

Summary

The sharp downgrades of structured credit products that followed in the wake of the subprime mortgage crisis and the more recent downgrades accompanying weakened sovereign balance sheets have focused attention on credit rating agencies (CRAs) and their rating methodologies. In part this attention reflects the myriad ways in which ratings drive investment decisions and collateral eligibility standards, even those of central banks. Securities regulations and rules have played a big part in this rating reliance, as well as prudential regulations. This chapter focuses on how well CRAs do their job and whether they inadvertently contribute to financial instability. The chapter specifically focuses on sovereign ratings, given the most recent escalation in sovereign credit risk and the propensity for ratings to affect sovereign debt markets.

Although CRAs have been under a cloud of suspicion following their role in structured credit markets, it should be acknowledged that ratings serve several useful purposes. They aggregate information about the credit quality of borrowers, including sovereign entities, corporations, financial institutions, and their related debt offerings. They thus allow such borrowers to access global and domestic markets and attract investment funds, thereby adding liquidity to markets that would otherwise be illiquid.

The chapter examines the top three CRAs (Fitch Ratings, Moody's Investors Service, and Standard & Poor's) to see whether they serve their various roles effectively and, more specifically, whether they rate sovereign debt accurately. It concludes that CRAs' ratings influence market prices, and that downgrades through the investment-grade barrier trigger market reactions. It shows that their market impact is associated not only with new information, but also with a "certification" role, though this is most evident through their use of "outlooks," "reviews" and "watches" (pre-rating change warnings) rather than actual rating changes.

CRAs insist that they do not target their ratings to specific credit risk metrics, such as default probabilities or expected losses, but only to ordinal rankings of credit risk. Tested against this objective, the chapter finds that the CRAs' discriminatory power of sovereign default risk is validated to some extent. For example, all sovereigns that defaulted since 1975 had noninvestment-grade ratings one year ahead of their default.

Despite the CRAs' goals of delivering only ordinal rankings, ratings are often used as though they map into specific credit-risk metrics, including in the Basel II standardized approach to determining bank capital requirements. Given this important use, and assuming Basel II's reliance on ratings remains, CRAs should provide default probabilities or expected losses. Also, they should be expected to meet the same rating calibration and validation standards as those required of banks that use the Basel II internal-ratings-based approach, since the CRAs are a substitute for this more sophisticated approach.

In addition, to reduce the negative "cliff effects" in prices and spreads that rating changes imply, the chapter recommends that regulations that hardwire buy or sell decisions to ratings be eliminated. This recommendation is already being implemented to some degree in some countries, but could usefully be extended. As well, CRAs should continue to provide additional information on the accuracy of their ratings, the underlying data, and their efforts to mitigate the conflicts of interest that are associated with their "issuer pay" model of charging issuers for their ratings.

In the wake of the recent U.S. structured finance “rating crisis” and recent European sovereign downgrades, many are asking whether credit rating agencies (CRAs) play a useful role in the market and whether their credit risk assessments are accurate. Because the current degradation of sovereign balance sheets raises very real concerns about their creditworthiness, and hence, how it is measured by credit ratings, this chapter will focus on sovereign debt ratings. One key concern is whether rating downgrades destabilize financial markets, since they are embedded in many regulations and private contracts, particularly when downgrades cross into noninvestment-grade categories. This chapter shows that CRA attempts to avoid volatile ratings by using smoothing practices actually make ratings more prone to procyclical “cliff effects,” which in turn are amplified by the way that ratings are used as sell triggers. Much of this was apparent in the structured credit market debacle, but sovereign ratings are also prone to cliff effects.

Despite the recent criticism leveled at CRAs, they play a significant role in the marketing of fixed-income instruments, with most investors requiring that their fixed-income holdings have a credit rating. Sovereigns seek ratings so that they and their private sector borrowers can access global capital markets and attract foreign investment. More recently, ratings of structured products have been a key factor in the development of the originate-to-distribute model, since the ability to obtain cost-efficient funding depended on getting the highest possible long-term rating (AAA/Aaa). Also, with more than 70 CRAs globally (Annex 3.1), issuing credit ratings apparently has been a good business. This chapter will focus only on the “big three”—Fitch Ratings, Moody’s Investors Service, and Standard & Poor’s (S&P)—because their sovereign rating coverage dwarfs that of the others, and because they maintain a longer history of ratings (Box 3.1).

According to the theoretical literature, CRAs potentially provide information, monitoring, and certification services. First, since investors do not often know as much as issuers about the factors that determine

credit quality, credit ratings address an important problem of asymmetric information between debt issuers and investors. Hence, CRAs provide an independent evaluation and assessment of the ability of issuers to meet their debt obligations. In this way, CRAs provide “information services” that reduce information costs, increase the pool of potential borrowers, and promote liquid markets. This implies that market prices are influenced by rating actions, and that CRA opinions can be important from a financial stability perspective. In theory, CRAs also provide valuable “monitoring services” through which they influence issuers to take corrective actions to avert downgrades via “watch” procedures. These implicitly insert a contract between the issuer and the CRA where the former implicitly promises to undertake specific actions to mitigate the risk of a downgrade (Boot, Milbourn, and Schmeits, 2006).

Although monitoring services can be useful, rating downgrades can lead to knock-on and spillover effects that destabilize financial markets (Box 3.2). These problems stem from the “certification” role played by ratings when they are embedded in regulatory capital requirements and thresholds, and in triggers in various financial contracts. For example, prudential regulations typically allow for less capital or reserves to be held against highly rated, fixed-income instruments. Central banks depend on ratings to determine which securities can serve as collateral for their money market operations. Suitability standards, such as those that constrain money market investments, are often based on rating thresholds. In these ways ratings influence institutional demand and market liquidity, and serve as buy-sell triggers. The strength of the three CRAs’ roles is empirically assessed below.

The structured finance credit rating debacle, which was covered in some detail in the April 2008 *Global Financial Stability Report*, shows how ratings can run amok. In that event, the contention that ratings represent accurate default risk metrics was brought into question by the sheer volume and intensity of the multiple downgrades of U.S. mortgage-related structured finance securities in the wake of the crisis. For example, Figure 3.1 shows that over three-quarters of all private-label residential mortgage-backed securities issued in the United States from

Note: This chapter was written by a team headed by John Kiff, and comprised of Allison Holland, Michael Kisser, Sylwia Nowak, Samer Saab, Liliana Schumacher, Han van der Hoorn, and Ann-Margret Westin, with research support from Yoon Sook Kim and Ryan Scuzzarella.

Box 3.1. The Global Credit Rating Agency Landscape

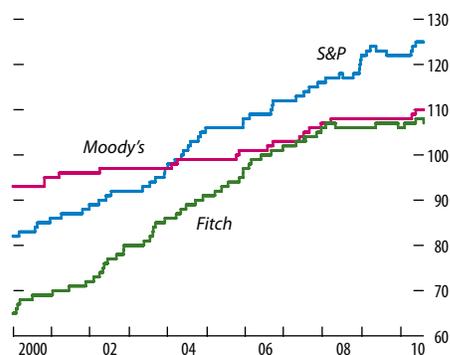
This box shows why the three major credit rating agencies surpass all others in global scope. In particular, their coverage of sovereigns is by far the largest.

When most think of credit rating agencies (CRAs) they think of the “big three” of Fitch Ratings, Moody’s, and Standard & Poor’s (S&P). Still, Annex 3.1 lists 74 CRAs worldwide. In the United States, the Securities and Exchange Commission recognizes 10 of these as nationally recognized statistical rating organizations (NRSROs), which are listed in the table below. Similarly, the European Central Bank recognizes the big three as well as DBRS as “external credit assessment institutions,” while in Japan the big three as well as the two Japanese CRAs that also are NRSROs are considered “designated rating agencies” by the Financial Services Agency.

However, only the big three CRAs are truly global and broad in their product coverage (“global-full spectrum”), the rest being either regional or product-type specialists. Also, their sovereign rating coverage dwarfs that of the others. For example, LACE Financial rated only 59 sovereigns as of July

Note: This box was prepared by John Kiff and Ann-Margret Westin.

Total Number of Sovereigns Rated by the Three Major Credit Rating Agencies



Sources: Fitch; Moody's; and Standard & Poor's.
Note: For 2010, data through July 31, 2010.

30, 2010, whereas S&P rated 125, Moody's 110, and Fitch 107 (see figure). They also have reasonably long histories of sovereign ratings, which is required for the empirical analysis of the chapter. For example, at the beginning of 2000, Moody's rated 93 sovereigns, S&P 82, and Fitch 65, whereas the two Japanese NRSROs rated only about 20 (Alsakka and ap Gwilym, forthcoming).

U.S. Nationally Recognized Statistical Rating Organizations (as of August 10, 2010)

| Credit Rating Agency | Head Office | Rating Scope | Number of Sovereigns Rated | Business Model | Internet Home Page |
|---|----------------------------------|---|----------------------------|----------------|--------------------------|
| A.M. Best Company, Inc. | United States | Global-Insurance | n.a. | Issuer-Pay | www.ambest.com |
| DBRS | Canada | Global-Corporates and Structured Finance | n.a. | Issuer-Pay | www.dbrs.com |
| Egan-Jones Rating Company | United States | Global-Corporates | n.a. | User-Pay | www.egan-jones.com |
| Fitch Ratings | United Kingdom and United States | Global-Full Spectrum | 107 | Issuer-Pay | www.fitchratings.com |
| Japan Credit Rating Agency, Ltd. | Japan | Japanese-Full Spectrum | 35 | Issuer-Pay | www.jcr.co.jp |
| LACE Financial Corp. | United States | U.S. Corporates, Global Banks, & Sovereigns | 59 | User-Pay | www.lacefinancial.com |
| Moody's Investors Service | United States | Global-Full Spectrum | 110 | Issuer-Pay | www.moodys.com |
| Rating and Investment Information, Inc. | Japan | Japanese-Full Spectrum | 46 | Issuer-Pay | www.r-i.co.jp |
| Realpoint LLC | United States | U.S.-Structured Finance | n.a. | User-Pay | www.realpoint.com |
| Standard & Poor's (S&P) | United States | Global-Full Spectrum | 125 | Issuer-Pay | www.standardandpoors.com |

Sources: U.S. Securities Exchange Commission (www.sec.gov/divisions/marketreg/ratingagency.htm); and rating agency websites.
Note: “Full spectrum” includes banks and other corporations, insurance companies, sovereigns, and structured finance.

Box 3.2. Spillover Effects of Sovereign Rating Downgrades

This box summarizes a working paper by Arezki, Candelon, and Sy (forthcoming) that examines the spillover effect of selected European sovereign rating downgrades during the 2007–10 period. The main finding is that rating downgrades have statistically significant spillover effects across countries and financial markets. The form of the spillover effect depends on linkages between countries.

The euro area crisis highlights the interdependence between different financial markets. This crisis has seen sovereign credit rating downgrades, widening of sovereign credit default swap (CDS) spreads, and pressures on stock markets. Did credit rating news in one country have an impact on financial markets in other euro area countries? Indeed, financial markets throughout the euro area have been under pressure, although credit rating actions

Note: This box was prepared by Rabah Arezki and Amadou Sy.

were concentrated in a few countries such as Greece, Ireland, Portugal and Spain.

Arezki, Candelon, and Sy (forthcoming) assess the impact of sovereign rating news on various financial markets across countries in the euro area. The analysis uses daily sovereign CDS spreads and stock market indices, including banking and insurance subindices. This approach fully captures the interdependence between financial markets and allows for identifying which markets and countries are the most affected by any given downgrade. The main result is that sovereign rating downgrades impact not only the financial markets in the country subject to the downgrade but also other euro area countries. For instance, Austrian CDS spreads and stock market indices moved sharply following the downgrades of Baltic countries, while the Austrian credit rating remained unchanged. One possible channel of this spillover effect is the exposure of Austrian banks to the Baltic countries.

2005 to 2007 that were rated AAA by S&P are now rated below BBB-, that is, below investment grade.¹ While downgrades are expected to some extent, a large number of them—in particular when they involve several notches at the same time or when the downgrading takes place within a short period after issuance or after another downgrade—are evidence of rating failure. This chapter looks at such sovereign rating failures to form a view about the reliability of sovereign ratings, and hence whether policies governing their use should be altered as a result.

The chapter will start with a primer on credit rating definitions and principles, and then review the various ways that ratings have become embedded in regulations and private contracts. It will then describe how CRAs actually assess sovereign credit risk, and present various empirical tests used to assess sovereign rating accuracy and information value. The chapter will close

¹For more on the history and meaning of the “investment-grade” distinction, see Fons (2004).

with some policy suggestions aimed at mitigating these cliff effects and their impact.

Basic Rating Definitions and Principles

A credit rating measures the relative risk that an entity or transaction will fail to meet its financial commitments, such as interest payments and repayment of principal, on a timely basis.² These relative risks are mapped into discrete rating grades that are

²A sovereign is typically deemed to default when it fails to make timely payment of principal or interest on its publicly issued debt, or if it offers a distressed exchange for the original debt. Default events do not usually include the failure to repay debt owed to other governments and official creditors, including the IMF and World Bank. S&P measures default risk in terms of default probability whereas Moody’s ratings measure expected loss. Fitch rates issuers on a default probability basis and instruments on an expected loss basis. Hence, in theory, Moody’s ratings should diverge from Fitch’s and S&P’s on the same issuer according to variations in loss severity, as the expected loss can be approximated by the product of the default probability and expected loss severity. However, in practice, there is little divergence, particularly among investment-grade ratings.

usually expressed in terms of alphabetic identifiers. For example, from the most creditworthy to the least, Fitch and S&P use AAA, AA, A, BBB for investment-grade long-term credit risk, and BB, B, CCC, CC, C and D for “speculative” long-term credit risk (see Table 3.1 for Moody’s scales).³ Modifiers are attached to further distinguish and rank ratings within each of the broader classification—Fitch and S&P use pluses and minuses (e.g., AA+ and AA-) and Moody’s uses numbers (Aa1 and Aa3).⁴

CRAs typically signal in advance their intention to consider rating changes. For example, Fitch, Moody’s, and S&P all use negative “review” or “watch” notifications to indicate that a downgrade is likely within the next 90 days. They use a negative “outlook” notification to indicate the potential for a downgrade within the next two years (one year in the case of speculative-grade credits).⁵

Although the CRAs do not explicitly quantify their scales, they do provide ex-post summaries of defaults by rating grades (Table 3.1).⁶ Furthermore, in their structured finance methodologies, they have revealed their target default probabilities and loss

³The CRAs sometimes distinguish between local and foreign currency obligations, with the gap usually in favor of the former, reflecting the sovereign’s greater access to local currency. Although such gaps are still frequently found among Fitch and S&P ratings, these distinctions are now infrequent among Moody’s ratings (Moody’s, 2010a).

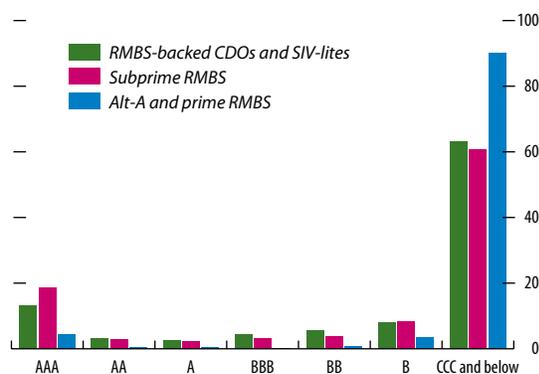
⁴The discussion here centers on long-term debt rating scales. Those for short-term obligations tend to be simpler. For example, Moody’s has three “Prime” grades that roughly map into the 10 long-term investment-grade notches. There are also differentiated scales for municipal securities and preferred shares, as well as a plethora of specialized ratings, such as “loss given default assessments” and “bank financial strength ratings” (Moody’s, 2010c). Bank financial strength ratings measure the likelihood that a bank will require assistance from third parties, including central banks and governments.

⁵For example, between June 26, 1989 and March 31, 2010, S&P published 74 negative sovereign CreditWatch notices, 51 of which were followed by downgrades within an average of six weeks. Over the same period, 212 negative outlooks were followed by 118 downgrades within an average of six months. Also, 404 stable outlooks were followed by 82 upgrades and only 30 downgrades, and 202 positive outlooks by 143 upgrades and no downgrades.

⁶It should be kept in mind that Moody’s default data include only 13 sovereign defaults since 1998. Of the 108 sovereigns that Moody’s currently rates, 39 have been added since 1998. Also, according to Moody’s, two-thirds of the 1983–2009 sovereign defaults were for unrated sovereigns.

Figure 3.1. Ratings of AAA-Rated U.S. Mortgage-Related Securities

(In percent of S&P’s originally rated 2005–07 issuance as of July 31, 2010)



Source: Standard & Poor’s.

Note: RMBS = residential mortgage-backed security; CDO = collateralized debt obligation; and SIV = structured investment vehicle.

Table 3.1. Long-Term Senior Debt Rating Symbols

| Interpretation | Fitch and S&P | Moody's | Moody's Five-Year Default Rates (1983–2009) (in percent) | | |
|--|---------------|---------|--|-----------|-----------|
| | | | Idealized | Corporate | Sovereign |
| Highest quality | AAA | Aaa | 0.003 | 0.086 | |
| High quality | AA+ | Aa1 | 0.031 | | |
| | AA | Aa2 | 0.068 | | |
| | AA– | Aa3 | 0.142 | 0.247 | |
| Strong payment capacity | A+ | A1 | 0.261 | | |
| | A | A2 | 0.467 | | |
| | A– | A3 | 0.730 | 0.806 | 0.000 |
| Adequate payment capacity | BBB+ | Baa1 | 1.100 | | |
| | BBB | Baa2 | 1.580 | | |
| | BBB– | Baa3 | 3.050 | 2.027 | 2.437 |
| Likely to fulfill obligations, ongoing uncertainty | BB+ | Ba1 | 5.280 | | |
| | BB | Ba2 | 8.410 | | |
| | BB– | Ba3 | 11.860 | 11.444 | 8.079 |
| High-risk obligations | B+ | B1 | 16.120 | | |
| | B | B2 | 20.710 | | |
| | B– | B3 | 27.050 | 26.240 | 10.572 |
| Vulnerable to default | CCC+ | Caa1 | 36.314 | | |
| | CCC | Caa2 | 48.750 | | |
| | CCC– | Caa3 | 69.821 | | |
| Near or in bankruptcy or default | CC | Ca | | | |
| | C | C | | 52.350 | 32.458 |
| | D | D | | | |

Sources: Fitch; Moody's; and Standard & Poor's.

rates. Examples of such target rates are the Moody's "idealized" default rates in Table 3.1, based on historical default rates over various horizons, and analyst judgments. The "idealization" process is intended to ensure the appropriate smooth ranking of default probabilities by rating.

However, the CRAs make it clear that they do not strive to maintain constant default rates for given letter grades (see Table 3.2). According to Cantor and Mann (2003, p. 6), this would require changing ratings "en masse in response to changes in cyclical conditions." More recently, the CRAs have made a special effort to clarify this point, both because of criticisms made of their quantitative models and because some uses of ratings by investors and the authorities, including central banks, are not fully compatible with this risk ordering idea. For example, the Basel II standardized approach is based on AAA/AA ratings implying a 0.10 percent probability of defaulting during a three-year period, single-A ratings a 0.25 percent probability, 1.00 percent for BBB instruments, and so on (BCBS, 2006, Annex 2). The Eurosystem's high "credit threshold" for collateral posted against monetary policy operations is defined in

terms of a BBB- rating that implies a 0.40 percent one-year default probability (ECB, 2008a).

The CRAs also make it clear that rating stability is another key rating objective. In particular, they aim to make sure that the higher rating grades are more stable than the lower rating categories. S&P (2010b) recently formalized this objective in its revamped criteria. The stability criterion is driven by an aversion of market participants to the potential transaction-related costs that would be triggered by frequent rating changes (Cantor and Mann, 2007). The portfolio governance rules, regulations, and contractual triggers that would be associated with such transactions are discussed in the next section.

One of the ways in which CRAs achieve this stability is by rating "through the cycle" (TTC) instead of at a "point in time" (PIT), thereby attempting to avoid procyclicality. In more practical terms, ratings are typically based on the ability of an issuer to survive a cyclical trough. Once the rating is set, it is changed only in response to changes in fundamental factors, such as secular trends or unanticipated policies. Under this approach, a recession or tightening of

Table 3.2. Rating Agency Statements on What Their Ratings Are Designed to Measure

| | |
|-------------------|--|
| Fitch | “Credit ratings express risk in relative rank order, which is to say they are ordinal measures of credit risk and are not predictive of a specific frequency of default or loss. Fitch Ratings’ credit ratings do not directly address any risk other than credit risk, ratings do not deal with the risk of a market value loss on a rated security due to changes in interest rates, liquidity and other market considerations.” |
| Moody’s | “There is an expectation that ratings will, on average, relate to subsequent default frequency, although they typically are not defined as precise default rate estimates. Moody’s ratings are therefore intended to convey opinions of the relative creditworthiness of issuers and obligations...Moody’s ratings process also involves forming views about the likelihood of plausible scenarios, or outcomes—not forecasting them, but instead placing some weight on their likely occurrence and on the potential credit consequences. Normal fluctuations in economic activity are generally included in these scenarios, and by incorporating our views about the likelihood of such scenarios, we give our ratings relative stability over economic cycles and a sense of horizon.” |
| Standard & Poor’s | “Standard & Poor’s credit ratings are designed primarily to provide relative rankings among issuers and obligations of overall creditworthiness; the ratings are not measures of absolute default probability. Creditworthiness encompasses likelihood of default and also includes payment priority, recovery, and credit stability.” |

Sources: Fitch (2010b); Fons (2002); and Standard & Poor’s (2009).

global liquidity should not, in itself, trigger a downgrade.⁷ PIT assessments tend to focus on the current conditions of an issuer.

More recently CRAs have started to develop new methodologies that shift the criteria from a TTC to a “through-a-crisis” focus. For example, the new S&P (2010b) credit stability criterion uses hypothetical stress scenarios as benchmarks for calibrating the criteria across different sectors and over time. Each scenario is constructed to be relevant for a specific rating grade. The scenario for a particular grade reflects the level of stress that issuers rated in that grade, say AAA, should be able to withstand without defaulting. In contrast to the TTC rating approach, this new stability criterion allows for hypothetical scenarios affecting fundamental components. In this way, ratings become measures of risk conditional on the realization of extreme scenarios (rather than conditional on the continuation of the current macroeconomic situation).

In either case, however, investors and policymakers should be aware that TTC ratings may appear to underperform the short-term predictive power of PIT assessments. Some of these implications are discussed in greater depth below.

⁷One of the challenges of producing TTC ratings is differentiating fundamental versus cyclical factors. These challenges are similar to those faced by central banks that try to maintain their monetary policy targets.

The Evolving Roles and Regulation of Credit Ratings and Credit Rating Agencies

Credit ratings have long played a significant role in the marketing of fixed-income instruments to investors, but over time they have also found their way into various rules and regulations.⁸ As a result, rating downgrades often lead to knock-on and spillover effects that can have destabilizing impacts on financial markets (Box 3.2). Country authorities have taken a two-pronged approach to mitigate these effects by seeking to reduce regulatory reliance on ratings, and by regulating the CRAs directly. In their efforts to reduce rating reliance, regulators are, however, recognizing that some smaller and less-sophisticated investors will have to continue to rely on ratings.

Central banks continue to use credit ratings rather mechanistically in their rules that determine the securities they accept as collateral in liquidity provision and market operations, and the margin or haircut applied thereon. For example, the U.S. Federal Reserve’s Term Auction Lending Facility mandates that only asset-backed securities rated AAA/Aaa by two or more of the major nationally recognized statisti-

⁸For a history of the rating business in the United States, going back to Moody’s *Analyses of Railroad Investments* published in 1909, and the increased regulatory reliance on ratings, see Cantor and Packer (1994), Partnoy (1999), and Federal Register (2008).

cal rating organizations (NRSROs) are eligible for nonrecourse loans. Similarly, the European Central Bank (ECB) requires that marketable assets meet “high credit standards” in order to be eligible as collateral, in turn requiring at least one BBB- credit rating from one of the four accepted “external credit assessment institutions” (with the exception of asset-backed securities, for which the credit rating at issuance should be AAA) (ECB 2008a, 2008b, and 2009).

Joint Forum Stocktaking Confirms Extensive Use of Credit Ratings in Regulations

A Joint Forum (2009) survey of the use of credit ratings by its member regulatory authorities in the banking, securities, and insurance sectors found that the reliance on credit ratings was widespread in regulations and legislation for the banking and securities sector, with more limited use in the insurance sector.⁹ Credit rating references were found to be more prevalent in U.S. and Canadian legislation and regulations relative to those in Europe, Japan, and Australia. In the United States, the Securities and Exchange Commission (SEC) first used the term NRSRO in 1975 in its net capital rule for broker-dealers as an objective benchmark to prescribe capital charges for different types of debt securities.

Since its introduction in 1975, the NRSRO designation, and hence credit ratings, have found their way into other federal securities laws and regulations and elsewhere (Federal Register, 2008). For instance, insurance codes set by state regulators rely on ratings to determine appropriate investments for insurance companies. By 1997, the number of references to NRSROs in U.S. securities legislation had risen to more than 1,000, while there were some 400 citations each in pension, banking, and real estate legislation (Partnoy, 1999). This is consistent with the findings of the Joint Forum (2009) report that an important role of credit ratings is to identify or classify assets, usually in the context of eligible investments or permissible asset concentrations. Ratings were also found to play key roles in evaluating the risks associated with assets

⁹The Joint Forum (2009) survey included 26 agencies representing 12 different countries, as well as five responses referring to international frameworks.

purchased as part of securitization offerings, and in determining disclosure requirements, as well as prospectus eligibility and exemptions. Still, the Joint Forum report found that the most common use of credit ratings is for regulatory capital.

Private Sector Contracts Are Also Highly Dependent on Credit Ratings

An SEC (2003) survey found that most mutual funds, pension funds, insurance companies, private endowments, and foundations use credit ratings to comply with internal by-law restrictions or investment policies that require certain minimum credit standards. External credit ratings constitute objective and easily verifiable third-party opinions. These institutions were also found to use ratings to ensure compliance with various regulatory requirements, even though they typically conducted their own credit analysis for risk management purposes, or to identify pricing discrepancies for their trading operations. Moreover, fixed-income portfolio manager performance is often benchmarked against standard indices that are usually constructed on the basis of credit ratings. For example, only investment-grade-rated (BBB-/Baa3 or better) instruments make it into the Barclays Euro Government Bond indices, implying that a bond downgrade to below the investment-grade threshold often triggers immediate liquidation.¹⁰

The SEC (2003) survey also noted the widespread use of “ratings triggers” in financial contracts that terminate credit availability or accelerate credit obligations in the event of specified downgrades. Moody’s (2001) describes three instances of rating-trigger-related “mutual assured destruction” during 2000–01, including the collapse of Enron. In that case, trading and other financial agreements gave counterparties the right to demand cash collateral, and lenders the right to demand repayment of outstanding loans once Enron’s credit rating declined below certain levels (Moody’s, 2001).¹¹

¹⁰In some cases, the liquidation requirement is actually triggered when an investment-grade issuer is just above the threshold (e.g., BBB-/Baa3 or BBB/Baa2) but on review for a downgrade, or when one of the relevant CRAs has issued the equivalent of a negative outlook.

¹¹The other examples of rating-trigger-related corporate failures given in Moody’s (2001) involve PG&E Corporation (and

Rating triggers in over-the-counter (OTC) derivative contracts also played a role in the near collapse of AIG. As long as the insurer and its financial products subsidiary (AIG FP) were rated AAA, the terms and conditions of their contracts did not oblige them to post collateral against these positions.¹² However, after the first downgrade (to AA+ in March 2005) they had to start posting collateral. As the crisis unfolded their mounting collateral posting requirements, coupled with liquidity strains from their securities lending unit, eventually became unsustainable. By September 2008, given the potentially disastrous systemic knock-on effects of a failure to post collateral, the U.S. authorities decided to supply AIG with liquidity assistance, which, at one point, exceeded \$100 billion.

Country Authorities Working to Reduce Rating Reliance

Authorities are currently seeking to reduce regulatory reliance on credit ratings, while being mindful of not returning to inferior alternatives, such as risk-insensitive systems (for example, the Basel I framework), or model-based systems that are not yet sufficiently robust. The Financial Stability Board is currently working on proposals to reduce reliance on external ratings in rules and regulations, in line with the Group of Twenty (G-20) Declaration at the Toronto 2010 Summit (G-20, 2010) in June. In the United States, the financial sector reform bill signed into law in July 2010 explicitly requires all federal agencies to review and modify regulations to remove references to or reliance upon credit ratings and substitute an alternative standard of creditworthiness.¹³ In Japan, the Financial Services Agency recently adopted a proposal aimed at reducing the use of credit ratings in the regulatory and supervisory framework.

Other options being explored include forcing institutions to conduct appropriate due diligence (with consequences for their required capital holdings if they fail to do so). In particular, institutional investors are

being required to follow the International Organization of Securities Commissions' (IOSCO) best due diligence practices. There are also considerations to require CRAs to comply with the IOSCO Code of Conduct in order for their ratings to be used for Basel II purposes, and to reduce cliff effects in the standardized approach. Such a cliff effect occurs when there is a downgrade, in particular below the investment-grade threshold, which in turn has an additional liquidity effect due to the need to meet regulatory requirements. Similarly, central banks should to an increasing extent rely on internal credit assessments.

Notwithstanding the current move toward reducing the regulatory reliance on credit ratings, CRAs and their ratings will inevitably continue to play important roles in financial markets. For example, smaller and less-sophisticated investors that do not have the economies of scale to do their own credit assessments will inevitably continue to rely extensively on external information, including credit ratings. Hence, any steps to reduce overreliance on ratings should differentiate both according to the size and sophistication of the institution, and the instruments concerned, making sure there is sufficient information for most users to do their own due diligence. Also, it will be important that the authorities continue efforts to improve CRA procedures, including transparency, governance, and mitigation of conflicts of interest.

Recent and Ongoing Measures to Regulate Credit Rating Agencies

At the 2009 London Summit, the G-20 leaders agreed that the regulatory oversight of CRAs, consistent with the IOSCO (2008) credit rating *Code of Conduct Fundamentals*, should be established by end-2009 (G-20, 2009). As a result, national and regional initiatives have been undertaken or are under way to strengthen oversight of CRAs, with some of them initiated even before the crisis. The SEC has adopted or proposed amendments to its rules on NRSROs to increase transparency, tighten oversight, and reduce conflicts of interest. In the European Union (EU), regulation introducing oversight and supervision of CRAs entered into force in December 2009, and there is a proposal for the new European Securities and Markets Authority to be in charge of registration and

its subsidiary Pacific Gas and Electric Company), and Southern California Edison Company.

¹²For more on the risk management of OTC derivative contracts, see IMF (2010, Chapter 3).

¹³In August 2010, the U.S. banking regulators published an advance notice of proposed rulemaking that invited comments on credit rating alternatives for their regulations.

supervision of CRAs. In Australia and in Japan, new regulatory frameworks for CRAs became effective in January and April 2010, respectively, while in Canada, a proposal to introduce regulatory oversight of CRAs was published for comment in July 2010. Many other G-20 countries have also introduced or are in the process of introducing new regulatory oversight for CRAs. (See Box 3.3 for a summary of the major initiatives and proposals.)

One particular ongoing concern is the conflict of interest arising from the issuer-pay model. Currently, almost all credit ratings are paid for by the issuer of the instruments, which might give issuers incentives to shop around for the best rating. In theory, a CRA should have a vested interest, including under an issuer-pay model, in providing reliable ratings on an ongoing basis in order to maintain its “reputational capital” (Partnoy, 1999; Bergevin, 2010). However, the significant increase over time in references to credit ratings in rules and regulations, combined with limited competition, has affected the business model of CRAs by creating a more or less “guaranteed market” with few incentives to compete on the basis of rating quality. Furthermore, some would argue that an investor-pay model, where ratings are paid for by investors through subscription fees, can also give rise to conflicts of interest.¹⁴ A large investor could try to influence CRAs to provide lower initial ratings (which tend to provide higher yields), while institutions that can only invest in highly rated instruments due to regulatory requirements might pressure a CRA to assign an investment-grade rating on a particular security (Partnoy, 2009).

The U.S. financial sector reform legislation signed into law in July 2010 will require several agencies to conduct studies of various proposals to deal with the conflict of interest arising from the issuer-pay model. One of the proposals to be studied (by the SEC) would establish a Credit Rating Agency Board

to assign NRSROs the rating of specific structured finance products to thwart rating shopping by issuers. The SEC and Government Accountability Office are also charged with reviewing alternative CRA business models and compensation schemes. In addition, a 2009 SEC amendment to the rules relating to the oversight of the NRSROs explicitly prohibits anyone who participates in determining a credit rating from also participating in any fee negotiations or discussions.¹⁵ A more radical approach to the incentive conflict problem could be to move to performance-based pay, where only a smaller fee would be paid up front while the remaining fee would be earned over time, based on the ultimate accuracy of the rating. Alternatively, Partnoy (2009) has suggested that CRAs be required to hold stakes in certain instruments that they rate highly, although it is unlikely that all CRAs would have sufficient capital to support potential losses on such an asset.

Self-Improvement Measures Taken by the Credit Rating Agencies

Since the onset of the financial crisis, the major CRAs have also taken steps themselves to improve rating quality, transparency, and corporate governance. They have conducted rating reviews across asset classes, revised ratings where necessary, and updated criteria and models with new factors and assumptions. Several CRAs have improved staff training, including by teaming up with high-ranking universities. There has been a further emphasis on the publication of the underlying research, as well as revamped external websites to enhance transparency. For example, to better signal concerns about potential rating pressures for structured finance products, some CRAs started publishing early indicators of a potential rating change over the next one- to two-year period. Given the intensification of the global financial crisis, there has been a particular emphasis on publishing better and more accessible research on sovereign creditworthiness.

In order to enhance governance, the major CRAs have revised their codes of conduct to conform to the updated IOSCO code of May 2008, focusing on the

¹⁴In the mid-1970s, as credit ratings started to become more important because of the increasing reliance on ratings in rules and regulations, NRSROs stopped selling ratings to investors and instead began charging the companies that issue the debt they rate (Partnoy 1999 and 2009). Still, some of the smaller and more focused current NRSROs, such as Egan-Jones Rating Company (which focuses on corporates), Lace Financial Corporation, and Realpoint, LLC (which focuses on structured finance), base themselves on subscription-based business models.

¹⁵For more information see www.sec.gov/rules/final/2009/34-59342-secg.htm.

Box 3.3. Developments in the Regulation of Credit Rating Agencies

In the wake of the recent financial crisis, many countries have taken steps to enhance the regulatory framework for credit rating agencies, focusing on registration, enhanced oversight, and transparency. Some countries are also moving toward reduced reliance on credit ratings in rules and regulations. This box examines the regulatory steps taken in this regard in the United States, Europe, Japan, Australia, and Canada.

United States

The U.S. *Credit Rating Agency Reform Act of 2006* gave the Securities and Exchange Commission (SEC) authority to regulate credit rating agencies (CRAs). The act's overriding purpose is to improve rating quality for the protection of investors by fostering accountability, transparency, and competition in the credit rating industry and by establishing a transparent registration system and oversight regime for nationally recognized statistical rating organizations (NRSROs).

The SEC has introduced new measures aimed at reforming CRA transparency and disclosure standards and reducing potential conflicts of interest, given the current "issuer-pay" compensation model. NRSROs are required to publish a description of their rating methodologies and procedures, plus certain rating performance analytics.¹ In addition, issuers will have to share with the other NRSROs all information they provide to any particular NRSRO with respect to structured credit product ratings.

On July 21, 2010, the *Dodd-Frank Wall Street Reform and Consumer Protection Act* was signed into law.² The bill increases internal controls for CRAs,

requires greater transparency of rating procedures and methodologies, and provides the SEC with greater enforcement and examination tools regarding NRSROs. In particular, the bill:

- Requires each NRSRO to have a Board of Directors of which at least half (but not fewer than two) are independent members, some of whom must be users of NRSRO ratings;
- Introduces the possibility of exposing NRSROs to liability as experts;³
- Suggests that the SEC should exercise its rulemaking authority to prevent conflict of interest arising from employees of NRSROs providing services to issuers of securities that are unrelated to the issuance of credit ratings;
- Requires each NRSRO to establish, maintain, enforce, and document an internal control structure to govern implementation of and adherence to policies, procedures, and methodologies for determining ratings;
- Asks the SEC to adopt rules that require each NRSRO to establish, maintain, and enforce policies and procedures that clearly define and disclose the meaning of any ratings symbol and apply this symbol consistently for all instruments for which the symbol is used;
- Requires the removal of certain statutory references to credit ratings and requires that all federal agencies review and modify regulations to remove references to or reliance upon credit ratings and substitute an alternative standard of creditworthiness; and

Note: This box was prepared by Ann-Margret Westin.

¹The first set of rules adopted by the SEC in 2007 required CRAs to include certain rating performance statistics (for example, historical downgrade and default rates within each major rating category). These rules were refined in 2009. In addition, CRAs have to make publicly available, in machine-readable form on a six-month delay, rating action histories for a randomly selected 10 percent of issuer-paid ratings for each class of credit rating for which they have issued 500 or more issuer-paid ratings. Furthermore, all such data must be made publicly available on a 12-month lag. See www.sec.gov/rules/final/2009/34-59342-secg.htm and www.sec.gov/rules/final/2009/34-61050-secg-nrsro.htm.

²For a summary of the bill, see Davis Polk (2010). For the full text of the bill, see www.govtrack.us/congress/bill.xpd?bill=h111-4173.

³The bill nullifies Rule 436(g) under the Securities Act, which exempts credit ratings provided by NRSROs from being considered part of a registration statement prepared or certified by a person within the meaning of Sections 7 and 11 of the act. As a result, registrants, in order to include an NRSRO credit rating in a registration statement, would be required to file the NRSRO's consent along with the registration statement, in turn exposing the NRSRO to liability for material misstatements or omissions with respect to such included ratings. As a result, the major CRAs have already announced that they will not allow debt issuers to include their ratings in prospectuses or debt registration statements for now. The SEC has given issuers six months to comply with the new regulations, currently allowing them to omit credit ratings from the registration statements.

Box 3.3 (continued)

- Establishes an SEC Office of Credit Ratings that will put in place fines and other penalties for violations by NRSROs, administer SEC rules with respect to NRSRO practices in determining ratings, and conduct an annual examination of each NRSRO.

The bill also asks for a number of studies. In particular, the SEC is required to undertake a study of the credit rating process for structured finance products and the conflicts of interest associated with the issuer-pay and subscriber-pay models, the range of metrics to determine the accuracy of ratings, and alternative means of compensation to create incentives for accurate ratings. The SEC must also study the feasibility of establishing an independent organization to assign NRSROs to determine credit ratings for structured finance products, and create and oversee a Credit Rating Agency Board that would assign a “qualified” CRA to rate each new issue of asset-backed securities, unless it determines that an alternative system would be more appropriate.⁴ The SEC is also asked to provide a study of the independence of NRSROs and how this affects ratings issued, while the Government Accountability Office must conduct a study of alternative means for compensating CRAs in order to create incentives to provide more accurate ratings.

Europe

The European Commission (EC) in November 2008 established a group chaired by Jacques

⁴The board would be made up of a majority of investors, and of at least one issuer representative, one rating agency representative, and one independent member. The probability of a CRA being chosen could depend on past performance. The board would also be able to prevent CRAs from charging unreasonable fees for providing a rating.

quality and integrity of the ratings process and reducing conflicts of interest.¹⁶ Some have updated their fee policies to ensure a clearer separation between their core

¹⁶See IOSCO (2009). For examples of the CRAs’ own codes of conduct, see www.fitchratings.com/jsp/creditedesk/CodeOf-Conduct.faces?context=3&detail=1 and www.standardandpoors.com/ratings/policies-and-code-of-conduct/en/us.

de Larosière to examine possible improvements to supervision and regulation of CRAs. As a result, a first set of regulations on CRAs was adopted in September 2009, responding to what was seen as major weaknesses in the activities of CRAs. The regulation, which came into force in December 2009, has introduced mandatory registration for all CRAs operating in the European Union (EU). Specific treatment can be extended on a case-by-case basis to CRAs operating exclusively from non-EU jurisdictions provided that their countries of origin have established regulatory and supervisory frameworks as stringent as the one now put in place in the EU.

Registered CRAs will have to comply with a comprehensive set of rules to make sure that ratings are not affected by conflicts of interest; that CRAs remain vigilant, ensuring the quality of the rating methodology; and that they act in a transparent manner. The regulation also includes a surveillance regime for CRAs. In particular, CRAs:

- May not provide advisory services;
- Will not be allowed to rate financial instruments if they do not have sufficient quality information on which to base their ratings;
- Must disclose the models, methodologies, and key assumptions on which they base their ratings;
- Must differentiate the ratings of more complex products by adding a specific symbol; and
- Should have at least two independent directors on their boards whose remuneration cannot depend on the business performance of the rating agency.

According to the regulation, the Committee of European Securities Regulators will be in charge of the registration and day-to-day supervision of the

rating activities and other business development activities, and clarified the definition of “ancillary business,” that is, what is not included in the core rating business. Also, and in line with the recently approved U.S. financial sector reform bill, several CRAs have implemented “look-back” reviews, that is, reviews of historical ratings when a rating analyst leaves a CRA to join an organization that was previously rated by the particular analyst.

Box 3.3 (concluded)

CRA. However, in June 2010 the EC proposed the introduction of centralized EU oversight of CRAs, entrusting the proposed new European Securities and Market Authority (ESMA) with exclusive supervisory powers over CRAs registered in the EU, making CRAs the first type of institution subject to centralized EU supervision. Under the proposal, the ESMA will have powers to request information, launch investigations, and perform on-site inspections. Furthermore, issuers of structured finance products will have to provide all other interested CRAs with access to the information they give to the CRA rating their product, enabling the other CRAs to issue unsolicited ratings.⁵

Japan

Similarly, in Japan, the *Financial Instruments and Exchange Act* was amended in June 2009 to introduce a set of regulations on CRAs, effective April 2010, to ensure (1) independence of CRAs from security issuers; (2) quality and fairness in the rating process; and (3) transparency for market participants. Among several measures, the Financial Services Agency (FSA) of Japan has introduced a registration system that requires registered CRAs to disclose rating policies in a timely manner, take measures to control quality and prevent conflict of interests, and avoid providing advisory services. Unregistered CRAs are still allowed to operate, but in using their credit ratings, issuers must notify investors of the fact that those ratings are issued by unregistered CRAs effective October 2010.⁶ The Japanese FSA also recently

adopted a proposal to amend the relevant cabinet office ordinances with the aim of reducing the use of credit ratings in the regulatory and supervisory framework, effective January 2011.

Australia and Canada

Since January 1, 2010, CRAs in Australia have been required to hold an Australian Financial Services license, requiring them to, among other things, manage conflicts of interests, have in place risk management systems, lodge annual compliance reports, and disclose procedures, methodologies, and assumptions for ratings. Measures have also been taken to enhance CRA exposure to legal liability.⁷

Meanwhile, in July 2010 the Canadian Securities Administrators published for comment a proposal aimed at introducing securities regulatory oversight of credit rating organizations. Central to the proposal is the requirement for credit rating organizations to apply to become a “designated rating organization” to allow their ratings to be used for various purposes within securities legislation. Once designated, a rating organization would be required to have and enforce a code of conduct that is based on the code published by IOSCO, and to establish policies and procedures to manage conflicts of interest, prevent inappropriate use of information, appoint a compliance officer, and make an annual filing.⁸

⁵For further information go to http://ec.europa.eu/internal_market/securities/agencies/index_en.htm.

⁶For further information go to www.fsa.go.jp/en/news/2010/20100331-4.html.

⁷For further information go to www.asic.gov.au/asic/asic.nsf.

⁸For further information go to www.securities-administrators.ca/aboutcsa.aspx?id=915.

The Way Forward

Despite efforts so far, conflicts of interest are still present and will require a two-pronged approach. There seem to be few viable alternative compensation models to an issuer-pay business model in the foreseeable future. In particular, it is not realistic to return to a general investor-pay subscription model. Already as of 1999, 95 percent of all CRA revenue stemmed from

issuer fees, reflecting in large part a desire to solve the free-rider problem of nonsubscribers accessing the rating information (Partnoy, 1999). Excluding nonsubscribers would be even more difficult in today’s information society. Meanwhile, the more radical compensation model of performance pay could be desirable looking ahead, in line with similar initiatives in banking supervision to have compensation be more closely related with

risks undertaken. However, this business model, as well as a model based on more “skin in the game,” is unlikely to gain momentum for the time being. Tellingly, no current regulatory initiatives seriously question the issuer-pay compensation model. Rather, the issuer-pay model should be expected to stay for now and the way forward should be a combination of gradually reducing the regulatory reliance on credit ratings to the extent possible, while at the same time enhancing CRA regulatory oversight. Reducing regulatory reliance on ratings will diminish some of the incentives to shop for ratings, since CRAs will no longer face a captive market but rather will need to compete on the basis of rating accuracy. The decline in regulatory reliance on ratings might in turn spur a decline in the use of ratings in private contracts as well. Still, credit ratings are likely to continue to serve an important role given the substantial existing information and analytical capacity asymmetries, in particular for smaller investors and illiquid instruments. Therefore, enhanced oversight of the CRAs will be essential, in line with IOSCO’s new objectives and principles (IOSCO, 2010).

Enhanced competition would need to be combined with tougher measures against rating shopping. Although there are more than 70 CRAs globally, only three to four cover the lion’s share of the global market. While there are few formal barriers for entering the market, fixed costs are still high given the information needs and the importance of company reputation, in turn stifling entry. Looking ahead, enhanced competition would be welcome, although there are a few caveats. Empirically, event studies suggest that the arrival of an additional CRA to a market has led to lower rating quality/higher ratings, in part reflecting enhanced opportunities for rating shopping, while not enhancing the information content.¹⁷ Hence, measures should be taken to discourage such rating shopping, including requiring disclosure about any preliminary ratings. Also, establishing a public CRA, in the spirit of enhancing competition, could entail its own conflicts of interest if it rated sovereigns, given the importance of sovereign credit ratings.

Regulators will also need to decide on how to treat CRA liability issues. In the United States, civil suits against CRAs have so far been unsuccessful, as ratings

qualify as “opinions” rather than expert recommendations. This is set to change with the recent Dodd-Frank Act (see Box 3.3), which subjects CRAs to greater liability. Similar measures have also been taken in Australia. With significant regulatory reliance on credit ratings, users could argue that legal recourse for rating inaccuracy is warranted. This might, however, become less important as the regulatory reliance on ratings declines over time.

Fundamental Sovereign Credit Risk Analysis

The CRAs are constantly fine-tuning their rating methodologies. It would appear that sovereign ratings have performed somewhat better through this crisis than they did during the Asian crisis. However, the analysis below suggests that there is still scope to capture more effectively some factors that have been significant in shaping the current crisis—namely, the level of short-term debt and the size of contingent liabilities.

Overall, the CRAs base their ratings on key economic factors coupled with some qualitative assessment (particularly of the nature of institutions and the political environment). These factors are described in significant detail in their publications, and much of the underlying information is in the public domain. This suggests that internal-ratings models could readily use the equivalent information. However, the analysis below of various tests of quantitative, model-driven ratings suggests that the qualitative judgmental element is an equally important rating driver.

Overview of Sovereign Rating Approaches

The CRAs determine sovereign ratings based on a range of quantitative and qualitative factors with which they gauge a country’s ability and willingness to repay its debt (Box 3.4). The limited number of actual sovereign defaults constrains back-testing of any empirical model when trying to determine a sovereign’s creditworthiness (and associated probability of default). Another factor that differentiates the rating of sovereigns over and above other instrument ratings is the concept of “willingness to pay.” This reflects the potential risk that even if the sovereign had the *capacity* to pay, it may not be *willing* to pay if it judges the social or political costs to be too great. To capture this element, CRAs assess a range of qualitative factors such as institutional strength,

¹⁷For example, see Becker and Milbourn (2010) and Bongaerts, Cremers, and Goetzmann (2009).

Table 3.3. Key Factors in Sovereign Credit Rating Assessments

| | |
|-------------------|--|
| Fitch | Macroeconomic policies, performance, and prospects; structural features of the economy; public finances; external finances |
| Moody's | Economic strength; institutional strength; financial strength of the government; susceptibility to event risk |
| Standard & Poor's | Political risk; economic structure; economic growth prospects; fiscal flexibility; general government debt burden; offshore and contingent liabilities; monetary flexibility; external liquidity; external debt burden |

Sources: Fitch (2010a); Moody's (2008); and Standard and Poor's (2008).

political stability, fiscal and monetary flexibility, and economic vitality. In addition, a country's track record of honoring its debt is an important indicator of willingness to pay, a characteristic that is otherwise difficult to measure objectively. These qualitative factors are complemented with quantitative factors such as the level of debt and official international reserves, the composition of debt (in particular the currency composition and maturity profile), and the extent of the debt burden, for example as captured in interest costs.

The fundamental analysis that feeds the rating process is comparable across the CRAs, but it differs in the way individual factors are classified and grouped, and in the specificity with which the CRAs present their methodologies. Hence, although the overall information sets are similar, Fitch and Moody's classify their indicators under four categories of key factors, while S&P uses nine (Table 3.3 and Box 3.4).¹⁸ The CRAs use public information as well as additional information supplied to them by the country authorities. Though sometimes difficult to achieve, a quality check of the data is an important part of the country risk analysis.

While CRAs make a significant effort to use clear and objective criteria to "score" country performance under each factor, the actual rating is not a mechanical weighting of these factors. As with their other ratings, sovereign ratings are determined by a rating committee that takes into account all the material presented by a relevant analyst and then forms a judgment of where the country stands relative to other credits.¹⁹ This judgment is neces-

sary in order to take into account the relevance of political and institutional factors; it also allows the ratings to adapt to changing circumstances, permitting the relative weight of various factors—for example, levels of domestic and short-term debt—to vary over time.

Also, rating methodologies themselves evolve over time and continue to be adjusted in response to new information and economic developments. These adjustments tend to be small, and CRAs are generally careful to keep the number of rating changes triggered by these adjustments to a minimum. However, following the Asian crisis—when the CRAs were widely criticized for failing to spot at an early stage the build-up of risks that would affect a sovereign—there was a more significant review and change in their sovereign risk methodologies. For example, Fitch adjusted its approach to more closely monitor countries with a high proportion of short-term external debt, even if overall debt levels were modest, while S&P increased its focus on external obligations, including private sector external debt and contingent liabilities.

The quality of CRA ratings would benefit from better sovereign data and transparency. Indeed, S&P has been assigning a greater weight to issues of transparency and the quality of fiscal data since the Asian crisis.²⁰ Global data transparency initiatives could give CRAs and other market participants access to key sovereign data in a more relevant and timely fashion. Also, such initiatives would help identify the current information gaps, including on contingent

¹⁸Between 1998 and 2008 the number of key factors considered by S&P has varied between 8 and 10.

¹⁹The rating committee typically also draws on staff from other rating teams, sectors, and regions. One reason is to help ensure consistency across rating groups. Another reason is to mitigate the risk of conflict of interest or "issuer capture" referred to above. Since the onset of the crisis, some CRAs have taken steps to further broaden their rating committee representation. In fact, one

element of the EU proposals on regulating CRAs is to ensure the regular rotation of rating committee members to mitigate issuer capture. This will need to be carefully balanced, though, so that the benefits of consistency through time are not lost.

²⁰For more analysis on the importance of disclosing fiscal risks from exogenous shocks and the realization of explicit or implicit contingent obligations of the government, see Everaert and others (2009).

Box 3.4. An Overview of the Factors Influencing Sovereign Credit Ratings

This box reviews the quantitative and qualitative factors that the credit rating agencies (CRAs) use to gauge a country's ability and willingness to repay its debt. Although there are significant overlaps in which factors the CRAs use, there are differences in the relative weightings of factors, not only between CRAs, but also between types of countries.

Each of the three main credit rating agencies identifies a set of key drivers that determine its sovereign credit ratings (see table). For each driver, a range of quantitative and/or qualitative criteria is assessed.¹ While there may be some differences in how these factors are characterized, there is significant overlap in the underlying information that is considered. For example, all of the CRAs consider GDP per capita, the level and composi-

tion of debt, financial resources of the government, some indicator of political stability, and the robustness of the financial sector to be key criteria. However, there are some differences—for example, Fitch and S&P appear to put relatively more weight on contingent liabilities of the government, while Moody's appears to put more relative weight on event risk. Similarly, both Moody's and S&P appear to consider a broader set of factors when considering the general economic structure, including income discrepancies, competitiveness and protectionist factors (S&P), and innovation and investment in human capital (Moody's), relative to Fitch. The relevance of each factor also depends on the (type of) country under review. For instance, the level of reserves is a much more prominent factor for countries operating under a fixed or managed exchange rate regime.

Each CRA differs slightly in how the information is aggregated into a single rating. For example, Fitch uses a sovereign rating model that combines the criteria into

Note: This box was prepared by Allison Holland, Samer Saab, and Han van der Hoorn.

¹These criteria are described more fully in each of the CRAs' criteria reports. See Fitch Ratings (2010a), Moody's Investor Services (2008), and Standard & Poor's (2008).

Indicators Used by the Credit Rating Agencies (By Type of Driver)

| | Fitch | Moody's | Standard & Poor's |
|---------------------|--|---|--|
| Macro/ Growth | <ul style="list-style-type: none"> GNP and GDP per capita Consistency of monetary and fiscal policies and credibility of policy framework Sustainability of long-term growth path Competitiveness of economy Depth of demand for local currency Capacity to implement countercyclical macro policies Composition of current account | <ul style="list-style-type: none"> GDP per capita Long-term volatility of nominal output Scale of economy Integration in economic and trade zones | <ul style="list-style-type: none"> Rate and pattern of economic growth Range and efficiency of monetary policy tool Size and composition of savings and investment Money and credit expansion Price behavior in economic cycles |
| Public finance | <ul style="list-style-type: none"> Financial assets of government Sovereign net foreign asset position Volatility of government revenue Revenue-to-GDP ratio Medium-term public debt dynamics Credibility of fiscal policy framework and institutions Financial flexibility | <ul style="list-style-type: none"> Government's ability to raise taxes, cut spending, sell assets, or obtain foreign currency (e.g., from official reserves) | <ul style="list-style-type: none"> General government revenue, expenditure, and surplus/deficit trends Compatibility of fiscal stance with monetary and external factors Revenue-raising flexibility and efficiency Expenditure effectiveness and pressures Size and health of nonfinancial public sector enterprises |
| Debt | <ul style="list-style-type: none"> Size and growth rate of public debt Composition of government debt (maturity, interest rate, and currency) Contingent liabilities of government Maturity and currency structure of foreign liabilities and assets Distribution of foreign liabilities and assets by sector Payment record | <ul style="list-style-type: none"> Level of debt Interest payments and revenues Structure of government debt Debt repayment burden Debt dynamics Conditional liabilities Financial depth | <ul style="list-style-type: none"> General government gross and net debt; gross and net external debt Share of revenue devoted to interest Debt service burden Maturity profile and currency composition Access to concessional funding Debt and breath of local capital markets |
| Financial sector | <ul style="list-style-type: none"> Macro-prudential risk indicators Quality of banking sector and supervision Contingent liabilities of banking sector Foreign ownership of banking sector | <ul style="list-style-type: none"> Financial sector strength Contingent liabilities of banking sector | <ul style="list-style-type: none"> Robustness of financial sector Effectiveness of financial sector |

a single score that is calibrated to derive a long-term issuer default rating. However, the actual rating can deviate from this model-generated rating, given that the model may not capture all relevant developments; this is where the rating committee, a body within each CRA, can provide additional value. In the case of Moody's, each of the four key factors is rated on a five-point scale, which is combined in three stages. In the final stage, economic resilience—factors (1) and (2)—and financial robustness—factors (3) and (4)—are blended with peer group information and any missing information considered relevant. In the case of S&P, each of the nine key factors is ranked on a six-point scale but there is no precise formula for combining the scores. In addition, trends in each of the factors, as well as their absolute level, are also taken into account in the final rating.

In general, the CRAs assign both foreign currency and local currency ratings to each sovereign. While

there is often little difference between the two in the case of advanced economies, in the case of emerging and developing economies the local currency rating is generally higher. This difference can be attributed to the fact that it is often easier to repay local currency debt than foreign currency debt, given the central bank's ability to create the local currency. When determining the foreign currency rating, a country's ability to convert domestic assets into foreign currency is critical to the assessment. A well-developed domestic capital market that facilitates local-currency, long-term funding at relatively low cost will likely translate into a higher local currency rating. In contrast, countries that are members of a currency union, with fully dollarized economies, or with a fixed peg, tend to have identical local and foreign currency ratings. When market analysts refer to "the sovereign rating," they are generally referring to the long-term foreign currency rating.

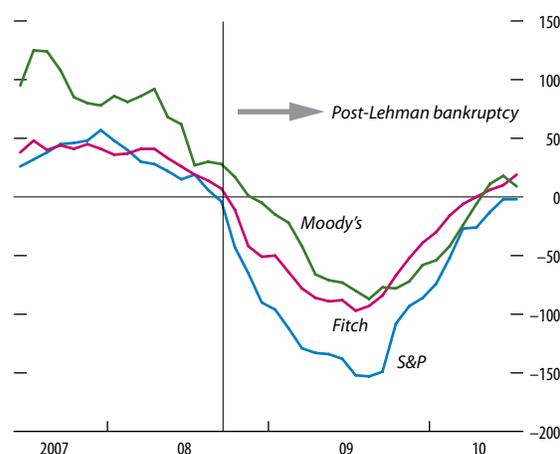
Indicators Used by the Credit Rating Agencies (By Type of Driver) (concluded)

| | Fitch | Moody's | Standard & Poor's |
|------------------------------|--|---|--|
| External finances | Capital flows Willingness of nonresidents to extend credit and purchase domestic assets Share of current output devoted to servicing external debt Reserve adequacy | Balance of payments dynamics Foreign exchange reserves Access to foreign exchange External vulnerability indicator | Impact of fiscal and monetary policies on external accounts Structure of the current account Composition of capital flows Reserve adequacy |
| Exchange rate | Exchange rate regimes Indexation and dollarization | Exchange rate regime Indexation and dollarization | Compatibility of exchange-rate regime and monetary goals Indexation and dollarization |
| Political | War risk Legitimacy of political regime Relations with international community and institutions | War Degree of political consensus Political chaos Efficiency and predictability of government action Level of policy transparency | Stability and legitimacy of political institutions Popular participation in political processes Orderliness of leadership succession Transparency in economic policy decisions and objectives Public security Geopolitical risk |
| Structural/ Institutional | Effectiveness of government Openness to international capital flows and trade Strength of business environment, human capital, and governance Rule of law, respect for property rights Control of corruption | Transparency Level of innovation Investment in human capital Respect for property rights | Efficiency of public sector Institutional factors, such as central bank independence Timeliness, coverage, and transparency in reporting Competitiveness and profitability of private sector |
| Other | Savings ratios Openness of economy to trade Commodity dependence | Earthquakes Hurricanes Speculative crises | Prosperity, diversity, and degree of market orientation Income discrepancies Protectionism and other nonmarket influences Labor flexibility |

Note: This table generalizes the presentation of indicators by the CRAs into a common set of key drivers.

Sources: Fitch (2010a); Moody's (2008); and Standard & Poor's (2008).

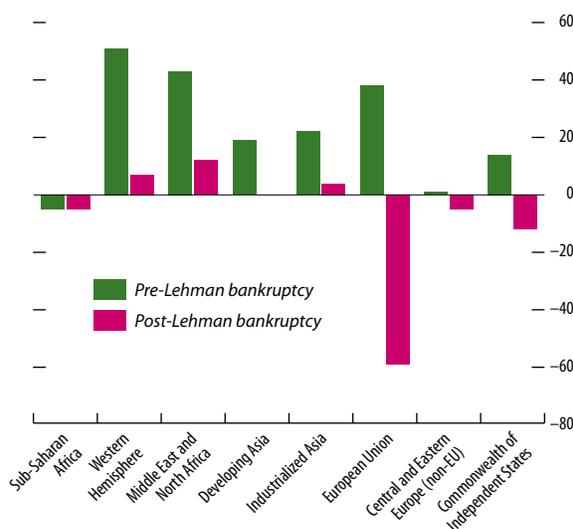
Figure 3.2. Sovereign Rating and Outlook Changes
(Rolling 12-month sum of rating actions)



Sources: IMF staff calculations using data from Fitch; Moody's; and Standard & Poor's.

Note: This figure shows rolling 12-month cumulative sums of all sovereign foreign currency rating actions across all sovereign ratings by each credit rating agency. For example, each positive (negative) rating outlook is +1 (-1); a review for upgrade (downgrade) is +2 (-2); and a positive (negative) rating change is +3 (-3).

Figure 3.3. Moody's Sovereign Rating and Outlook Changes by Selected Regions, May 2007–June 2010
(Cumulative sum of rating actions)



Source: IMF staff calculations using data from Moody's.

Note: No changes were made for the United States and Canada during this period. This figure shows cumulative sums of all sovereign foreign currency rating actions for the period May 2007–June 2010. For example, each positive (negative) rating outlook is +1 (-1); a review for upgrade (downgrade) is +2 (-2); and a positive (negative) rating change is +3 (-3). The regional groupings are based on the conventions used in the IMF's *World Economic Outlook*.

liabilities settled in national currency and those outside the scope of the monetary and central government authorities.²¹

A number of empirical studies have tried to infer the relative weighting of each factor in determining the ultimate rating (see Jaramillo, 2010, for a summary). A crude analysis that simply counts the frequency with which specific words appear in methodological papers might give a tentative indication of their relative importance to each CRA. This would suggest that Moody's attaches a relatively higher weight to the ability to pay, whereas Fitch and S&P focus relatively more on willingness to pay. Moody's also seems to attach greater weight to debt levels, particularly relative to official international reserves and other sovereign assets—that is, the affordability of debt—than the other two agencies. S&P appears to deviate from the other agencies in that it seems to attach relatively high weight to political risks and to monetary policy. (See Box 3.5 for a review of recent empirical work that has sought to reverse engineer ratings from fundamental inputs.)

Sovereign Credit Ratings through the Recent Crisis

One defining feature of the recent crisis is that it originated in advanced economies, with many emerging market economies relatively insulated. Overall, the sovereign rating environment began deteriorating significantly in the spring of 2008, with a strong downward trend evident starting in September 2008 (Figure 3.2). However, as also discussed in Chapter 1, this overall development masks important differences in performance across regions and levels of income (Figure 3.3). For example, Latin America and the Middle East continued to register positive rating actions both before and after the Lehman Brothers bankruptcy, as many emerging markets have demonstrated considerable resilience through the crisis. On

²¹An example of data transparency initiatives is the IMF's International Reserves and Foreign Currency Liquidity Data Template, which includes in its two-dimensional framework (foreign currency resources and the net demand on these resources) both predetermined and contingent demands on foreign currency resources resulting from short-term foreign currency liabilities and off-balance-sheet activities of national authorities.

the other hand, the European region, where the crisis hit harder, subsequently performed very poorly.

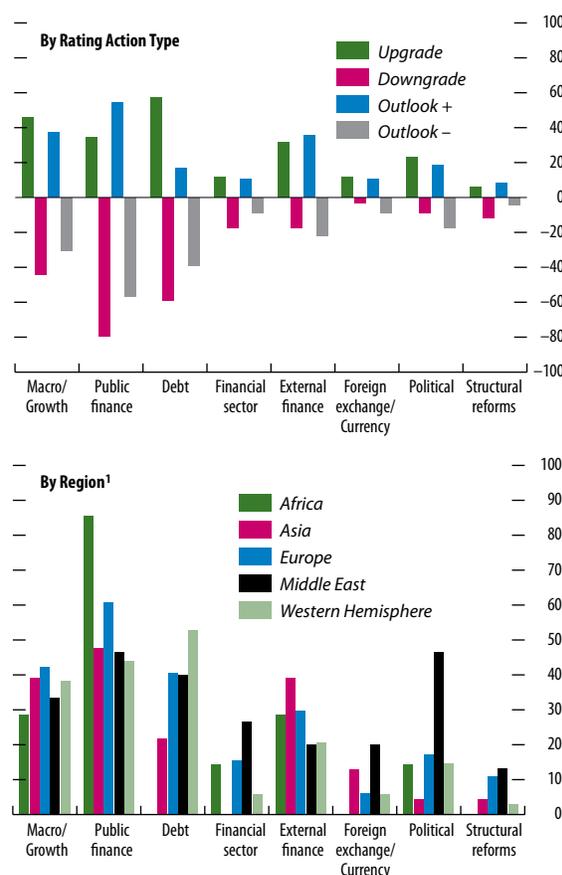
Reflecting this general deterioration in sovereign credit ratings, sovereign spreads widened significantly. However, some of these negative rating changes appear to have surprised markets, particularly the scale of the change. Specifically, the four-notch downgrade of Greece by Moody's in June 2010—a very significant move—seemed to have caught the market off guard, with spreads widening significantly following the event (see Box 3.6). Yet, when Moody's placed Greece on review for further possible downgrades in April, the potential for a multi-notch downgrade was clearly flagged. This suggests that insufficient attention was paid to the detailed analysis and information underlying the change in outlook. The importance of review and outlook changes for spreads is highlighted in the next section.

An examination of the analysis accompanying the announcement of each rating action by the “big three” CRAs shows that the drivers were not uniform across types of rating actions or geographic regions (Figure 3.4).²² While traditional debt sustainability rating drivers such as the fiscal balance and debt level were the most commonly cited variables across rating action types and geographic distribution, they played a proportionally greater role in driving negative rating actions than positive ones. Conversely, external financing conditions and political factors seem to matter more in an upgrade/positive outlook decision.

The Accuracy and Informational Value of Sovereign Ratings

In the wake of the recent crisis and European sovereign downgrades, questions are being asked about the usefulness of CRAs and the accuracy of their credit risk assessments. Also, going back to the 1990s, CRAs have been accused of not only being too slow to change ratings, but also of being procyclical. For example, Larrain, Reisen, and von Maltzan (1997) argued that the Mexican crisis of 1994–95 “produced the sentiment that rating agencies react to events rather than anticipate them.” During the 1997

Figure 3.4. Rating Drivers, May 2007–June 2010
(In percent of total rating actions)



Sources: IMF staff calculations using data from Fitch, Moody's, and Standard & Poor's.

Note: See Box 3.4 for the definitions of the rating drivers.

¹Both upgrades and downgrades.

²²Figure 3.4 is based on a “count” of main ratings drivers mentioned in the rating action reports.

Box 3.5. Empirical Studies of Rating Determinants

This box reviews some of the recent empirical work that has tried to reverse-engineer sovereign ratings from fundamental inputs. The results of these studies have implied that sovereign debt composition and contingent liabilities are not significant credit rating drivers, despite their key roles in recent crises.

An empirical study by Cantor and Packer (1996) indicated that a small number of well-defined criteria explained the sovereign ratings of both Moody's and S&P, with apparently similar weights across both agencies. Of the eight indicators considered, six were statistically significant in explaining the rating; surprisingly, the fiscal and external balances were not. It should be noted that this study effectively assessed what determined a sovereign rating at just one point in time—September 1995. Reflecting the fact that relative weights are likely to change over time, later studies (e.g., Jüttner and McCarthy, 2000) showed that the predictive power of a model declines in future years, suggesting that models designed to infer a “shadow rating” should ideally allow for structural breaks. This study was followed by a series of additional studies, some of which looked at the determinants of ratings across a longer time horizon.¹ These studies tended to focus on the experience of emerging market economies, reflecting the fact that ratings for advanced economies have not varied very much in the past. Given that focus, and reflecting the importance of accessing international capital markets for the emerging market countries, these studies often also explored the link between credit ratings and spreads (that is, the price of credit risk).

One surprising feature of many of these studies is the limited focus on the composition of debt, which is explicitly mentioned as a key indicator by both S&P and Fitch. Specifically, while many studies investigate the importance of the level of external debt (and find it significant), only Jaramillo (2010) explicitly considers the importance of domestic debt, also finding it significant, although less important. This suggests that many studies might have missed an important factor. In the same vein, none of these studies have explicitly

considered information on the interest rate structure or the average maturity of debt, both of which are likely to affect a sovereign's medium-term prospects.

In contrast, many studies do consider the relative importance of short-term (external) debt in explaining ratings. Overall, with the exception of Mulder and Perrelli (2001), this does not appear to be a significant factor in determining the level of credit rating. This is surprising given the emphasis placed on liquidity risk in alternative approaches to sovereign credit risk assessment, such as the balance sheet approach (Allen and others, 2002) and the assertion by the credit rating agencies (CRAs) that they adapted their approach in the wake of the Asian crisis to put more emphasis on this factor.² The importance of short-term debt has increased significantly across advanced economies in this crisis. Its role as a determinant of sovereign credit risk is evident if we consider that the level of short-term debt is highly significant and explains close to 30 percent of the recent movement in credit default swap (CDS) spreads across a sample of developed countries.³

Similarly, no studies have sought to explicitly address the role that contingent liabilities play in determining ratings. Again, this is one of the key indicators highlighted by the CRAs in their rating methodologies and one which plays an important role in determining the level of sovereign risk using alternative approaches (for example, the contingent claims approach of Gray, Merton, and Bodie, 2007). This is potentially an important omission given the role the extraordinary support to the banking sector played in the current crisis. However, in this case, while there is some evidence of a relationship between the level of outstanding government guaranteed debt and CDS spreads—with the stock of government guaranteed financial sector debt explaining close to 40 percent of recent movements in CDS spreads across a subsample of European countries where guarantees comprise more than 1 percent of GDP—the sign on the coefficient is negative and counterintuitive.

²In support of this, Mulder and Perrelli (2001) find a role for short-term debt in explaining ratings in the latter part of their sample. In contrast, Rowland (2004) explores the importance of a variety of liquidity factors in determining the level of ratings as of summer 2003; however, none are found to be significant.

³This was estimated using a pooled regression with fixed effects covering a sample of 17 countries that intervened heavily in the financial sector over the period 2006:Q1 to 2009:Q4.

Note: This box was prepared by Allison Holland.

¹Mulder and Perrelli (2001), Rowland and Torres (2004), and Afonso, Gomes, and Rother (2007) all looked at determinants of ratings over a multi-period sample.

Asian crisis, CRAs were accused both of being too slow initially to downgrade East Asian sovereigns, and subsequently of downgrading more than the worsening fundamentals justified.²³

All of these concerns are relevant from a financial stability point of view if ratings (1) actually influence markets, and (2) are inaccurate and/or ill-timed. The empirical tests in the following subsections will show that sovereign ratings do in fact influence markets, although more via credit warnings (“outlooks,” “reviews,” and “watches”) than through actual rating changes. However, actual rating changes do matter when they cross the investment-grade threshold, which supports reforms oriented toward reduced rating reliance, because these large “certification” effects do not necessarily fully reflect the impact of marginal new information.

Rating “accuracy” can be defined on an ordinal (rank ordered) or cardinal (absolute level) basis, with the CRAs professing that their ratings are supposed to reflect ordinal risk rankings. In fact, for sovereigns the CRAs make it clear that they do not aim for a mapping of default risk measures into rating grades.²⁴ In any case, the empirical analysis below shows that CRAs quite accurately rank sovereign default risk (that is, defaults tend to cluster in the lowest rating grades), particularly over short time horizons.

This suggests that in regulatory situations in which cardinal accuracy is important, such as the Basel II standardized approach, credit ratings should be subjected to the same rigorous calibration tests that are expected of the institutions that are allowed to use internal ratings.²⁵ At the very least, CRAs should be expected to be more transparent about how they calibrate ratings to default risk metrics (that is, the default probabilities, loss severities and stability assumptions).

²³See IMF (1999) and Ferri, Liu, and Stiglitz (1999). The latter authors came to their conclusion by comparing actual ratings with a rating model based on economic fundamentals.

²⁴However, the CRAs did indeed map credit metrics such as default probabilities and expected losses into ratings in their pre-crisis structured finance models (Fender and Kiff, 2005).

²⁵See Annex 2 of BCBS (2006) for an indication of the importance of cardinal accuracy in Basel II: “Supervisors will be responsible for assigning an eligible ECAI’s credit risk assessments to the risk weights available under the standardized risk approach.” An ECAI is an external credit assessment institution.

Empirical Tests of Rating Information Value: Do Ratings Matter and Why?

According to the theoretical literature, credit ratings potentially provide value to and influence markets in three ways. The “informational services” theory would be compatible with evidence pointing to a significant market reaction to rating actions (either changes in ratings or changes in outlook) regardless of the initial starting point on the scale. The “certification services” theory would point to a significant market reaction to upgrades and downgrades involving investment-grade threshold crossings versus other rating changes. If, instead, the “monitoring services” theory is a better explanation of the role played by CRAs, there should be a significant market reaction to downgrades that follow negative credit watches. This is because the downgrade is a signal that the CRA has come to the conclusion that, based on the private information it had access to during the credit watch period, any adjustments required by the CRA to maintain the pre-watch rating have not been met (Boot, Milbourn, and Schmeits, 2006).

These testable implications are analyzed using five-year credit default swap (CDS) spreads.²⁶ The CDS spreads measure the market price of creditworthiness and, as expected, higher spreads are associated with lower ratings. Figure 3.5 illustrates, for each year and each sovereign, the average CDS spread and average credit ratings. The figure also imposes an exponential trend line that shows that the rating/spread relationship is clearly nonlinear, and in line with the historical relationship between ratings and default probabilities (Table 3.1). It is notable that not only did spreads increase across the board during the recent crisis, but since 2007 the dispersion of spreads at the lowest rating grades has widened. This suggests that the market discriminates more among different risk profiles than the CRAs and that this additional discrimination takes place

²⁶A CDS is a financial contract under which an agent buys or sells risk protection against the credit risk associated with a specific reference entity (or specified range of entities). For a periodic fee, typically expressed as a spread, the protection seller agrees to make a contingent payment to the buyer on the occurrence of a default or other specified credit event. Hence, the spread is considered a reflection of the market’s perception of reference entity credit quality.

Box 3.6. Greece: An Examination of the Evolution of Rating Actions

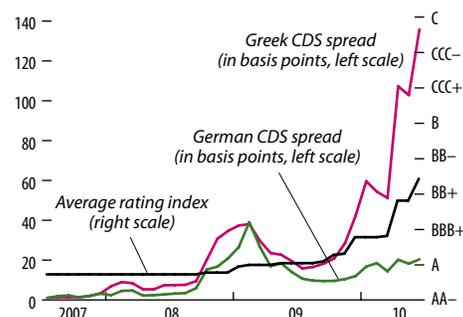
In late autumn 2009, markets became increasingly concerned about the outlook for Greece and its credit-worthiness. This was reflected in the market turmoil seen through 2010, and spreads remain elevated despite the support provided by the IMF program and European bailout. This box examines the information content of the rating actions undertaken for Greece and explores their links with observed changes in credit default swap (CDS) spreads.

The credit rating on Greece was relatively strong until October 2008—S&P had Greece’s A rating on stable outlook since November 2004, while Moody’s put Greece’s A1 rating on positive outlook in January 2007, with Fitch following suit (from an A rating) in March 2007. However, beginning with Fitch, which cut the outlook back to stable in October 2008, the credit rating agencies became increasingly negative on Greece. Notably, S&P put Greece on negative outlook in January 2009, followed by Moody’s cutting its positive outlook back to stable in February 2009. The full chronology of actions over this period is set out in the table. At the same time, CDS spreads on Greece began to diverge from the general market trend in the summer of 2009 (see figure).

Note: This box was prepared by Allison Holland.

Credit Default Swap (CDS) Spreads and Average Rating

(CDS: July 2007 = 100)



Sources: Bloomberg L.P.; and IMF staff estimates.

Note: The average rating shown on the right-hand side reflects the average of three rating agency (Fitch, Moody’s, and S&P) levels (shown are Fitch and S&P symbols; see Table 3.1 for corresponding Moody’s symbols). In addition, in order to capture more fully the information content of the outlook, the rating level is also adjusted by -0.3 ($+0.3$) for a negative (positive) outlook or negative (positive) watch.

To examine the information value of ratings in explaining Greek CDS spreads, a linear transformation is used to translate each rating into a number between 21 and 1. In addition, to capture more fully the information content of the outlook, following Monfort and Mulder (2000), the rating level is

mainly among the worst credits. This additional discrimination during crises has also been recognized in other studies (Sy, 2002).²⁷

The analysis of credit rating events suggests that ratings do in fact reflect information beyond that generally available to market participants (Box 3.7). However, most of the incremental information value is delivered through

²⁷The increasing influence of factors other than credit risk in spreads is evident in the declining explanatory power of ratings during the global crisis. For a decomposition of credit and noncredit components of spread changes, see Annaert and others (2010). See also the Bank of England (2010) discussion of the factors that might distort sovereign CDS spreads. All of this calls for some caution in interpreting CDS spread levels as indicators of the market’s assessment of sovereign default probabilities.

negative credit warnings (see Figure 3.6), rather than actual rating changes. Yet even though rating changes in general have little market impact, crossings of the investment-grade threshold lead to statistically significant widening of CDS spreads. This suggests that some of the market impact associated with rating changes is related to their “certification” value. In contrast, the results provide no support for the monitoring theory.

How Accurately Do Ratings Measure Credit Risk?

There are two dimensions along which credit rating accuracy could be assessed, namely their ability to rank order default risk, and how well their mapped hypothetical default probabilities match true default

Chronology of Greek Sovereign Credit Rating Actions, January 2009–August 2010

| Date | Agency | Action |
|-------------------|---------|---|
| January 9, 2009 | S&P | Outlook changed from stable to watch negative |
| January 14, 2009 | S&P | Downgraded one notch to A-; outlook stable |
| February 25, 2009 | Moody's | Outlook changed from positive to stable |
| May 12, 2009 | Fitch | Outlook changed from stable to negative |
| October 22, 2009 | Fitch | Downgraded one notch to A-; outlook remains negative |
| October 29, 2009 | Moody's | Outlook changed from stable to review for downgrade |
| December 7, 2009 | S&P | Outlook changed to watch negative |
| December 8, 2009 | Fitch | Downgraded one notch to BBB+; outlook remains negative |
| December 16, 2009 | S&P | Downgraded one notch to BBB+; remains on watch negative |
| December 22, 2009 | Moody's | Downgraded one notch to A2; outlook negative |
| March 16, 2010 | S&P | Outlook changed from watch negative to negative outlook |
| April 9, 2010 | Fitch | Downgraded two notches to BBB-; outlook remains negative |
| April 22, 2010 | Moody's | Downgraded one notch to A3; on review for downgrade |
| April 27, 2010 | S&P | Downgraded three notches to BB+; outlook remains negative |
| June 14, 2010 | Moody's | Downgraded four notches to Ba1; outlook stable |

Sources: Fitch; Moody's; and Standard & Poor's.

adjusted by -0.3 for a negative outlook or watch and by $+0.3$ for a positive outlook or watch. The average of the three rating levels is shown in the figure.

Regressing the (log) level of CDS spreads indicates that there is significant explanatory power in the ratings.¹ Taking ratings as the sole explanatory vari-

¹As discussed in the main text, an exponential transformation is applied to each of the ratings series. The estimated coefficients have the expected sign and are statistically significant.

able, they appear to explain almost 70 percent of the CDS spreads, with the relationship contemporaneous rather than leading. However, taking into account that there are common market factors driving spreads using a two-stage process to isolate the idiosyncratic elements driving Greek CDS spreads (relative to German CDS spreads), ratings explain an additional 32 percent of the residual variation. Overall, these findings are in line with the aggregate findings on information content of ratings as reported in the main body of the chapter.

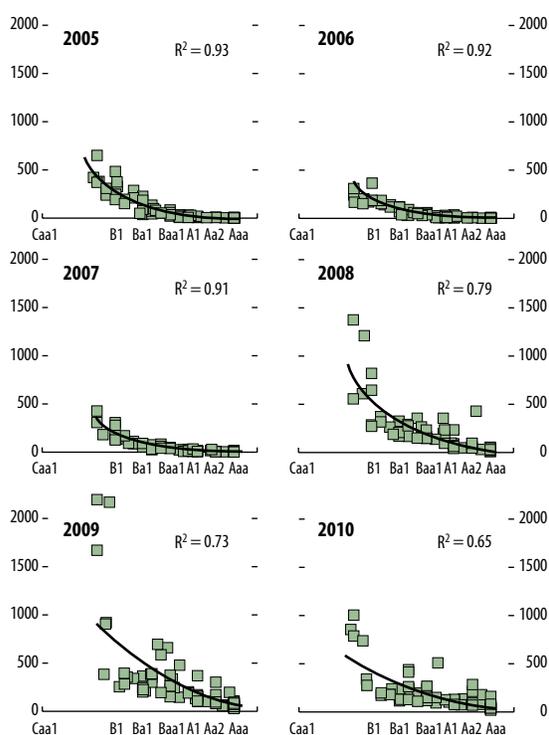
probabilities. When the CRAs evaluate their own performance, they focus on the first dimension—the discriminatory power of their rating system (that is, the power to differentiate ex ante between potential defaulters and nondefaulters) as well as on the stability of ratings. Their tests only intend to assess if defaults tend to take place among the lowest rating categories.

The discriminatory power of sovereign ratings is validated to some extent by the fact that all of the defaults are among noninvestment-grade sovereigns. Taking into account the difficulty in predicting rare events, Figure 3.7 shows that all 14 sovereign defaulters involving 12 countries between 1975 and 2009 had (S&P) ratings of BB- or below, that is, all noninvestment-grade, one year prior to default, and none in the investment-grade categories.

The point made above can be tested more formally with cumulative accuracy profile (CAP) curves and accuracy ratios (ARs), as done by Moody's (Sobehart, Keenan, and Stein, 2000) and S&P (2010a). The CAP curve is derived by plotting out the cumulative proportion of issuers by rating grade (starting by the lowest grade on the left) against the cumulative proportion of defaulters by rating grade. "Ideal" CAP curves (the red lines in Figure 3.8) look almost like vertical lines because all the defaulters should be among the lowest-rated issuers.²⁸ In the "random" curve, all defaults occur

²⁸In spite of the CAP curve's general use, it is not obvious that this ideal curve is a good estimate of "best" rating performance. Even good credits have positive default probabilities. This means

Figure 3.5. Average Credit Default Swap Spread and Ratings for Countries Rated by Moody's, 2005–10
(CDS spread in basis points)



Sources: Markit; Moody's; and IMF staff calculations.
Note: CDS = credit default swap. Each data point represents a different sovereign's average credit rating and average CDS spread throughout the year. R^2 shows the proportion of the average CDS spreads' movement that can be attributed to credit ratings. Data for 2010 are through June 30, 2010.

randomly throughout the rating distribution (admittedly an unrealistically low bar for a CRA), so it lies along the diagonal (the green lines in Figure 3.8). The closer the CAP curve to the ideal curve, the better the discriminatory power of that CRA's ratings. The AR is the ratio of two areas: (1) the area bounded by the CAP curve and the random curve; and (2) the area bounded by the ideal curve and the random curve. An AR equal to 1 is equivalent to perfect discriminatory power while an AR equal to 0 implies no discriminatory power.²⁹

The S&P CAP curves for sovereigns at different risk horizons tend to suggest that, as expected, discriminatory power is a function of time, since some power is lost as the risk horizon increases (Figure 3.8). This loss of power is indicated by the ARs: 92 percent over the one-year horizon, 82 percent over three years, 80 percent over five, and 84 percent over 10. Hence, the CRAs are better at predicting defaults over short horizons than long ones. ARs that were calculated for S&P corporate ratings suggest that they are better at pinpointing potential defaulters among sovereign issuers than among corporates. The corporate-rating ARs over a one-year horizon are 77 percent for financials and 81 percent for nonfinancials (versus 92 percent for sovereigns), and 63 percent and 71 percent over five years (versus 80 percent).³⁰

A welcome contribution of the CRAs would be the calibration of ratings to target credit risk metrics, such as default probabilities, and the publication of validation tests against such standards. This would make the message embedded in a rating more transparent and would also allow more relevant tests of accuracy and—in the end—review of the quality of the work produced by CRAs. The Basel Committee on Banking Supervision (BCBS, 2005) suggests a number of cardinal accuracy tests, but they presuppose specific default probabilities for individual rating grades. However, the CRAs put little emphasis on such tests, preferring to

that the ideal curve (in which all defaults happen among the worst credits) does not measure “best” rating performance.

²⁹Engelmann, Hayden, and Tasche (2003) propose a statistical test of the accuracy ratios that measures the quality of credit rating models. However, the test requires that the sample contain at least 50 defaults and thus cannot be applied to the sovereign dataset.

³⁰The S&P sovereign ARs were estimated based on 1975–2009 data, and the corporate ARs based on 1981–2009 data.

focus on ordinal accuracy tests, because they do not target specific risk metrics for their ratings.³¹

An Examination of Rating Stability

There is an inevitable trade-off between rating accuracy and stability, but users have expressed a preference for stability. This is driven by the certification role played by ratings, and the transaction costs induced by trading when ratings change frequently. In an attempt to satisfy their users, CRAs use several mechanisms to promote stability. Though of less interest to CRAs, rating stability is important at a systemic level, since rating downgrades can be associated with forced sales.

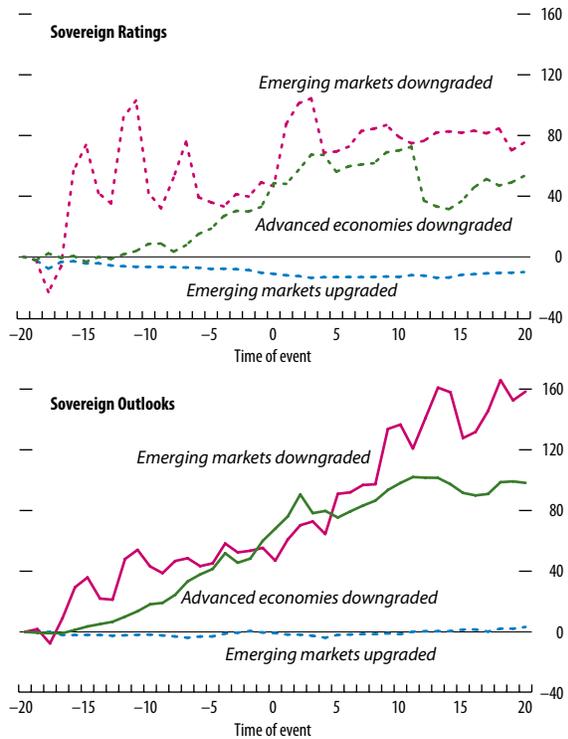
In practice, rating agencies seek to ensure rating stability by focusing on rank ordering credit risk, instead of rating to specific credit metrics. Hence, the impact of cyclical fluctuations on ratings is automatically muted. Also, CRAs generally try to rate “through the cycle,” as opposed to rating based on “point in time” information. Conceptually, this means that they rate based on the issuer’s ex-ante perceived ability to survive cyclical troughs, which provides a cushion against the impact of economic downturns. Lastly, the CRAs apply smoothing rules that, for example, change ratings only if (1) the anticipated rating change is expected to be persistent, and/or (2) the prescribed change is more than one notch (Cantor and Mann, 2007).

Figures 3.9 and 3.10 show that higher ratings are more stable than lower ones, and that sovereign ratings are more stable than corporate ones.³² Using S&P data from 1975, Figure 3.9 shows the average percent of ratings that remain at the same level over one-year horizons by rating grade. For example, 82.1 percent of A-rated sovereigns were still A-rated at the end of each year, versus 77.5 percent of the corporates. It clearly shows that the percent of unchanged ratings decreases

³¹Nevertheless, Moody’s, for example, conducts some cardinal accuracy assessments—investment-grade default rates over multiple horizons and average ratings of defaulting issuers up to three years prior to default (Cantor and Mann, 2003). Alternatively, cardinal accuracy tests could be conducted against the target default probabilities (in the case of Fitch and S&P) or expected losses (Moody’s), which have been used to rate structured credit products (Fender and Kiff, 2005).

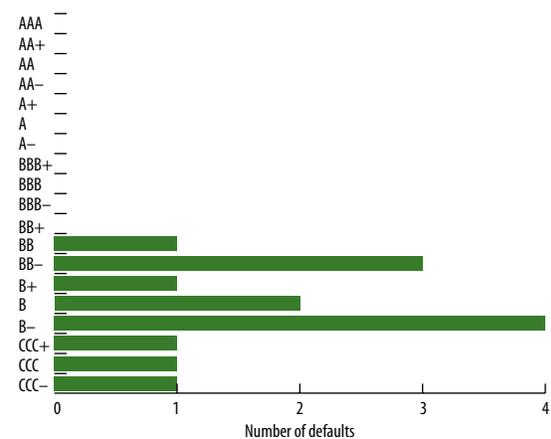
³²Figures 3.9 and 3.10 are based on S&P ratings, but similar results were found for Fitch and Moody’s ratings (see Kiff, Nowak, and Schumacher, forthcoming).

Figure 3.6. Impact of Change in Sovereign Ratings and Credit Warnings on Credit Default Swap Spread (CDS spread in basis points)



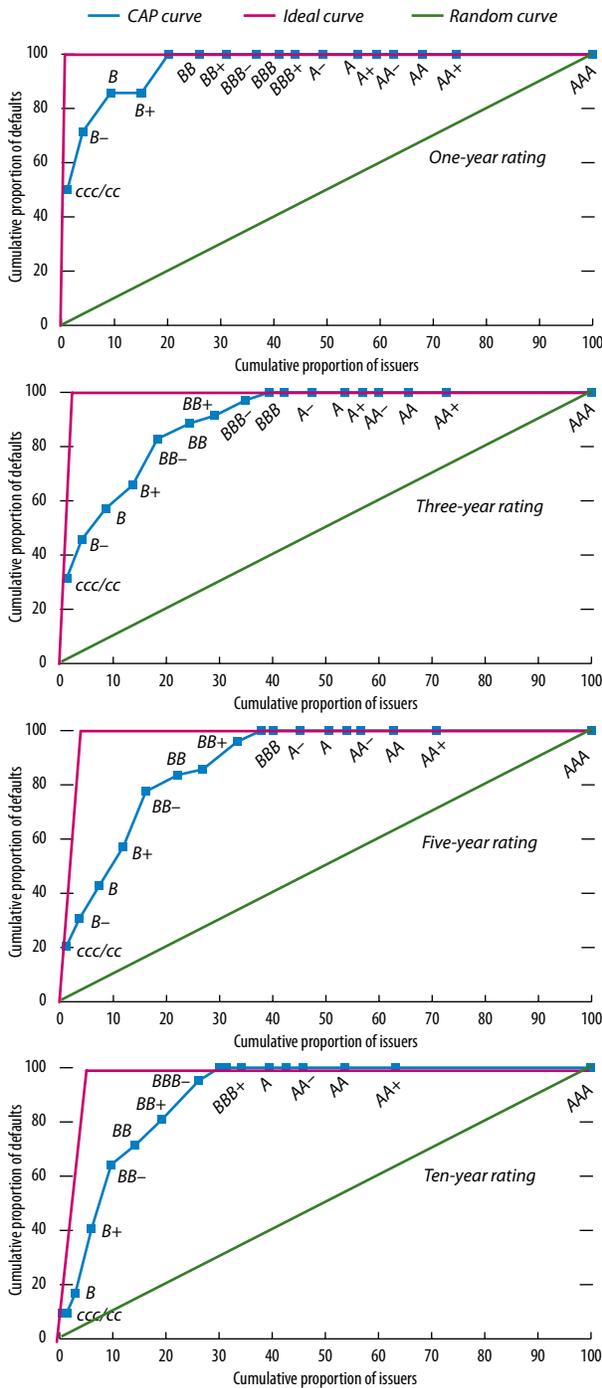
Sources: Markit; Moody’s; and IMF staff estimates.
Note: CDS = credit default swap. Solid lines indicate rating events that have a statistically significant impact on CDS spreads; dashed lines indicate insignificant events.

Figure 3.7. Ratings One Year Prior to Sovereign Default, 1975–2009



Source: Standard & Poor’s.

Figure 3.8. Sovereign Rating Performance by Standard & Poor's (In percent)



Source: Standard & Poor's.
Note: CAP = cumulative accuracy profile.

as rating categories decline. Figure 3.10 shows the average percent of ratings that are downgraded by three or more notches, a definition of “rating failure” suggested by Bhatia (2002) and S&P (2010b).³³ For example, 1.8 percent of A-rated sovereigns were downgraded three or more notches, versus 6.9 percent of corporates.

However, Figures 3.11 and 3.12 show that these long-term averages hide signs of significant rating instability during periods of market stress, suggesting that smoothing techniques work less well during such times. The figures summarize Moody’s upgrades and downgrades during the Asian crisis and the recent financial crisis. Sovereigns on the 45 degree line maintained their ratings while those below (above) were downgraded (upgraded).³⁴ The figures show that 68 percent of ratings remained unchanged during the Asian crisis and 63 percent during the current crisis (so far). Similar conclusions would be drawn from a similar analysis of Fitch and S&P sovereign rating transitions (Kiff, Nowak, and Schumacher, forthcoming). Focusing on the magnitude of the rating changes, Tables 3.4 and 3.5 show that big downgrades (three or more notches) have been concentrated in the investment-grade categories, even though these higher rating categories are supposed to be more stable than lower rating categories by design. All of this highlights the fact that risk is a forward-looking measure that—to be meaningful—needs to be conditioned on specific scenarios. While CRAs condition ratings to surviving a cyclical trough, they do not condition on crisis survival, which is reflected in the data.

Confronted with these evident “failures,” CRAs have been developing rating procedures that would condition a rating to the country’s ability to survive a crisis. However, it is not clear whether this methodology enhances stability beyond that provided by the TTC approach. Although Box 3.8 shows that TTC ratings are inherently more stable than PIT assessments, some of this stability is undermined by the aforementioned rating change smoothing rules. If the smoothing rule’s prescribed downgrade turns out to be persistent, and

³³The three or more notch stability threshold is also in line with a practice used by CRAs in their stability studies (Moody’s, 2010b).

³⁴Some caution must be exercised in interpreting Figures 3.11 and 3.12. Although the equivalent Fitch and S&P figures are very similar, the number of rated sovereigns has grown significantly.

the creditworthiness of the issuer has possibly worsened, a more abrupt downgrade is required. In other words, by attempting to smooth ratings, typical TTC methodologies run the danger of actually exacerbating procyclical cliff effects. Even “through the crisis” methodologies will be prone to these smoothing-induced cliff effects, although perhaps with less frequency, because of the more severe ex ante stress tests.

Conclusions and Policy Implications

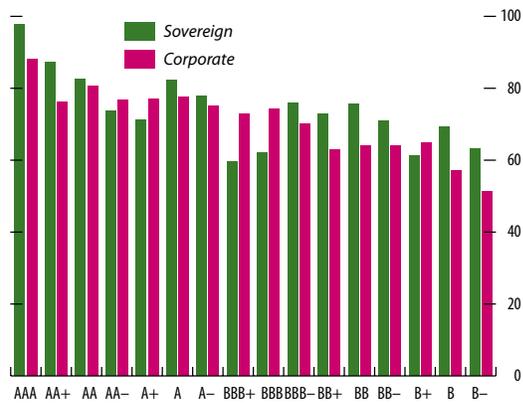
The empirical analysis shows that CRAs do have an impact on the funding costs of issuers and consequently their actions can be a financial stability issue. Also, the theoretical analysis suggests that the way that CRAs try to smooth their rating changes may make them prone to procyclical cliff effects. Furthermore, the market impact of these rating changes is exacerbated by the overreliance on ratings in legislation, regulations, and private sector contracts. Beyond this “certification role” the empirical work shows that sovereign ratings do provide useful informational value. However, most of this is delivered through “outlooks,” “reviews” and “watches” that signal the likely direction and timing of future rating actions, as opposed to actual rating changes. Nevertheless, an examination of the widening of CDS spreads when ratings are downgraded through the investment-grade threshold confirms the importance of the certification role.

The empirical work has also shown that credit ratings quite accurately rank sovereign credit risk, but they should not be expected to be consistent with specific default probabilities or other quantitative default risk metrics. This is because CRAs do not target such specific metrics for their sovereign (or corporate) ratings, despite the fact that many ratings users, including regulators, assume that there are specific and stable relationships between ratings and these metrics.

While some advocate the elimination of the major CRAs’ issuer-pay business model, this compensation model is expected to stay for the foreseeable future.³⁵

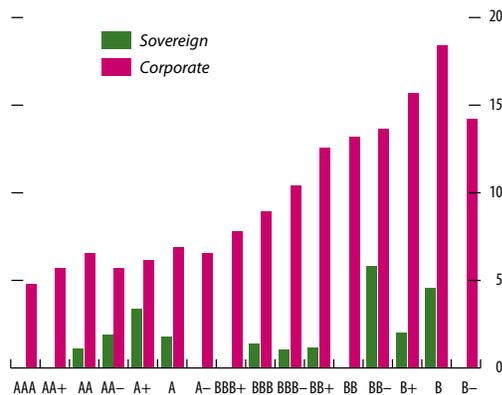
³⁵It offsets a more prevalent free-rider problem that would arise if the CRAs were to return to an investor-pay business model in an information environment where it is difficult to limit access. Nevertheless, additional policy work and research should be carried out to examine whether it is feasible to have an investor-pay model without free riders.

Figure 3.9. Average Proportion of S&P Sovereign Ratings Unchanged Over One Year (In percent)



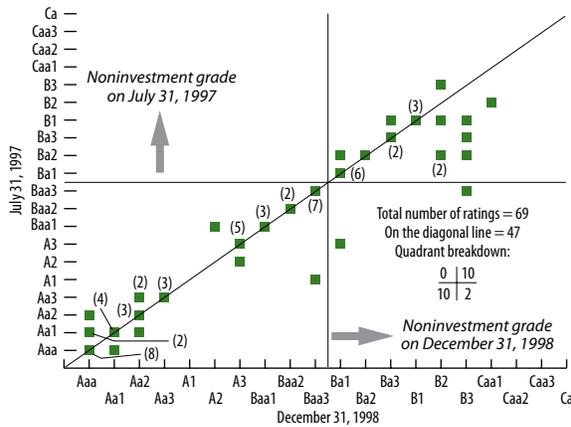
Source: Standard & Poor’s.
Note: Sovereign ratings for 1975–2009, and corporate ratings for 1981–2009.

Figure 3.10. Average Proportion of S&P Sovereign Ratings Downgraded More Than Two Notches Over One Year (In percent)



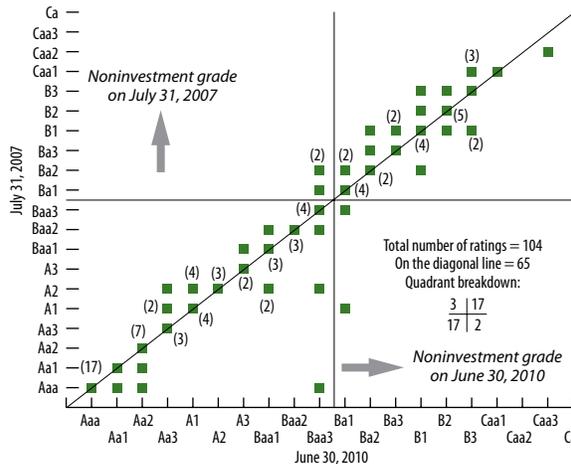
Source: Standard & Poor’s.
Note: Sovereign ratings for 1975–2009, and corporate ratings for 1981–2009.

Figure 3.11. Asian Crisis: Sovereigns Rated by Moody's between July 31, 1997 and December 31, 1998



Source: Moody's.
 Note: The numbers in parentheses indicate the number of issuers associated with that rating.

Figure 3.12. Current Crisis: Sovereigns Rated by Moody's between July 31, 2007 and June 30, 2010



Source: Moody's.
 Note: The numbers in parentheses indicate the number of issuers associated with that rating.

Rather, a better way forward is a combination of gradually reducing the regulatory reliance on credit ratings to the extent possible, while at the same time enhancing CRA regulatory oversight. Also, the mitigation of procyclical cliff effects should be a priority. In that regard, key policies to deal with these issues include the following:

Reduce rating reliance. Policymakers should continue their efforts to reduce their own reliance on credit ratings, and wherever possible remove or replace references to ratings in laws and regulations, and in central bank collateral policies. They should discourage the mechanistic use of ratings in private contracts, including investment manager internal limits and investment policies. However, they should recognize that smaller and less sophisticated investors and institutions that do not have the economies of scale to do their own credit assessments will inevitably continue to use ratings extensively. Hence, any steps to reduce overreliance on ratings should differentiate both according to the size and sophistication of the institution, and the instruments concerned.

Increase the oversight of CRAs when their ratings are used in regulations. It is important that the authorities continue efforts to push CRAs to improve their procedures, including transparency, governance, and the mitigation of conflict of interest. In particular, CRAs whose ratings are used in the Basel II standardized approach should have to meet similar validation standards as those required for banks that use their own internal ratings. CRAs should be encouraged to calibrate ratings to target credit risk metrics, such as default probabilities, and publish validation tests against such standards. CRAs should also be transparent about the quantitative measures they calibrate in the rating process and how they validate their ratings.

Encourage accurate through-the-cycle approaches. CRAs should be discouraged from over-smoothing downgrades (and upgrades) that effectively merely delay what is likely to be inevitable. Encouraging more accurate smoothing methods could be part of the enhanced oversight and validation testing. If the rating change eventually does take place, it can be more abrupt and cliff-like if the credit's situation has continued to deteriorate (or improve). Remaining cliff effects and what may be labeled rating failures should be addressed by emphasizing that risk is a forward-looking dimension conditional on the

Table 3.4. Sovereign Rating “Failures” during the 1997–98 Asian Crisis

| | Fitch | | | Moody's | | | S&P | | |
|--------------------|-------|------|---------|---------|------|---------|-------|------|---------|
| | Start | End | Notches | Start | End | Notches | Start | End | Notches |
| Indonesia | BBB– | B– | –6 | Baa3 | B3 | –6 | BBB | B– | –7 |
| Korea ¹ | AA– | B– | –12 | | | | AA– | B+ | –10 |
| Korea ¹ | B– | BBB– | 6 | | | | B+ | BBB– | 4 |
| Malaysia | | | | A1 | Baa3 | –5 | A+ | BBB– | –5 |
| Romania | | | | Ba3 | B3 | –3 | BB– | B– | –3 |
| Russia | BB+ | B– | –5 | Ba2 | B3 | –4 | BB– | B– | –3 |
| Thailand | | | | A2 | Ba1 | –5 | A | BBB– | –4 |
| Venezuela | | | | Ba2 | B2 | –3 | | | |

Sources: Fitch; Moody's; and Standard & Poor's.

Note: Table shows successive downgrades or upgrades by three or more notches in aggregate during any rolling 12-month period, excluding downgrades or upgrades into, out of, within, or between the CCC or Caa categories downward; 1997 through January 1999.

¹Korea was downgraded by Fitch and S&P in October 1997–December 1997; and then a series of upgrades occurred between February 1998 and January 1999.

Table 3.5. Sovereign Rating “Failures” during the 2007–10 Crisis

| | Fitch | | | Moody's | | | S&P | | |
|----------------------|-------|------|---------|---------|------|---------|-------|------|---------|
| | Start | End | Notches | Start | End | Notches | Start | End | Notches |
| Greece | A | BBB– | –4 | A1 | Ba1 | –6 | A– | BB+ | –4 |
| Iceland ¹ | A+ | BBB– | –5 | Aaa | Baa1 | –7 | A+ | BBB– | –5 |
| Iceland ¹ | | | | A1 | Baa3 | –5 | | | |
| Ireland | AAA | AA– | –3 | | | | | | |
| Latvia | BBB+ | BB+ | –3 | A2 | Baa3 | –4 | BBB+ | BB | –4 |
| Lithuania | A | BBB | –3 | | | | | | |
| San Marino | AA | A | –3 | | | | | | |

Sources: Fitch; Moody's; and Standard & Poor's.

Note: The table shows successive downgrades or upgrades by three or more notches in aggregate during any rolling 12-month period, excluding downgrades or upgrades into, out of, within, or between the CCC or Caa categories downward; 2007 through June 2010.

¹The Iceland downgrades by Moody's involve overlapping periods. The first period includes downgrades from May 2008 through end-December 2008, while the second period includes downgrades from December 1, 2008 through end-November 2009. That is, both periods include the three-notch downgrade on December 4, 2008.

macroeconomic and financial environment scenario that may change more rapidly than typical TTC approaches accommodate.

The analysis of the factors that underlie sovereign ratings shows that CRAs take into account a broad array of fundamental factors and weigh them very dynamically. Although there are some methodological differences among the big three CRAs, their ratings do track each other very closely. Also, the recent Greek downgrades point to some important data issues, particularly with respect to accuracy and coverage (for example contingent liabilities as provided by sovereigns). Hence, as was also the case with structured credit product issuance, sovereigns should do more to provide relevant and timely information to CRAs and other market participants to enable them to conduct their own independent credit analysis. This should include disclosure of contingent liabilities. In that regard, the IMF encourages countries to prepare and

make publicly available a fiscal risk statement (Everaert and others, 2009).

Credit ratings can play an important and positive role in capital markets, primarily by using their economies of scale to provide cost-effective information services that increase the pool of potential borrowers and promote liquid markets. For the most part, they have been a positive force in fixed-income markets, particularly in their traditional corporate markets, as well as in the markets for sovereign bonds. However, the structured finance rating crisis has exposed some flaws in the system (rating overreliance), and some concerning aspects of the CRAs' own rating philosophies (rating smoothing). However, these flaws can be rectified, although admittedly it will not be easy. In particular, reducing rating overreliance will require finding appropriate replacements, and it will be important that the authorities remain wary of unintended adverse consequences.

Box 3.7. Empirical Tests of Rating Information Value

In summarizing the empirical tests of rating information value, this box shows that credit rating agencies provide information and certification services to investors, with credit outlooks and watch lists as the main instruments to deliver information.

The theoretical literature asserts that credit rating agencies influence financial markets by providing three types of services: informational, certification, and monitoring. This box assesses the impact of sovereign rating events on credit default swap (CDS) spreads to gauge the importance of these services to market participants. The main analysis covers 72 sovereigns for which both Moody's ratings and the relevant CDS data are available from January 2005 to July 2010.¹ This includes 194 credit rating events: 26 downgrades, 57 upgrades, 71 positive outlooks/reviews for upgrade, and 40 negative outlooks/reviews for downgrade. In addition, the box reviews the impact of rating actions by S&P and Fitch. Both event studies and causality tests are used.

The event study measures the impact of rating changes and credit warnings (that is, "outlooks," "reviews," and "watches") by averaging cumulative changes in CDS spreads across individual rating events. Changes in CDS spreads are analyzed within an event window of 41 days, starting from 20 days before the event until 20 days after the event. Spread changes are calculated against the level at the beginning of the event window ($t = 0$) to make them comparable across events and sovereigns. For tractability, the sovereigns are divided into advanced economies and emerging markets. Hence, within each group, the relationship between credit ratings and CDS spreads can be assumed to be linear, so that a two-notch downgrade

leads to spread widening that is twice as large as that associated with a one-notch downgrade. However, the results are robust to relaxing this assumption, as discussed below. The significance is tested using a standard one-sided t -test, with the hypothesis that negative rating actions (downgrades, negative outlooks, and reviews for downgrade) should lead to an increase in spreads, and positive rating actions (upgrades, positive outlooks, and reviews for upgrade) to a decrease.

The baseline results for Moody's (see first table) confirm the agencies' traditional role as information providers. However, most of the incremental information value is transmitted through negative credit warnings (see Figure 3.6), rather than actual rating changes.² The event study found very little market reaction to positive rating actions, in contrast to Cantor and Packer (1996), Reisen and von Maltzan (1999), and Ismailescu and Kazemi (forthcoming). Yet even though rating changes in general have little market impact, a downgrade through the investment-grade classification boundary is associated with a statistically significant widening of CDS spreads. This suggests that some of the market impact associated with rating changes is related to their "certification" value. In contrast, the results provide no support for the monitoring theory.³

The event study results are robust to (1) shortening or lengthening the event window to 10 days before and after or 45 days before and after, from the base of 20 days; (2) controlling for global volatility (as proxied by the S&P 500 VIX), the liquidity risk premium (as proxied by the U.S. LIBOR), and the daily business conditions in the United States (as tracked by the Aruoba-Diebold-Scotti business conditions index; see Aruoba, Diebold, and Scotti, 2009); (3) using natural logarithms of spreads to account for the nonlinear relationship between the CDS spreads and rating/credit warning events; (4) splitting the sample into the pre- and during-crisis periods; and (5) disaggregating announcements for

Note: This box was prepared by Sylwia Nowak, based on Kiff, Nowak, and Schumacher (forthcoming).

¹The countries are Argentina, Australia, Austria, Belgium, Bulgaria, Brazil, Tunisia, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Germany, Denmark, Dominican Republic, Egypt, El Salvador, Estonia, Finland, France, Greece, Guatemala, Iceland, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Korea, Latvia, Lebanon, Lithuania, Malaysia, Malta, Mexico, Morocco, Netherlands, Norway, New Zealand, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Qatar, Hungary, Romania, Russia, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Thailand, Trinidad and Tobago, Turkey, United Arab Emirates, United Kingdom, Ukraine, Uruguay, United States, Venezuela, and Vietnam.

²The predictive power of S&P "watch" and "outlook" notices has been documented in Hessol, Erturk, and Ontko (2007) and Chambers (2010). Hamilton and Cantor (2005) and Hartelius, Kashiwase, and Kodres (2008) document similar results for Moody's "outlook" notices.

³Hill and Faff (2008) reached a similar conclusion using national stock market indices instead of CDS spreads.

The Empirical Tests of Rating Information Value

| | Information Services | Certification Services | Monitoring Services |
|---------|---|---|---|
| Theory | Ratings include new information ➡ market prices react to rating actions. | Classifying securities into investment-grade and high-yield grade ➡ market prices react to rating changes in and out of the investment grade. | Rating warnings influence issuers to take corrective actions to avert downgrades ➡ market prices react to rating confirmations. |
| Test | Event study of the impact of credit rating and credit warning changes on credit default swap (CDS) spreads. | Event study of the impact of rating changes and downgrades/upgrades in and out of investment grade on CDS spreads. | Event study of the impact of downgrades/upgrades preceded/not preceded by a matching warning or review on CDS spreads. |
| Results | Negative credit warning announcements are followed by statistically significant spread widening; 100 basis points for advanced economies and 160 basis points for emerging markets. The impact of rating changes is insignificant (see Figure 3.5). | Downgrades through the investment grade threshold lead to statistically significant CDS spread widening of 38 basis points. | No evidence |

Sources: Fitch; Moody's; and IMF staff estimates.

Multi-Agency Dynamics

| | The first credit rating agency to take a negative rating action: | | | The last credit rating agency to take a negative rating action: | | |
|--------------------|--|---------|-----|---|---------|-----|
| | Fitch | Moody's | S&P | Fitch | Moody's | S&P |
| All countries | 28 | 13 | 59 | 36 | 36 | 28 |
| Advanced economies | 22 | 4 | 74 | 30 | 52 | 17 |
| Emerging economies | 32 | 17 | 51 | 39 | 27 | 34 |

Sources: Fitch; Moody's; Standard & Poor's; and IMF staff estimates.

Note: The table reports the frequencies with which each credit rating agency (CRA) either acts first or last within each rating adjustment cycle, defined as either until three months following the initial rating adjustment or until the originating CRA takes another action, depending on which event comes first.

investment/noninvestment-grade sovereigns as opposed to advanced economies and emerging markets.

Statistical causality tests yield results consistent with event study results by finding information about preceding negative credit warning helps predict changes in CDS spreads of emerging economies, even when the past values of CDS spreads are accounted for. The causality tests are panel Granger-causality tests (Granger, 1969; and Hurlin and Venet, 2001), estimated using the generalized method of moments with fixed effects. Instruments used are lagged S&P 500 VIX, lagged U.S. LIBOR, lagged Aruoba-Diebold-Scotti business conditions index for the United States, and CDS spreads lagged two periods.

An extension of the analysis to sovereign rating actions by S&P and Fitch largely confirms the above findings while pointing to two important differences. First, Moody's most frequently precedes its rating changes with credit warnings (27 percent of rating changes are preceded by corresponding credit watches, compared

with 14 percent in the case of S&P and only 8 percent in the case of Fitch). This suggests different information value of downgrades and credit warnings across the CRAs. Second, Moody's tends to lag behind Fitch and S&P. An analysis of the dynamics of rating adjustments, as summarized in the second table, reveals that Moody's and Fitch tend to follow S&P negative rating actions more often than S&P follows the others. This is consistent with conclusions of Güttler (2009) and Alsakka and ap Gwilym (forthcoming) that Moody's is more likely to adjust its rating given a rating change by S&P. In addition, on occasions when Moody's leads the rating adjustment cycle, it tends to issue credit watches rather than actual downgrades. Consequently, Moody's downgrades have no significant impact on financial markets while Fitch's and S&P's do. This result, consistent with Brooks and others (2004), indicates that markets react to new information but not all CRAs convey new information through the same channels.

Box 3.8. Point-in-Time versus Through-the-Cycle Credit Ratings

This box uses a simple contingent claims analysis (CCA) framework to compare through-the-cycle (TTC) and point-in-time (PIT) credit ratings. It shows that although TTC ratings are more stable than PIT ratings, credit rating agency (CRA) attempts to smooth TTC-prescribed rating changes can generate procyclical cliff effects.

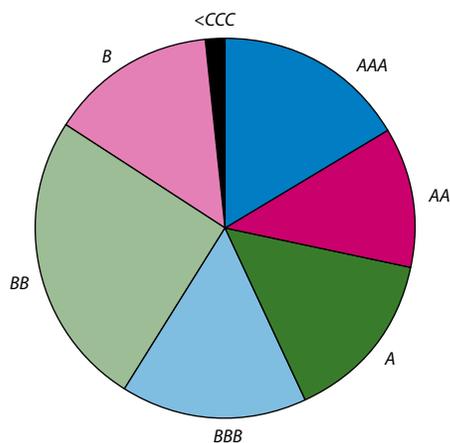
In the CCA framework, a sovereign defaults when the value of its assets falls through a distress threshold that is related to its liabilities (Gray, Merton, and Bodie, 2007).¹ The simple model used here is based on Loeffler (2004) and assumes that asset values are driven by (1) the sovereign’s fundamentals and (2) cyclical factor fluctuations. Conceptually, the PIT rating process involves estimating the difference between future values of the assets and liabilities (“distance to default”), and mapping this difference into a default-probability-related credit rating.²

A TTC rating process estimates the distance to default based on fundamental values but imposes a stress scenario on the cyclical component. In a second stage, the CRAs typically apply a smoothing rule to rating changes to avoid overshooting or subsequent reversals. In other words, it is a two-step process in which ex-ante ratings are based on fundamentals and a stress scenario and ex-post rating changes are smoothed, and not adjusted immediately. For purposes of this box, the factor that represents the sovereign’s “fundamentals” is assumed to follow a random walk, whereas the cyclical component is assumed to follow an autoregressive process.

The pie charts show the distribution of actual S&P sovereign ratings (top) and of the model-implied ratings under the TTC approach under various net asset value and volatility assumptions (bottom). One can see that the parameters underlying the model provide a realistic set of assumptions for the next set of experiments.

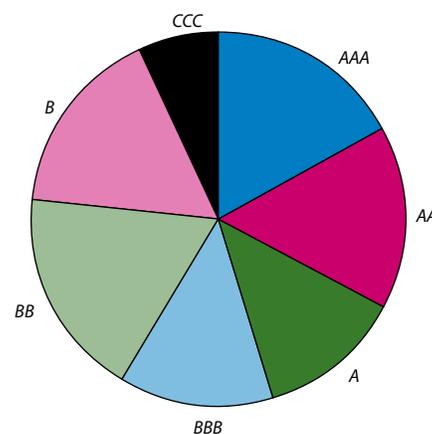
The main interest of this analysis lies in how ratings evolve over time and how well the two approaches

Actual Rating Grade Distribution



Source: IMF staff estimates based on Standard & Poor’s data.

Model-Implied Through-the-Cycle Rating Grade Distribution



Source: IMF staff estimates.

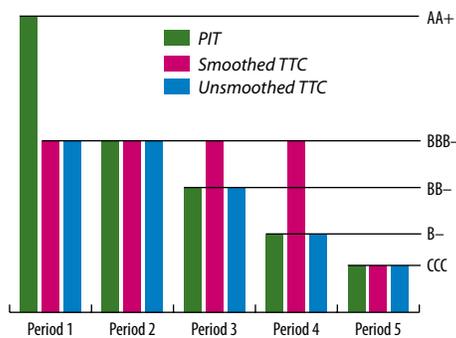
predict future defaults. It therefore assumes that future asset values do not evolve according to their expected values but instead come in well below. While the PIT approach would imply immediate downgrades for this case, a CRA following the TTC approach would typically wait to see if the deviation is only of a cyclical nature. For example, in the case below downgrades are assumed to occur only if (1) the rating change is

Note: This box was prepared by Michael Kisser, based on Kiff, Kisser, and Schumacher (forthcoming).

¹In the case of a sovereign, assets include foreign reserves and fiscal assets such as the present value of taxes and other revenues, and liabilities include base money, public debt (local and foreign currency), and guarantees (explicit and implicit).

²In this box the mapping of distance-to-default-derived default probabilities into ratings is done using Moody’s idealized probabilities such as those in Table 3.1.

Impact of Rating Approaches on Downgrade Trajectories



Source: IMF staff estimates.
Note: PIT = point in time; TTC = through the cycle.

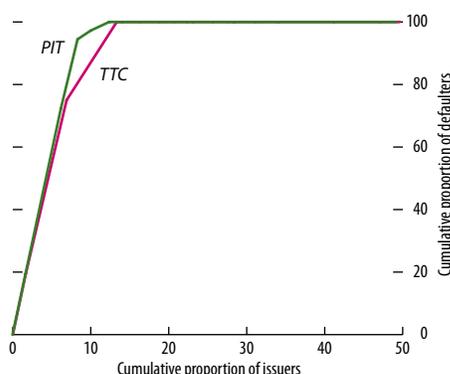
expected to be persistent and (2) the implied change is larger than one notch. This is one of several smoothing rules discussed in Cantor and Mann (2006), which also accounts for the empirically documented fact that CRAs are slow in adjusting their ratings (Loeffler, 2005). Clearly, other definitions could be employed.³

The figure above on stability visualizes rating downgrades under the PIT and smoothed TTC methodologies and compares them to the case in which a CRA switches from a TTC to a PIT rating method once the initial stress scenario is breached (“unsmoothed TTC”). One can see that ratings decline faster under the PIT approach whereas a downgrade is less likely if the CRA followed a TTC approach. The intuitive reason is that TTC ratings built in a pessimistic forecast so the rating is already lower and does not have to fall as much as the more “optimistic” PIT ratings would imply.

However, as time passes the PIT rating would eventually drop below the smoothed TTC rating (Period 3), which is precisely the point when the smoothed TTC approach becomes prone to potential cliff effects. By not reacting to new information in Periods 3 and 4, the TTC ratings would drop from BBB- to CCC in Period 5, thereby generating a rating downgrade of eight notches. From a stability perspective it would therefore be optimal if a CRA followed the TTC approach ex ante but would immediately adjust the rating once the initial forecast has been breached.

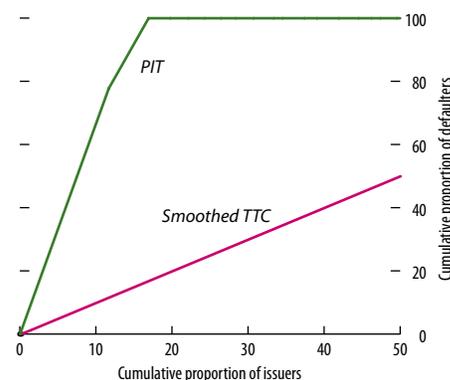
³Further details can be found in Altman and Rijken (2006), Loeffler (2004 and 2005), and Carey and Hrycay (2001).

Cumulative Accuracy Profile Curve for PIT and TTC Ratings for Defaults at the End of Period 1 (In percent)



Source: IMF staff estimates.
Note: PIT = point in time; TTC = through the cycle.

Cumulative Accuracy Profile Curve for PIT and Smoothed TTC Ratings for Defaults at the End of Period 2 (In percent)



Source: IMF staff estimates.
Note: PIT = point in time; TTC = through the cycle.

Finally, the analysis looks at how well both approaches predict future defaults by computing the cumulative accuracy profile (CAP) for defaults taking place at the end of Periods 1 and 2. It turns out that initially the TTC approach is only slightly less accurate at forecasting future defaults (see top figure above) but as time passes the PIT approach becomes clearly more accurate (see second figure above) as it immediately incorporates new information into its

Box 3.8 (concluded)

ratings whereas the TTC approach only reacts with a lag due to its smoothing policy.

In summary, the experiment has shown that, from an ex-ante viewpoint, the TTC approach produces more stable and only slightly less accurate ratings when current net asset values are higher than in the stress scenario. However, once ratings drop below those implied by the stress scenario, the smoothed TTC approach is less accurate at predicting defaults and it runs the risk of generating rating cliff effects that may lead to dangerous second-round liquidity effects.

Current discussions on the usefulness of the TTC approach should therefore focus on the reaction to new information when net asset values drop below those implied by the initial stress scenario. The implementation of a “through the crisis” methodology, which has been mentioned by the CRAs themselves, seems to require a more severe stress test ex ante. However, it currently does not address the slow adjustment typically taking place once the cushion built in by a TTC methodology is eroded, nor does it address the potential for cliff effects created by smoothing policies.

Annex 3.1. Credit Rating Agencies around the World¹

- A.M. Best Company, Inc. (U.S.)
- Agusto & Co. Ltd. (Nigeria)
- Ahbor Rating (Uzbekistan)
- Apoyo & Asociados Internacionales S.A.C. (Peru)
- Bank Watch Ratings S.A. (Ecuador)
- BRC Investor Services S.A. (Columbia)
- Calificadora de Riesgo, PCA (Uruguay)
- Capital Intelligence, Ltd. (Cyprus)
- Caribbean Information & Credit Rating Services Ltd. (CariCRIS) (Caribbean)
- Central European Rating Agency (CERA) (a/k/a: Fitch Polska, S.A., Poland)
- Cerved Group (Italy)
- Chengxin International Credit Rating Co., Ltd. (China)
- China Lianhe Credit Rating, Co. Ltd. (China)
- Clasificadora de Riesgo Humphreys, Ltda. (Chile)
- Class y Asociados S.A. Clasificadora de Riesgo (Peru)
- CMC International, Ltd. (Nigeria)
- Companhia Portuguesa de Rating, SA (CPR) (Portugal)
- Credit Analysis & Research Ltd (CARE) (India)
- Credit-Rating Agency: A Ukrainian rating agency (Ukraine)
- Credit Rating Agency of Bangladesh, Ltd. (CRAB) (Bangladesh)
- Credit Rating Information and Services, Ltd. (CRISL) (Bangladesh)
- CRISIL, Ltd. (a/k/a: Credit Rating Information Services of India, India)
- Dagong Global Credit Rating Co., Ltd. (China)
- Demotech, Inc. (U.S.)
- Dominion Bond Rating Service (DBRS) (Canada)
- Duff & Phelps de Colombia, S.A., S.C.V (Columbia)
- Ecuability, SA (Ecuador)
- Egan-Jones Rating Company (U.S.)
- Equilibrium Clasificadora de Riesgo (Peru)
- European Rating Agency, a.s. (Slovak Republic)
- European Rating Agency (ERA) (U.K.)
- Feller Rate Clasificadora de Riesgo (Chile)
- Fitch Ratings, Ltd. (U.S./U.K.)
- Global Credit Rating Co. (South Africa)
- HR Ratings de Mexico, S.A. de C.V. (Mexico)
- Interfax Rating Agency (IRA) (Russia)
- Investment Information and Credit Rating Agency (ICRA) (India)
- Islamic International Rating Agency, B.S.C. (IIRA) (Bahrain)
- Istanbul International Rating Services, Inc. (a/k/a: TurkRating, Turkey)
- Japan Credit Rating Agency, Ltd. (JCR) (Japan)
- JCR Avrasya Derecelendime A.S. (a/k/a: JCR Eurasia Rating, Turkey)
- JCR-VIS Credit Rating Co. Ltd. (Pakistan)

¹The main source of this annex is DefaultRisk.com as of October 2009.

Kobirate Uluslararası Kredi Derecelendirme ve Kurumsal Yönetim Hizmetleri A.Ş. (a/k/a/ Kobirate, Turkey)

Korea Investors Service, Inc. (KIS) (Korea)

Korea Ratings Corporation (a/k/a: Korea Management Consulting and Credit Rating Corp. (KMCC) (Korea)

LACE Financial Corporation (U.S.)

Lanka Rating Agency, Ltd. (LRA) (Sri Lanka)

Malaysian Rating Corporation Berhad (MARC) (Malaysia)

Mikuni & Co., Ltd. (Japan)

Moody's Investors Service (U.S.)

National Information & Credit Evaluation, Inc. (NICE) (Korea)

Onicra Credit Rating Agency of India, Ltd. (India)

P.T. Kasnic Credit Rating Indonesia—Indonesia (Indonesia)

P.T. PEFINDO Credit Rating Indonesia (a/k/a: PT Pemingkat Efek Indonesia, Indonesia)

Pacific Credit Rating (PCR) (a/k/a: Clasificadora de Riesgo Pacific Credit Rating S.A.C., Peru)

Pakistan Credit Rating Agency, Ltd. (PACRA) (Pakistan)

Philippine Rating Services, Corp. (PhilRatings) (Philippines)

RAM Rating Services Berhad (RAM) (f/k/a: Rating Agency Malaysia Berhad, Malaysia)

Rapid Ratings International, Inc. (Australia/New Zealand)

Rating and Investment Information, Inc. (R&I) (Japan)

Realpoint, LLC (U.S.)

Rus Ratings (Russia)

Saha Kurumsal Yönetim ve Kredi Derecelendirme Hizmetleri A.Ş. (Turkey)

Seoul Credit Rating & Information, Inc. (SCI) (Korea)

Shanghai Credit Information Services Co., Ltd. (China)

Shanghai Far East Credit Rating Co., Ltd. (China)

SME Rating Agency of India Limited (SMERA) (India)

Sociedad Calificadora de Riesgo Centroamericana, S.A. (SCRiesgo) (Costa Rica)

Standard and Poor's (S&P) (U.S.)

Taiwan Ratings Corp. (TCR) (Taiwan Province of China)

Thai Rating and Information Services Co., Ltd. (TRIS) (Thailand)

TheStreet.com Ratings, Inc. (a/k/a: Weiss Ratings, Inc., U.S.)

TCR Kurumsal Yönetim ve Kredi Derecelendirme Hizmetleri A.S. (a/k/a: Türk KrediRating (TCRating), Turkey)

Veribanc, Inc. (U.S.)

References

- Afonso, António, Pedro Gomes, and Philipp Rother, 2007, "What 'Hides' Behind Sovereign Debt Ratings?" ECB Working Paper Series No. 711 (Frankfurt: European Central Bank).
- Allen, Mark, Christoph B. Rosenberg, Christian Keller, Brad Setser, and Nouriel Roubini, 2002, "A Balance Sheet Approach to Financial Crisis," IMF Working Paper 02/210 (Washington: International Monetary Fund).
- Alsakka, Rasha, and Owain ap Gwilym, forthcoming, "Leads and Lags in Sovereign Credit Ratings," *Journal of Banking and Finance*.
- Altman, Edward I., and Herbert A. Rijken, 2006, "A Point-in-Time Perspective on Through-the-Cycle Ratings," *Financial Analysts Journal*, Vol. 62, No. 1, pp. 54–70.
- Annaert, Jan, Marc De Ceuster, Patrick Van Roy, and Cristina Vespro, 2010, "What Determines Euro Area Bank CDS Spreads?" National Bank of Belgium Working Paper No. 190.
- Arezki, Rabah, Bertrand Candelon, and Amadou Sy, forthcoming, "Sovereign Ratings News and Financial Markets Spillovers," IMF Working Paper (Washington: International Monetary Fund).
- Aruoba, S. Borağan, Francis X. Diebold, and Chiara Scotti, 2009, "Real-Time Measurement of Business Conditions," *Journal of Business and Economic Statistics*, Vol. 27, No. 4, pp. 417–27.
- Bank of England, 2010, "Markets and Operations," *Quarterly Bulletin* (London, Q1).
- Basel Committee on Banking Supervision (BCBS), 2005, "Studies on the Validation of the Internal Rating Systems," BCBS Working Papers No. 14 (Basel: Basel Committee on Banking Supervision).
- , 2006, "International Convergence of Capital Measurement and Capital Standards: A Revised Framework—Comprehensive Version" (Basel: Basel Committee on Banking Supervision).
- Becker, Bo, and Todd Milbourn, 2010, "How Did Increased Competition Affect Credit Ratings?" April. Available via

- the Internet: <http://apps.olin.wustl.edu/faculty/milbourn/BeckerMilbournApril2010.pdf>.
- Bergevin, Philippe, 2010, "Addicted to Ratings: The Case for Reducing Governments' Reliance on Credit Ratings," C.D. Howe Institute Backgrounder No. 130 (Toronto: C. D. Howe Institute).
- Bhatia, Ashok Vir, 2002, "Sovereign Credit Ratings Methodology: An Evaluation," IMF Working Paper 02/170 (Washington: International Monetary Fund).
- Bongaerts, Dion, K. J. Martijn Cremers, and William Goetzmann, 2009, "Multiple Ratings and Credit Spreads," NBER Working Paper No. 15331 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Boot, Arnoud W. A., Todd T. Milbourn, and Anjolein Schmeits, 2006, "Credit Ratings as Coordination Mechanisms," *Review of Financial Studies*, Vol. 19, No. 1, pp. 81–118.
- Cantor, Richard, and Christopher Mann, 2003, "Measuring the Performance of Corporate Bond Ratings," Moody's Investors Service Special Comment (New York: Moody's Investors Service, April). Available via the Internet: <http://ssrn.com/abstract=996025>.
- , 2007, "Analyzing the Tradeoff between Ratings Accuracy and Stability," *Journal of Fixed Income*, Vol. 16, No. 4, pp. 60–68.
- Cantor, Richard, and Frank Packer, 1994, "The Credit Rating Industry," *FRBNY Quarterly Review*, Vol. 19, No. 2, pp. 1–26 (New York: Federal Reserve Bank of New York).
- , 1996, "Determinants and Impact of Sovereign Credit Ratings," *FRBNY Economic Policy Review*, Vol. 2, No. 2, pp. 37–54 (New York: Federal Reserve Bank of New York).
- Carey, Mark, and Mark Hrycay, 2001, "Parameterizing Credit Risk Models with Rating Data," *Journal of Banking and Finance*, Vol. 25, No. 1, pp. 197–270.
- Chambers, John, 2010, "Outlooks: The Sovereign Credit Weathervane, 2009/2010 Update," Standard & Poor's RatingsDirect, April 20. Available via the Internet (by subscription): www2.standardandpoors.com/portal/site/sp/en/la/page.topic/ratings_sov/2,1,8,0,0,0,0,0,3,1,0,0,50,0,0.html.
- Davis Polk, 2010, "Summary of the Dodd-Frank Wall Street Reform and Consumer Protection Act, Passed by the House of Representatives on June 30, 2010," July 9. Available via the Internet: <http://www.davispolk.com/publications/list.aspx>.
- Engelmann, Bernd, Evelyn Hayden, and Dirk Tasche, 2003, "Testing Rating Accuracy," *Risk*, January, pp. 82–86. Available via the Internet: www.german-zscore.de/docs/engelmann_2003.pdf.
- European Central Bank (ECB), 2008a, "Technical Specifications for the Temporary Expansion of the Central Framework," ECB Press Release, October 17.
- , 2008b, "The Implementation of Monetary Policy in the Euro Area: General Documentation on Eurosystem Monetary Policy Instruments and Procedures," November.
- , 2009, "Guideline of the European Central Bank of 20 January 2009 Amending Guideline ECB/2000/7 on Monetary Policy Instruments and Procedures of the Eurosystem," Official Journal of the European Central Bank, February.
- Everaert, Greetje, Manal Fouad, Edouard Martin, and Ricardo Velloso, 2009, "Disclosing Fiscal Risks in the Post-Crisis World," IMF Staff Position Note 09/18 (Washington: International Monetary Fund).
- Federal Register, 2008, *Securities and Exchange Commission: References to Ratings of Nationally Recognized Statistical Rating Organizations; Security Ratings; Proposed Rules*, Part IV, July 11, Available via the Internet: www.federalregister.gov/articles/2008/07/11/E8-15280/references-to-ratings-of-nationally-recognized-statistical-rating-organizations.
- Fender, Ingo, and John Kiff, 2005, "CDO Rating Methodology: Some Thoughts on Model Risk and its Implications," *Journal of Credit Risk*, Vol. 1, No. 3, pp. 37–58.
- Ferri, Giovanni, Li-gang Liu, and Joseph E. Stiglitz, 1999, "The Procyclical Role of Rating Agencies: Evidence from the East Asian Crisis," *Economic Notes*, Vol. 28, No. 3, pp. 335–55.
- Fitch Ratings, 2010a, "Sovereign Rating Methodology," Fitch Ratings Master Criteria Report, August 16. Available via the Internet (by subscription): www.fitchratings.com/creditedesk/reports/report_frame.cfm?rpt_id=547765.
- , 2010b, "Definitions of Ratings and Other Forms of Opinion," August. Available via the Internet: www.fitchratings.com/web_content/ratings/fitch_ratings_definitions_and_scales.pdf.
- Fons, Jerome S., 2002, "Understanding Moody's Corporate Bond Ratings and Rating Process," Moody's Investors Service Special Comment, May. Available via the Internet: <http://v3.moody.com/sites/products/AboutMoodyRatingsAttachments/2001400000389218.pdf?frameOfRef=corporatefor>.
- , 2004, "Tracing the Origins of 'Investment Grade'," Moody's Investors Service Special Report, January. Available via the Internet: www.moody.com.br/brasil/pdf/InvGradeOrigins.pdf.
- Granger, Clive W. J., 1969, "Investigating Causal Relations by Econometric Models and Cross-spectral Methods," *Econometrica*, Vol. 37, No. 3, pp. 424–38.

- Gray, Dale F., Robert Merton, and Zvi Bodie, 2007, "Contingent Claims Approach to Measuring and Managing Sovereign Credit Risk," *Journal of Investment Management*, Vol. 5, No. 4, pp. 1–24.
- Group of Twenty (G-20), 2009, *Declaration on Strengthening the Financial System*, London Summit Communiqué, Annex, April 2, Available via the Internet: www.london-summit.gov.uk/en/summit-aims/summit-communique/.
- , 2010, *The G-20 Toronto Summit Declaration*, Annex 2, June 26–27, www.g20.org/pub_communiques.aspx/.
- Güttler, Andre, 2009, "Lead-lag Relationships and Rating Convergence Among Credit Rating Agencies," European Business School Research Paper 09–14
- Hamilton, David T., and Richard Cantor, 2005, "Rating Transitions and Defaults Conditional on Rating Outlooks Revisited: 1995–2005," Moody's Investor Service Special Comment, December. Available via the Internet: <http://v2.moodys.com/cust/content/content.ashx?source=StaticContent/Free%20pages/Credit%20Policy%20Research/documents/current/2004700000425139.pdf>.
- Hartelius, Kristian, Kenichiro Kashiwase, and Laura Kodres, 2008, "Emerging Market Spread Compression: Is it Real or is it Liquidity?" IMF Working Paper 08/10 (Washington: International Monetary Fund).
- Hessol, Gail I., Erkan Erturk, and Jason Ontko, 2007, "Credit Watch and Rating Outlooks Provide Powerful Warning Signals," Standard & Poor's RatingsDirect, August 7. Available via the Internet: www.alacrastore.com/research/s-and-p-credit-research-CreditWatch_And_Rating_Outlooks_Provide_Powerful_Warning_Signals-595377.
- Hill, Paula, and Robert Faff, 2008, "Do Credit Watch Procedures Affect the Information Content of Sovereign Credit Rating Changes?" Paper presented at the Financial Management Association European Conference, Prague, Czech Republic, June. Available via the Internet: http://69.175.2.130/~finman/Prague/Papers/FMA-Euro_2008_Submission_HillnFaff.pdf.
- Hurlin, Christophe, and Baptiste Venet, 2001, "Granger Causality Tests in Panel Data Models with Fixed Coefficients," Working Paper Eurisco 2001–09 (Paris: Université Paris IX Dauphine).
- International Monetary Fund (IMF), 1999, *International Capital Markets* (Washington, July).
- , 2010, *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, April).
- International Organization of Securities Commissions (IOSCO), 2008, "Code of Conduct Fundamentals for Credit Rating Agencies," May. Available via the Internet: www.iosco.org/.
- , 2009, "A Review of Implementation of the IOSSCO Code of Conduct Fundamentals for Credit Rating Agencies," March. Available via the Internet: www.iosco.org/.
- , 2010, "Objectives and Principles of Securities Regulation," June. Available via the Internet: www.iosco.org/.
- Ismailescu, Iuliana, and Hossein Kazemi, forthcoming, "The Reaction of Emerging Market Credit Default Swap Spreads to Sovereign Credit Rating Changes," *Journal of Banking and Finance*.
- Jaramillo, Laura, 2010, "Determinants of Investment Grade Status in Emerging Markets" IMF Working Paper 10/117 (Washington: International Monetary Fund).
- Joint Forum, 2009, *Stocktaking on the Use of Credit Ratings* (Basel: Bank for International Settlements). Available via the Internet: www.bis.org/publ/joint22.htm
- Jüttner, D.J., and J. McCarthy, 2000, "Modelling a Rating Crisis" (unpublished; Sydney: Macquarie University).
- Kiff, John, Michael Kissler, and Liliana Schumacher, forthcoming, "An Inspection of the Through-the-Cycle Rating Methodology," IMF Working Paper (Washington: International Monetary Fund).
- Kiff, John, Sylwia Nowak, and Liliana Schumacher, forthcoming, "Are Rating Agencies Powerful? An Investigation into the Impact and Accuracy of Sovereign Ratings," IMF Working Paper (Washington: International Monetary Fund).
- Larrain, Guillermo, Helmut Reisen and Julia von Maltzan, 1997, "Emerging Market Risk and Sovereign Credit Rating," OECD Development Centre, Working Paper 124 (Paris: Organization for International Cooperation and Development).
- Loeffler, Gunter, 2004, "An Anatomy of Rating Through the Cycle," *Journal of Banking and Finance*, Vol. 28, No. 3, pp. 695–720.
- , 2005, "Avoiding the Rating Bounce: Why Rating Agencies are Slow to React to New Information," *Journal of Economic Behavior and Organization*, Vol. 56, No. 3, pp. 365–81.
- Monfort, Brieuc, and Christian Mulder, 2000, "Using Credit Ratings for Capital Requirements on Lending to Emerging Market Economies: Possible Impact of a New Basel Accord," IMF Working Paper 00/69 (Washington: International Monetary Fund).
- Moody's Investors Service, 2001, "The Unintended Consequences of Rating Triggers," Moody's Investors Service Special Comment, December. Available via the Internet (by subscription): www.moodys.com.

- , 2008, “Sovereign Bond Ratings,” Moody’s Investors Service, September. Available via the Internet (by subscription): http://v3.moodys.com/viewresearchdoc.aspx?docid=PBC_109490.
- , 2010a, “Sovereign Methodology Update: Narrowing the Gap – A Clarification of Moody’s Approach to Local vs. Foreign Currency Government Bond Ratings,” Moody’s Investors Service, February. Available via the Internet (by subscription): http://v3.moodys.com/viewresearchdoc.aspx?docid=PBC_118820
- , 2010b, “The Performance of Moody’s Structured Finance Ratings: March 2010 Quarterly Update,” Moody’s Investors Service, June. Available via the Internet (by subscription): http://v3.moodys.com/viewresearchdoc.aspx?docid=PBC_125378.
- , 2010c, “Rating Symbols and Definitions,” Moody’s Investors Service, July. Available via the Internet: http://v3.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_79004.
- Mulder, Christian, and Roberto A. Perrelli, 2001, “Foreign Currency Credit Ratings for Emerging Market Economies,” IMF Working Paper 01/191 (Washington: International Monetary Fund).
- Partnoy, Frank, 1999, “The Siskel and Ebert of Financial Markets? Two Thumbs Down for the Credit Rating Agencies,” *Washington University Law Quarterly*, Vol. 77, No. 3. Available via the Internet: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=167412.
- , 2009, “Rethinking Regulation of Credit Rating Agencies: An Institutional Investor Perspective,” White Paper (Washington: Council of Institutional Investors). Available via the Internet: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1430608.
- Reisen, Helmut, and Julia von Maltzan, 1999, “Boom and Bust in Sovereign Ratings,” *International Finance*, Vol. 2, pp. 273–93.
- Rowland, Peter, 2004, “Determinants of Spread, Credit Ratings and Creditworthiness for Emerging Market Sovereign Debt: A Follow-Up Study Using Pooled Data Analysis,” *Borradores de Economía* 296 (Bogotá: Banco de la República de Colombia).
- , and José L. Torres, 2004, “Determinants of Spread and Creditworthiness for Emerging Market Sovereign Debt: A Panel Data Study,” *Borradores de Economía* 295 (Bogotá: Banco de la República de Colombia).
- Securities and Exchange Commission (SEC), 2003, *Report on the Role and Function of Credit Rating Agencies in the Operation of the Securities Markets* (Washington, January). Available via the Internet: www.sec.gov/news/studies/cred-ratingreport0103.pdf.
- Sobehart, Jorge R., Sean C. Keenan, and Roger M. Stein, 2000, “Benchmarking Quantitative Default Risk Models: A Validation Methodology,” Moody’s Investors Service Rating Methodology, March. Available via the Internet: www.moodyskmv.com/research/files/wp/53621.pdf
- Standard & Poor’s (S&P), 2008, “Sovereign Credit Ratings: A Primer,” Standard & Poor’s RatingsDirect, May 19. Available via the Internet: www.investinginbondseurope.org/uploadedFiles/Learn_About_Bonds/What_You_Should_Know/Market_and_Economic_Influences_on_Your_Bond_Investments/Sovereign%20Credit%20Ratings%20Primer%20-%20SP.pdf.
- , 2009, “Understanding Standard & Poor’s Rating Definitions,” Standard & Poor’s RatingsDirect, June 3. Available via the Internet: www2.standardandpoors.com/spf/pdf/fixedincome/Understanding_Rating_Definitions.pdf.
- , 2010a, “Another Perspective on Rating Comparability and Performance,” Standard & Poor’s RatingsDirect, April 9. Available via the Internet (by subscription): www.standardandpoors.com/ratings/articles/en/us/?assetID=1245209944177.
- , 2010b, “Methodology: Credit Stability Criteria,” Standard & Poor’s RatingsDirect, May 3. Available via the Internet (by subscription): www.standardandpoors.com/ratings/articles/en/us/?assetID=1245211382965.
- Sy, Amadou N. R., 2002, “Emerging Market Bond Spreads and Sovereign Credit Ratings: Reconciling Market Views with Economic Fundamentals,” *Emerging Markets Review*, Vol. 3, No. 4, pp. 380–408.