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**SOVEREIGN RATINGS AND MIGRATIONS:
EMERGING MARKETS**

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Sovereign ratings and migrations: emerging markets

Abstract

The demand for sovereign ratings in emerging economies has grown rapidly in recent years due to globalisation of financial markets, and investors' increasing focus on international diversification. This paper investigates the quantitative determinants of sovereign ratings in emerging markets provided by six international agencies. The study also examines the effects of changes in economic and financial conditions of emerging countries on sovereign rating migrations. The findings show that a large set of economic fundamentals is essential in modelling levels and changes in emerging sovereign ratings. Rating behaviour varies across different economic/financial circumstances, highlighting the heterogeneity of emerging sovereign ratings. Evidence of different rating processes across agencies and dissimilar behaviour of upgrades and downgrades is presented.

Sovereign ratings and migrations: emerging markets

1. Introduction

Foreign-currency sovereign ratings represent assessments of the ability and willingness to generate the foreign exchange necessary to meet the government's obligations. They represent a measure of the credit risk of a given country and a ceiling for the ratings assigned to non-sovereign issuers within the country. In addition, sovereign ratings affect the dynamics of sovereign bond spreads and stock market returns, and also influence the cost of capital (Cantor and Packer, 1996; Brooks et al., 2004; Bissoondoyal-Bheenick, 2005; Bennell et al., 2006). Rating agencies are a key source for evaluation of the creditworthiness of sovereign borrowers. However, rating agencies do not reveal the detail of their methodology for rating assessments. Events during the 2007-9 global financial crisis have further heightened interest in the performance of these agencies.¹

Sovereign ratings are particularly important for emerging countries because risk is greater and information can be of lower quality than for developed countries. Investors usually pay close attention to sovereign ratings when investing capital in emerging countries. Particularly, under the Basel II accord, financial institutions can use credit ratings from approved agencies when calculating their capital requirements. Credit risk changes are more frequent in emerging markets and large changes can occur quickly and unpredictably. Thus, the role of rating agencies is more challenging, problematic and costly in emerging markets. Many factors motivate governments in emerging countries to seek ratings from external rating agencies. Sovereign ratings enhance the capability of emerging countries'

¹ Rating agencies are partly responsible for the current financial crisis due to problems relating to identifying risk in securities backed by sub-prime mortgages.

governments and private sectors to access global capital markets and help to attract foreign direct investment. The net private capital flows to emerging markets reached a record volume of \$898.45 billion in 2007. An understanding of emerging sovereign ratings has become important given the significant and growing flow of institutional funds into emerging countries due to globalisation and investors' increasing focus on international diversification (Biglaiser et al., 2008; Alsakka and ap Gwilym, 2009, 2010b). This paper aims to explore what factors determine the sovereign ratings and rating migrations in emerging countries.

The focus of previous studies in this strand of literature has been on analysing the determinants of sovereign ratings in both developed and developing countries.² Cantor and Packer (1996) provide the first study on sovereign ratings determinants. Applying OLS regression, they find that sovereign ratings by Moody's and S&P can be explained by a small number of economic fundamentals. They reveal that stronger sovereign ratings were associated with higher GDP per capita and GDP growth, and by a lower inflation rate and external debt-to-export ratio. However, the OLS estimation technique does not take into account the discrete, ordinal nature of credit ratings. Trevino and Thomas (2001) identify the empirical merits of the ordered probit modelling approach, in terms of superior classification, compared to the use of linear regressions in earlier studies. Mellios and Paget-Blanc (2006) also find that the ordered probit model is more appropriate than the OLS model.

² Rating behaviour for developed countries may well be quite different and influenced by different considerations than those which affect the emerging countries (Monfort and Mulder, 2000; Mulder and Perrelli, 2001). Our study's sample includes only sovereign ratings of emerging countries. Therefore, it is less heterogeneous than the samples of Cantor and Packer (1996), Trevino and Thomas (2000), Bennell et al. (2006) and Bissoondoyal-Bheenick (2005), which were diverse as they included both developed and emerging countries. This increased homogeneity will produce more robust results with less pronounced random-effects across countries.

Prior studies on the determinants of sovereign ratings have examined data samples ending in 1999 at the latest.³ The number of sovereign issuers has significantly grown since the turn of the century, largely based on expansion in emerging country ratings. For example, the number of sovereign issuers rated by S&P has increased by 37% from 1999 to 2008 (from 78 to 107) (see Beers, 2008).

Although several studies have investigated the determinants of sovereign ratings, the literature has been silent on the dynamics of sovereign ratings, especially in emerging countries. Rating migrations, which summarize the average changes in credit quality over a given time period, are key inputs to many applications in modern risk management, such as portfolio risk assessments, bond pricing models, pricing of credit derivatives and modelling credit risk premia. There are only two previous studies on the heterogeneity of sovereign ratings behaviour.⁴ Fuertes and Kalotychou (2007) examine rating momentum and duration effects on rating upgrades/downgrades. Alsakka and ap Gwilym (2009, 2010a) investigate how rating momentum, Watchlist status, existing rating, rating duration and issuers' geographical location impact upon changes in emerging sovereign ratings. For corporate ratings, empirical studies show that corporate rating downgrades are more likely in times of economic contraction, while upgrades are more likely in high-growth periods (see Nickell et al., 2000; Bangia et al., 2002; Kadam and Lenk, 2008). However, significant differences between sovereign and corporate ratings are demonstrated in the literature (see Cantor and Packer, 1996; Nickell et al.,

³ Trevino and Thomas (2000) and Bennell et al. (2006) use annual sovereign ratings assigned by 11 rating agencies to 55 and 70 countries during the period of 1989 to 1997 and 1989 to 1999, respectively. Monfort and Mulder (2000) and Mulder and Perrelli (2001) include Moody's and S&P sovereign ratings for 20 emerging countries on a semi-annual basis from 1994-99. Hu et al. (2002) utilize S&P sovereign ratings observed from 1981 to 1998. Bissoondoyal-Bheenick (2005) uses Moody's and S&P sovereign ratings for 95 countries during 1995-1999. Mellios and Paget-Blanc (2006) is the only study using later data, from Moody's, S&P and Fitch for 2003 only.

2000). Yet the effects of changes in economic and financial conditions on sovereign rating migrations are not examined in prior literature.

Using an ordered probit modelling approach, this paper analyses how a wide set of macroeconomic fundamentals can explain the level of emerging sovereign ratings and how changes in these fundamentals can affect the behaviour of rating adjustments over time. One contribution of this paper is that it is far more extensive than earlier studies in terms of the total number of observations (1730), number of economic factors included (17 variables) and number of rating agencies (6 agencies). With the exception of Bennell et al. (2006) and Trevino and Thomas (2000), all previous studies utilized data assigned by only Moody's, S&P and/or, Fitch. The paper also adds to the literature by being the first to examine the effects of changes in economic and financial conditions of emerging countries on sovereign ratings' dynamics. Both the statistical and economic significance of the findings are provided. Evidence confirming the heterogeneity of emerging sovereign ratings is presented.

The organisation of the paper is as follows. The next section describes the data, followed by presenting the ordered probit models in Section 3. Section 4 analyses the empirical results and Section 5 concludes the paper.

2. Data sample

The sample includes 1730 annual observations (as at 31st of January) of long-term foreign-currency sovereign ratings assigned by six international credit rating agencies to 54 emerging sovereign debt issuers during the period

⁴ Rating heterogeneity means that the rating migration probabilities are not stable over time, and that the future ratings depend on the rating history of the issuer.

from 2000 to 2008.⁵ The rating agencies are: Moody's Investors Service, Standard and Poor's (S&P), Fitch Ratings, Capital Intelligence (CI), Japan Rating and Investment Information (R&I) and Japan Credit Rating Agency (JCR). To identify "emerging" countries, the World Bank's country classification, according to countries' GNI per capita, is adopted. All low-income or middle income countries are defined as "emerging". Rows 1 & 2 of Table 1 report the number of countries and number of annual rating observations by each agency. The ratings scale is transformed into a 20-point numerical scale (Aaa/AAA = 1, Aa1/AA+ = 2 ... Caa3/CCC- = 19, Ca/CC, C/SD-D = 20) (see e.g., Bennell et al., 2006; Alsakka and ap Gwilym, 2010b).

Figure 1 presents the distribution of the sovereign ratings by rating score for the data sample. None of the sovereign issuers are rated between Aaa/AAA and Aa3/AA-, while very few issuers are rated in the A1/A+ categories, reflecting the focus of the data sample on emerging markets. Additionally, only 4.7% of observations are at the Caa1/CCC+ category and below due to the small number of defaulted sovereigns (issuers are usually rated Caa1/CCC+ or below just before/after they defaulted or at default). With the exception of the small proportion of ratings in categories at the top and the bottom of the rating scale, there is a reasonable spread of rating observations across the scale. Rows 3 and 4 of Table 1 reveal that the majority of emerging sovereign issuers were assigned speculative-grade ratings, representing 54.5%, 56.0% and 53.2% for Moody's, S&P and Fitch respectively. In contrast, 57.8%, 75.0% and 79.5% of ratings by CI, R&I and JCR are at investment grade. R&I and JCR tend to focus more on sovereigns

⁵ The sovereign ratings data is obtained from the Financial Times Credit Ratings International database. The sample size is larger than in previous studies modelling sovereign ratings: e.g. 49 observations in Cantor and Packer (1996), 1003 in Trevino and Thomas (2000), 487 by Hu et al. (2002) and 1383 in Bennell et al. (2006).

in the region where they operate (Asia). Also, CI has a high proportion of rated countries in the Middle East, but none in Latin America.

The aim of this study is to analyze the determinants of sovereign rating levels and rating migrations. The dependent variables are: (i) the long-term foreign-currency sovereign ratings assigned to each emerging country by each of the six agencies included in the study as at January 31st of each year; (ii) the sovereign rating changes made by each agency to each emerging issuer. Rating migrations are identified by notches (one-notch and more-than-one notch) and on the basis of 1-year intervals. Details on the annual rating upgrades and downgrades are presented in Table 1 (Rows 5-14). The percentages of upgrades are far higher than downgrades during this period. The upgrade trend of emerging sovereign ratings derives from a variety of causes fuelling economic growth during the study period. The trend reflects higher commodity prices, higher oil and natural gas prices, lower-cost production, larger pools of inexpensive skilled labour and more flexible work rules (Wyss, 2006). Additionally, since annual data is used, some downgrades that occurred within a year but were later upgraded are not captured.

A sovereign rating is an assessment of the economic, financial and political situation of an economy. The focus of this study will be on the economic and financial factors. Political indicators are not explicitly included in this analysis, which is consistent with related research results which show that these perceptions are largely mirrored in the economic performance of a given country as they indicate the long-term political position (Lee, 1993; Bennell et al., 2006). In addition, political instability cannot be measured by a single variable, but is a complex, multidimensional concept requiring multiple indicators (Brewer and Rivoli, 1990). These political indicators are extremely subjective and not accessible for many of the emerging countries

included in the study sample. Explanatory variables are selected to be in line with factors that are stressed in the theoretical and empirical literature as determinants of both the capacity and willingness of sovereign issuers to meet their foreign currency debts. Besides, this set of variables contains the key variables that rating agencies indicate that they use in assessing sovereign creditworthiness (Truglia and Cailleteau, 2006; FitchRatings, 2007; Beers, 2008). Table 2 provides a description of each macroeconomic variable used in this analysis and their expected sign relative to sovereign rating numerical scores, rating upgrades and rating downgrades. As a large number of economic variables is used, this may introduce the possibility of multicollinearity. Table 3 demonstrates the correlation matrix for the economic variables used in this analysis. The correlation between the economic factors is low; indicating no evidence of a multicollinearity problem.⁶

3. Ordered probit models

The ordered probit modelling approach is used to examine the determinants of sovereign ratings and migrations. The models are estimated using data from each rating agency separately and also using the aggregated data from all rating agencies. For comparability with Cantor and Packer (1996) and Bennell et al. (2006), seven economic indicators have been selected as the explanatory variables in a base model (1a): GDP per capita, external debt, GDP growth, inflation rate, external balance, fiscal balance and default history. In addition to these macroeconomic variables and consistent with Bennell et al. (2006), region indicator dummy variables are included in all estimations. Agency indicator dummy variables are also incorporated in the

⁶ Tolerance values are also calculated and show no problem of multicollinearity among the selected variables. The results are not presented in the interests of brevity.

regression estimated by data from all agencies. The base model (Eq. (1a)) constitutes the starting point of the empirical analysis as it allows for comparison between its findings and the results of the most closely related previous studies.

Then, model (1b) is estimated, whereby the remaining 10 macroeconomic factors are added to the base model: exchange rate, unemployment rate, foreign reserves, exports-to-GDP, investment-to-GDP, export growth, exports-to-imports, foreign debt service-to-exports, foreign reserves-to-imports and reserves-to-foreign debt. These economic variables are found to be important in other previous studies on sovereign rating determinants (Monfort and Mulder, 2000, Mulder and Perrelli, 2001, Hu et al., 2002; Bissoondoyal-Bheenick, 2005). For variable selection in model (1b), a stepwise methodology, with backward elimination, is adopted. The ordered probit specifications for Models (1a) and (1b) are defined as follows:

$$Rating_{it} = \sum_k \beta_k X_{k,i,t-1} + \zeta_j + \gamma Ag_i + \varepsilon_{it}; \varepsilon_{it} \sim N(0, 1) \quad (1)$$

$i=1, \dots, C$ (number of countries), $t=1, \dots, 9$ years, $k=1, \dots, 7$ explanatory factors in model (1a) (base model), $k=1, \dots, 17$ explanatory factors in model (1b).

Rating_{it} : an ordinal variable that takes the value of 5, 6, 7, ... 18 or 20, which represents the sovereign rating of an issuer i rated by agency A . There are no cases with values of 1, 2, 3, 4 and 19 (see Figure 1).

X: Set of macroeconomic explanatory factors. Seven macroeconomic variables will be used in Model (1a) (base model), while 17 factors will be

incorporated in Model (1b). All explanatory variables included in the models are lagged by one year, unless stated otherwise in Table 2.⁷

r_i is a 3×1 vector of dummy variables indicating the geographical region of the emerging country of interest. According to the World Bank regional classification, four regions are considered: East Asia & Pacific and South Asia (E S Asia), Europe and Central Asia (EU-CA), Latin America (LA), and Middle East, North Africa and Sub-Saharan Africa (ME & Af), where EU-CA is used as the reference region.

Ag_i is a 5×1 vector of dummy variables indicating the agency assigning the given sovereign rating, with S&P used as the reference agency. The agency dummy variables are only included in the estimation using data from all agencies.

In Model (2), the relationship between annual rating migrations and changes in economic conditions is analysed. Subsequent downgrade and upgrade models are estimated separately due to expected dissimilar behaviour (Fuertes and Kalotychou, 2007, Alsakka and ap Gwilym, 2009, 2010a). A stepwise methodology, with backward elimination, is applied for variable selection. The ordered probit specification for Model (2) is defined as follows:

$$y_{it} = \sum_k \beta_k \Delta X_{k,i,t} + \zeta_i + Spec_{it-1} + \varepsilon_{it}; \varepsilon_{it} \sim N(0, 1) \quad (2)$$

$i = 1, \dots, C$ (number of countries), $t = 1, \dots, 9$ years, $k = 1, \dots, 17$ explanatory factors.

⁷ CPI, Exbal and Fbal (Ggdp) use the average values of the previous three (four) years, consistent with Cantor and Packer (1996) and Bennell et al. (2006), to reflect the rating agencies' approach of removing business cycle effects when assigning sovereign ratings.

y_{it} is an ordinal variable UP_{it} or DW_{it} . UP_{it} (DW_{it}) = 1 or 2 if an emerging sovereign i was upgraded (downgraded) by agency A by one-notch or more-than-one-notch, respectively, in year t compared with year $t-1$; 0 otherwise; ΔX : annual changes in a set of 17 macroeconomic factors (from year $t-1$ to year t).

r_i is the region indicator dummy variables.

$Spec_{it-1}$ is a dummy variable that takes the value of 1 if a sovereign i is rated as speculative-grade at time $t-1$ by agency A, and 0 otherwise. $Spec_{it-1}$ is included to control for the issuer's existing rating.

Marginal effects are calculated for model (2) to estimate the economic significance of the explanatory variables. For continuous variables, the marginal effects are the difference in the predicted value of the dependent variable (rating changes) as one independent variable changes value by 1 standard deviation (1 s.d.) while all other variables are held constant at their mean. For dummy variables, the marginal effects are the partial derivative of the predicted probability of the dependent variable that results when the independent dummy variables take the value of 1 while the other variables are held at their mean.

4. Results

Table 4 presents the results of Models (1a) and (1b) using the aggregated data from all agencies. For the base model (1a), with the exception of external balance, all variables are significant and have the anticipated sign. These findings are consistent with Bennell et al.'s (2006) results, but the external balance variable is insignificant in this study while significant with the wrong sign in Bennell et al. (2006). For model (1b), the only eliminated

insignificant variables are investment-to-GDP per capita and exports-to-imports. All other variables are significant with the expected sign, yet the external balance has the unexpected positive sign. However, Cantor and Packer (1996), Monfort and Mulder (2000), and Mulder and Perrelli (2001) also find external balance to have the unexpected sign. Therefore, it is a problematic counter intuitive result. The lack of a clear relation between sovereign ratings and external balance may reflect, according to Cantor and Packer (1996), the market tendency to force poor credit risk countries into strong external balance positions, diminishing the significance of external balance as an explanatory variable. The Pseudo R^2 value increases from 21.0% in the base model to 24.3% in model (1b), implying greater explanatory power. Further, the agency dummy variables show that CI is more likely to assign lower sovereign ratings than S&P, while the Japanese agencies are more likely to assign higher ratings.

Table 5 documents the results for Model (1b) that relates sovereign ratings with 17 macroeconomic variables using data from each rating agency separately. The only variables from the base model that remain significant and have the anticipated signs in Model (1b) are GDP per capita, inflation rate and default history in all estimations. External debt is positive and significant in Fitch, CI and R&I models; GDP growth and fiscal balance are negative and significant in Moody's, CI and JCR models; and external balance is positive and significant in S&P and the Japanese agencies models.

Consistent with prior expectations, it is found that a higher exchange rate is associated with lower numerical rating-score (higher rating) assigned by the

larger three agencies and R&I.⁸ This result is also in line with Monfort and Mulder's (2000) findings. Additionally, a higher unemployment rate is associated with higher numerical rating scores, i.e. lower ratings, by S&P, Fitch and JCR, but not Moody's, CI or R&I. A higher ratio of exports-to-GDP results in lower numerical rating scores, i.e. better sovereign ratings, by all agencies with exception of Fitch. A lower reserves-to-imports ratio is related to higher numerical rating-score (lower sovereign ratings) by S&P, CI and JCR. The growth rate of exports, investment-to-GDP, debt service-to-exports and reserves-to-foreign debt appear not to play a significant role in explaining the sovereign ratings assigned by the larger three agencies. On the other hand, better CI ratings are linked to a higher growth rate of exports and higher debt service-to-exports. Also, higher reserves-to-foreign debt results in a better rating from CI/R&I. Further, a lower investment-to-GDP ratio results in better sovereign ratings from the Japanese agencies. A lower exports-to-imports ratio is associated with better sovereign ratings from Moody's, CI and JCR. The results for the investment-to-GDP and exports-to-imports ratios are not in line with prior expectations. The lower number of observations for the Japanese agencies and CI, whereby a higher percentage of observations are at investment-grade, may influence these results.

The values of Pseudo R² are 21.9%, 27.1%, 27.8%, 33.6%, 33.8% and 45.0% in model (1b) for Moody's, S&P, Fitch, CI, R&I and JCR, respectively.⁹ It is clear that a wider range of explanatory variables are important to explain emerging sovereign ratings assigned by the smaller agencies compared to

⁸ A higher (lower) rate indicates that the home country's currency will usually be worth more (less) than an import currency. In other words, a higher effective exchange rate means more foreign-currency units per one unit of local currency, which implies greater capability of a sovereign government to service its foreign currency debts.

⁹ Model (1a) was also estimated using data from each agency separately. The results are not shown here (in the interests of brevity). These results show considerable increases in the values of Pseudo R² from the base model (1a) to model (1b).

the larger three agencies. This suggests that the smaller agencies tend to depend more on public and quantitative information in sovereign ratings assessment. Conversely, the larger three agencies are better equipped to reach private and qualitative information, which seem to play an important role in their rating processes.

The statistical results also suggest that rating agencies use different rating criteria, and even when they share the same criteria they weight the variables differently. It is obvious that rating agencies use a broader set of economic factors to rate sovereign issuers than those examined by Cantor and Packer (1996) and Bennell et al. (2006). This result can be derived from the focus of this study on emerging countries, highlighting the different behaviour of sovereign ratings in emerging countries compared to developed countries. Bissoondoyal-Bheenick (2005) shows that economic variables do not play a significant role for the high-rated sample of countries, as GDP per capita and inflation rate seem to be the only relevant economic variables for Moody's and S&P sovereign ratings. Real exchange rate, exports-to-GDP, foreign reserves and unemployment rate are not significant in most estimations. This is triggered by the lack of variability in Bissoondoyal-Bheenick' high-rated data sample since the majority of the high rated countries are with AAA/Aaa ratings over the entire sample period 1995-1999. Yet, the level of foreign reserves is a significant determinant of sovereign ratings in their sub-sample of low-rated countries.

The region indicator dummy variables show that emerging sovereign issuers outside "Europe and Central Asia" region tend to obtain lower ratings by all agencies, with the exception of the Japanese agencies. The improving economic conditions in this region are the underlying cause (Wyss, 2006).

The empirical results on the effect of changes in economic conditions of emerging sovereign issuers on sovereign rating migrations, estimated by Model (2), are presented in Table 6. All significant variables have the anticipated sign, with the exception of the ratio of exports-to-imports.¹⁰ Panel A of Table 6 reports the results for the relationship between annual rating changes by Moody's and macroeconomic variables. Increases in GDP per capita, foreign reserves and debt service-to-exports by 1 s.d. enhance (decrease) the probabilities of one-notch/more-than-one-notch upgrade (downgrade) the following year by 4.24%/2.81% (2.78%/1.58%), 2.32%/1.53% (6.44%/4.99%) and 2.05%/1.35%. Also, increasing GDP growth, exports-to-GDP, reserves-to-imports and reserves-to-foreign debt by 1 s.d. results in decreased probabilities of one-notch/more-than-one-notch downgrade the following year by 1.46%/0.72%, 1.99%/1.05%, 7.11%/5.79% and 0.37%/0.16%. On the other hand, a 1 s.d. increase in exports-to-imports and having default history are associated with elevated probabilities of one-notch/more-than-one-notch downgrade the following year by 2.44%/1.34% and 3.16%/2.06%. These rating change probabilities are highly significant given that on average only 18.5%/3.6% of Moody's issuers experience rating upgrades/downgrades within a 1-year interval (see Rows 12&13 of Table 1).

Panel B of Table 6 reports the results for the relationship between annual rating changes by S&P and macroeconomic variables. For the upgrade case, the results show that if GDP per capita, external balance, fiscal balance and reserves-to-foreign debt improve by 1 s.d., the probabilities of one-notch/more-than-one-notch annual upgrade will increase by 9.33%/1.77%, 4.66%/0.87%, 0.03%/0.01% and 6.73%/1.26%. For the downgrade case, it is found that the probabilities of one-notch/more-than-one-notch annual

¹⁰ The exports-to-imports ratio is the only problematic factor as it is a significant variable in downgrade processes in the larger three agencies but it has the unexpected sign.

downgrade will increase by 29.66%/31.31% if issuers had defaulted previously and by 8.68%/2.06% if exports-to-imports have increased by 1 s.d. If GDP per capita, exchange rate, foreign reserves, exports-to-GDP, investment-to-GDP and reserves-to-imports increase by 1 s.d, the probabilities of one-notch/more-than-one-notch annual downgrade will decrease by 3.40%/0.63%, 3.37%/0.62%, 6.21%/1.30%, 8.61%/2.14%, 2.19%/0.39% and 9.14%/2.22%. These rating change probabilities are highly significant given that on average only 25.3%/6.3% of S&P issuers experience rating upgrades/downgrades within a 1-year interval (see Rows 12&13 of Table 1).

Panel C of Table 6 documents the results for the relationship between annual rating changes by Fitch and macroeconomic variables. Issuers are more (less) likely to experience one-notch/more-than-one-notch rating upgrades (downgrades) in the following year by 19.76%/3.22 (1.93%/0.61%), 3.81%/0.58%, 25.90%/4.74%, 15.53%/2.51% (2.44%/0.80%), 4.72%/0.72% and 27.62%/5.20% (1.24%/0.37%), if GDP per capita, fiscal balance, reserves, exports-to-GDP, debt service-to-exports and reserves-to-imports has increased by 1 s.d. Additionally, issuers with default history are more (less) likely to be one-notch/more-than-one-notch downgraded (upgraded) the next year by 9.86%/5.96% (19.39%/1.76%). Also, if exports-to-imports and external debt increase by 1 s.d., one-notch/more-than-one-notch upgrade (downgrade) probabilities will decline (rise) by 16.75%/2.74% (2.15%/0.69%) and 20.51%/3.49%. These rating change probabilities are highly significant bearing in mind that on average only 24.9%/3.8% of Fitch issuers experience rating upgrades/downgrades within a 1-year interval (see Rows 12&13 of Table 1).

Panel D of Table 6 exhibits the results for the relationship between annual rating changes by CI and macroeconomic variables. 1 s.d. increases in exchange rate, reserves, exports-to-GDP, export growth, debt service-exports, reserves-to-imports ratio and reserves-to-foreign debt are associated with improved (decreased) probabilities of one-notch/more-than-one-notch upgrades (downgrades) by (0.17%), 11.41%/3.56 (1.99%), 6.66%/2.02%, 6.18%/1.87% (0.04%), (0.04%) 9.36%/2.88 (0.46%) and (0.04%). In addition, a 1 s.d. increase in external debt (GDP per capita) will reduce the probabilities of one-notch/more-than-one-notch upgrades (downgrades) by 6.74%/2.04% (0.22%). These rating change probabilities are highly significant bearing in mind that on average only 20.0%/2.6% of CI issuers experience rating upgrades/downgrades within a 1-year interval (see Rows 12&13 of Table 1).¹¹

The results provide evidence that changes in economic and financial fundamentals are highly influential in rating changes. Rating behaviour varies across the expansion and contraction states of the economy. Conducting separate models for upgrades and downgrades enables clear illustration of the influence of different sets of macroeconomic factors. It is worth noting that the set of macroeconomic factors is wider in the case of downgrade actions. It seems that the upgrading decision is driven to a greater extent by qualitative variables and the circumstances of the relevant emerging countries. Conversely, agencies' perspectives on the factors influencing the downgrade process of emerging sovereigns are relatively clearer and this seems primarily driven by quantitative rather than qualitative factors.

¹¹ GDP is the only economic variable which is significant in affecting rating upgrade actions by the Japanese agencies, which is surprising even when bearing in mind the smaller number of emerging sovereigns rated by these agencies. The results are not shown here. Only 4 (3) annual downgrades by R&I (JCR) are observed during the sample period (Table 1). R&I (JCR) downgrade regressions are not estimated.

The findings also provide insights that different factors and different weights attached to these factors are considered by four international rating agencies in making upgrade and downgrade decisions. GDP per capita and foreign exchange reserves are the common factors that play a key role in explaining the rating dynamics for the three larger agencies and CI. Default history, exports-to-GDP and reserves-to-imports are important drivers of downgrade actions in the larger three agencies. On the other hand, reserves-to-foreign debt and GDP growth (debt service-to-exports) are key aspects for downgrading (upgrading) decisions made by Moody's. External balance, fiscal balance and reserves-to-foreign debt (exchange rate and investment relative to GDP) are relevant to the rating upgrade (downgrade) process for S&P. External debt, fiscal balance, exports-to-GDP, debt service-to-exports and reserves-to-imports are taken into account in upgrade decisions by Fitch. Finally, external debt, export growth, exports-to-GDP and reserves-to-import contribute to upgrade actions by CI, while exchange rate, export growth, debt service-to-exports and reserves-to-foreign debt are essential variables to explain emerging sovereign downgrades by CI.

Not surprisingly, issuers outside "Europe and Central Asia" are less likely to be upgraded by the larger three agencies, given the economic growth in this region.

5. Conclusion

The analysis uses the ordered probit approach to examine how a wide set of macroeconomic variables can explain the level of sovereign ratings and how adjustments in these factors can influence rating changes. The analysis employs a larger sample than earlier studies on sovereign rating determinants in terms of the total number of observations, and the number

of macroeconomic factors included. Additionally, it compares the rating process across six international rating agencies. Furthermore, it substantially expands the literature by presenting the first study on the relationship between sovereign rating migrations and macroeconomic factors as a source of rating heterogeneity. The findings show that a wider range of economic and financial indicators play an important role in assigning sovereign ratings in emerging countries than those examined by Cantor and Packer (1996) and Bennell et al. (2006). Also, rating agencies seem to use different rating criteria, and when they share the same criteria they weight the same variables differently. GDP per capita, inflation rate, foreign reserves and default history are the common factors considered by all agencies in assigning sovereign ratings. External debt is significant only in Fitch, CI and R&I rating processes; GDP growth and fiscal balance are important in Moody's, CI and JCR rating assessments; and external balance is significant in S&P, R&I and JCR procedures. A stronger exchange rate is associated with better ratings assigned by the larger three agencies and R&I. A higher unemployment rate is linked with lower ratings by S&P, Fitch and JCR. A higher ratio of exports-to-GDP results in better ratings from all agencies, except Fitch. A lower reserve-to-import ratio is related to lower sovereign ratings by S&P, CI and JCR. Stronger CI ratings are linked to higher ratios of debt service-to-exports, reserves-to-foreign debt and export growth.

The results identify that a broader range of explanatory variables is vital to explain sovereign ratings assigned by the smaller agencies compared to the larger three agencies. This implies that the smaller three agencies depend on public available information in their rating processes to a greater extent than do the larger agencies.

Evidence of emerging sovereign rating heterogeneity is provided by showing that changes in the economic and financial fundamentals are crucial determinants of rating dynamics. Rating actions vary across expansion and contraction states of the economy. A wider set of macroeconomic factors impact downgrade actions compared with upgrade actions, highlighting crucial differences. This suggests that agencies' views on the variables affecting the downgrade process of emerging sovereigns are relatively clearer and primarily driven by quantitative rather than qualitative factors. In contrast, the upgrade process is driven more by qualitative variables and the circumstances of the emerging country. A negative reputational effect for an agency from being tardy or incorrect in downgrades is more significant than for upgrades. Issuers may expect agencies to provide robust reasoning when being downgraded.

Different macroeconomic factors and different weights attached to these factors are considered by the agencies in making upgrade and downgrade decisions. Increases in GDP per capita and foreign exchange reserves are the common factors that play a key role in explaining increased probabilities of upgrades and decreased probabilities of downgrades by the three larger agencies and CI. Additionally, having a history of default and declining ratios of exports-to-GDP and reserves-to-imports are important drivers of downgrade actions by the larger three agencies. Yet, these factors are weighted differently by rating agencies as identified by the marginal effects. On the other hand, decreased reserves-to-foreign debt and GDP growth (enhanced debt service-to-exports) are considered in the rating downgrade (upgrade) process by Moody's. The significant aspects for upgrade (downgrade) decisions made by S&P are improved fiscal balance and reserves-to-foreign debt (weakening exchange rate and investment relative to GDP). Fitch takes into account reduced external debt and enhanced fiscal

balance, exports-to-GDP, debt service-to-exports and reserves-to-imports in upgrade decisions. Stronger exchange rate, export growth, debt service-to-exports and reserves-to-foreign debt contribute to decreased probabilities of downgrades by CI, while a decrease in external debt and increases in export growth, exports-to-GDP and reserves-to-imports are essential variables to explain increased probabilities of upgrades by CI.

With the inevitable globalisation of financial markets and increasing focus on international diversification, the findings offer improved understanding of sovereign rating behaviour and dynamics in emerging countries. The results will be of interest to regulators, investors, financial institutions, credit rating agencies, sovereigns, credit risk managers and investment managers, particularly with expected increased competition in the rating industry in the light of the recent global financial crisis and the severity of criticism directed at credit rating agencies recently.

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Table 1- Descriptive statistics of the data sample of emerging sovereign ratings

Row No.	Rating agency	Moody's	S&P	Fitch	CI	R&I	JCR	All Agencies
1	No. of Countries	50	49	45	26	19	14	54
2	No. of Obs.	444	411	365	230	168	112	1730
3	Investment grade %	45.5%	44.0%	46.95%	57.8%	75.0%	79.5%	52.1%
4	Speculative grade %	54.5%	56.0%	53.2%	42.2%	25.0%	20.5%	47.9%
5	No. of 1-notch Upgrade	56	90	79	37	28	24	314
6	No. of more than 1-notch Upgrade	26	14	12	9	3	2	66
7	No. of 1-notch Downgrade	7	16	7	6	2	2	40
8	No. of more than 1-notch Downgrade	9	10	7	0	2	1	29
9	No. of annual Upgrades	82	104	91	46	31	26	380
10	No. of annual downgrades	16	26	14	6	4	3	69
11	No. of annual rating Changes	98	130	105	52	35	29	449

12	% of annual Upgrades to no. of Obs.	18.5%	25.3%	24.9%	20.0%	18.5%	23.2%	22.0%
13	% of annual Downgrades to no. of Obs.	3.6%	6.3%	3.8%	2.6%	2.4%	2.7%	4.0%
14	% of annual Changes to no. of Obs.	22.1%	31.6%	28.7%	22.6%	20.9%	25.9%	26.0%

This Table presents summary statistics for the dataset, which comprises six international rating agencies. The sample consists of annual (as at January 31st) long-term foreign-currency sovereign ratings of 54 emerging countries during the period January 2000 to January 2008. Rating changes are observed by notches based on a 20-point rating scale and 1-year intervals.

Table 2- Description of macroeconomic explanatory variables*

Variable Name	Definition	Unit	Expected sign for rating numerical score/Downgrade	Expected sign for Upgrade
GDP	GDP per Capita for the previous year	US Dollars	-	+
Exdebt	Total external debt relative to exports for the previous year	Percent	+	-
Ggdp	Average annual real GDP growth on a year-over-year basis for the previous four years	Percent	-	+
CPI	Average annual consumer price inflation growth on a year-over-year basis rate for the previous three years	Percent	+	-
Exbal	Average annual account balance relative to GDP for the previous three years	Percent	-	+
Fbal	Average annual central government deficit or surplus relative to GDP for the previous three years	Percent	-	+
DH	Dummy default history	1 = default	+	-
Exrate	Nominal effective exchange rate for the previous year	Index	-	+
Unemp	Unemployment rate for the previous year	Percent	+	-
Res	Foreign exchange reserve for the previous year	Millions of US Dollars	-	+
Exgdp	Ratio of export to nominal GDP for the previous year	Percent	-	+
Invgdp	Direct investment in the country relative to nominal GDP for the previous year	Percent	-	+
Gexp	Growth rate of exports for the	Percent	-	+

	previous year			
Expimp	Ratio of exports to imports for the previous year	Percent	-	+
Dserexp	Ratio of debt service to export for the previous year	Percent	-	+
Resimp	Ratio of foreign exchange reserves to total imports for the previous year	Percent	-	+
Resfd	Ratio of foreign exchange reserves to total foreign debt for the previous year	Percent	-	+

This Table provides a description of each macroeconomic variable used in this analysis and their expected sign relative to sovereign rating numerical scores, rating upgrades and rating downgrades. *Numerical scale: Aaa/AAA = 1, Aa1/AA+ = 2 ... Caa3/CCC- = 19, Ca/CC,C/SD-D = 20.

Table 3- Correlation matrix of macroeconomic explanatory variables for 54 countries, 2000-2008

ALL	gdp	exdebt	ggdp	cpi	exbal	fbal	exrate	unemp	res	exgdp	invgdp	gexp	expimp	dsereexp	resimp	resfd
gdp	1															
exdebt	-0.130	1														
ggdp	0.191	-0.140	1													
cpi	-0.192	0.058	-0.300	1												
exbal	0.129	-0.456	0.012	0.035	1											
fbal	-0.381	0.064	-0.273	-0.094	-0.323	1										
exrate	0.195	-0.212	0.140	0.012	0.044	-0.072	1									
unemp	-0.172	0.149	-0.200	0.071	-0.132	0.116	0.163	1								
res	0.043	-0.214	0.275	-0.076	0.197	-0.080	0.035	-0.176	1							
exgdp	0.396	-0.448	0.155	-0.144	0.275	-0.121	0.119	-0.330	0.018	1						
invgdp	-0.081	-0.071	0.059	0.032	0.114	-0.030	0.388	0.349	-0.026	-0.129	1					
gexp	0.094	-0.212	0.311	-0.029	0.143	-0.132	0.234	0.187	0.077	0.054	0.564	1				
expimp	0.275	-0.291	-0.106	0.038	0.489	-0.244	-0.210	-0.357	0.119	0.343	-0.406	-0.065	1			
dsereexp	-0.045	0.719	-0.078	0.065	-0.323	0.088	0.008	0.143	-0.142	-0.448	-0.080	-0.170	-0.252	1		
resimp	-0.039	-0.096	0.086	-0.103	0.312	0.007	-0.071	-0.032	0.411	-0.273	0.053	0.148	0.227	0.020	1	
resfd	0.006	0.019	-0.062	-0.001	-0.020	0.022	0.006	0.063	-0.078	-0.032	-0.001	0.001	-0.015	0.017	-0.028	1

This Table demonstrates the correlation matrix for the economic variables for 54 emerging countries during the period January 2000 to January 2007. For variable definition see Table 2.

Table 4- Determinants of emerging sovereign rating levels

Rating level	Model (1a)		Rating level	Model (1b)	
	Estimated Coefficient	t-value		Estimated Coefficient	t-value
Gdp	-0.0002***	-25.83	Gdp	-0.0002***	-22.29
Exdebt	0.001***	5.96	Exdebt	0.001***	3.99
Ggdp	-0.071***	-5.99	Ggdp	-0.030**	-2.30
CPI	0.038***	13.58	CPI	0.039***	13.41
Exbal	0.007	1.26	Exbal	0.026***	4.03
Fbal	-0.032***	-3.48	Fbal	-0.032***	-3.41
Dh	2.363***	13.25	Dh	2.261***	12.62
			Exrate	-0.012***	-8.00
			Unemp	0.018***	3.01
			Res	-0.0001***	-11.04
			Exgdp	-0.015***	-7.59
			Invgdp		
			Gexp	-0.004**	-2.05
			Expimp		
			Dserexp	-0.005***	-3.26
			Resimp	-0.002**	-2.17
			Resfd	-0.0001***	-2.97
E S Asia	-0.010	-0.11	E S Asia	0.180*	1.88
LA	0.934***	12.24	LA	0.645***	7.12
ME & Af	0.029	0.33	ME & Af	0.441***	4.50
Moody's	0.048	0.68	Moody's	0.046	0.65
Fitch	-0.097	-1.32	Fitch	-0.094	-1.27
CI	0.193**	2.21	CI	0.218***	2.49
JCR	-0.649***	-5.73	JCR	-0.723***	-6.34
R&I	-0.452***	-4.72	R&I	-0.457***	-4.72
Pseudo R ²	21.0%		Pseudo R ²	24.3%	
No of Obs.	1730		No of Obs.	1730	

This Table reports the results of Ordered probit estimation (Model (1)) using the aggregated data of annual sovereign ratings from all agencies during January 2000-January 2008. The dependent variable is $Rating_{it}$, which represents the annual sovereign rating of an issuer i at year t (it takes the value of 5, 6, 7, ... 18 or 20). Seven macroeconomic variables are used in Model (1a), while 17 factors are incorporated in Model (1b). See Table 2 for variable definitions. A stepwise methodology, with backward elimination, is applied for variable selection in Model (1b). The equation includes a set of dummy variables indicating the geographical region of the emerging country of interest being East Asia & Pacific and South Asia (E S Asia), Latin America (LA), and Middle East, North Africa and Sub-Saharan Africa (ME & Af). Europe and Central Asia (EU-CA) is used as the reference region. The equation also includes a set of dummy variables indicating the agency assigning the given sovereign rating, with S&P used as the reference agency. ***Significant at 1% level; **significant at 5% level; *significant at 10% level. The

estimates of the threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 5- Determinants of emerging sovereign rating levels across agencies, Model (1b)

Panel A- The larger three agencies

Rating level	Moody's		S&P		Fitch	
	Estimated Coefficient	t-value	Estimated Coefficient	t-value	Estimated Coefficient	t-value
Gdp	-0.0002***	-12.05	-0.0003***	-12.58	-0.0003***	-12.44
Exdebt					0.001*	1.67
Ggdp	-0.060***	-2.55				
CPI	0.036***	6.33	0.045***	7.82	0.049***	8.26
Exbal			0.043***	3.57		
Fbal	-0.091***	-4.99				
Dh	1.837***	4.72	2.251***	6.18	3.073***	7.60
Exrate	-0.013***	-5.50	-0.011***	-3.41	-0.014***	-4.05
Unemp			0.024**	2.22	0.027**	2.04
Res	-0.0001***	-5.99	-0.0001***	-5.65	-0.0001***	-5.81
Exgdp	-0.012***	-4.17	-0.023***	-5.90		
Expimp	0.004***	2.89				
Resimp			-0.004*	-1.75		
E S Asia	0.548***	3.22	0.240	1.24	-0.146	-0.77
LA	0.736***	4.84	0.639***	3.75	0.694***	4.30
ME & Af	0.127	0.77	0.598***	3.04	0.452**	2.27
Pseudo R ²	21.9%		27.1%		27.8%	
No of Obs.	444		411		365	

Panel B- The smaller agencies

Rating level	CI		R&I		JCR	
	Estimated Coefficient	t-value	Estimated Coefficient	t-value	Estimated Coefficient	t-value
Gdp	-0.0002***	-6.59	-0.0002***	-5.18	-0.0004***	-7.11
Exdebt	0.003***	2.79	0.003***	2.57		
Ggdp	-0.095**	-1.97			-0.123*	-1.65
CPI	0.057***	6.27	0.154***	5.52	0.019*	1.73
Exbal			0.078***	2.61	0.135***	3.10
Fbal	-0.055**	-2.11			-2.256***	-6.06
Dh	4.652***	6.10	2.499***	3.18	NA	NA
Exrate			-0.029***	-3.41		
Unemp					0.084***	2.81
Res	-0.0001***	-3.99	-0.0001***	-5.04	-0.0001*	-1.64
Exgdp	-0.013***	-2.76	-0.015***	-2.65	-0.071***	-7.01
Invgdp			0.050*	1.60	0.111***	3.21
Gexp	-0.016***	-2.37				
Expimp	0.018***	6.18			0.048***	4.34
Dserexp	-0.022***	-3.23				
Resimp	-0.006*	-1.65			-0.015*	-1.72
Resfd	-0.0002**	-2.27	-0.0002**	-2.06		
E S Asia	1.416***	5.37	-0.828***	-2.40	-1.586***	-3.07
LA	NA	NA	-0.134	-0.35	Mexico: merged with ref.	
ME & Af	0.253	0.98	-0.090	-1.12	NA	NA
Pseudo R ²	33.6%		33.8%		45.0%	
No of Obs.	230		168		112	

This Table reports the results of ordered probit estimation (Model (1)) using data of annual sovereign ratings from each rating agencies during January 2000-January 2008. The dependent variable is *Rating_{it}* (see Table 4 for definition). 17 macroeconomic factors are incorporated in Model (1b) (see Table 2 for variable definitions). A stepwise methodology, with backward elimination, is applied for

variable selection in Model (1b). The equation includes a set of dummy variables indicating the geographical region of the emerging country of interest being (see Table 4 for definitions). ***Significant at 1% level; **significant at 5% level; *significant at 10% level. The estimates of the threshold parameters are significant at the 1% level in all estimations, and are not shown here.

Table 6- Determinants of emerging sovereign rating migrations, Model (2),

Panel A- Moody's

Moody's	Upgrades				Downgrades			
	Estimated Coefficient	t-val	Marginal Effects %		Estimated Coefficient	t-val	Marginal Effects %	
			1 notch	> 1 notch			1 notch	> 1 notch
Δ Gdp	0.021***	2.83	4.24	2.81	-0.122***	-2.99	-2.78	-1.58
Δ Ggdp					-0.001**	-1.91	-1.46	-0.72
Dh					0.927*	1.78	3.16	2.06
Δ Res	0.004**	1.93	2.32	1.53	-0.075**	-2.24	-6.44	-4.99
Δ Exgdp					-0.089**	-2.27	-1.99	-1.05
Δ Expimp					0.104***	2.64	2.44	1.34
Δ Dserexp	0.004*	1.76	2.05	1.35				
Δ Resimp					-0.088**	-2.31	-7.11	-5.79
Δ Resfd					-0.002**	-2.05	-0.37	-0.16
E S Asia	-0.824**	-1.92	-0.93	-0.41	0.106	0.67	1.74	1.17
LA	-0.742**	-1.99	-1.10	-0.52	-0.233	-1.55	-3.82	-2.53
ME & Af	Merged with E S Asia				Merged with E S Asia			
Spec_t-1	0.094	0.64	1.54	1.00	0.896**	1.98	1.220	0.58
Pseudo R ²	5.6%	No of Obs.		394	36.5%	No of Obs.		394

Panel B- S&P

S&P	Upgrades				Downgrades			
	Estimated Coefficient	t-val	Marginal Effects %		Estimated Coefficient	t-val	Marginal Effects %	
			1 notch	> 1 notch			1 notch	> 1 notch
Δ Gdp	0.027***	4.01	9.33	1.77	-0.051**	-2.27	-3.40	-0.63
Δ Exbal	0.0001*	1.74	4.66	0.87				
Δ Fbal	0.0005*	1.65	0.03	0.01				
Dh					2.357***	3.94	29.66	31.31
Δ Exrate					-0.075***	-3.67	-3.37	-0.62
Δ Res					-0.033*	-1.87	-6.21	-1.30
Δ Exgdp					-0.108***	-4.27	-8.91	-2.14
Δ Invgdp					-0.001***	-2.35	-2.19	-0.39
Δ Expimp					0.108***	4.04	8.68	2.06
Δ Resimp					-0.050***	-2.60	-9.14	2.22
Δ Resfd	0.002***	3.12	6.73	1.26				
E S Asia	-0.270	-1.31	-7.17	-1.18	-0.691	-1.51	-2.49	-0.38
LA	-0.415**	-2.20	-11.04	-1.91	-0.375	1.05	-1.75	-0.29
ME & Af	-0.673***	-2.62	-16.06	-2.22	-1.514***	-2.42	-3.53	-0.53
Spec_t-1	0.173	0.57	0.87	0.15	0.266*	1.72	7.25	1.32

Pseudo R ²	11.2%	No of Obs.	362	32.4%	No of Obs.	36
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Table 6- Continued
Panel C- Fitch

Fitch	Upgrades				Downgrades			
	Estimated Coefficient	t-val	Marginal Effects %		Estimated Coefficient	t-val	Marginal Effects %	
			1 notch	> 1 notch			1 notch	> 1 notch
ΔGdp	0.060***	3.38	19.76	3.33	-0.066***	-3.60	-1.93	-0.61
ΔExdebt	-0.004***	-2.59	-20.51	-3.49				
ΔFbal	0.001**	2.09	3.81	0.58				
Dh	-1.100**	-2.08	-19.39	-1.76	1.421***	2.50	9.86	5.96
ΔRes	0.032**	2.28	25.90	4.74				
ΔExgdp	0.044**	2.28	15.53	2.51	-0.074***	-3.71	-2.44	-0.80
ΔExpimp	-0.050**	-2.33	-16.75	-2.74	0.072***	3.64	2.15	0.69
ΔDserexp	0.005*	1.76	4.72	0.72				
ΔResimp	0.039***	2.44	27.62	5.20	-0.020**	-2.28	-1.24	-0.37
E S Asia	-0.402*	-1.71	-9.89	-1.27	-0.777	-1.50	-1.07	-0.28
LA	-0.422**	-1.99	-10.65	-1.47	-0.717	-1.60	-1.22	-0.34
ME & Af	-1.013***	-1.65	-1.05	-0.26	-0.117	-0.41	-3.03	-0.43
Spec_t-1	0.276	1.59	7.27	1.10	0.304	0.79	0.63	-0.18
Pseudo R ²	12.6%	No of Obs.	320		47.6%	No of Obs.	320	

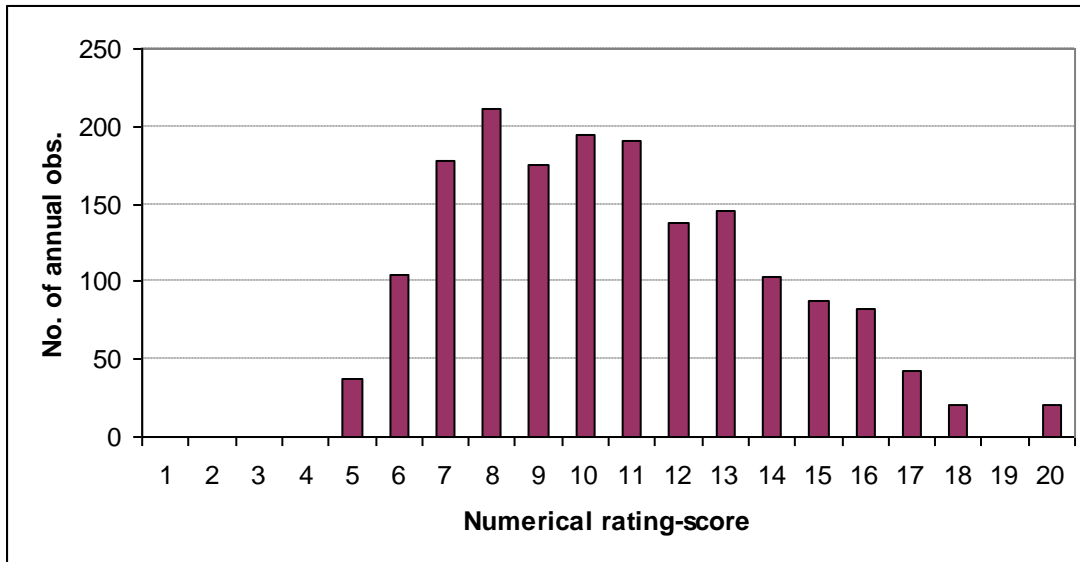
Panel D- CI

CI	Upgrades				Downgrades			
	Estimated Coefficient	t-val	Marginal Effects %		Estimate d Coefficient	t-val	Marginal Effects %	
			1 notch	> 1 notch			1 notch	> 1 notch
ΔGdp					-0.127*	-1.80	-0.22	NA
ΔExdebt	-0.001**	-2.29	-6.74	-2.04				
ΔExrate						-2.47	-0.17	NA
ΔRes	0.023***	2.56	11.4	3.56	-0.119**	-2.07	-1.99	NA
ΔExgdp	0.032***	2.39	6.66	2.02				
ΔGexp	0.001**	1.97	6.18	1.87	-0.001*	-1.69	-0.04	NA
ΔDserexp					-0.163*	-1.79	-0.04	NA
ΔResimp	0.020**	2.01	9.36	2.88	-0.789*	-1.70	-0.46	NA
ΔResfd					-0.003*	-1.82	-0.04	NA
E S Asia	-0.020	0.08	-0.42	-0.12	0.686	0.96	0.05	NA
LA	NA	NA	NA	NA	NA	NA	NA	NA
ME & Af	-0.230	0.86	-4.64	-1.30	Merged with E S Asia			
Spec_t-1	-0.349*	-1.65	-7.12	-2.08	0.201	0.68	0.53	NA
Pseudo R ²	8.8%	No of Obs.	204		45.1%	No of Obs.	204	

This Table reports the results of ordered probit estimation (Model (2)), using data from Moody's in Panel A, from S&P in Panel B, from Fitch in Panel C, and from CI in Panel D. The dependent variable is *UP (DW)* (which equals 1 or 2 if an emerging sovereign *i* was upgraded (downgraded) by agency *A* by one-notch or more-than-one-notch, respectively, in year *t* compared with year *t-1*; 0 otherwise). The explanatory variables are annual changes in a set of 17 macroeconomic factors (see Table 2 for variable definitions). A stepwise methodology, with backward elimination, is applied for variable selection. The equation includes a set of dummy variables indicating the geographical region of the emerging country of interest being (see Table 4). *Spec_t-1* is a dummy variable that takes the value of 1 if a sovereign *i* is rated as speculative-grade at time *t-1*, and 0 otherwise. ***Significant at 1% level;

**significant at 5% level; *significant at 10% level. The estimates of the threshold parameters are significant at the 1% level in all estimations, and are not shown here. We also estimate the impact of each variable on the probability of a rating change (marginal effect).

Figure 1- Distribution of emerging sovereign annual ratings by rating score



The Figure shows the distribution of the sovereign ratings' data sample, which comprises six international rating agencies (Moody's, S&P, Fitch, CI, R&I and JCR). The sample consists of annual (as at January 31st) long-term foreign-currency sovereign ratings of 54 emerging countries during the period January 2000 to January 2008. The credit ratings scale is transformed into a 20-point numerical scale (Aaa/AAA = 1, Aa1/AA+ = 2 ...Caa3/CCC- = 19, Ca/CC, C/SD-D = 20).