.

(Table 11. Insert here)

(Table 12. Insert here)

The coefficients on the inverse Mill's ratio are significant in all, but one case. The test on the significance of the ρ coefficient is also significant. Besides, in comparing the results in table 6 and 7 and the results in table 11 and 12, it is found that based on the values of the log-likelihood, the correction brought by the Heckman model has significantly improved the fit. These remarks justify the usefulness of the correction method.

The sign and the significance of the coefficients in the outcome equations of tables 11 and 12 remain almost the same as the results from the uncorrected model in table 6 and 7. The values of the coefficients from these two models differ only slightly. This is an indication of the robustness of the findings on upgrading and downgrading.

One of the only few exceptions is that the positive effects of *latitude* on upgrading from category 1 is reinforced under the Heckman model, while that effect was not significant in the uncorrected model. Similarly *territory size* has now a positive effect on the upgrading to category 5 while such a fixed indicator has no significant effect in the model without correction. But the effect of inflation has a bit weakened on the downgrading

from higher categories to category 1 especially, and that from higher categories (4 and 5) to category 3.

The use of Heckman correction model gives more insights into what determine the downgrading from category 5 (this information was not available because of non-convergence in the iteration during the estimation in the uncorrected model). Table 12 shows that the coefficient of hazard rate of exit out of category 5 (a downgrade) is positive, $q>1$, which confirms the results from the non-parametric method and the results from the breakdown per region (table 8) and per foreign influence (table 10): the longer is the stay in category 5, the higher is also the chance of exiting category 5. This comes against some expectations that built-in reputation in top-ranked and attractive countries for investment may save these countries from any slides in ratings. It is an indication that high ranked countries (mostly developed and industrialized countries), favorite destinations of foreign investment, are not immune to shocks (e.g. recession, natural or manmade disasters, political uncertainty and corruption scandals) that could reduce their ratings despite their reputation or geographical, historical and cultural advantages. These unavoidable shocks could be the reason for this lack of persistence to stay at the highest rating category.

The result in Table 12 also shows that a decrease in per capita income, an increase in trade protection, as well as an undervaluation of the currency significantly hasten the downgrading from category 5. These results come as expected and show once more the importance of these main macroeconomic indicators in the efforts to maintain the highest ratings. Also some geographical and historical advantages have significant impacts in halting the slide from category 5. Larger territory size, longer coastline, further distance

from the equator, and higher country *age* all work strongly in favor of maintaining the highest ratings category for investment. On the contrary, high level of ethno-linguistic fractionalization of the society increases the chance of slipping down to lower ratings.

5. Conclusions and Implications

The issue of what causes the differences in the duration and speed to upgrade in investment ratings across countries and across rating categories has been addressed. This paper estimated whether path-dependent and heterogeneity (country fixed-characteristics) have affected countries' downgrading and upgrading in country investment ratings at each level of the five ratings categories. The analysis employed a unique dataset based on monthly observation of investment risk ratings for 145 countries between 1983 and 2003. The country ratings were presented in five categories ranging from *very high risks* to *very low risk* for investment. The framework was based on a competing risks and multiple spell model with random-effects using both non-parametric and parametric method for the estimation.

A unique feature of the estimation procedure is that it takes into account the ranked exit destinations in the duration analysis. Also the analysis took into account and corrected for censoring bias using the Heckman two-step model. The path-dependence effect was measured by the sign of the coefficient on the baseline hazard. The heterogeneity effect, included in the model as a multiplicative random effect, was measured by its variance. The estimation controlled for main macroeconomic indicators (GDP per capita, inflation, openness and real exchange rate distortions) and especially for some fixed geographical

(territory size, length of coastline, and latitude), historical (age since independence), and cultural (ethno-linguistic fractionalization) indicators as the impacts of these indicators on investment ratings were also estimated .

This paper found a strong presence of heterogeneity even after controlling for fixed (time-invariant) indicators based on country characteristics and after disaggregating by region and by foreign influence. The strong heterogeneity effect on hazard rates indicates that some other unobserved country characteristics remain unexplored. But more importantly it signals that other purposes linked to the graders' own perception or even to investor's own preference could also influence investment ratings. Indeed, components of ratings, such as political risks, and the weights used to calculate a composite rating are still based on subjective assessment. This may explain why some countries despite their failed policies do not suffer much in their ratings and even in some cases may still continue to maintain high standing and attract investors while others are not that lucky.

Also, it is found that there is a positive path-dependent effect in the upgrading of investment ratings: the longer a country stays in a category, the higher is the chance of a promotion to the next higher rating category. This applies to upgrading to all rating categories, except the upgrading to the highest rating (*very low risks*) category where a negative path-dependent effect was found. On the contrary, result showed that there is a negative path-dependent effect in downgrading: the longer a country stays in a category, the smaller the chance to drop to lower categories. This applies to downgrading from all ratings categories, except the downgrading from the highest rating where a positive path-dependent effect was found. The estimated values of baseline hazard also showed that the upgrading or downgrading rates are not the same across categories.

These results on path-dependent effects actually offer hopes for countries in that there is a reward for perseverance in the efforts to attract investment. As the efforts take roots and continue even over a long period of time the chance to upgrade increases while the chance to downgrade decreases. It also implies that a long stay in low rating categories does not necessarily (at least not permanently) incur bad reputation and does not hold back efforts to upgrade. The only exception, showing the stark difference in exit rates across categories, is the difficulty to get and maintain the highest rating status. The chance to get the highest ratings is smaller, the longer is the stay in lower ratings categories. But a long stay in the highest rating category also increases the chance to downgrade. In other words, access to the highest ratings requires tremendous efforts and good reputation; but being at the highest ratings does not provide complete immunity to shocks and to risks to downgrading. This sets a warning that attracting investment requires continuous, not once-for-all, efforts.

The effects of macroeconomic indicators used as control variables on the investment ratings are also estimated. Increases in country's income, low inflation and low trade barriers improve the chance to upgrade while reduce the chance to downgrade in investment ratings. But real exchange rate distortions, whether it is an acute overvaluation or a severe undervaluation of currency would harm the chance of an upgrading while increase the likelihood to a downfall.

On the impacts of fixed indicators, the other set of control variables, results indicated that having large territory size and long coastline, and being located far from the equator counts as advantages in country's investment ratings. This implies that investors may see a large territory as a potential for large natural and human resources; long coastline as

a high capacity to trade at lower transaction costs; and long distance from the equator as an impulse to high productivity.

Similarly, results indicated that long period elapsing from the year of independence constitutes an advantage in investment ratings. The length of the period elapsing since the year of independence can be seen as a proxy to represent the degree of maturity of institutions and levels of experiences in governance and in enforcing the rules of law. High cultural diversity represented by ethno-linguistic fractionalization also plays a positive role in investment ratings except on the upgrading to the highest ratings for which less diversity seems to be needed.

Disaggregating the data and conducting the analysis by region and by foreign influence under both non-parametric and parametric method did not alter these finding. These estimation results were also robust to correction of censoring bias through the Heckman selection model.

Still, the interpretation of the results requires some cautions as, for instance, the study could not cover events before 1984, thus excluding major shocks such as the oil shock in early 1970's. A much longer series could be useful but was not available, for the analysis. Also the results are tied to the functional forms of the hazard rates and to the *Gaussian* distribution used to represent the distribution of the heterogeneity. But the use of other types of functional form and distribution that may fit the data and analysis better to achieve this paper's objective is still rare or inexistent in the literature. Also, the analysis is based on the data on country investment risk ratings not on the actual amounts of foreign investment that countries receive. Evidence supports that investors may not

always follow what the ratings suggest. Even when the country's ratings are favorable for investment, investors sometimes prefer to actually 'wait' until they see that the expected profit exceeds the irreversible (sunk) cost of entry and cost of information uncertainty (Pindyck 1991; Dixit, 1992). Investors include also their subjective assessment, as the graders do which is evidenced in this paper, before making a decision.

The findings in this paper have specific implications on how countries could conduct efforts to improve investment ratings in their quest for an increase in capital inflow. Heterogeneity effects entail subjective perceptions affecting the ratings. Policy makers cannot control these subjective perceptions. But they can design and implement policies to influence graders' perception and investors' decision. These policies could be aimed at multiplying contacts between local and foreign investors, increasing country's exposures to investment and advertising the country's image and comparative advantages in the eyes of potential investors.

Also much can be achieved in identifying and correcting any innate shortcomings based on geography, history and culture. For instance, it is difficult, even impossible to extend territory size (without wars) or increase the length of coastline or move a country far from the equator. But regional integration and cooperation could increase labor movement, increase trade capacity by lowering trade barriers and transaction cost. Also, better infrastructure and communication services (roads, and ports) could overcome some of the 'natural' shortcomings. Similarly the year of independence, a part of a country's history, cannot be changed but it is possible to speed up the maturity and strengthening of institution by actions such as reducing corruption and enforcing laws.

All these actions are important but, as this study also showed, they are no substitute to the usual domestic list-to-do efforts such as sound macroeconomic policies promoting growth and stability, averting high inflation and exchange rate misalignment, and increasing openness. Likewise, no action could substitute for sound public policies building human capital stock, or for sound investment policies ensuring investment security along with a political stability. Improvement in risk ratings requires a combination of both the efforts to improve investment climate internally and the equally important efforts to correct any innate shortcomings and to advertise achievement and comparative advantages abroad. Pursuing aggressively the two will undoubtedly increases the chance of attracting more investment for economic development and growth.

References

Alesina, A., Baqir, R., Easterly, W., (1999). Public goods and ethnic divisions, Quarterly Journal of Economics 114, 1243-1284.

Alesina, A. and G. Spolaore (2003). The Size of Nations Cambridge, Mass: MIT Press.

Allison Paul D (1982). "Discrete-Time Methods for the Analysis of Event Histories." Social Methodology 13 (1982): 61-98.

Baldwin, Richard (1988). "Hysteresis in Import Prices: The Beachhead Effects." *American Economic Review* 78(1988): 773-785.

Baldwin, Richard and P. Krugman (1989). "Persistent Trade Effects of Large Exchange Rate Shocks." *Quarterly Journal of Economics* 104 (1989): 635-654.

Box-Steffensmeier, Janet M. and C. Zorn (2002). "Duration Models for Repeated Events." *Journal of Politics* 64 (2002):1069-1094.

Central Intelligence Agency (2006). *CIA World Factbooks* published online.

Cleves, Mario (1999a). "Analysis of Multiple Failure-Time Data with Stata." Stata Technical Bulletin 49(1999a):30-39.

Cleves, Mario. (1999b) "Stsetting Spell-type data.". *Stata Corp: Frequently Asked Question* published on line in www.stata.com/support/faqs/stat/stspell.html.

Coface (2003). *The Handbook of A Country Risks: A Guide To International Trade and Business*. Paris, France (2003).

Dahl, R.A. and E.R. Tufte (1973). Size and Democracy. Stanford University Press.

Dixit, Avinash (1989). "Hysteresis, Import Penetration, and Exchange Rate Pass-Through." *Quarterly Journal of Economics* 104 (1989): 205-228.

Dixit, Avinash (1991). "Analytical Approximations in the Model of Hysteresis." *Review of Economic Studies* 58 (1991): 141-151.

Dixit, Avinash (1992). "Investment and Hysteresis." The *Journal of Economic Perspectives* 6 (1992): 107-132.

Dollar, David (1992). "Outward-oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985". Economic Development and Cultural Change, April 1992, pp.523-544.

Easterly, William, and R. Levine. (1997) "Africa's Growth Tragedy: Policies and Ethnic Divisions" Quarterly Journal of Economics, Vol. 112, No. 4: 1203-1250.

Easterly, William, and R. Levine (2002). "Tropics, Germs, and Crops: How Endowments Influence Economic Development." National Bureau of Economic Research. Working paper no. 9106. August 2002.

Elbers, Chris and G. Ridder (1982). True and Spurious Duration Dependence: The Identifiability of the Proportional Hazard Model." Review of Economic Studies 49 (1982): 403-409.

Han A., and J. Hausman (1990). "Flexible Parametric Estimation of Duration and Competing Risks Models." Journal of Applied Econometrics. 5, 1-28.

Hansson, Gustav & Olsson, Ola, (2006). "Country Size and the Rule of Law: Resuscitating Montesquieu," Working Papers in Economics 200, Göteborg University, Department of Economics.

Happe, Nancy, M. Hussai, and L. Redifer (2003). " Absorber Les Chocs." Finance and Développement. 40(2003): 24-27.

Heckman James J. (1974), Shadow Wages, Market Wages and Labor Supply, Econometrica 42: 679–693.

Heckman James J. (1976), "The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models." *Annals of Economic and Social Measurement* 5, 475–492.

Heckman James J. (1979), "Sample Selection Bias as a Specification Error", *Econometrica* 47: 153–161.

Heckman James J. and B. Honore (1989), "The Identifiability of the Competing Risks Model", *Biometrika* 76: 325-330.

Heckman, James J. (1991) "Identifying the Hand of Past: Distinguishing State Dependence from Heterogeneity." *American Economic Review*, Papers and Proceedings of the Hundred and Third Annual Meeting of the American Economic Association 81: 75-79.

Heckman, James J. and B. Singer (1984). "A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data." Econometrica 52: 271-320.

Heston A., R. Summers and B. Aten (2006). Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.

Holzner, Mario (2006). "Real Exchange Rate Distortion in Southeast Europe." Paper Prepared for the 'Global Development Network Southeast Europe' project of The World Bank and Austrian Ministry of Finance.

Horowitz, Joel L (1999). "Semiparametric Estimation of A Proportional Hazard Model With Unobserved Heterogeneity." *Econometrica*, 67: 1001-1028.

Jenkins, Stephen (2005). Survival Analysis with Stata. On-line courses material. http://www.iser.essex.ac.uk/teaching/degree/stephenj/ec968/

Kieffer, Nicholas M (1988). "Economic Duration Data and Hazard Functions." Journal of Economic Literature 26 (1988): 646-679.

Landes, D., 1998. The Wealth and Poverty of Nations (W.W. Norton, New York, NY).

La Porta, Rafael, F. Lopez-de-Silanes, A. Shleifer, and R. Vishny (1999). "The Quality of Government." Journal of Law, Economics and Organization. V15, N1 p 222-279.

Mealli, Fabrizia, and S. Pudney (1996). Occupational Pensions and Job Mobility in Britain: Estimation of a Random-Effects Competing Risks Model. Journal of Applied Econometrics. 11(1996): 293-320.

Mellinger, Andrew D., Jeffrey D. Sachs and John L. Gallup (2000). "Climate, Coastal Proximity, and Development," in *Oxford Handbook of Economic Geography*. Clark, Gordon L., Maryann P. Feldman, and Meric S. Gertler, eds. Oxford University Press, 2000.

Meyer, B.D. (1990). "Unemployment Insurance and Unemployment Spells." Econometrica 58: 757-82.

Narendranathan Wiji. and M.B. Stewart (1993a). "How Does Benefit Vary as Unemployment Spells Lengthen?" Journal of Applied Econometrics, 8 (October): 361-381.

Narendranathan Wiji. and M.B. Stewart (1993b). "Modeling the Probability of Leaving Unemployment: Competing Risks Models with Flexible Base-Line Hazards" Applied Statistics, 42 (1): 63-83.

Parsley David C. and Wei, Shang-Jin (1993). "Insignificant and Inconsequential Hysteresis: The Case of U.S. Bilateral Trade." *Review of Economics and Statistics* 75: 606-613.

Pindyck, Robert S (1991). "Irreversibility, Uncertainty and Investment." *Journal of Economic Literature*, 29: 1110-1148.

PRS Group (2006). International Country Risks Guide. www.ICRGOnline.com

Rodrik, Dani, A. Subramanian and F. Trebbi (2004) "Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development". Journal of Economic Growth 9(2): 131-165.

Rose, Andrew K. (2005) "Size Really Doesn't Matter: In Search of a National Scale Effect" CEPR Working Paper No 5350.

Sachs, Jeffrey D., (2001). "Tropical Underdevelopment." National Bureau of Economic Research Working Paper 8119.

Sachs, Jeffrey D (2003). "Institutions Don't Rule: Direct Effects of Geography On Per Capita Income." National Bureau of Economic Research. Working paper no. 9490. February 2003.

Smith, Jeffrey, A (2006). Lecture on Microeconomics: Duration Data. online course material.

World Bank (2006). Global Development Finance published online.

World Bank (2006). World Bank Development Indicators published online.

Appendix 1
Distribution of number of month spells (January 1984- February 2003)

Country	Region*	risk rating category					
		1	2	3	4	5	Total
Albania	ECA	27	44	138	0	0	209
Algeria	MENA	0	195	35	0	0	230
Angola	SSA	142	67	0	0	0	209
Argentina	LAC	82	23	45	80	0	230
Armenia	ECA	0	23	28	0	0	51
Australia	EAP	0	0	0	66	164	230
Austria	WE	0	0	0	0	230	230
Azerbaijan	ECA	0	25	26	0	0	51
Bahamas	LAC	0	0	0	199	20	219
Bahrain	MENA	0	12	82	121	7	222
Bangladesh	SA	104	22	104	0	0	230
Belarus	ECA	0	23	35	0	0	58
Belgium	WE	0	0	0	38	192	230
Bolivia	LAC	79	28	111	12	0	230
Botswana	SSA	0	0	42	131	48	221
Brazil	LAC	6	83	137	4	0	230
Brunei	EAP	0	0	0	0	209	209
Bulgaria	ECA	0	47	116	56	0	219
Burkina Faso	SSA	1	156	57	0	0	214
Cameroon	SSA	10	163	57	0	0	230
Canada	NA	0	0	0	0	230	230
Chile	LAC	38	10	47	109	26	230
China	EAP	0	23	75	121	0	219
Colombia	LAC	0	113	114	3	0	230
Congo, Dem. Rep.	SSA	222	8	0	0	0	230
Congo Rep.	SSA	62	132	21	0	0	215
Costa Rica	LAC	0	70	26	134	0	230
Cote d'Ivoire	SSA	0	93	105	0	0	198
Croatia	ECA	0	0	14	37	0	51
Cuba	LAC	84	46	79	0	0	209
Cyprus	WE	0	0	53	105	61	219
Czech Republic	ECA	0	0	0	85	37	122
Czechoslovakia	ECA	0	0	39	58	0	97
Denmark	WE	0	0	0	0	230	230
Dominican Republic	LAC	66	40	66	58	0	230
East Germany	ECA	0	0	57	12	0	69
Ecuador	LAC	29	113	88	0	0	230
Egypt	MENA	64	32	79	55	0	230
El Salvador	LAC	103	7	55	65	0	230
Estonia	ECA	0	0	0	52	0	52
Ethiopia	SSA	118	51	51	0	0	220
Finland	WE	0	0	0	14	216	230
France	WE	0	0	0	47	183	230
Gabon	SSA	0	0	219	11	0	230

Gambia, The	SSA	11	70	117	12	0	210
Germany	WE	0	0	0	3	146	149
Ghana	SSA	51	73	106	0	0	230
Greece	WE	0	44	79	107	0	230
Guatemala	LAC	93	39	67	31	0	230
Guinea	SSA	86	77	46	0	0	209
Guinea-Bissau	SSA	204	4	0	0	0	208
Guyana	LAC	84	42	103	1	0	230
Haiti	LAC	152	78	0	0	0	230
Honduras	LAC	86	83	61	0	0	230
Hong Kong	EAP	0	0	31	130	69	230
Hungary	ECA	0	0	76	145	2	223
Iceland	WE	0	0	0	134	96	230
India	SA	29	85	112	4	0	230
Indonesia	EAP	58	83	56	33	0	230
Iran	MENA	84	12	104	30	0	230
Iraq	MENA	230	0	0	0	0	230
Ireland	MENA	0	0	0	64	166	230
Israel	MENA	19	69	80	62	0	230
Italy	WE	0	0	0	148	82	230
Jamaica	LAC	3	70	72	85	0	230
Japan	EAP	0	0	0	2	228	230
Jordan	MENA	31	65	30	104	0	230
Kazakstan	ECA	0	0	24	27	0	51
Kenya	SSA	3	140	87	0	0	230
Kuwait	MENA	14	33	60	73	50	230
Latvia	ECA	0	0	0	51	0	51
Lebanon	MENA	105	69	56	0	0	230
Liberia	SSA	225	5	0	0	0	230
Libya	MENA	81	15	118	16	0	230
Lithuania	ECA	0	0	1	50	0	51
Luxembourg	WE	0	0	0	0	219	219
Madagascar	SSA	51	109	59	0	0	219
Malawi	SSA	0	183	47	0	0	230
Malaysia	EAP	0	0	57	127	46	230
Mali	SSA	101	74	48	0	0	223
Malta	MENA	0	0	59	47	97	203
Mexico	LAC	0	38	101	91	0	230
Moldova	ECA	9	19	23	0	0	51
Mongolia	EAP	0	80	122	1	0	203
Morocco	MENA	52	44	28	106	0	230
Mozambique	SSA	143	55	11	0	0	209
Myanmar	EAP	40	66	28	0	0	134
Namibia	SSA	11	12	18	108	8	157
Netherlands	WE	0	0	0	0	230	230
New Caledonia	EAP	78	15	34	0	0	127
New Zealand	EAP	0	0	0	64	166	230
Nicaragua	LAC	114	106	10	0	0	230
Niger	SSA	65	136	16	0	0	217

Nigeria	SSA	75	141	14	0	0	230
North Korea	EAP	178	13	18	0	0	209
Norway	WE	0	0	0	0	230	230
Oman	MENA	0	27	51	132	14	224
Pakistan	SA	100	88	42	0	0	230
Panama	LAC	26	85	51	68	0	230
Papua New Guinea	EAP	0	43	179	4	0	226
Paraguay	LAC	10	72	75	73	0	230
Peru	LAC	110	21	91	8	0	230
Philippines	EAP	96	7	77	50	0	230
Poland	ECA	49	24	23	97	26	219
Portugal	WE	0	0	23	134	73	230
Qatar	MENA	0	70	58	95	0	223
Romania	ECA	36	85	102	0	0	223
Russia	ECA	12	37	72	9	1	131
Saudi Arabia	MENA	0	54	53	119	4	230
Senegal	SSA	0	132	98	0	0	230
Sierra Leone	SSA	209	9	0	0	0	218
Singapore	EAP	0	0	0	45	185	230
Slovakia	ECA	0	0	5	117	0	122
Slovenia	ECA	0	0	0	43	8	51
Somalia	SSA	216	2	0	0	0	218
South Africa	SSA	0	44	116	70	0	230
South Korea	EAP	0	0	39	104	73	216
Spain	WE	0	0	10	180	40	230
Sri Lanka	SA	91	46	93	0	0	230
Sudan	SSA	207	23	0	0	0	230
Suriname	LAC	96	40	65	9	0	210
Sweden	WE	0	0	0	6	224	230
Switzerland	WE	0	0	0	0	230	230
Syria	MENA	85	11	95	39	0	230
Taiwan	EAP	0	0	0	24	206	230
Tanzania	SSA	53	115	62	0	0	230
Thailand	EAP	0	8	97	116	9	230
Togo	SSA	35	149	46	0	0	230
Trinidad & Tobago	LAC	0	57	94	79	0	230
Tunisia	SSA	41	52	39	98	0	230
Turkey	ECA	53	124	53	0	0	230
U.K.	WE	0	0	0	34	196	230
U.S.	NA	0	0	0	16	214	230
U.S.S.R.	ECA	0	16	41	28	0	85
Uganda	SSA	117	46	67	0	0	230
Ukraine	ECA	0	15	44	0	0	59
United Arab Emirates	MENA	0	83	13	107	27	230
Uruguay	LAC	0	44	97	89	0	230
Venezuela	LAC	0	39	160	31	0	230
Vietnam	EAP	91	32	61	25	0	209

West Germany	WE	0	0	0	0	81	81
Yemen, Rep.	MENA	8	38	104	0	0	150
Yugoslavia	ECA	153	77	0	0	0	230
Zambia	SSA	102	95	33	0	0	230
Zimbabwe	SSA	93	85	52	0	0	230
Total		5,892	5,891	6,861	5,578	5,299	29,521

Sources: Adapted from PRS Group Inc.
* Regions are Sub-Saharan Africa (SSA); Middle-East and North-Africa (MENA); Latin America and Caribbean (LAC); North America (NA); East Europe and Central Asia (ECA); West Europe (WE); East Asia and Pacific (EAP); and South Asia (SA).

Appendix 2
Data and Sources

- **Country Risk Ratings**: PRS group (2006)

- **GDP per capita** (PPP constant international $, year 2000) from the World Bank in ($ 1000)

- **Inflation** (%): Change in consumer price levels of World Bank Development Indicators and Global Development Finance (World Bank)

- **Real Exchange Rate Distortion**: Using the Dollar and Easterly-Levine method. (Dollar, 1992; Easterly and Levine, 1997)
RERD = /Predicted real price level
Where RPL = Actual Real Price level = (Price level/price level in the US)*100
PRL = Predicted RPL is obtained from the regression:
RPL = a + b*GDP +c*GDP-square +c*Year Dummy

- **Real Interest Rate** (%) of World Bank Development indicator and Global Development Finance (World Bank)

- **Openness:** Import plus export divided by real GDP at constant $ year 2000 (unit, %) from Heston, Summers and Aten (2006)

- **Territory Size** (million km-square) World Bank and Geography Atlas

- **Length of Coastline** (1,000 km) World Bank and Geography Atlas

- **Years elapsing since independence (age)**. Geography Atlas, and CIA *factbooks*. Year 2001 was chosen as the base year.

- **Latitude**: absolute value of the distance from the equator; adjusted to take a value between 0 and 1 (La Porta et al.)

- **Ethno-linguistic fractionalization** (scaled from 0 to 1). The index is an average of five different indices: (i) probability that two randomly selected individuals from a given country will not belong to the same ethno-linguistic group, (ii) probability of two randomly selected people speaking different languages, (iii) probability that two randomly selected individuals do not speak the same language, (iv) percent of population not speaking the official language, and (v) percent of population not speaking the widely used language. (From La Porta et al., 1999)

Tables and Figures

Table 1: Risk Categories

Category	Appellation	Scores
1	Very High Risk	00.0 to 49.5 points
2	High Risk	50.0 to 59.5 points
3	Moderate Risk	60.0 to 69.5 points
4	Low risk	70.0 to 79.5 points
5	Very Low Risk	80.0 to 100 points

Source: PRS Group Inc.

Table 2: An Example of Input Data Structure for Kaplan-Meyer Survival Analysis

Observation	Id (country)	Begin	End	Failure (=1)	t=end-begin	X=Covariates
1	1	0	70	0	70	.
2	1	70	230	1	160	.
3	2	25	230	0	205	.
…	…	…	…	…		.

Source Authors; adapted from Jenkins (2006), Cleves (1999)

Table 3: Estimation of Hazard Rate for Countries' Transfer to a Rating Category Using Multinomial Logit (mlogit) and Complementary Log-logistic (cloglog)Functional Forms

	Entry to category 1 (very high risk)[a]	**Entry to category 2 (high risk)**		**Entry to category 3 (moderate risk)**		**Entry to category 4 (low risk)**		**Entry to category 5 (very low risk)**	
	Dependent variable : hazard rate								
Independent variables									
	cloglog	mlogit	cloglog	mlogit	cloglog	mlogit	cloglog	mlogit	cloglog
Log(t) (Baseline hazard)	-0.549*** (0.016)	0.497 *** (0.0287)	-0.246*** (0.0147)	1.609*** (0.041)	0.532*** (0.023)	2.353*** (0.057)	0.619*** (0.029)	1.342*** (0.064)	-0.597*** (0.028)
Macro covariates									
GDP per capita	-0.310*** (0.012)	0.280*** (0.017)	-0.138*** (0.005)	0.465*** (0.018)	-0.062*** (0.004)	0.585*** (0.018)	-0.015*** (0.003)	0.761*** (0.019)	0.156*** (0.005)
Inflation	0.002*** (0.0001)	-0.002*** (0.0001)	-0.0004*** (0.0001)	-0.002*** (0.0002)	-0.0002*** (0.0001)	-0.068*** (0.004)	-0.039*** (0.002)	-0.214*** (0.009)	-0.116*** (0.006)
Rer distortion	0.004*** (0.0003)	-0.003*** (0.0004)	-0.0001 (0.00011)	-0.007*** (0.0005)	-0.004*** (0.0003)	-0.011*** (0.0008)	-0.004*** (0.0005)	-0.006*** (0.001)	0.005*** (0.001)
Openness	-0.034*** (0.001)	0.033*** (0.0013)	-0.0005 (0.0004)	0.042*** (0.0014)	0.0001 (0.0003)	0.051*** (0.002)	0.00002 (0.0004)	0.068*** (0.001)	0.013*** (0.0005)
Fixed covariates									
Territory size	-0.439*** (0.028)	0.442*** (0.033)	0.120*** (0.015)	0.454*** (0.036)	0.053*** (0.014)	0.505*** (0.048)	-0.054*** (0.016)	0.597*** (0.052)	0.033** (0.014)
Coastline	0.032*** (0.002)	-0.046*** (0.003)	-0.015*** (0.0021)	-0.045*** (0.003)	-0.008*** (0.002)	-0.010** (0.004)	-0.0013 (0.0012)	0.031*** (0.007)	0.036*** (0.004)
Latitude	-0.540*** (0.165)	0.465** (0.227)	0.030 (0.139)	0.089 (0.262)	-1.958*** (0.147)	4.266*** (0.330)	-0.444*** (0.163)	8.081*** (0.435)	2.612*** (0.193)
Years since independence	-0.002*** (0.0003)	0.001* (0.0005)	-0.002*** (0.0002)	0.007*** (0.0005)	0.00017 (0.00012)	0.009*** (0.0005)	0.001*** (0.0001)	0.009*** (0.0005)	0.001*** (0.0001)
Ethno-linguistic fractionalization	-0.815*** (0.077)	1.131*** (0.113)	0.025 (0.062)	1.614*** (0.126)	-0.332*** (0.060)	-0.647*** (0.161)	-2.330*** (0.083)	-0.986*** (3.164)	-2.176*** (0.184)
constant	3.989*** (0.111)	-4.547*** (0.192)	0.738*** (0.089)	-11.153*** (0.262)	-2.413*** (0.126)	-16.40*** (0.372)	-2.866*** (0.171)	-18.154*** (0.442)	-3.166*** (0.193)
N = 19604									
Log likelihood R = -16432 (for mlogit)	-4949		-8260		-8871		-7518		-2888
Pseudo R-Sq= 0.46 (for mlogit)									

a: Category 1 serve as basis in the mlogit model

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 4: Estimation of Hazard Rate for Countries' Exit out of Rating Categories Using Complementary Log-logistic Functional Form with Random Effects (xtcloglog)

	Exit from category 1 (very high risk)	**Exit from category 2 (high risk)**	**Exit from category 3 (moderate risk)**	**Exit from category 4 (low risk)**
Independent variables :	**Dependent variable: Hazard rate**			
Logt (baseline hazard)	0.809*** (0.025)	0.276 *** (0.016)	-0.386*** (0.014)	-0.548*** (0.020)
Macro covariates				
GDP per capita	0.202*** (0.008)	0.120*** (0.004)	0.100*** (0.003)	0.057*** (0.003)
Inflation	-0.001*** (0.0001)	0.0003*** (0.00004)	0.0002***	0.035*** (0.002)
Rer distortion	-0.002*** (0.0003)	0.002*** (0.0003)	0.002*** (0.0002)	0.001* (0.0006)
Openness	0.016*** (0.001)	0.002*** (0.0007)	0.0002 (0.0006)	-0.0007 (0.0004)
Fixed covariates				
Territory size	0.124** (0.005)	-0.002*** (0.034)	0.060*** (0.024)	0.012 (0.020)
Coastline	-0.007* (0.004)	0.016* (0.009)	0.012* (0.006)	0.0042 (0.0048)
Latitude	-0.270 (0.364)	0.275 (0.404)	0.803*** (0.238)	-0.827***
Years since independence	0.006*** (0.009)	0.003*** (0.0007)	0.0001 (0.0002)	0.0003 (0.0004)
Ethno-linguistic Fractionalization	1.001*** (0.225)	0.328*** (0.200)	0.560*** (0.118)	1.987*** (0.147)
Heterogeneity (random effect) test	***	***	***	***
N = 19604 T=230				
Log likelihood	-3470	-6452	-7216	4841

Category 1 serve as basis

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 5: Estimation of Hazard Rate of an Upgrading in Risk Ratings Using Complementary Log-logistic Functional Form

	From category 1 to higher categories	**From category 1 and 2 to higher categories**	**From category 1 2 and 3 to higher categories**	**From category 4 and lower to category 5**
Independent variables	**Dependent variable : hazard rate**			
Log (t) (baseline hazard)	0.809*** (0.025)	1.646*** (0.032)	1.274*** (0.042)	-0.683*** (0.043)
Macro covariates				
GDP per capita	0.202*** (0.008)	0.221*** (0.007)	0.146*** (0.006)	0.202*** (0.013)
Inflation	-0.001** (0.0001)	-0.004*** (0.001)	-0.046*** (0.004)	-0.055*** (0.006)
Rer distortion	-0.002*** (0.0003)	-0.001** (0.0004)	0.007*** (0.0008)	0.010*** (0.001)
Openness	0.016*** (0.001)	0.007*** (0.0007)	0.016*** (0.0008)	0.023*** (0.0014)
Fixed covariates				
Territory size	0.124** (0.005)	-0.025 (0.032)	0.099* (0.051)	0.028 (0.065)
Coastline	-0.007* (0.004)	0.017*** (0.004)	0.044*** (0.006)	0.050*** (0.015)
Latitude	-0.270 (0.364)	1.306** (0.512)	5.250*** (0.364)	3.781*** (0.590)
Years since independence	0.006*** (0.009)	0.006*** (0.0009)	0.004*** (0.0002)	0.002** (0.0007)
Ethno-linguistic fractionalizaion	1.001*** (0.225)	0.689*** (0.208)	-1.738*** (0.216)	-2.938*** (0.455)
Heterogeneity test	***	***	***	***
Loglikelihood	-3470	-4543	-2673	-2207

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 6: Estimation of Hazard Rate of A Downgrading in Countries' Risk Ratings Using Complementary Log-logistic Functional Form

	To category 1 (from higher categories)	**To category 1 and 2 (from higher categories)**	**To category 3 and lower (from categories 4 and 5)**
Independent variables:	**Dependent variable : hazard rate**		
Log(t) Baseline hazard	-0718*** (0.021)	-1.239*** (0.023)	-0.966*** (0.031)
Macro covariates			
GDP per capita	-0.418*** (0.019)	-0.333*** (0.009)	-0.239*** (0.006)
Inflation	0.0006*** (0.0001)	0.0004*** (0.0001)	0.042*** (0.003)
Rer distortion	0.003*** (0.0007)	0.001** (0.004)	-0.002** (0.0008)
Openness	-0.050*** (0.002)	-0.013*** (0.001)	-0.013*** (0.0009)
Fixed covariates			
Territory size	-0.367** (0.078)	-0.018 (0,071)	-0.194*** (0.070)
Coastline	0.037*** (0.006)	-0.011*** (0.004)	-0.026*** (0.004)
Latitude	-0.060 (1.082)	0.186 (0.530)	-1.503*** (0.369)
Years since independence	-0.002* (0.001)	-0.006*** (0.001)	-0.003*** (0.0003)
Ethno-linguistic fractionalization	-1.371*** (0.372)	-0.857*** (0.255)	0.337 (0.227)
Heterogeneity test	***	***	***
Loglikelihood	-3404	-4645	-2669

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 7: Estimation of Hazard Rate of Upgrading in Risk Ratings by Region Using Complementary Log-logistic Functional Form

	From category 1 to higher categories					From category 1 and 2 to higher categories				From category 1 2 and 3 to higher categories					From category 4 and lower to category 5	
Independent variables	**Dependent variable: hazard rate**					**Dependent variable: hazard rate**				**Dependent variable: hazard rate**					**Dependent variable: hazard rate**	
	SSA	MENA	LAC	ECA	EAP	SSA	LAC	ECA	EAP	SSA	MENA	LAC	WE	EAP	WE	EAP
Logt (baseline hazard)	0.787*** (0.046)	0.719*** (0.080)	1.118*** (0.062)	-1.369*** (0.320)	1.596*** (0.404)	1.685*** (0.098)	1.748*** (0.062)	25.438*** (6.457)	0.135 (0.130)	2.198*** (0.281)	4.182*** (0.267)	1.965*** (0.129)	-1.378** (0.563)	0.257** (0.109)	-1.061*** (0.090)	-0.940*** (0.111)
Macro covariates																
GDP per capita	1.648*** (0.109)	3.158*** (0.244)	0.400*** (0.043)	3.225*** (0.752)	6.914*** (1.305)	0.883*** (0.041)	0.217*** (0.016)	15.446*** (4.413)	0.583** (0.253)	1.246*** (0.136)	0.045 (0.045)	0.153*** (0.021)	4.862*** (1.453)	0.604*** (0.069)	0.367*** (0.029)	0.393*** (0.040)
Inflation	-0.017*** ((0.001)	0.020*** (0.002)	-0.001*** (0.0001)	-0.008 (0.007)	-0.118*** (0.029)	-0.033*** (0.004)	-0.0003*** (0.0001)	-0.059 (0.064)	-0.046*** (0.009)	-0.041 (0.029)	0.026*** (0.004)	-0.026*** (0.004)	-1.014*** (0.243)	-0.209*** (0.034)	-0.092*** (0.013)	0.067*** (0.021)
Rer distortion	-0.002** (0.0008)	-0.012*** (0.005)	-0.003*** (0.0005)	-0.052*** (0.016)	0.278*** (0.049)	-0.004** (0.002)	-0.0006 (0.0005)	-0.409** (0.178)	-0.010 (0.006)	0.033*** (0.007)	0.015** (0.003)	0.005*** (0.0007)	0.164* (0.093)	0.082*** (0.008)	0.017*** (0.003)	0.045*** (0.004)
Openness	0.013*** (0.002)	0.020*** (0.005)	0.019*** (0.004)	-0.048 (0.034)	0.141*** (0.024)	0.0007 (0.001)	0.009*** (0.002)	-1.903*** (0.468)	0.031*** (0.005)	0.024*** (0.003)	-0.002 (0.008)	0.023*** (0.003)	0.180 (0.146)	0.024*** (0.004)	0.013*** (0.004)	0.029*** (0.005)
Fixed covariates																
Territory size	-0.347** (0.174)	185.2*** (14.5)	0.120 (0.088)	n.a.	-15.300 (109.7)	-1.560*** (0.506)	0.021 (0.076)	n.a.	-0.809 (77.6)	-5.070*** (1.190)	9.200** (3.790)	-0.872 (0.554)	0.072 (1.283)	0.368 (0.402)	0.260 (1.330)	0.545* (0.325)
Coastline	0.475*** ().105)	-35.622*** (2.787)	-0.050 (0.066)	n.a	0.104 (8.88)	-0.0001 (0.00008)	0.051 (0.051)	n.a.	-0.023 (1.140)	-1.507*** (0.407)	-2.133** (0.960)	0.126 (0.134)	-2.406 (42.930)	0.091*** (0.015)	-0.084* (0.043)	-0.229** (0.104)
Latitude	-0.725 (0.897)	12.683*** (6.226)	-6.690*** (0.973)	n.a	-438.146 (2153.6)	-3.047 (0.637)	-0.104 (0.785)	n.a.	-18.70 (1018)	4.414 (2.770)	-69.328*** (12.045)	8.585*** (1.881)	-94.954 (2900)	-11.693*** (3.501)	-1.495 (1.637)	18.333*** (5.198)
Years elapsing since independence	0.043*** (0.005)	-3.112*** (0.241)	0.020*** (0.005)	n.a	-0.023 (1.190)	-0.041*** (0.008)	0.009*** (0.002)	n.a.	-0.003 (1.140)	0.187*** (0.038)	-0.382*** (0.094)	0.015*** (0.003)	-0.010 (0.947)	0.004*** (0.0004)	0.002** (0.0009)	0.004* (0.002)
Ethnolinguistic Fractionalization	3.154*** (0.721)	-83.310*** (6.438)	-0.079 (0.518)	n.a	-146.045 (1008)	-0.921* (0.530)	2.643*** (0.499)	n.a.	-9.874 (539.10)	-18.870*** (2.500)	-9.027*** (3.061)	1.176 (1.389)	-158.291 (2617)	-4.740*** (1.445)	-3.890*** (1.320)	9.651*** (2.564)
Heterogeneity test	***	n.s.	***	n.s.	n.s	***	***	n.s.	n.s	n.s.	n.s.	***	n.s	n.s.	***	***
Loglikelihood	-1121	-357	-873	-99	-76	-1641	-1403	-26	-354	-204	-480	-1064	-35	-379	-1111	-528

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 8: Estimation of Hazard Rate of Downgrading in Risk Ratings by Region Using the Complementary Log-logistic Functional Form

	To category 1 from higher categories					**To category 1 and 2 from higher categories**				**To category 1, 2 and 3 from higher categories**				**From category 5**	
Independent variables	**Dependent variable: hazard rate**					**Dependent variable: hazard rate**				**Dependent variable: hazard rate**				**Dependent variable: hazard rate**	
	SSA	MENA	LAC	ECA	SA	SSA	LAC	ECA	SA	SSA	MENA	LAC	EAP	WE	EAP
Logt (baseline hazard)	-1.031*** (0.059)	-0.390*** (0.074)	-0.834*** (0.043)	3.785*** (0.769)	2.278*** (0.363)	-1.153*** (0.056)	-1.128*** (0.039)	-24.385*** (5.444)	-9.332*** (1.107)	-1.487*** (0.153)	-3.404*** (0.225)	-1.501*** (0.112)	-0.157 (0.116)	1.186*** (0.128)	0.676*** (0.102)
Macro covariates															
GDP per capita	-2.121*** (0.178)	-4.794*** (0.390)	-0.631*** (0.065)	-8.236*** (1.565)	-0.022*** (0.002)	-0.710*** (0.034)	-0.369*** (0.018)	-14.564*** (0.004)	5.307*** (0.001)	-0.708*** (0.062)	-0.101** (0.041)	-0.280*** (0.020)	-0.807*** (0.116)	-0.376*** (0.037)	-0.373*** (0.043)
Inflation	0.013*** (0.001)	-0.019*** (0.002)	0.0005*** (0.00007)	0.011 (0.013)	0.232*** (0.038)	0.022*** (0.002)	0.0003*** (0.0001)	0.108*** (0.039)	-0.148*** (0.032)	0.051** (0.021)	-0.018*** (0.003)	0.029*** (0.003)	0.088*** (0.023)	0.089*** (0.011)	-0.094*** (0.021)
Rer distortion	0.002* (0.001)	0.017*** (0.004)	0.00004 (0.0012)	0.099*** (0.028)	-0.120*** (0.023)	0.004*** (0.0007)	-0.0003** (0.0001)	0.463*** (0.143)	-0.178*** (0.027)	-0.002 (0.004)	0.001 (0.005)	0.0001 (0.001)	-0.046*** (0.008)	-0.019*** (0.003)	-0.053*** (0.005)
Openness	-0.039 (0.004)	-0.045*** (0.008)	-0.046*** (0.003)	0.102 (0.062)	-0.264*** (0.039)	-0.006*** (0.0015)	-0.017*** (0.002)	1.763*** 0.420)	-0.222*** (0.031)	-0.009*** (0.001)	0.009 (0.007)	-0.016*** (0.002)	-0.023*** (0.005)	-0.036*** (0.006)	-0.020*** (0.004)
Fixed covariates															
Territory size	0.153 (0.150)	-273.8*** (22.4)	-0.065 (0.267)	n.a	87.300 (834.1)	0.911*** (0.180)	-0.082 (0.165)	n.a	-54.3 (871.8)	3.190*** (0.472)	-9.130*** (3.390)	0.886** (0.375)	-1.250*** (0.330)	-1.470 (1.740)	-0.348* (0.197)
Coastline	-0.821*** (0.125)	52.788*** (4.409)	-0.077 (0.140)	n.a	-0.030 (0.296)	-0.020 (0.063)	0.002 (0.044)	n.a	18.86 (309.88)	1.162*** (0.198)	2.039** (0.867)	-0.112 (0.090)	-0.027*** (0.009)	0.004 (0.071)	0.189*** (0.059)
Latitude	1.408 (1.172)	-27.300*** (8.675)	3.258 (2.595)	n.a	n.a	2.135*** (0.404)	1.300 (0.848)	n.a	n.a	-4.972*** (0.978)	46.335*** (12.433)	-1.265 (1.237)	0.449 (3.338)	2.028 (1.315)	-10.402*** (3.909)
Years elapsing since independence	-0.057*** (0.008)	4.520*** (0.378)	-0.015*** (0.0055)	n.a	7.927 (48.611)	0.015*** (0.005)	-0.013*** (0.0018)	n.a	-2.825 (50.807)	-0.087*** (0.013)	0.293*** (0.084)	-0.022*** (0.002)	-0.003*** (0.0004)	-0.002*** (0.0006)	-0.004*** (0.001)
Ethno-linguistic fractionalization	-5.557*** (0.817)	117.713*** (10.140)	-0.651 (0.794)	n.a	-361.246 (2540.1)	-0.504 (0.398)	-2.653*** (0.508)	n.a	152.30 (2654.89)	10.876*** (1.014)	7.269** (2.860)	-2.365*** (0.865)	-2.382 (1.837)	3.489* (1.867)	-8.075*** (2.087)
Heterogeneity test	***	n.s.	***	n.s.	n.s	***	***	n.s	n.s.	n.s.	n.s.	***	***	***	***
Log-likelihood	-1095	-367	-895	-89	-182	-1603	-1514	-29	-200	-208	-500	-1041	-365	-1082	-514

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 9: Estimation of Hazard Rate of Upgrading in Risk Ratings by Foreign Language of Influence Using Complementary Log-logistic Functional Form

	From category 1 to higher categories				From category 1 and 2 to higher categories				From category 1 2 and 3 to higher categories				From category 4 and lower to category 5
Independent variables	Dep. Var: hazard rate				Dep. Var: hazard rate				Dep. Var: hazard rate				Dep. Var: hazard rate
	English	French	Spanish	Other	English	French	Spanish	Other	English	French	Spanish	Other	English
Log(t) (Baseline hazard)	0.998*** (0.046)	0.635*** (0.055)	1.189*** (0.075)	0.268*** (0.049)	1.517*** (0.052)	2.443*** (0.181)	1.392*** (0.072)	1.142*** (0.079)	1.205*** (0.061)	5.086*** (0.593)	1.221*** (0.115)	0.103 (0.108)	-0.675*** (0.050)
Macro covariates													
GDP per capita	0.308*** (0.015)	1.096*** (0.126)	1.017*** (0.078)	0.097*** (0.016)	0.165*** (0.014)	1.920*** (0.128)	0.965*** (0.038)	0.149*** (0.021)	0.153*** (0.013)	2.394*** (0.323)	0.974*** (0.071)	0.526*** (0.054)	0.172*** (0.014)
Inflation	-0.238*** (-0.002)	-0.006* (0.004)	-0.001*** (0.0002)	0.0005** (0.0002)	-0.028*** (0.002)	-0.051*** (0.010)	-0.015*** (0.002)	-0.00001 (0.0001)	-0.058*** (0.008)	0.077** (0.037)	-0.0274*** (0.004)	-0.086*** (0.017)	-0.014* (0.008)
Rer distortion	-0.003*** (0.0009)	0.006*** (0.002)	-0.003*** (0.0005)	-0.022*** (0.0027)	-0.004*** (0.001)	0.002 (0.002)	-0.0005 (0.0004)	0.013*** (0.003)	0.010*** (0.002)	0.043*** (0.011)	0.005*** (0.0008)	0.049*** (0.007)	0.009*** (0.002)
Openness	0.019*** (0.002)	0.014*** (0.003)	0.009** (0.004)	0.014*** (0.003)	0.004*** (0.001)	0.021*** (0.005)	0.006** (0.002)	0.013** (0.005)	0.013*** (0.001)	0.021 (0.031)	0.004 (0.003)	0.045*** (0.008)	0.023*** (0.001)
Fixed covariates													
Territory size	0.283*** (0.096)	0.272 (0.364)	-2.510*** (0.319)	-0.908*** (0.152)	0.101 (0.130)	-1.840*** (0.228)	-2.200*** (0.158)	0.315 (0.240)	0.487** (0.212)	-5.720 (4.120)	-2.060*** (0.231)	7.630*** (0.794)	0.053 (0.134)
Coastline	-0.023*** (0.005)	0.905*** (0.139)	0.118 (0.101)	-0.008** (0.003)	0.029*** (0.006)	1.769*** (0.182)	0.284*** (0.048)	0.016** (0.006)	0.069*** (0.010)	0.002 (0.001)	0.177*** (0.044)	0.421*** (0.040)	0.076*** (0.019)
Latitude	2.333** (1.031)	-2.592** (1.259)	-4.579*** (1.617)	-20.953*** (2.997)	3.709*** (0.877)	-1.904 (1.923)	-2.506*** (0.743)	7.129 (5.427)	5.863*** (0.783)	7.600 (5.268)	-0.245 (1.434)	183.293*** (18.138)	3.294*** (0.631)
Years elapsing since independence	0.009*** (0.004)	0.0004 (0.007)	0.038*** (0.013)	0.004*** (0.002)	0.005*** (0.001)	-0.025 (0.023)	0.027*** (0.004)	0.012*** (0.004)	0.003*** (0.0003)	0.025 (0.018)	-0.006*** (0.002)	0.023*** (0.002)	0.002** (0.0007)
Ethno-linguistic Fractionalization	2.429*** (0.299)	5.610*** (1.068)	5.705*** (0.772)	-14.214*** (1.916)	0.027 (0.301)	7.640*** (1.102)	7.603*** (0.466)	2.928 (3.501)	-0.732 (0.674)	-3.240 (3.003)	4.237*** (0.935)	78.562*** (8.386)	-2.304*** (0.504)
Heterogeneity test	***	***	***	n.s.	***	***	***	***	***	***	***	n.s.	***
Loglikelihood	-1329	-698	-645	-433	-1943	-708	-1004	-550	-1254	-108	-792	-323	-1366

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 10: Estimation of Hazard Rate of Downgrading in Risk Ratings by Foreign Language of Influence Using Complementary Log-logistic Functional Form

	From higher categories to category 1				From higher categories to category 1 and 2				From higher categories to category 1, 2 and 3				From category 5
Independent variables:	Dep. Var: hazard rate				Dep. Var: hazard rate				Dep. Var: hazard rate				Dep. Var: hazard rate
	English	French	Spanish	Other	English	French	Spanish	Other	English	French	Spanish	Other	English
Log(t) (Baseline hazard)	-0.651*** (0.033)	-0.701*** (0.054)	-1.039*** (0.062)	-0.122 (0.087)	-1.071*** (0.033)	-1.491*** (0.119)	-1.130*** (0.590)	-1.342*** (0.085)	-0.823*** (0.045)	-5.761*** (0.641)	-1.065*** (0.097)	-0.237*** (0.086)	0.280*** (0.040)
Macro covariates													
GDP per capita	-0.857*** (0.088)	-1.151*** (0.208)	-0.961*** (0.102)	-0.232*** (0.037)	-0.291*** (0.011)	-1.395*** (0.079)	-1.079*** (0.063)	-0.242*** (0.025)	-0.242*** (0.010)	-2.408*** (0.300)	-0.980*** (0.062)	-0.523*** (0.044)	-0.175*** (0.015)
Inflation	0.015*** (0.001)	0.009 (0.006)	0.0004*** (0.0001)	0.001* (0.0006)	0.025*** (0.002)	0.035*** (0.006)	0.020*** (0.002)	0.0001 (0.0002)	0.053*** (0.006)	0.050 (0.035)	0.021*** (0.004)	0.058*** (0.016)	0.005 (0.007)
Rer distortion	0.006*** (0.001)	-0.013*** (0.002)	0.0001 (0.0002)	0.044*** (0.005)	0.005*** (0.001)	0.005*** (0.002)	0.0001 (0.0007)	-0.007*** (0.003)	-0.002 (0.001)	-0.026*** (0.009)	-0.002** (0.001)	-0.039*** (0.005)	-0.007*** (0.002)
Openness	-0.041*** (0.003)	-0.066*** (0.0069)	-0.045*** (0.0052)	-0.046*** (0.009)	-0.011*** (0.001)	-0.013*** (0.003)	-0.012*** (0.003)	0.010** (0.005)	-0.012*** (0.001)	0.088*** (0.020)	0.001 (0.003)	-0.032*** (0.006)	-0.013*** (0.002)
Fixed covariates													
Territory size	-0.856*** (0.178)	-1.460 (0.947)	1.940*** (0.386)	0.603*** (0.115)	-0.129 (0.165)	1.150*** (0.135)	1.250*** (0.348)	-0.364 (0.322)	-0.437*** (0.134)	3.580*** (0.812)	1.830*** (0.220)	-6.350*** (0.489)	-0.113 (0.072)
Coastline	0.072*** (0.010)	-1.480*** (0.445)	-0.510*** (0.112)	0.017* (0.009)	-0.012 (0.008)	-1.124*** (0.093)	-0.150 (0.095)	-0.026*** (0.008)	-0.030*** (0.006)	-1.548*** (0.486)	-0.082* (0.049)	-0.325*** (0.025)	-0.021 (0.013)
Latitude	2.018 (1.448)	1.865 (2.223)	7.013*** (2.528)	5.950 (5.023)	-2.333*** (0.827)	2.778** (1.119)	2.348* (1.389)	-11.342 (7.299)	-2.049*** (0.614)	-7.304*** (2.149)	1.393 (0.987)	-146.958*** (10.969)	-1.459** (0.660)
Years elapsing since independence	-0.003 (0.002)	-0.014 (0.012)	-0.066*** (0.015)	-0.060*** (0.023)	-0.007*** (0.002)	0.003 (0.010)	-0.037*** (0.010)	-0.021*** (0.006)	-0.002*** (0.0003)	0.022*** (0.007)	0.003 (0.002)	-0.019*** (0.001)	-0.002** (0.0008)
Ethno-linguistic Fractionalization	-2.120*** (0.580)	-9.268*** (1.839)	-6.501*** (1.209)	3.012 (3.970)	-1.028*** (0.313)	-6.556*** (0.585)	-6.078*** (0.811)	-7.643 (4.860)	0.019 (0.241)	1.748 (1.153)	-5.388*** (0.727)	-65.712*** (5.159)	0.325 (0.487)
Heterogeneity test	***	***	***	n.s.	***	***	***	***	***	***	***	n.s	***
Loglikelihood	-1389	-677	-671	-402	-1999	-727	-1051	-551	-1236	-108	-774	-339	-1368

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 11: Estimation of Hazard Rate of Upgrading in Risk Ratings in a Two-Step Heckman Model

	From category 1 to higher categories		**From category 1 and 2 to higher categories**		**From category 1, 2 and 3 to higher categories**		**From category1 2 3 4 to category 5**	
	Probit	**Cloglog For panel data**	**Probit**	**Cloglog For panel data**	**Probit**	**Cloglog For panel data**	**Probit**	**Cloglog For panel data**
Independent variables:	**Dep.var.: Probability**	**Dep.var.: hazard rate**	**Dep.var.: Probability**	**Dep.var.: hazard rate**	**Dep.var.: Probability**	**Dep.var.: hazard rate**	**Dep.var.: Probability**	**Dep.var.: hazard rate**
Log(t) (Baseline hazard)		0.795*** (0.309)		1.456*** (0.037)		1.311*** (0.045)		-0.576*** (0.043)
Macro covariates								
GDP per capita	-0.159*** (0.005)	0.134*** (0.020)	-0.145*** (0.002)	0.181*** (0.040)	-0.152*** (0.002)	0.595*** (0.043)	-0.149*** (0.002)	0.388*** (0.023)
Inflation	0.002*** (0.0001)	-0.002** (0.001)	0.009*** (0.0004)	-0.024*** (0.003)	0.029*** (0.001)	-0.101*** (0.008)	0.062*** (0.003)	-0.089*** (0.009)
Real exchange rate distortion		-0.003*** (0.0004)		-0.002*** (0.0005)		0.008*** (0.0009)		0.009*** (0.002)
Real interest rate	-0.021*** (0.001)		-0.011*** (0.001)		0.004*** (0.001)		0.032*** (0.003)	
Openness	-0.008*** (0.0005)	0.004*** (0.001)	-0.006*** (0.0003)	0.004** (0.002)	-0.003*** (0.0002)	0.023*** (0.001)	-0.0007*** (0.0002)	0.020*** (0.002)
Fixed covariates								
Territory size		0.259*** (0.081)		-0.009* (0.049)		0.149*** (0.051)		0.127*** (0.047)
Coastline		-0.009** (0.004)		0.019*** (0.004)		0.033*** (0.004)		0.021* (0.013)
Latitude		1.816*** (0.592)		1.962*** (0.493)		4.819*** (0.390)		2.214*** (0.631)
Years since independence		0.005*** (0.001)		0.006*** (0.0007)		0.0038*** (0.0002		0.002*** (0.007)
Ethno-linguistic fractionalization		1.108*** (0.204)		0.624*** (0.235)		-1.115*** (0.235)		-1.860*** (0.446)
Inverse of Mill's ratio		2.106*** (0.122)		0.160 (0.337)		-4.084*** (0.391)		-1.884*** (0.213)
Heterogeneity test (Chi-Square)		***		***		***		***
LogLikelihood		-2274		-3402		-2354		-2115

(a) testing whether the variance of heterogeneity divided by one plus the same variance is equal to zero.

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Table 12: Estimation of Hazard Rate of Country's Downgrading in Risk Ratings in a Two-Step Heckman Model

	To category 1 from higher categories		**To category 1 and 2 from higher categories**		**To category 3 and lower from cat 4 and 5**		**To category 4 and lower from category 5**	
	Probit	**Cloglog**	**Probit**	**Cloglog**	**Probit**	**Cloglog**	**Probit**	**Cloglog**
Independent variables	**Dep.var.: Probability**	**Dep.var.: hazard rate**	**Dep.var.: Probability**	**Dep.var.: hazard rate**	**Dep.var.: Probability**	**Dep.var.: hazard rate**	**Dep.var.: Probability**	**Dep.var.: hazard rate**
Log(t) (Baseline hazard)		-0.759*** (0.028)		-1.211*** (0.027)		-1.405*** (0.046)		0.234*** (0.035)
Macroeconomic covariates								
GDP per capita	0.160*** (0.005)	-0.329*** (0.024)	0.145*** (0.003)	-0.218*** (0.015)	0.152*** (0.002)	-0.036 (0.025)	0.149*** (0.002)	-0.147*** (0.026)
Inflation	-0.0018*** (0.0001)	0.0001 (0.0001)	-0.009*** (0.0004)	0.012*** (0.003)	-0.029*** (0.001)	0.013* (0.006)	-0.062*** (0.003)	0.006 (0.011)
Rer distortion		0.0066*** (0.0006)		0.002*** (0.0004)		-0.003*** (0.001)		-0.006*** (0.001)
Real int. rate	0.021*** (0.001)		0.0111*** (0.0008)		-0.004*** (0.001)		-0.032*** (0.003)	
Openness	0.008*** (0.0004)	-0.029*** (0.002)	0.0063*** (0.0003)	-0.0002 (0.0015)	0.003*** (0.0002)	-0.008*** (0.001)	0.0007*** (0.0002)	-0.014*** (0.001)
Fixed covariates								
Territory size		-1.380** (0.161)		-0.252** (0.118)		-0.382*** (0.079)		-0.136*** (0.048)
Coastline		0.066*** (0.008)		-0.0001 (0.0005)		-0.021*** (0.005)		-0.019* (0.011)
Latitude		-2.419* (1.321)		0.259 (0.534)		-3.153*** (0.457)		-1.245** (0.492)
Years since independence		-0.004*** (0.001)		-0.006*** (0.0008)		-0.004*** (0.0003)		-0.001*** (0.0002)
Ethno-linguistic fractionalization		-2.194*** (0.457)		-0.807*** (0.240)		1.083*** (0.288)		0.728 (0.474)
Inverse of Mill's ratio		3.173*** (0.225)		2.044*** (0.240)		2.342*** (0.319)		0.392* (0.218)
p-value on Heterogeneity test		***		***		***		***
Loglikelihood		-2233		-3364		-2312		-2086

Levels of significance: * at 0.1 , ** at 0.05 and *** at 0.01

Figure 1. Level of duration in investment ratings by category

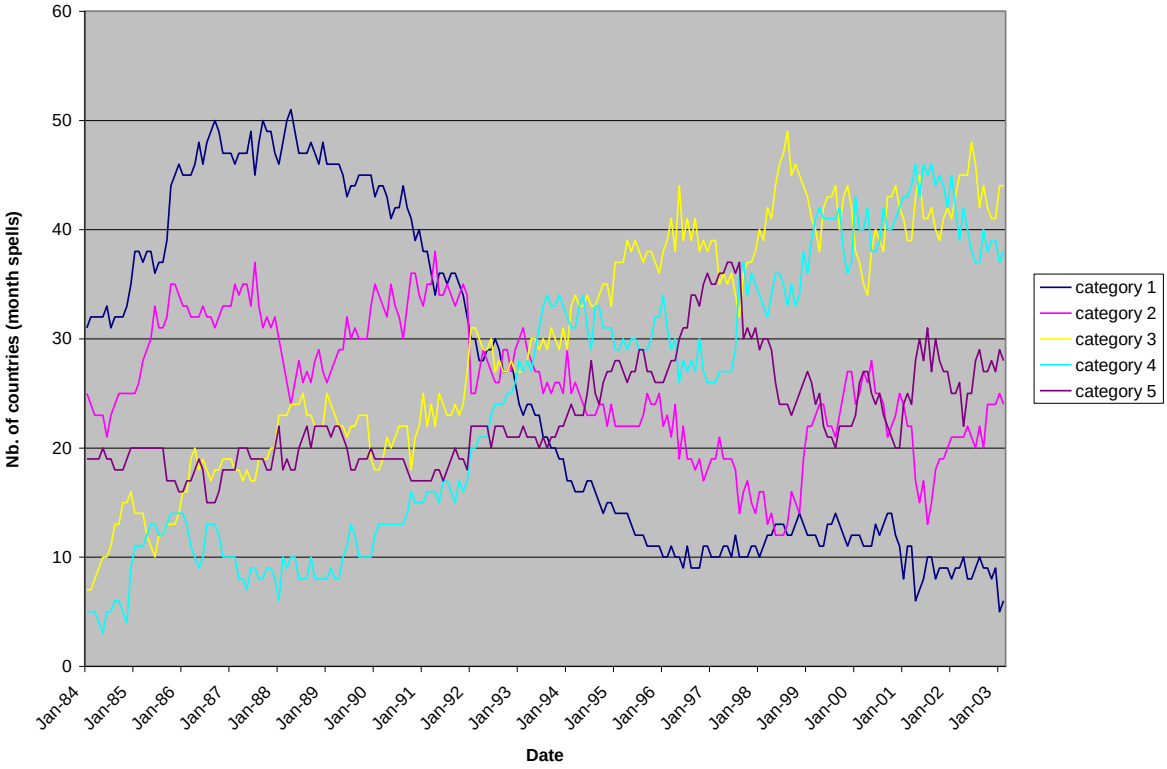


Figure 2. Proportion of duration in investment rating by category

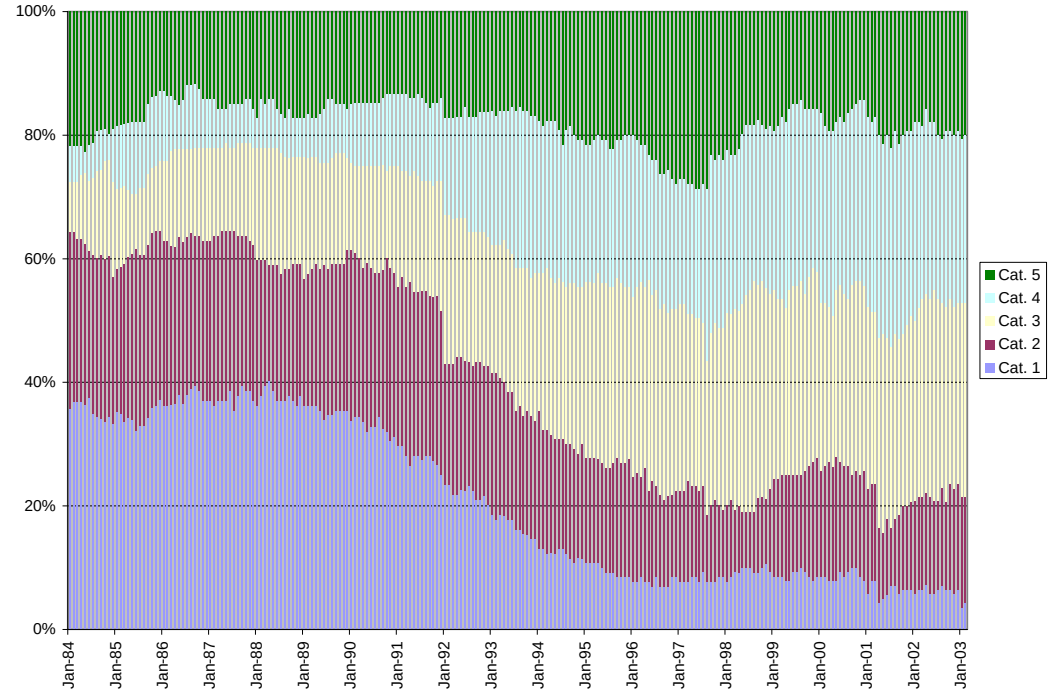


Figure 3a. Exit (Upgrading) from category 1

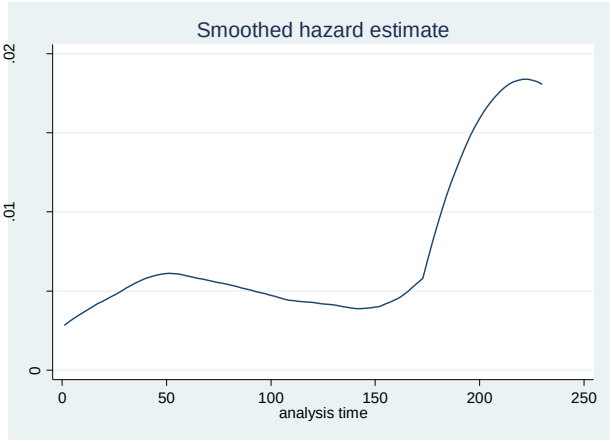


Figure 3b. Exit (Downgrading) from category 5

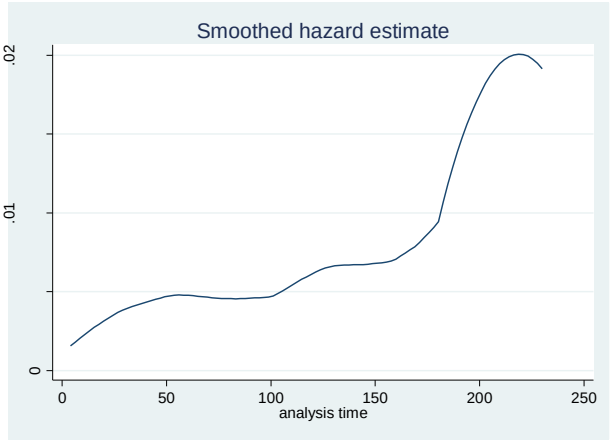


Figure 3c Exit from category 3

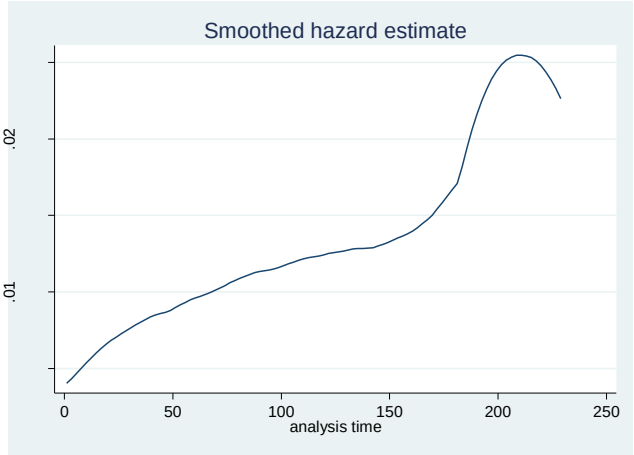


Figure 4a. Exit (Upgrading) from category 1 by region

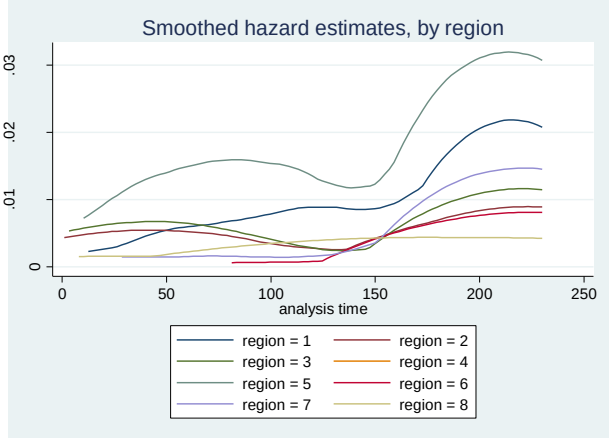
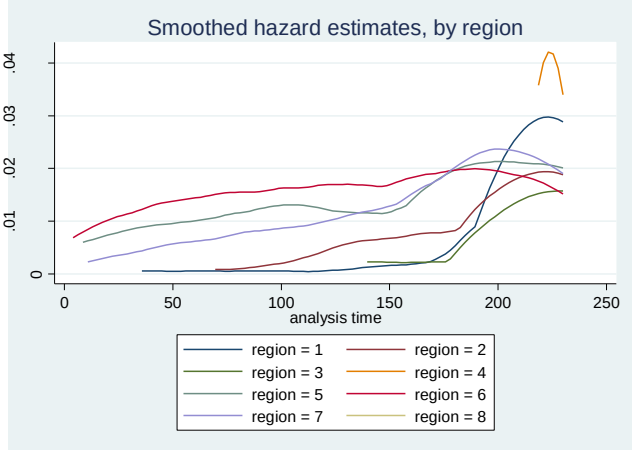


Figure 4b. Exit (Downgrading) from category 5 by region



Region 1: Sub-Saharan Africa
Region 2: Middle East and North Africa
Region 3: Latin America and Caribbean
Region 4: North America
Region 5: East Europe and Central Asia
Region 6: West Europe
Region 7: East Asia and Pacific
Region 8: South Asia

Figure 4c. Exit from category 3 by region

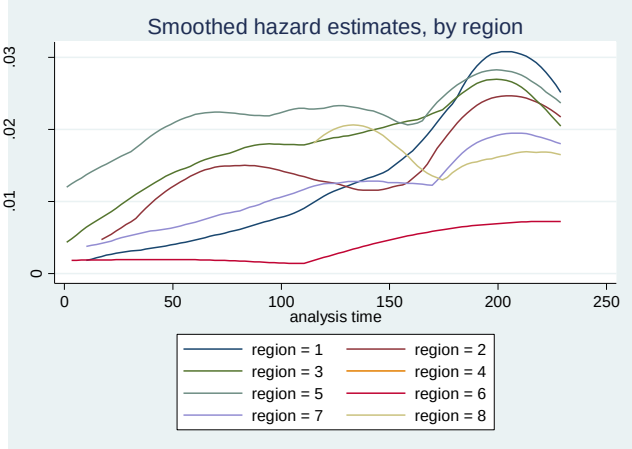


Figure 5a. Exit (Upgrading) from category 1 by foreign language of influence

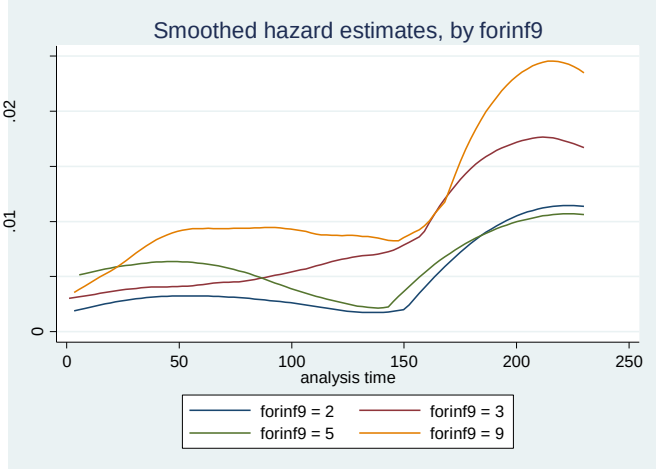
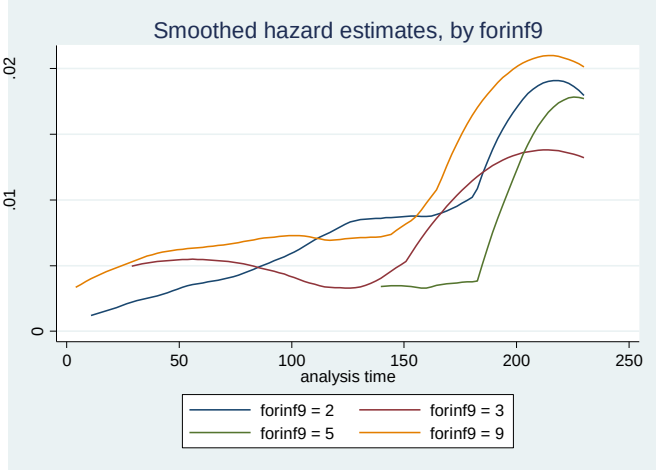


Figure 5b. Exit (Downgrading) from category 5 by foreign language of influence



Forinf9

2: English
3: French
5: Spanish
9: Others

Figure 5c. Exit from category 3 by foreign language of influence