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Statistical properties of country credit ratings

Juan J. Cruces *

Universidad de San Andres, Vito Dumas 284, Victoria B1644BID; Prov. Buenos Aires, Argentina

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Abstract

The country credit rating is a key covariate of the cost and availability of international financing for an economy. This paper models ratings as a function of expected repayment capacity, derives empirical implications, and tests them using the most comprehensive consistent series of sovereign credit ratings. These are the *Institutional Investor* ratings which have been widely used in the international finance literature. We report several stylized facts: volatility clustering, asymmetric adjustments, and serial correlation in credit revisions, especially in Emerging countries. These features are consistent with rational behavior of credit rating teams and have important implications in assessing the long term risk of international investments.

JEL classification: G15; F34

Keywords: Sovereign risk; Credit rating modeling

1. Introduction

It is well known that there is limited ability to enforce contracts subject to the regulatory authority of a foreign government. This is because governments are sovereign in their territories and they have few assets beyond their borders that can be seized by a foreign court order. Therefore, measures of host government sovereign risk contain critical information when contemplating international investment. This paper studies the statistical properties of the sovereign credit ratings awarded by a pool of international bankers and published by *Institutional Investor*, the largest consistent series on sovereign risk, spanning 25 years and covering up to 173 countries.

* Tel.: +54 11 4725 7088; fax: +54 11 4725 7027.
E-mail address: cruces@udesa.edu.ar.

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The paper makes the following contributions. First, it models the transition from capacity to repay to credit ratings and derives empirical implications of the hypothesis that ratings are rational expectations forecasts of expected collection. Among other things, this shows that ratings could exhibit volatility clustering, asymmetric adjustments, and non-zero expected revisions that are serially correlated. Second, it provides a statistical description of the complete *Institutional Investor* (*II*) ratings—the largest series of any study to date. While these data have been widely used either as explanatory or as explained variables, relatively little is known about the properties of the ratings themselves. Third, it shows that the statistical properties of these ratings are broadly consistent with the model. The most important findings are that maximum rating volatility occurs for countries where potential default is expected, that there is mean reversion for ratings in certain ranges of the scale, that there is substantial serial correlation in revisions, especially in Emerging markets, and that low- and middle-income countries and regions can have material non-zero mean rating changes for several years. By contrast, credit changes are relatively small in developed countries.

The presence of serial correlation in credit rating changes does not necessarily imply that ratings are informationally inefficient, because ratings forecast expected collection during a fixed window that starts when the rating is issued. Therefore, two ratings given one year apart forecast different events. Serial correlation in revisions does imply that the standing rating is not necessarily the best forecast of expected collection for debt which matures beyond the credit rating window. This conclusion is interesting from several perspectives. Portfolio investors can benefit from knowing that given two long-term securities of equal rating, the one whose last revision was more favorable carries a smaller default risk. For regulators who set limits on the amount of debt that institutional investors can hold in different rating categories, it is important that ratings are not statistically sufficient measures of default risk. In particular, they can be improved by accounting for the serial correlation.

Very few of the empirical papers on country risk account for the dynamics of credit ratings (Hoti and McAleer, 2004, p.12). One exception is Erb, Harvey, and Viskanta (1996) who report persistence of rating changes and mean reversion—a fact that also appears in Diamonte, Liew, and Stevens (1996). We confirm these findings of the early literature, expand them to a larger sample, and provide an explanation for why they arise.[1]

Credit ratings have been used both as explained and as explanatory variables in empirical work. Some authors attempted to uncover the fundamental determinants of credit ratings. Feder and Uy (1985) and Lee (1993) use *II* data, Ul-Haque, Kumar, Mark and Mathieson (1996) use *II*, *Euromoney* and *The Economist Intelligence Unit* data, and Cantor and Packer (1996) use Moody's and S and P ratings as the dependent variable.

A comprehensive study, Ul-Haque, Kumar, Mark, and Mathieson (1996), analyzes the correlation of country credit ratings (CCR) with variables that are presumed to affect country risk according to the sovereign risk literature. Their sample consists of over 60 developing countries observed from 1980 until 1993. They regress the level of CCR on the lagged values of exports growth, current account balance, international reserves, GDP growth, inflation, terms of trade, US Treasury Bill return, the lagged level of CCR, etc. They report three main findings. The most important domestic determinants of creditworthiness are the country's foreign reserves holdings, output growth, and the current account balance in the year before the rating was published.

[1] Using a more recent sample, Harvey (2004) finds lack of persistence in rating changes. We address this result in our discussion of Table 5.