

Gonzalez, Fernando et al.

Research Report

Market dynamics associated with credit ratings - a literature review

ECB Occasional Paper, No. 16

Provided in Cooperation with:

European Central Bank (ECB)

Suggested Citation: Gonzalez, Fernando et al. (2004) : Market dynamics associated with credit ratings - a literature review, ECB Occasional Paper, No. 16, European Central Bank (ECB), Frankfurt a. M.

This Version is available at:

<https://hdl.handle.net/10419/154469>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



EUROPEAN CENTRAL BANK

OCCASIONAL PAPER SERIES

NO. 16 / JUNE 2004

**MARKET
DYNAMICS
ASSOCIATED WITH
CREDIT RATINGS
A LITERATURE
REVIEW**

by Fernando Gonzalez,
François Haas, Ronald
Johannes, Mattias Persson,
Liliana Toledo, Roberto
Violi, Martin Wieland
and Carmen Zins





EUROPEAN CENTRAL BANK



In 2004 all ECB publications will feature a motif taken from the €100 banknote.



OCCASIONAL PAPER SERIES

NO. 16 / JUNE 2004

MARKET DYNAMICS ASSOCIATED WITH CREDIT RATINGS A LITERATURE REVIEW*

by Fernando Gonzalez¹,
François Haas², Ronald
Johannes³, Mattias Persson⁴,
Liliana Toledo⁵, Roberto
Violi⁶, Martin Wieland⁷
and Carmen Zins⁷

This paper can be downloaded from
the ECB's website (<http://www.ecb.int>).

* This paper represents a joint effort by a group of European central bank experts co-ordinated by F. Haas (Banque de France). It has benefited from comments and suggestions from Ingo Fender and Franck Packer (Bank for International Settlements). The views expressed in this paper do not necessarily reflect those of the European Central Bank or of the respective institutions of the authors.

¹ European Central Bank, Kaiserstrasse 29, 60311, Frankfurt am Main, Germany

² Banque de France, 39, rue Croix-des-Petits-Champs, 75049 Paris Cedex 01, France

³ Bank of England, Threadneedle Street, London EC2R 8AH, United Kingdom

⁴ Sveriges Riksbank, Brunkebergstorg 11, 103 37 Stockholm, Sweden

⁵ Banco de España, Alcalá 50, 28014 Madrid, Spain

⁶ Banca d'Italia, Via Nazionale 91, 00184 Rome, Italy

⁷ Deutsche Bundesbank, Wilhelm-Epstein-Str. 14, 60431 Frankfurt am Main, Germany

© European Central Bank, 2004

Address

Kaiserstrasse 29
60311 Frankfurt am Main
Germany

Postal address

Postfach 16 03 19
60066 Frankfurt am Main
Germany

Telephone

+49 69 1344 0

Website

<http://www.ecb.int>

Fax

+49 69 1344 6000

Telex

411 144 ecb d

All rights reserved. Reproduction for educational and non-commercial purposes is permitted provided that the source is acknowledged.

The views expressed in this paper do not necessarily reflect those of the European Central Bank.

ISSN 1607-1484 (print)
ISSN 1725-6534 (online)



CONTENTS

1 EXECUTIVE SUMMARY	4
2 INTRODUCTION	6
3 THE EXPANDING USE OF RATINGS	7
3.1 A tentative definition of ratings	7
3.2 The expanding use of credit ratings	8
4 RATINGS AND MARKET DYNAMICS: DO RATINGS AND CHANGES IN RATINGS INFLUENCE MARKET DYNAMICS?	10
4.1 The information content of ratings and reactions to changes in ratings	10
4.2 The consequences of the more widespread use of ratings	12
5 THE CHALLENGE: HOW TO RECONCILE THE (HETEROGENEOUS) INTERESTS OF DIFFERENT USERS?	16
5.1 The methodology: “rating through-the-cycle” vs. “point-in-time”	16
5.2 Recent developments in methodology: structural changes or refinement?	19
6 ACCURACY, STABILITY AND THE “RELATIVE” PROCYCLICALITY OF RATINGS	22
7 POLICY IMPLICATIONS AND ISSUES	24
7.1 Hardwiring vs. flexibility	24
7.2 Implications of the limited short-term accuracy of ratings	24
7.3 Rating agency initiatives and transparency	25
7.4 Possible implications of a change in methodology	25
8 APPENDIX	27
8.1 Default risk and the informational efficiency of rating changes: evidence from capital markets	27
8.2 Credit risk and transition matrices	28
8.3 Credit Migration Estimates: methods and risk measurement implications	30
9 REFERENCES	32

I EXECUTIVE SUMMARY

1. Credit ratings produced by the major credit rating agencies (CRAs) aim to measure the creditworthiness, or more specifically, the relative creditworthiness of companies, i.e. their ability to meet their debt servicing obligations. In principle, the rating process focuses on the fundamental long-term credit strength of a company. It is typically based on both public and private information, except for unsolicited ratings, which focus only on public information. The basic rationale for using ratings is to achieve information economies of scale and solve principal-agent problems. Partly for the same reasons, the role of credit ratings has expanded significantly over time. Regulators, banks and bondholders, pension fund trustees and other fiduciary agents have increasingly used ratings-based criteria to constrain behaviour. As a result, the influence of the opinions of CRAs on markets appears to have grown considerably in recent years.

2. One aspect of this development is its potential impact on market dynamics (i.e. the timing and path of asset price adjustments, credit spreads, etc.), either directly, as a consequence of the information content of ratings themselves, or indirectly, as a consequence of the “hardwiring” of ratings into regulatory rules, fund management mandates, bond covenants, etc.

When considering the impact of ratings and rating changes, two conclusions are worth highlighting:

– First, ratings correlate moderately well with observed credit spreads, and rating changes with changes in spreads. However, other factors, such as liquidity, taxation and historical volatility clearly also enter into the determination of spreads. Recent research suggests that reactions to rating changes may also extend beyond the immediately-affected company to its peers, and from bond to equity prices. Furthermore, this price reaction to rating changes seems to be asymmetrical, i.e. more pronounced for downgrades than for upgrades, and may be

more significant for equity prices than for bond prices.

– Second, the hardwiring of regulatory and market rules, bond covenants, investment guidelines, etc., to ratings may influence market dynamics, and potentially lead to or magnify threshold effects. The more that different market participants adopt identical ratings-linked rules, or are subject to similar ratings-linked regulations, the more “spiky” the reaction to a credit event is likely to be. This reaction may include, in some cases, the emergence of severe liquidity pressures. Efforts have recently been made, notably with support from the rating agencies themselves, to encourage a more systematic disclosure of rating triggers and to renegotiate and smooth the possibly more destabilising forms of rating triggers. However, the lack of a clear disclosure regime makes it difficult to assess how far this process has evolved. Questions also remain as to the extent to which ratings-based criteria introduce a fundamentally new element into market behaviour, or, conversely, the extent to which they are simply a variant of more traditional contractual covenants.

3. Rating agencies strive to provide credit assessments that remain broadly stable through the course of the business cycle (rating “through the cycle”). Agencies and other analysts frequently contrast the fundamental credit analysis on which ratings are based with market sentiment – measured for example by bond spreads – which is arguably subject to more short-term influences. Agencies are adamant that they do not directly incorporate market sentiment into ratings (although they may use market prices as a diagnostic tool). On the contrary, they make every effort to exclude transient market sentiment. However, as reliance on ratings grows, CRAs are being increasingly expected to satisfy a widening range of constituencies, with different, and even sometimes conflicting, interests: issuers and “traditional” asset managers will look for

more than a simple statement of near-term probability of loss, and will stress the need for ratings to exhibit some degree of stability over time. On the other hand, mark-to-market traders, active investors and risk managers may seek more frequent indications of credit changes. Hence, in the wake of major bankruptcies with heightened credit stress, rating agencies have been under considerable pressure to provide higher-frequency readings of credit status, without loss of quality. So far, they have responded to this challenge largely by adding more products to their traditional range, but also through modifications in the rating process.

4. The rating process and the range of products offered by rating agencies have thus evolved over time, with, for instance, an increasing emphasis on the analysis of liquidity risks, a new focus on the hidden liabilities of companies and an increased use of market-based tools. It is too early, however, to judge whether these changes should simply be regarded as a refinement of the agencies' traditional methodology or whether they suggest a more fundamental shift in the approach to credit risk measurement. For the same reason, it is not possible to draw any firm conclusions about changes in the effects of credit ratings on market dynamics.

2 INTRODUCTION

This paper summarises the work conducted by a group of economists from various European central banks over the summer of 2003. It is intended to add to the ongoing debate on major rating agencies and their methodologies. The analysis and policy considerations proposed are based on a review of the literature and are those of the authors; they do not necessarily reflect the positions of their respective institutions.

The paper is aimed at contributing to the current debate on this topic in two ways: first, by providing a factual exposition of the significance and evolving use of credit ratings in the financial markets and, second, by identifying the possible impacts that such evolving use may have on market dynamics (i.e. the timing and path of asset price adjustments, the dynamics of credit spreads, the potential magnifying effects that rating changes can trigger) and analysing how credit rating agencies (CRAs) have responded to the increasing, and sometimes conflicting, demands that market participants put on credit ratings. In doing so, the paper also provides a comprehensive review of literature on credit ratings and CRAs.

The paper is organised as follows: Section 3 explains how the role of ratings has evolved in financial markets; Section 4 examines different channels through which ratings and rating changes may impact on market dynamics and contribute to asset price movements; Section 5 discusses rating methodology and the meaning of some recent developments in this field; Section 6 considers the accuracy, stability and the relative procyclicality of ratings; and Section 7 concludes by pointing to some policy implications and issues derived from the preceding developments. An appendix (Section 8) surveys some key issues in credit risk measurement.

3 THE EXPANDING USE OF RATINGS

3.1 A TENTATIVE DEFINITION OF RATINGS

RATINGS ARE CREDIT OPINIONS

Ratings provided by CRAs are a measure of the long-term fundamental credit strength of companies, i.e. their long-term ability and willingness to meet debt servicing obligations. More specifically, ratings apply either to the general creditworthiness of an obligor or to its obligations with respect to a particular debt security (senior and subordinated bonds, either secured or unsecured, collateralised debt structures, etc.) or other specific financial obligations.

CRAs base their analyses on a company's financial statements, franchise value, management quality and competitive position in its industry, and seek to predict credit performance – the servicing of debt obligations in full and on time – under a range of macroeconomic and credit conditions, including stress situations. This analysis is based not only on public information, but also on private/confidential information which companies agree to share with CRAs.

CRAs stress that ratings are opinions.¹ These opinions, which stem from fundamental credit analysis, are used to classify credit risk. In keeping with their status as opinions, ratings are determined by a rating committee.² As such, ratings do not constitute a recommendation to buy, sell or hold a particular security, and do not address the suitability of an investment for a particular investor.

Inherent in this definition of ratings is the notion that they are an ordinal measure of risk, but not necessarily a cardinal one. Accordingly, all CRAs express the outcome of their assessments in the form of symbols, such as Aaa, AAA, etc., which more or less correspond to each other across agencies. The division of the rating scale into these buckets, and the subsequent assignment of debt obligations to them, essentially reflects the judgement and

experience of rating agency staff, supplemented in some areas by the use of models.

THE ECONOMIC RATIONALE FOR THE USE OF RATINGS

In economic terms, the rationale for using ratings, and their growing “popularity” stems from their ability to provide information economies of scale on the one hand, and from their contribution to solving principal-agent problems on the other.

– Information economies of scale

Creditors and investors have found it efficient to use ratings opinions in initiating and monitoring their transactions because of the economies of scale achieved in gathering and analysing information. This, in turn, has facilitated the access of borrowers to debt markets, by widening the investor pool and reducing adverse selection problems resulting from information asymmetries between investors and issuers of debt,³ and has provided significant impetus to the development of financial markets.

– Principal-agent problems

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

1 “Understanding Moody's Corporate Bond Ratings and Ratings Process”, Moody's Investors Service, May 2002, New York.

2 Mara Hilderman, “Opening the Black Box: The Rating Committee Process at Moody's”, Moody's Investors Service, July 1999, New York.

3 The general adverse selection problem was introduced by George Akerlof in 1970 (see “The market for lemons”, *Quarterly Journal of Economics*, Vol. 54, pp. 488-500). In the case of bond markets, the problem implies that non-rated markets are characterised by very low spreads between the interest rates paid by strong issuers and those paid by weak issuers. An objective assessment of credit risk significantly increases this spread, benefiting strong issuers but harming weak issuers.

In economic terminology, ratings are used to solve principal-agent problems, that is, a principal's problem of maximising incentives for agents to perform well when it is hard to observe or directly control their actions.

3.2 THE EXPANDING USE OF CREDIT RATINGS

Indeed, precisely due to the aforementioned qualities of ratings, interest in credit rating services and the demand for a wider range of ratings, beyond the credit assessment of traditional corporate bonds, have significantly increased⁴ over the past three decades. Regulators (in regulations), banks and bondholders (in loan and bond covenants), pension fund trustees and other fiduciary agents (in investment guidelines, insurance company charters, etc.) have made increasing use of ratings-based constraints in their rules. As a result, the use of ratings and the influence of the opinions of CRAs on securities markets have grown significantly, to the extent that ratings are now ubiquitous in financial markets, and increasingly act as benchmarks or creditworthiness standards, far beyond their initial purpose. This role can be highlighted in the area of regulation as well as in debt issuance and portfolio management.

"CORE CLIENTS": ISSUERS AND FIXED-INCOME INVESTORS

– Debt issuers

From the outset, debt issuers have been among the "natural" users of ratings, and increasingly so, given that, although ratings may not determine their ability to enter financial markets, they do at least contribute to determining their financing costs and the quality of their investor bases. Hence, preserving or achieving a desired rating is frequently incorporated into corporate goals and represents an integral part of the financing strategy of companies. Indeed, through the use of specific services offered by CRAs, such as Moody's Rating Assessment Service or

Standard & Poor's (S&P's) Rating Evaluation Service, companies are able to "monitor" the behaviour of their ratings under different scenarios. The use of rating triggers, that is to say covenants that imply a change in the characteristics of an existing financing instrument, should the rating of the issuer/borrower change, are an example of how investors can use ratings to tailor their investments by issuer. Such ratings-based triggers were initially mostly found in bank loan covenants. They became increasingly popular, however, and took diversified forms, in bond issuance in the mid to late 1990s (see below).

– Bond investors and portfolio managers

Ratings provided by recognised CRAs play a central role in portfolio governance, especially for small to medium-sized asset managers who lack the resources to develop reliable internal credit assessment systems. However, even for major asset managers, the use of internal credit assessment systems is frequently limited to supplementing external ratings when the latter are not available or when they provide diverging signals. The use of ratings in portfolio governance and investment mandates appears to be twofold: (i) ratings-based guidelines contribute to determining the universe of eligible assets – within this universe ratings (in conjunction with maturity constraints) are also used to determine the maximum, and sometimes minimum, proportion

4 *Short-term rating of commercial papers* was first introduced in the 1970s. *Bank ratings* in the form of financial strength ratings measure credit risk for a bank in the absence of any assumed support from governmental authorities. Fitch also produces bank ratings which factor in the likelihood of support. *Asset-backed ratings* measure credit risk on structured products in which the rated liabilities are backed by a dedicated set of assets, e.g. asset-backed commercial papers backed by trade receivables, or collateralised debt obligations (CDOs) backed by commercial bank loans. *Liquidity rating assessments*, which were formally introduced by Moody's in 2002 for speculative grade borrowers, are designed to supplement short-term ratings and to give an assessment of vulnerability to sudden loss of market access. Additionally, there are *sovereign ratings*, both for industrialised countries and emerging market borrowers. This type of rating is very different from the others in its conception of credit risk, and lies beyond the scope of this paper.

of authorised holdings – and (ii) these ratings-based guidelines also shape the reactions of asset managers when faced with changes in the credit quality of their holdings.⁵

OTHER MARKET PARTICIPANTS

Market participants, be they investors, market makers or broker-dealers, also rely extensively on external ratings for the assessment of their trading counterparties (selection of credit counterparties and definition of credit limits). This is especially true with regard to the short-term management of liquidity (repo transactions, for instance) and over-the-counter derivative transactions (swaps, options, etc.): the creditworthiness of market participants, as assessed by CRAs, determines either the conditions (costs) under which those participants can access the market (the frequency of margin calls, the magnitude of collateralisation that they will be asked to provide) or even their very access to markets.

In the management of their portfolios and the implementation of monetary policy, central banks also frequently rely on ratings provided by CRAs, in ways similar to that of other market participants, i.e. in the definition of eligible assets, either for the investment of own funds and foreign exchange reserves or as monetary policy collateral. In the latter case, the credit quality of eligible assets impacts on the required level of collateralisation and risk controls.

REGULATORS

The importance of ratings-based regulations has traditionally been particularly visible in the United States, where it can be traced back to the 1930s. These regulations affect not only banks, but also insurers, pension funds, mutual funds and broker-dealers, restricting or prohibiting the purchase of bonds with “low” ratings (usually below BBB), imposing variable capital charges depending on the rating of the holdings or easing the issuance conditions or disclosure requirements for securities carrying a

“satisfactory” rating. While ratings-based regulation appears to be less common overall in Europe, a similar approach can be found in the Capital Adequacy Directive in the area of bank regulation. More generally, the Basel II project, in its “standardised approach to credit risk” establishes fixed credit risk weights for each supervisory category and relies explicitly on “external credit assessments”.

⁵ See Report of the CGFS “Incentives structures in Institutional Asset Management and their Implications for Financial Markets”, March 2003.

4 RATINGS AND MARKET DYNAMICS: DO RATINGS AND CHANGES IN RATINGS INFLUENCE MARKET DYNAMICS?

When considering the possible impacts of ratings (and, more specifically, changes in ratings) on market dynamics (i.e. the behaviour of asset prices and spreads), it is necessary to distinguish between a direct impact, resulting from the information content of a rating change, and an indirect impact, stemming from the “hardwiring” of regulations and guidelines to ratings.

4.1 THE INFORMATION CONTENT OF RATINGS AND REACTIONS TO CHANGES IN RATINGS

For bond ratings to have a direct, information-related impact on spreads and spread dynamics, they must contain relevant pricing information that investors cannot obtain from other sources at comparable cost. The question of the information content of ratings has been addressed (1) by analysing the relation between bond yields and ratings and (2) by studying price reactions to rating changes.

RELATIONSHIP BETWEEN BOND YIELDS AND RATINGS

The various studies that have tried to answer the question of the information content of ratings in general come to the conclusion that ratings do help explain cross-sectional differences in yield spreads.⁶ In these studies, ratings may, however, be a proxy for omitted publicly available variables that affect the spreads.⁷

Indeed, even if ratings and rating changes do partly explain observed spreads and their dynamics, there remains a large part of these spreads that ratings cannot explain. Additional factors, whose relative importance varies according to the different studies, therefore need to be included:

- *Taxation.* While ratings are found by Gabbi and Sironi (2002) to be effectively the most important factor determining primary yield spreads between corporate bonds and the equivalent Treasury securities, other factors, such as expected tax treatment for bonds,

are also important. However, the structural efficiency⁸ of the market and liquidity variables do not appear to be significant in explaining the cross-sectional variability of spreads.⁹

- *Systematic risk.* According to Elton, Gruber, Agrawal and Mann (2001), losses stemming from expected defaults come last among the three factors that can explain (i.e. break down) corporate spreads – expected losses are found to explain only 17.8% of the variation in the spread. Differential taxes appear to be more important and explain about 36% of the spread. The remaining portion of the spread (more than 46%) is found to be closely related to the factors commonly accepted as explaining risk premia for common stocks, i.e. the Fama-French factors.¹⁰ Hence, a large portion of the spread seems to be compensation for systematic risk, that cannot be diversified away.
- *Volatility.* Campbell and Taksler (2003) analysed the effects of equity volatility on corporate bond yields, and showed that idiosyncratic volatility was directly related to the cost of borrowing for

6 See, for example, Liu and Thakor (1984) and Kao and Wu (1990). Ederington et al. (1987) find that, conditional on economic and company-specific variables, ratings do have explanatory power for bond yields.

7 See Galil (2002). See Appendix for more details and more references to the academic literature.

8 Such as fees charged to the issuer, the number of managers in the bond issuing syndicate, and the issuance process (private placement versus public issue and fixed-priced versus open-priced issues).

9 The study was conducted on the primary corporate eurobond market and analysed spreads on eurobond issues completed by almost 600 major corporations from 15 industrialised countries during the 1991-2001 period. In addition to the above-mentioned result, the study also showed that bond investors' reliance on rating agencies' judgements increased over time during the sample period. Also, empirical evidence shows that rating agencies adopt a “through-the-cycle” evaluation approach to obligors' creditworthiness that is different to the forward-looking approach used by bond investors. Finally, rating agencies' discordance, as measured by a different numeric value of the assigned rating notch, appears to be perceived by bond investors as a sign of (or simply reflects) a higher degree of uncertainty concerning the issuer's default risk.

10 The excess return on the market (RM) factor, the “small minus big” (SMB) factor, and the “high minus low” (HML) factor.

corporate issuers. Furthermore, the results also suggest that volatility can explain as much cross-sectional variation in yields as credit ratings.

- *Supply and demand.* Using dealers' quotes and transaction prices for industrial bonds, Collin-Dufresne, Goldstein and Martin (2001) investigated the determinants of credit spread changes. Their results show that variables, which in theory determine credit spread changes, have limited explanatory power. Rather, using principal component analysis, they show that most of the residuals are driven by a single factor. Monthly credit spread changes appear to be driven principally by local supply/demand shocks that are independent of both credit-risk factors and liquidity.
- *Liquidity.* Chen, Lesmond and Wei (2002) find liquidity to also be an important factor explaining corporate bond spreads, after controlling for credit ratings, maturity, amounts outstanding and volatility. These results indicate that liquidity is indeed priced into corporate bonds.

PRICE REACTIONS TO RATING CHANGES

Numerous studies have focused on the price reactions of bonds and equities to changes in ratings. A recent study by Klinger and Sarig (2000), which focuses on the refinement of Moody's rating system in 1982, shows that investors do indeed react to changes in ratings if they are unexpected, in the same way as they react to new information. Their test was, however, conducted on a one-off event basis that does not necessarily reflect the informational content of ratings in future years. More generally, while research conducted in this field¹¹ usually yields mixed results, two findings are worth highlighting:

- *Reactions to bond rating downgrades percolate from the affected company to its rivals, and from the bond market to equity prices.* Equity analysts revise their earnings expectations

downward for both the downgraded company and its rivals, and the extent of this reaction depends on the initial rating and the size of the downgraded debt (Caton and Goh, 2003).

- *The price reaction to rating changes, and in particular the effect on stock returns, is asymmetrical, i.e. the market reacts more strongly to rating downgrades than to rating upgrades,*¹² and ultimately this asymmetry appears less significant for bonds than for stocks. Several studies suggest that abnormal equity returns following bond downgrades are negative, whereas there is no significant abnormal equity return reaction to upgrades. Holthausen and Leftwich (1986) suggest that the difference between one-year pre-announcement returns to upgrade and downgrade is in the order of 20% to 30%. They find no abnormal returns after the announcement of upgrades, but do find evidence of abnormally low returns in the quarter following a downgrade. Dichev and Piotroski (2001) find negative abnormal stock returns in the order of 10% to 14% in the first year following downgrades. Furthermore, the underperformance is more pronounced for small companies with low credit quality.

The above findings could stem from the way in which rating agencies produce their ratings or could reflect the fact that rating agencies expend more resources on detecting deteriorations in company balance sheets than they do on detecting improvements in earnings. A further explanation is, of course, that stock markets overreact to rating downgrades (see Dichev and Piotroski, 2001). It could also be argued that the overreaction to downgrades reflects the fact

11 Griffin and Sanvicente (1982), Ingram, Brooks and Copeland (1983), Holthausen and Leftwich (1985), Hand, Holthausen and Leftwich (1992) and Goh and Ederington (1993).

12 Hand, Holthausen and Leftwich (1992) find asymmetrical results with respect to reactions to rating downgrades and upgrades. They observe significantly negative average excess bond and stock returns for downgrades, and a weaker positive effect for upgrades. However, when controlling for expected rating changes, the asymmetries disappear in bond returns but persist in stock returns. Similarly, according to Ederington, Goh and Nelson (1996), the stock market reacts to downgrade information more quickly than analysts do and, in contrast to downgrades, upgrades do not elicit any market response.

that downgrades convey additional information: a downgrade signals that the rated company has either decided not to or proved unable to avoid the downgrade. This is consistent with the role of ratings as coordination mechanisms, see Boot/Milbourn (2002).

4.2 THE CONSEQUENCES OF THE MORE WIDESPREAD USE OF RATINGS

THE EFFECTS OF THE HARDWIRING OF RULES AND REGULATIONS TO RATINGS

As mentioned above, enshrining ratings into rules and regulations is a possible answer to principal-agent problems. At the same time, such hardwiring may fuel specific market dynamics as it injects a dose of automatism (and predictability) into the reactions of the affected market participants to the initial rating event, potentially magnifying threshold effects. For instance, the point at which probabilities of default have been found empirically to rise sharply constitutes one of the most important divides in rating scales (between BBB- and BB+), and one of the main thresholds in the world of asset management, as it separates “investment grade” securities from “speculative grade” securities, which many investors are not authorised to hold or may only hold in strictly limited quantities. Hence, the downgrading of a bond issue (or an issuer) to below that level may force asset managers to restructure their portfolios, triggering a forced liquidation of assets. More generally, the more that different market participants are constrained by identical ratings-linked rules or subject to similar ratings-linked regulations, the more their reactions can be expected to be identical in the event of a credit event, and the more pronounced the effect of such reactions is likely to be.

In this regard, it appears that investment mandates offer different degrees of flexibility in the management of guideline violations triggered by changes in ratings (most notably downgrades). Guidelines imposing an

automatic and immediate liquidation of the downgraded assets seem to be less common than they were, and are increasingly supplemented by flexible rules that either allow the fund manager to keep the affected assets in the portfolio (provided that overall these assets do not represent more than a certain percentage of the whole portfolio) or allow him to dispose of the affected assets over a certain period of time. Such flexibility is welcomed as it limits the risks of “fire sales” that can fuel downward spirals in prices. At the same time, however, expectations of such liquidations, even if they are anticipated to take place over a “certain” period of time instead of in the period immediately following the credit event, are likely to trigger “front running” behaviour by other market participants, a situation that tends to bring forward much of the ultimate price impact. More generally, this trend toward increased flexibility in the managing of rating events can be seen as paralleling the progressive changes in portfolio management from an initial “buy and hold” approach to a more active, mark-to-market approach. In the same vein, the framework of the Basel II standard approach could smooth the major discontinuity between “investment grade” and “speculative grade” securities, as it spreads the increase in weights across the rating scale. Indeed, the BBB-/BB+ threshold is not a relevant threshold for the setting of risk weights by banking regulators.¹³

FROM A DOWNGRADE TO A LIQUIDITY CRISIS: RATING TRIGGERS

Ratings-based triggers are intended to protect lenders against credit deterioration and asymmetric information problems, and lenders are willing to pay for triggers by accepting lower spreads/coupons. Hence, there is a clear demand-side reason for issuing debt instruments with embedded rating triggers. There is, however, also a supply-side reason for rating triggers: i.e. borrowers are willing to include such triggers because without them

¹³ Securities rated from BBB+ to BB- are assigned a 100% risk weight in the new accord standard approach.

lenders would probably demand a higher initial spread on debt contracts. Rating triggers attempt to offer protection to investors, but, due to the way in which they work, they could precipitate a liquidity crisis and/or even contribute to extreme events such as bankruptcies.

The inclusion of rating triggers in debt contracts is not new. The so-called “super poison put provisions”, for example, that gained prominence in bonds issued in late 1980s, following the RJR Nabisco buyout, contained embedded rating triggers.¹⁴ A super poison put provision allows bondholders to sell their bonds to the issuing company at par value or at a premium after the occurrence of a “designated event”¹⁵ combined with a “qualifying downgrade”. Hence, super poison put provisions can be viewed as conditional rating triggers, conditional on a specific event or a set of events. The exact provisions varied from issue to issue, creating uncertainty about the strength of the protection offered in any particular bond issue. In response to this uncertainty, S&P began rating the event risk protection of bonds with put provisions in July 1989.

The designs of ratings-based triggers vary, both in form and in the identity of the contracting parties. In general, a rating trigger provides creditors and counterparties with certain rights in the event of a borrower’s credit rating falling to, or below, a specified level. The rights given to the creditors usually vary from an increase in the nominal coupon to a put option.

According to a recent survey by Moody’s (2001), out of 771 US corporate issuers rated Ba1 or higher, only 12.5% reported no triggers, while the remaining 87.5% reported a total of 2,819 rating triggers.¹⁶ Not only did rating triggers appear to be widely used, but situations in which a single issuer was subject to multiple triggers were common at the time of the survey. While there are reasons to believe that the use of such features has since declined, no comprehensive picture is available that would help to accurately assess the current situation.

The table below shows common features of rating triggers and their frequency.

Table	
Trigger	Frequency
Collateral, letter of credit, bonding provisions	21.6%
Pricing grid	21.1%
Acceleration	29.1%
of which	
Termination	8.5%
Material adverse change	5.4%
Default	5.3%
Acceleration	4.0%
Put	3.0%
Early amortisation	2.9%
Other	28.2%

Source: Moody’s Investors Service (2001).

As can be seen in this table, contingency clauses are diverse in nature, and hence their consequences, if activated, may be wide-ranging:

- *Collateral, L/Cs and bonding provisions* are clauses that are usually written into bank loan agreements. When the clause is triggered, the mechanism does not result in a change in the initial financing conditions but requires the borrower to pledge assets to guarantee its financing over time. Hence, the impact of the triggered clause should mainly be on the opportunity cost of capital.
- *Pricing grids or adjustments in interest rates or coupons* are features found both in bonds and in bank loans where the initial interest rate or coupon is revised in the event

¹⁴ In October 1988 the market was surprised by the leveraged buyout of RJR Nabisco. Credit agencies lowered the credit rating of RJR Nabisco bonds and the price of these bonds decreased by 17%. This led to investor demand for bond covenants for such events, and such covenants became known as super poison put provisions. For a discussion on super poison put provisions see, for example, Bae, Klein and Padmaraj (1994), Crabbe (1991) and Norton (1992).

¹⁵ A designated event is one in which the company’s shareholders generally benefit, to the detriment of bondholders. Such events include mergers, takeovers, major stock repurchase plans and major distributions of assets to shareholders. If, after such an event, the credit rating agencies downgrade the bond to below investment grade, the put option can be exercised.

¹⁶ “The Unintended Consequence of rating triggers”, Moody’s Investors Service, December 2001.

of a change in the borrower's rating (or in some of its financial ratios). The impact of the exercised trigger is a mechanical increase in the cost of capital.

- *Acceleration clauses* may have more severe, or sometimes even critical, effects. For example, for a loan or bond initially issued for a long period, the triggering of the clause may result in an acceleration of repayments or even early termination of credit. As mentioned above, these types of clause are used both in bond contracts and in bank loan agreements as well as in back-up credit lines. Not only does the triggering of a clause result in an increase in the cost of capital, but also in an immediate need for new capital.

Two major problems associated with rating triggers are worth highlighting:

- *Rating triggers can contribute to "credit cliff" situations.* "Credit cliff" is market jargon for a situation in which dire consequences, i.e. compounding credit deterioration, possibly leading to default, may be expected should certain risk scenarios materialise. In this regard, S&P has stated that "in these cases, if there is a rating change, it will necessarily be a very substantial change (due to) the entity's greater sensitivity to credit quality or a particular occurrence."¹⁷ This can put material pressure on the company's liquidity or its business. For example, when downgraded, the position of a company that is performing poorly will worsen as its cost of capital rises. Rating triggers and other covenants, particularly when combined, can contribute to the development of such credit cliffs and may speed up the pace at which the cost of capital increases due to credit deterioration. This is especially the case in situations where multiple triggers are set off simultaneously, or when the triggering of one clause leads to an accumulation of negative consequences.¹⁸ It is not clear how CRAs take these situations into account. Bonds rated at the lowest investment-grade

notch (where traditionally a large proportion of these rating triggers have been found) tend to suffer large price falls when they are downgraded. Owing to the above mentioned risks of self-fulfilling effects, the presence of rating triggers may reinforce the finding that rating agencies are only willing to decide on a rating action when it is unlikely to be reversed shortly afterwards.¹⁹

- Disclosure of ratings-based triggers by issuers has until recently been incomplete and largely ignored by analysts and investors. Present accounting standards leave a significant degree of discretion as to whether triggers need to be disclosed. Under US (GAAP/FAS), UK (FRS) and international accounting standards (IAS) there is an obligation to disclose material triggers, but material in this context means not only that the contingent obligation is large, but that it potentially has a significant bearing on the company's financial situation. For instance, these requirements do not appropriately address situations where an issuer/borrower has included many "non-material" triggers in its debt covenants/bond issues. However, if there is uncertainty as to whether the company is a going concern, there should be a clear obligation to disclose. Nonetheless, it has proved difficult to obtain a comprehensive picture of the size of the contingent liability of triggers, despite the fact that this information is crucial for investors as well as analysts and rating agencies in order to fully apprehend the risks attached to a specific issue or issuer.²⁰ Efforts have been made in this area, notably under pressure from rating agencies, to encourage a more systematic disclosure of

¹⁷ Standard & Poor's, "Playing out the Credit Cliff Dynamic", December 2001.

¹⁸ For example, a situation in which a company is downgraded and, at the same time, has to redeem some of its long-term debt early.

¹⁹ See, for example, Johnson (2003) and Löffler (2003).

²⁰ Rating agencies cannot force an issuer to disclose the nature or extent of its use of rating triggers. If an issuer deems that public disclosure is not required by securities laws or after inquiries made by investors or rating agencies, the issuer's credit profile assessment cannot be completed.

rating triggers and to renegotiate and smooth the more dangerous ones. A survey by S&P in 2002 among more than 1,000 US and European investment-grade debt issuers revealed that about half of these issuers were exposed to some sort of ratings-linked contingent liability. However, fewer than 3% exhibited serious vulnerability to rating triggers or other contingent calls on liquidity which could turn a moderate decline in credit quality into a liquidity crisis.²¹

stemming from trigger-carrying instruments would be offset by deteriorating financing conditions (and increased volatility) for “unprotected” instruments. It is, of course, unlikely that all rating triggers could be disclosed, since there are private placements and bank loan agreements with embedded options. Still, greater transparency should have both direct and indirect positive effects on credit markets.

Transparency and disclosure are important features that could help mitigate some of the negative aspects of rating triggers and other contingency clauses. It is unlikely that systematic (mandatory) disclosure of rating triggers and greater transparency with regard to exposure to rating triggers could prevent rating events from disturbing markets once the triggers are activated, but it could increase the awareness of the situation in the market and promote a longer-term view on the part of market participants. The same holds true for covenants based on balance sheet ratios. Furthermore, the present context of incomplete transparency and disclosure of rating triggers may be seen as impacting on the price discovery mechanism of fixed income products (and, by extension, equities) as it results in an additional risk premium associated with this “rating trigger” uncertainty. This in turn may lead to a higher cost of capital and higher yields than would have been the case under a more transparent framework. Thus, the “benefits” of these clauses are not fully exploited. However, if rating triggers were systematically disclosed from their inception, this information would be priced in from the start in bond issues (and stocks) and the number of triggers used in debt issues of any single borrower would probably be more limited. Moreover, it could also be argued that the expected benefits (for issuers) from these devices would prove illusory, as the relative prices of the various debt instruments of an issuer/borrower and its equity price would adjust to reflect the existence of rating triggers in some debt instruments, and that the benefits (in terms of favourable financing conditions)

21 “Survey on Rating Triggers, Contingent Calls on Liquidity”, Standard and Poor’s, 2002.

5 THE CHALLENGE: HOW TO RECONCILE THE (HETEROGENEOUS) INTERESTS OF DIFFERENT USERS?

5.1 THE METHODOLOGY: RATING “THROUGH THE CYCLE” VERSUS “POINT-IN-TIME”

THE TIME HORIZON OF RATINGS: RATINGS ARE ORDINAL IN THE SHORT TERM AND CARDINAL IN THE LONG TERM

From an operational standpoint, the purpose of ratings is to measure credit risk in terms of probability of default, expected losses or likelihood of timely payments in accordance with contractual terms. CRAs are careful to stress, however, that these estimates should not be seen as a short-term outcome (i.e. one to two years), but rather should be considered over a longer horizon.²² Long term generally appears to mean at least one or two business cycles. Agencies will say that the time horizon is indefinite, but may be thought of as 5 to 10 years. The reason for using an indefinite horizon is that, for a given constant rating, the probability of default varies with different time horizons. While agencies have been criticised, and at times rightly so, for being vague as to the time horizon over which they are rating, it would appear that if it is assumed that they have always used a horizon of several years, then their various statements are consistent.²³ Ratings are a cardinal measure of credit risk if used over an unspecified long horizon (Keenan, 1999, and Brand and Bahar, 1999). Indeed, over the long term, ratings are found by academic studies to be an accurate and unbiased estimator of default probabilities. Thus, while ratings are ordinal in their design, associations can be drawn with cardinal probabilities of default in the long term.²⁴ For shorter horizons, there is not necessarily a stable mapping from ratings to probability of loss, and the rating becomes an ordinal measure of risk. Different agencies use different concepts of loss, although in practice the differences do not appear to affect the ratings outcomes significantly.

FUNDAMENTAL CREDIT ANALYSIS VERSUS MARKET INDICATORS

CRAs compare the fundamental credit analysis on which ratings are based with market

sentiment, which is measured by quantitative indicators such as the market price of corporate bonds and equities, price volatility, the subordinated debt price, and the credit default swap price. CRAs are adamant that they do not directly incorporate market sentiment into ratings, although they may use market prices as a diagnostic tool. On the contrary, they take care to exclude transient market sentiment. The reason for this is that their clients, in particular portfolio managers, have expressed concern that the use of market sentiment as an input would give rise to greater ratings volatility. Portfolio managers prefer ratings to exhibit stability, i.e. a degree of inertia in ratings changes. Furthermore, the value of ratings based solely on market sentiment/prices would be questionable, as they would not incorporate any information that is not already available to market participants.

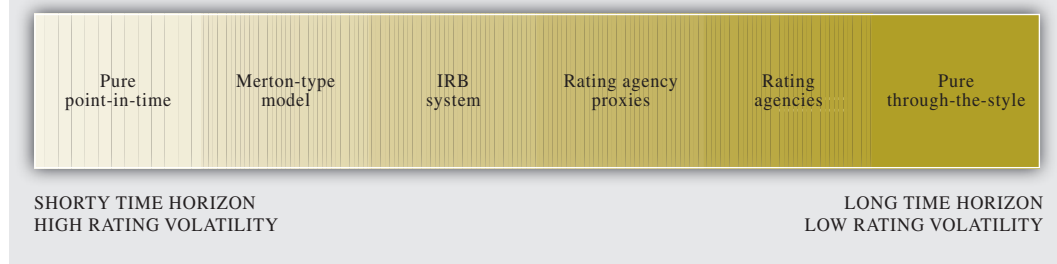
The graph below summarises the way in which various credit assessment systems differ in terms of both the time horizon for the assessment and the resulting ratings volatility. The traditional approach of CRAs is considered to be closest to a pure through-the-cycle approach, whereas Merton-type, structural models are closest to a pure point-in-time approach. The internal ratings based (IRB) approaches of commercial banks are probably somewhere between the two latter approaches. Although banks traditionally use a one-year time horizon in their probability of default estimations, in accordance with the Basel II Consultative Paper 3, they have to use longer

22 See “The evolving meaning of Moody’s bond ratings”, August 1999, “Corporate rating methodology” FitchRatings, June 2003, and “Rating methodology: evaluating the issuer”, Standard & Poor’s, September 2001.

23 In times past, agencies stated that their aim was to rate “through the cycle”. This aim was achieved by examining the ability of the company to continue servicing its debt under a range of stressful credit conditions, both in the macro economy at large and in the specific industry. More recently, they have tended to downplay the through-the-cycle notion, arguing that business cycles have become more irregular.

24 Keenan, S. C. (1999), “Historical default rates of corporate bond issues, 1920-1998” Special Comment, Moody’s Investors Service, and Brand, L. and R. Bahar (1999), “Ratings performance 1998”, Standard and Poor’s Corporation.

Chart Point-in-time versus through-the-cycle assessments



time horizons when assigning ratings. Hence, their probability of default estimates should move away from the estimates of pure Merton-type models. Ultimately, the positioning of each IRB system on this “through-the-cycle” to “point-in-time” scale will depend on the specific characteristics chosen by the individual banks. Rating agency “proxies”²⁵ (“quantitative credit scoring models”) are positioned between IRBs and traditional ratings since, although their credit assessments should vary more than traditional agency assessments owing to their more frequent revisions, their methodology is designed to replicate traditional through-the-cycle ratings (see sub-section 5.2).

THE LIMITS OF “THROUGH-THE-CYCLE” METHODOLOGY

- Increased volatility and downward momentum

Several academic studies have examined the behaviour of credit ratings over time, for instance through the analysis of credit upgrades and downgrades. Altman and Kao (1992) for example analyse the stability of newly issued S&P ratings for two sub-periods (1970 to 1979 and 1980 to 1988). They show that for every rating and time horizon (one to five years) newly-rated issues from the earlier period exhibit greater stability.²⁶ Lucas and Lonski (1992) examined the credit ratings of more than 4,000 rated US and international debt issues from 1970 to 1990 and found that corporate creditworthiness became more volatile over the

period and that this increased volatility was accompanied by a downward trend in ratings. Carty and Fons (1994), using Moody’s database of over 4,700 long-term issues and 2,400 short-term issues, found that trends in overall corporate credit quality, as measured by the percentage of upgrades and downgrades of one or more letter, have changed over time.²⁷ They also noted a degree of predictability in changes in credit ratings over time, and in particular that rating changes tended to exhibit serial correlation. More specifically, a downgrade is more likely to be followed by a subsequent downgrade than by an upgrade, i.e. credit ratings exhibit downward momentum, which is evident for all grades.²⁸

The existence of momentum in rating changes implies that the history of past rating actions of agencies should help predict their future actions, which may suggest that agency ratings do not fully reflect available information. As explained by Löffler (2001), the “through-the-

25 These “proxies” are products developed by international rating agencies (for example, Riscalc by Moody’s, Creditmodel by S&P and CRS by Fitch) to replicate their traditional through-the-cycle ratings in order to support credit risk management. These products enable customers to buy the software and run analyses at any time.

26 It should be noted, however, that the composition and size of the ratings universe changed over this time period.

27 For example, during the period from 1950 to 1980, on average 4.77% of issues changed ratings, while drift averaged a mere -0.07%. During the period from 1980 to 1993, however, the average number of issuers experiencing ratings changes rose to 12.43%, while drift became more negative at -4.97%.

28 There is some evidence, though less pronounced, of upward momentum (see Lando and Skødeberg, 2002, and Bangia et al., 2002).

cycle” method of rating, while able to explain important stylised facts such as ratings stability, fails to account for the predictability of rating changes. Furthermore, infrequent reviews of ratings cannot explain serial dependence in rating changes. Rating policy or shortcomings in information processing (slow reactions, biases, etc.) can, in principle, be put forward as factors underlying the relatively weak information content of credit ratings. Differentiating between these alternative explanations, however, is a daunting task. Löffler (2003) shows that overlapping rating grades in terms of default probabilities, which arise as a result of the discreteness of the grades and efforts to avoid “rating bounces” (e.g. fulfilling the market’s “expectation for stable ratings”) (Cantor, 2001), would suffice to generate momentum in rating changes. Blurred differences in terms of default probabilities between adjacent rating categories result from stickiness in ratings. The ratings overlap then triggers the subsequent gradual adjustment (momentum).

- Rating changes exhibit a certain degree of procyclicality

As shown by Nickell et al. (2000), default probabilities depend strongly on the stage in the business cycle, and transition matrices tend to exhibit a higher frequency of downgrades during a recession and a higher occurrence of upgrades during booms. However, without further conditioning on measures of true underlying default risk, which may in part be pro-cyclical, it is not possible to conclude, by considering rating transitions in terms of the state of the business cycle, that ratings are assigned in a procyclical manner, but only that ratings move procyclically. Such evidence must nevertheless be squared with the claim by the major CRAs that they rate “through the expected cycle”.

Amato and Furfine (2002) note that, while the ratings of most companies change little, significant evidence, important from both a statistical and economic perspective, points to

ratings exhibiting sensitivity to business cycle conditions. Rating agencies monitor the conditions of companies to a greater or lesser extent at any given time, and generally do not react to small movements in their risk profiles. This is consistent with the CRAs’ often-stated objective of taking a rating action only “when it is unlikely to be reversed within a relatively short period of time” (Cantor, 2001). However, when rating agencies do make a change, they overreact in relation to prevailing conditions, and the nature of this overreaction positively correlates with the state of the aggregate economy. This could be the consequence of excessive optimism/pessimism during upturns/downturns on the part of rating agencies (Amato and Furfine, 2002).

Empirical models tend to indicate a rise in credit risk during recessions. For instance, Altman et al. (2002) show that there is a relationship between the correlation of default probabilities and loss in the event of default and the business cycle. These authors argue that models that assume independence of default probabilities and loss-given-default will tend to underestimate the probability of severe losses during economic downturns. A study by Bangia et al. (2002) demonstrates the empirical significance of the procyclicality of credit quality changes by showing that estimated credit losses are much higher in a contraction than in an expansion. Kavvathas (2001), who made a systematic study of the variation of credit migration (including default risk) over the business cycle, found that an increase in short and long term real rates, a lower equity return and a higher equity return volatility were generally associated with higher conditional downgrade probabilities. The accuracy of credit rating transition probability (CRTP) matrix forecasting, thanks to the use of state variable information, has generally been improved, both statistically and economically, in in-sample and out-of-sample experiments. The statistical and economic importance of the term structure and equity return variables give rise to an interpretation that may defuse some of the above mentioned criticisms directed at the

forward-looking nature of the rating activity of CRAs. The fact that ratings, according to the findings of Kavvathas (2001), correlate contemporaneously with market variables in an anticipated fashion, goes some way to addressing this criticism. Nonetheless, empirical evidence on ratings has to be interpreted with care, since apparent violations of informational efficiency could well result from the CRAs' objectives and constraints. Hence, their performance would need to be compared with an appropriate benchmark.

Recently, literature has also focussed on whether the severity of the ratings process has changed over time. Specifically, Blume, Lim and MacKinlay (1998) consider whether the recent trends in corporate bond upgrades and downgrades are the result of the declining credit quality of US corporate debt or whether ratings standards have evolved over time. Using ratings data from the period 1978-1995, they argue that rating agencies have become more strict, implying in part that the downward trend in ratings is a result of changing standards.

5.2 RECENT DEVELOPMENTS IN METHODOLOGY: STRUCTURAL CHANGES OR REFINEMENT?

International rating agencies strive to provide credit assessments that hold generally steady through the course of the business cycle (rating "through-the-cycle"). However, in a "post-Enron" world, rating agencies have been under considerable pressure from some investors to provide more timely and accurate readings of the credit outlook ("What's going on at rating agencies", Morgan Stanley, 2003). Perhaps partly induced by this increased pressure on rating agencies, market participants sense a change in rating methodologies with ratings becoming more sensitive to the business cycle.

The increased volatility that ratings have exhibited in the recent period may have contributed to this perception. Indeed, according to Moody's, "the last two years (2001 and 2002) have been atypically volatile"

with on average 28% of issuers experiencing a rating change of any type, and 8% experiencing a "large" (three or more notches) rating change (the series hit an all-time high in 2001). In any typical year, the corresponding figures are below 25% (rating change of any type) and below 5% (large rating change). Consequently, "rating volatility ... is currently at the highest level observed since 1982".²⁹

Rating actions can be triggered by two types of factor: changes in rating methodology and changes in business and economic outlook. As regards changes in methodology, as the reliance on ratings has been growing, from a broadening base of market participants, CRAs are expected to satisfy a variety of constituencies, with different, if not sometimes conflicting, interests: issuers and "traditional" asset managers require more than a simple statement of near-term probability of loss, but stress the need for ratings to exhibit some degree of stability over time. As regards the latter criterion, this desire for stability is also motivated by the fact that ratings have become pervasively embedded in investment guidelines and bond indices, meaning that volatile or unexpected rating changes can force asset managers to sell or buy securities against their better judgement at inopportune times. However, mark-to-market traders, active investors and risk managers require frequent indications of credit changes.

Consequently, the rating process and the range of products offered by CRAs have evolved over time:

- Renewed emphasis on *communication*

While *notches* (+/-, 1,2,3) were introduced between 1971 and 1982 by the major agencies in response to these new demands, *outlooks and watchlists* were developed more recently in order to provide additional signals to rating users as to where the balance of probabilities lies regarding future changes in ratings or to

²⁹ "Measuring the Performance of Corporate Bond ratings", Moody's Special Comment, April 2003.

attract attention to exceptional rating reviews in the light of specific developments. Notches and watchlists may be viewed as attempts to give more timely indications of changes in credit quality in response to allegations that the agencies lagged market prices and were “behind the curve”. As such, they are expected to contribute to smoothing market reactions to rating changes by providing early warning signals. At the same time, *rating review periods* have been shortened in response to investor criticism regarding the lack of timeliness of rating actions. In May 2000 Moody’s announced an improvement in communication and transparency of ratings by indicating the likelihood of future rating changes and their severity.

- Emphasis on *liquidity risks*

Similarly, more emphasis has been placed on liquidity risk, reflecting the recent shortcomings on the part of rating agencies in accounting for this factor in recent well-publicised defaults. New products have been developed which aim to assess the availability of short-term financing for companies and take into account the increasing volatility of financing conditions, especially for speculative grade issuers: *Liquidity risk assessments* (LRAs) for issuers of US commercial paper were introduced in March 2002, the *speculative grade liquidity rating* (SGLs) for speculative grade issuers followed in September 2002.³⁰ SGLs are opinions about an issuer’s ability to generate cash from internal sources and the availability of external sources of committed finance relative to its cash obligations over the coming 12 months. More specifically, liquidity ratings are defined as a measure of the impact that a loss of access to liquidity would have on an issuer; and the short-term rating is defined as a product of that impact and the probability of occurrence of a loss of access.

- Emphasis on “*hidden*” liabilities

In early 2003 S&P announced changes in the framework for analysing financial measures and

ratios, in order to better reflect the potential impact on corporate profitability of pension liabilities that companies may carry, especially in the current environment of low interest rates and weak stock market performances.

- Increased use of *market-based tools*

Rating agencies are making more extensive use of *quantitative* and *market-based methods* to provide additional perspectives in their credit risk assessment process. Moody’s, for instance, is using tools such as KMV to identify material and systematic gaps between fundamental ratings and ratings implied by market data. Similarly, the renewed focus on event risks (litigation risks, accounting irregularities, cash/debt-financed M&As and share repurchase programmes) justifies, in Moody’s view, this increased reliance on quantitative risk models in order to “capture” stock market concerns and better reflect them in ratings (see, for instance, “Implications of the acquisition of KMV for Moody’s Ratings”, March 2002).

CRA’s have also been developing “*agency proxies*”, i.e. quantitative credit scoring models that analyse financial statement data to produce default probability predictions and/or quantitatively-derived estimates of “traditional” credit ratings. While these quantitative approaches are supposed to supplement but not replace traditional ratings, there appears to be some ambiguity in the definition of the role they are expected to play alongside traditional credit ratings. For instance, with a view to facilitating market participants’ comprehension of the results of the modelling process, the output of these models can be expressed using traditional rating symbols. Furthermore, as stated by S&P, although scores are not credit opinions, “the scoring models interpret the data in a way that is consistent with how Standard & Poor’s analysts work” and “the models reflect

³⁰ See Moody’s Investors Service, “Moody’s Liquidity Risk Assessments – Q&A”, March 2002, and Moody’s Investors Service, “Speculative Grade Liquidity Ratings”, September 2002.

Standard & Poor's specific credit analysis experience and prospective views of each industry.”

All these changes may indicate that credit signals produced by rating agencies are becoming both more diverse and generally more responsive to current market conditions, which in turn arouses suspicions that there may be a “post-Enron” regime change in the rating process. At the same time, however, it is interesting to note that rating agencies are publicly stating that they are not pursuing active changes in the way they conduct their rating process. They reaffirm the value of rating stability and the meaning of ratings as a long-term fundamental credit risk assessment. Rating agencies believe that the market does not look at ratings primarily as buy/sell signals, and does not want ratings to be pro-cyclical or to add to market volatility.³¹

Although recent changes and refinements in rating methodologies may have contributed to the additional volatility in rating actions, the increase in uncertainty about economic and business events is perhaps the main factor behind this higher ratings volatility. Rating agencies recognise that even for a rating process that aims to produce long-term stable ratings, periods of heightened credit and event stress could contribute to a larger number of rating actions than would have been historically expected on a “normal” basis. On the basis of this argument, it could be said that it is not a change in the rating process (i.e. from a through-the-cycle to point-in-time assessments) that is responsible for the recent higher frequency of rating actions, but rather the increased difficulty in seeing through the fog of economic forecasts. It is this difficulty that makes the role of rating analysis more challenging.

31 See, for example, Moody's Investor Service Special Comment “Understanding Moody's Corporate Bond Ratings and Rating Process”.

6 ACCURACY, STABILITY AND THE “RELATIVE” PROCYCLICALITY OF RATINGS

Although the recent increase in rating volatility may to some extent have been due to an increase in economic and business uncertainty, questions remain as to whether this uncertainty will lead the CRAs to adjust the weights they attach to different objectives – accuracy and stability – in their rating process more actively. Assessing the performance of rating agencies with regard to these two objectives can be done either in relation to the methodology they use (i.e. do ratings provide an accurate and stable picture of default risk “through the cycle”?) or in relation to alternative credit risk measurement techniques (i.e. how do signals provided by ratings compare with other signals of credit risk?). This latter approach is discussed below.

Obviously, aiming for accuracy and stability at the same time involves a trade-off. Moody’s own calculations illustrate that in terms of stability their ratings outperform implied bond ratings (ratings inferred from bond spreads) by a large margin.³² Over the recent period (1999-2002), as a twelve-month average, 25% of issuers experienced a rating action by Moody’s. However, market-implied rating changes affected 91% of the issuers. This general result also holds for large rating changes (7% against 43%) and rating reversals (1% against 76%), which are categories that institutional investors are particularly concerned with.³³

As regards accuracy over a short horizon, however, Moody’s ratings do not seem to match those of market-based indicators. For a one-year horizon, for example, bond market-implied ratings are, on average, a better approximation of corporate defaults than Moody’s ratings. As the time horizon lengthens, however, the gap between these two measures is reduced.

Given their large outperformance with respect to rating stability, it would be interesting to assess whether CRAs are effectively becoming more concerned with (short-term) accuracy, i.e. their secondary objective. Such behaviour could be reinforced by the fact that many market participants and observers criticise rating

agencies for “being behind the curve” or “lagging the market”, which might – although it is the natural outcome of the CRAs’ traditional approach – represent a threat to their all-important reputation. In fact Moody’s finds that, by historical standards, the stability of its own ratings is currently low. However, it may be too early to judge at this stage whether this is the beginning of a trend. This question nonetheless deserves close monitoring.

CRAs state that they purposely incorporate stability into their ratings in response to demands from their “core” client base. If indeed agencies’ primary client base does not consist of mark-to-market investors but of portfolio managers and issuers, then their role is not only one of providing economies of scale in information but also one of providing monitoring signals in a principal-agent relation. These two roles, however, necessitate a trade-off. Stability can be seen as a device that affords the fund manager greater discretion by smoothing cyclicity. The signal (the rating) attempts to filter out the noise of every fluctuation in market sentiment. A comparison may be drawn with models that aim to forecast default probabilities over a short time horizon (one year). Such models, which draw heavily on market prices and exhibit extreme cyclicity, appeal to mark-to-market traders.

The degree of smoothing – the trade-off between roles – is therefore essentially a matter of judgement: if changes in credit fundamentals are considered to be minor or transient, no rating change is warranted, and vice versa for large and permanent changes. One way to measure the degree of smoothing is to assess

32 This result is consistent with another line of research which indicates that credit ratings assigned by the rating agencies give rise to much smoother fluctuations in banks’ capital requirements within the Basel II framework as compared to Merton-type rating systems like KMV. See, for example, P. Lowe, “Credit risk measurement and procyclicality”, BIS Working Papers No 116, September 2002; E. Catarieneu-Rabell et al., “Procyclicality and the new Basel Accord – banks’ choice of loan rating system”, Bank of England Working Paper No. 181, 2003.

33 “Measuring the Performance of Corporate Bond ratings”, Moody’s Special Comment, April 2003.

the volatility of ratings (compared, for instance, to the volatility of market credit spreads). What is surprising is that academic testing has, until recently,³⁴ virtually ignored this aspect of ratings, preferring to treat them as rivals to market prices that are deficient if they do not incorporate every scrap of market information.

34 Löffler, G. (2001), "An Anatomy of Rating through the Cycle", University of Frankfurt, Frankfurt.

7 POLICY IMPLICATIONS AND ISSUES

7.1 HARDWIRING VERSUS FLEXIBILITY

The paper has argued that ratings and rating changes can potentially give rise to specific market dynamics. However, it is worth stressing that such dynamics are much more likely to be triggered by the way ratings are used by market participants, far beyond their initial purpose, than by the actual information content of ratings themselves. The hardwiring of rules and regulations into ratings, the proliferation of ratings-based trigger clauses and the extensive use of ratings in asset management have contributed to turning ratings and rating agencies into structural elements of modern financial markets. As a result, rating changes may themselves become credit events. In this context, in order to avoid rating changes turning into automatic triggers for portfolio restructuring and forced sales, it is crucial that, when ratings are enshrined in regulations and rules and hence potentially shape behaviour, enough flexibility is afforded to market participants. The challenge here is to strike the right balance between the benefits of monitoring and disciplining that ratings can provide and the “breathing space” that market participants need in order to conduct their activities efficiently. The change depicted in the practices of the asset management industry, i.e. moving away from strictly rule-based responses to rating changes, illustrates this search for the optimum combination.

7.2 IMPLICATIONS OF THE LIMITED SHORT-TERM ACCURACY OF RATINGS

Some of the empirical findings presented in this paper regarding the lack of short-term accuracy of ratings relative to other, market-based indicators have implications that appear to be problematic for capital market participants and bank regulators in view of the increasing reliance on external ratings issued by CRAs in credit assessments and in the setting of economic capital by banks and capital requirements by the authorities. The large divide between ratings and market price-based

credit risk measures is manifest in individual credit spreads, which vary greatly within a given rating category, with a substantial degree of overlapping among adjacent categories (some credit spreads in higher categories are larger than others in lower categories). As a result, ratings may not be efficient short-term predictors of default (or credit quality deterioration) – and, indeed, they are not designed to be. This evidence does not necessarily contradict the (less robust) finding that average credit spreads for each rating category increase monotonically going down the rating scale (i.e. ratings are generally informative, as a lower credit rating corresponds to a higher probability of default).

It could be argued that market price-based rating systems may lead to more accurate credit risk estimates and, in a regulatory capital setting, to more timely changes in required capital than systems based on external ratings (or ratings methodologies similar to those used by the CRAs). This assumes, however, that financial markets offer consistent and reliable leading indicators of the business cycle. Indeed, Moody's has recently recognised that bond market-implied ratings are more powerful than Moody's ratings over a one-year horizon.³⁵

However, as some developments documented in this study have shown, asset prices in general, and credit spreads in particular, incorporate a large variety of factors in addition to (market) estimates of credit risk. Some of these factors can be viewed, in the context of the setting of economic capital by banks and capital requirements by the authorities, as transient events or as noise that needs to be “filtered out”.

Ultimately, an appropriate balance must be struck between the added value that incorporating relevant market price information can bring to the credit assessment process (accuracy) without at the same time contributing to market fluctuations and giving rise to

³⁵ See Moody's Special Comment report “Measuring the performance of corporate bond ratings”, April 2003, page 25.

unintended fluctuations in capital requirements in the event of large swings in market sentiment (stability).

7.3 RATING AGENCY INITIATIVES AND TRANSPARENCY

In the context of the current volatility of ratings, disentangling the impact of economic uncertainty (in itself very hard to assess) from possible changes in the methodology used by rating agencies, has proved particularly difficult. The developments reviewed above do not lead to the conclusion that CRAs are in the process of changing their methodology in favour of a more “point-in-time” approach. However, CRAs have shown a very “proactive” stance in recent years in refining their approach to credit risk measurement and in adding new products and tools to their initial range. From a purely technical point of view, rating agencies now possess instruments that could enable them to move towards an increasing use of market-based models, which are currently intended to complement but not replace the traditional approach to credit rating. Developments in this area are of interest to central banks and policy makers.

Faced with numerous criticisms in recent years, rating agencies have made renewed efforts to justify their actions and make their activity more transparent and understandable. Results have been mixed to date, with communication on, for instance, the long-term performance of ratings clearly improving. But few insights have been provided into the rating process itself (i.e. how ratings are arrived at), which is an aspect that rating agencies consider to be to a large extent proprietary. At the same time rating agencies have devoted many resources to expanding the range of rating products and credit risk modelling tools they offer in order to keep pace with the needs of market participants. Without additional communication efforts, rating agencies may ultimately be faced with a situation in which market participants will encounter increasing difficulties in

understanding the interconnection between these different rating products, and how they differ in the context of an overall consistent approach. For instance, how do LRAs interact with CP ratings and issuer ratings? Similarly, the interactions between the agencies’ “traditional” ratings approach and their growing presence in the domain of the quantitative modelling of credit risk needs to be clarified. Should the perception develop that rating agencies are sending blurred signals to the markets (appearing either redundant or incoherent), this would have a negative impact on both the agencies (loss of credibility) and the functioning of the market.

7.4 POSSIBLE IMPLICATIONS OF A CHANGE IN METHODOLOGY

All in all, precisely because ratings are widely used by market participants, a move towards a more market-based methodology would have far-reaching implications for financial markets and financial stability, and would be likely to result in an increase in the risks of extreme price movements, especially at the micro level. A key feature of ratings is that they contain some information that is not publicly known and, furthermore, information which is relevant to pricing. Most often, however, ratings seem to incorporate only a small portion of “new” information. Nevertheless, this does not mean that ratings do not play an important role in corporate bond markets, as they are liable to be very valuable for less-informed investors given that they translate risks into simple letters (i.e. a simple ranking) and offer a long-term analysis based partly on private information. More generally, because rating agencies provide information economies of scale, filtering and extracting noise from market information, it can be said that they contribute to the information efficiency of financial markets. In the light of the empirical evidence on spreads and spread dynamics provided above, a change in rating methodology towards an exclusively “point-in-time” approach would probably produce ratings with no pricing-relevant information that was

not already provided by market prices. Hence, the challenge facing rating agencies is rather to adequately combine, in their credit assessment, the input that market prices can provide with the private information that they gather. Furthermore, should ratings become more point-in-time, it is likely that credit spreads would become more volatile since the market would be more frequently surprised. Presumably, however, the increased volatility of ratings would ultimately lead to changes in their use. For instance, as regards rating triggers, it seems unlikely that the contracts outstanding and new contracts issued would rely solely on ratings if they were state-dependent, i.e. if they changed over the business cycle. Since there is both demand from lenders and supply from borrowers for option-like features in debt contracts, a more volatile rating environment would probably lead to new solutions, with less volatile features, which would, however, offer lenders the same protection and borrowers a lower spread. Under such circumstances, it is possible that both creditors and borrowers would turn back to conditional rating triggers, such as super poison put provisions. More generally, should ratings become more point-in-time, both lenders and borrowers would bear increased costs as a result of the higher volatility of ratings and a decline in their information content.

8 APPENDIX

8.1 DEFAULT RISK AND THE INFORMATIONAL EFFICIENCY OF RATING CHANGES: EVIDENCE FROM CAPITAL MARKETS

A number of academic papers have investigated the informational efficiency of ratings in relation to the level of and changes in default risk. Some of these studies tested the consistency of ratings across industrial segments and geographical regions. Ammer and Packer (2000) showed that, in some years, US financial companies obtained higher ratings than other companies with similar annual default risks. Cantor et al. (2001) also examined inconsistencies across several groups. These studies did not set out to control for inconsistencies across narrower sectors or to determine any company-specific variables, such as size or leverage. They only took account of Moody's ratings and did not address the question of the information provided by credit rating sub-categories.

Galil (2002) examined the quality of corporate credit ratings in relation to their default prediction power. He focused on whether ratings efficiently incorporate publicly-available information at the time of rating, the extent to which rating classifications are informative and whether rating classifications are consistent across industries and countries of incorporation. The results reveal that ratings could be improved by using publicly-available information such as size, leverage and availability of collateral. Therefore, combining such public information (industry classification) with ratings could produce a better assessment of default risk. Despite the fact that ratings have some undesired qualities, the real informational content of ratings cannot be disregarded. Ratings provide a better assessment of default risk than public information alone. This result is consistent with the findings of Kliger and Sarig (2000) and may confirm that CRA activity adds value, even though ex-post ratings are not found to be entirely consistent across industries and the narrowness of rating categories is found to be not particularly informative. Since these results

hold ex-post, the argument that ratings are optimal ex-ante, even if a sample includes ratings over a long period (1983-1993) and the period of exposure to default risk is even longer (1983-2000), is hard to refute. For example, the fact that S&P underestimated the risks in some industries at the time it assigned its ratings might have been due to an unexpected shock during the sample period.

Vassalou and Xing (2003) provide new insights into the informational content of bond upgrades and downgrades. They show that default risk varies too much over time for credit ratings to provide any useful information about the future default risk of a company. Furthermore, their results imply that grouping stocks according to their credit ratings (A, B, or C) provides almost identical information about default risk as a classification of companies into size or book-to-market (BM) tertiles. Using an alternative-to-bond-ratings measure of default risk, they are able to show that stocks with large increases in their default risk earn significantly higher subsequent returns than stocks with large decreases in their default risk. This result is consistent with economic intuition which dictates that investors will require a higher return to hold stocks with higher (default) risk. They reconcile the two sets of results by introducing a forward-looking measure of default risk based on the contingent claims approach of Merton (1974). This measure, known as the default likelihood indicator (DLI), gives the company's default probability³⁶ and can be updated frequently (e.g. every month). It therefore stands a chance of providing a better estimate of the company's current default probabilities than a bond rating, which is typically not updated more often than once a year.

Vassalou and Xing compare changes in DLIs with changes in credit ratings. In the case of downgrades, the results show that the average DLI for all downgrades starts increasing about

³⁶ Risk measures of default probabilities along the lines of DLIs have become popular among investors and are regularly supplied by commercial providers such as KMV.

two to three years prior to the downgrade, and reaches its peak at time zero, the date of the downgrade announcement. This result was largely to be expected, since some substantial change in the default risk of a company has to occur in order for a downgrade to take place. What is surprising, however, is the fact that, following the downgrade, the average DLI starts decreasing at about the same rate at which it previously increased. Furthermore, it returns to almost the same level it had three years prior to the downgrade. In other words, the graph of average DLI as a function of time around the downgrade (plus-minus 36 months) has an inverted V shape, with the peak at the announcement date of the downgrade.

The above finding implies that equity returns following a downgrade should be lower, given that the company's default risk is lower. It also implies that it is important to adjust for the variation in the DLI when calculating abnormal equity returns following a downgrade. Indeed, if equity returns are adjusted not only for size and BM but also for DLI, the short-horizon negative abnormal equity returns found in Dichev and Piotroski (2001) disappear. Some negative abnormal returns are still found in the two to three-year horizon. However, about 42% of stocks with a downgrade experience subsequent downgrades in the three-year period following the initial one. When this fact is also taken into account, the economically significant negative abnormal returns disappear completely.

The inverted V pattern in the DLI around downgrades is most pronounced for companies with C-grade debt, with the rate of change in default risk being particularly high during the year surrounding the announcement of the downgrade. The change in default risk in the period around the downgrade is less pronounced in the case of companies with grade B debt, and non-existent in the case of firms with grade A debt.

These results are consistent with those of Dichev and Piotroski (2001) in the sense that

they explain why the negative returns following a downgrade are most pronounced for small non-investment grade companies. The reason is that most companies with low-grade debt are small, and the reduction in default risk following a downgrade is steeper in their case than it is for larger, investment grade companies. Therefore, in those cases, it is even more important to take into account the DLI of the companies in calculating their abnormal returns.

The picture that emerges in the case of upgrades is quite different from that described above. The line of average DLI for all companies is almost flat, with a slight dip on the announcement date of the upgrade. This dip is so small, that it cannot possibly be associated with a significant increase in subsequent equity returns. We observe a rapid decrease in default risk for grade C companies prior to an upgrade, but the increase subsequent to the announcement date is again too small to give rise to large positive returns.

The asymmetry observed in previous studies in the reaction of equity returns to downgrades and upgrades can be explained by the asymmetric change in average DLI associated with credit rating changes, depending on the nature of the event (i.e. upgrade or downgrade). DLI varies a lot around downgrades, but not around upgrades. Therefore, adjusting for DLI in calculating abnormal equity returns following downgrades is essential, whereas it is immaterial in the case of upgrades, since DLI exhibits little, if any, variation in the latter case.

8.2 CREDIT RISK AND TRANSITION MATRICES

The value of most fixed income securities is inversely related to the probability of default. Thus, fixed income investors are very concerned about changes in the value of their investments due to changes in the probability of default, even though actual default seldom occurs. In fact, fixed income investors may be more concerned with changes in the perceived

credit quality of their bond holdings than with actual default, because bond spreads react to credit risk and affect the performance of bond portfolio managers. Rating migrations, which offer one reflection of changes in the perceived quality of bonds, occur much more frequently than defaults.³⁷

Rating agencies regularly measure the historical default frequency of both US and non-US corporate issuers. While these historical default frequencies are of interest, they are not forward-looking. The same argument applies to historical transition matrices computed from past frequencies of rating migrations. As mentioned above, the DLI measure of default probability, based on option theory and computed from stock market data, can provide information about expected changes in credit risk. Corporate bond spreads should also reflect such expected changes in credit risk (migration).

Delianedis and Geske (2003) focus on the information contained in (risk neutral) default probabilities, derived according to the Merton (1974) and Geske (1977) models. These models were used to estimate a monthly time series of risk neutral default probabilities over approximately 12 years, from 1988 to 1999. In examining the changes in these default probabilities before the event of a rating migration or default, there appears to be significant leading information about rating migrations and about defaults in these forward-looking risk-neutral probabilities of default. The term structure of default probabilities from the Geske model appears to contain additional information. The short-term probability of default from the Geske model appears to contain significant information about both the default event and the shape of the term structure of default probabilities prior to the actual default. It appears that this short term default probability is able to distinguish impending cash flow problems for the company. Furthermore, rating migrations and defaults do not appear to be a surprise to the market since

they can be detected months in advance by either model.

Credit migration or transition matrices, which depict the past changes in credit quality of obligors (typically companies), are essential inputs in many risk management applications, including portfolio risk assessment, the modelling of the term structure of credit risk premia, and the pricing of credit derivatives. Risk management tools, such as CreditMetrics, specifically utilise credit migration measures as one of their primary inputs. Ratings changes reflect an agency's assessment that a company's credit quality has improved (upgrade) or deteriorated (downgrade).

The issue of credit quality migration is very important for fixed-income investors, institutions, regulators, and managers of credit risk. Investors are concerned with the migration of ratings, because it influences the price of a bond. Institutions are concerned with ratings changes because of internal policies limiting the percentage of below-investment-grade loans that banks permit themselves to hold. Regulators are concerned with ratings since in some cases they determine investment eligibility of assets and valuation for capital determination. In the New Basel Accord (Basel Committee on Banking Supervision, 2001) capital requirements are driven in part by ratings migration. Their accurate estimation is therefore critical.

Transition matrices measure the probability of a credit rating being upgraded or downgraded within a specific time period. S&P and Moody's both look at the rating migration of credit quality in all ratings categories for various time horizons, including one, five and ten years, and in some cases longer. The transition matrices

³⁷ In the Delianedis and Geske (2003) study of approximately 12 years (1988-1999) of US corporations rated by S&P on Compustat, the number of rating migrations other than to default (1,800) was about 100 times greater than the number of migrations to default (18), after screening for sufficient data in the University of Chicago Graduate School of Business Center for Research in Securities prices (CRSP) and Compustat.

issued by the major rating agencies include all industrial and transportation companies, utilities, financial institutions and sovereigns that have issued long-term debt to the public. Transition matrices are calculated by comparing beginning-of-period ratings to end-of-period ratings. Transition matrices focus on two distinct points in time, typically the first and last day of a year, and ignore any intervening changes.

S&P transition matrices use the implied senior unsecured rating of each issuer, regardless of the size of a particular issue or the number of shares outstanding from that particular issue. Similarly, Moody's relies upon an implied senior unsecured rating of the issuer, rather than the ratings of individual debt instruments.

Several academic studies have taken a slightly different approach to measuring and reporting rating transitions. Altman (1989) and Altman and Kao (1992) were the first to take an approach to constructing transition matrices which assesses the changes from an initial bond rating, usually at the time of issuance. They argue that this distinction is important because of an ageing or seasoning effect that is observable in the early years after issuance and that such an effect generally disappears within four to five years. This result is intuitively appealing because, as Altman (1998) notes, as time passes strong companies are able to call or repurchase their debt and refinance it with lower coupon issues. Thus, the remaining pools of issuers naturally display higher default/transition rates. Besides cohort or pool construction, there are two other important differences in how Altman and Kao (1992) construct transition matrices. First, Altman and Kao transitions are based on the ratings of specific issues, rather than the implied senior unsecured rating of issuers. Second, unlike the rating agencies, Altman and Kao (1992) do not include the ratings category "withdrawn" when reporting their transition matrices. The primary difference that arises when comparing the two ways of constructing transition matrices is that the pools or cohorts tracked by the major rating

agencies contain portfolios of both seasoned and new-issue bonds. Issues of construction aside, comparing transition matrices is problematic because of the different time periods covered by the raters' data. Moreover, changes in the number and types of debt issues, the industries rated, and initial credit quality over those time periods exacerbate the difficulties in making direct comparisons between transition matrices.

8.3 CREDIT MIGRATION ESTIMATES: METHODS AND RISK MEASUREMENT IMPLICATIONS

At least two estimation techniques have been suggested in the literature: the standard frequentist (cohort) approach and the duration (hazard) approach. The latter, which uses the transition information from obligor more efficiently than does the cohort method, also enables proper testing for time homogeneity and non-homogeneity of the transition matrix (the distance between dates, but not the dates themselves, influences the transition probability).

The frequentist method, which is the current industry standard, estimates the transition probability as a simple proportion of companies at the end of the sampling period (horizon) (e.g. at the end of the year for an annual matrix) with rating *j* having started out with rating *i*. Typically, any rating change activity which occurs within the period (horizon) is ignored, and companies whose ratings were withdrawn or migrate to "not rated" (NR) status are removed from the sample. In addition, two critical aspects are ignored in the cohort method: (right) censoring, which means that what happens to the company after the sample window closes is not known (e.g. does it default right away or does it live on until the present), and (left) truncation, which means that companies only enter sample if they have survived long enough or have received a rating. These issues are addressed by the duration approach (see Schuermann and Jafry, 2003) in which the estimation method varies, accepting

or relaxing the time homogeneity assumption. Statistically significant differences in migration matrices estimated by the cohort and duration approaches do indeed arise for a one-year horizon, which is typical in many risk management applications.³⁸ However, such differences are confined to the homogenous duration and cohort methods; relaxing the time homogeneity assumption would appear to yield little difference. Thus, the non-Markovian behaviour hypothesis of the rating process would not be materially significant. This conclusion, however, seems to contrast somewhat with the estimates reported in Kavvathas (2001). Similarly, looking at the economic significance of such differences, the measurement of credit risk capital implies a divergence between the cohort and the duration method of the same order as that implied by business cycles which, in turn, is about 40% (excess capital that should be held during a recession over the optimal level set during an expansion – see Bangia et al., 2002). Credit pricing is also affected substantially when the estimated matrices differ significantly; using the “wrong” matrix can lead to mis-pricing by over 50%.

38 This difference is likely to decrease for shorter horizon matrices (e.g. quarterly or monthly), but increase for longer, multi-year horizons.

9 REFERENCES

- Altman, E. (1989), "Measuring corporate bond mortality and performance", *The Journal of Finance*, September, pp. 909-922.
- Altman, Edward I. (1998), "The importance and subtlety of credit rating migration", *Journal of Banking & Finance*, Vol. 22, Nos. 10 to 11, October, pp. 1231-1247.
- Altman, E. and D. L. Kao (1992), "Rating drift in high-yield bonds", *Journal of Fixed Income*, Vol. 2, pp. 15-20.
- Altman, E. I., B. Brooks, A. Resti and A. Sironi (2002), "The link between default and recovery rates: implications for credit risk models and procyclicality", paper presented at the BIS conference on "Changes in risk through time: measurement and policy options", 6 March.
- Amato, J. D. and C. H. Furfine (2003), "Are credit ratings procyclical?", *BIS Working Papers*, No. 126, Basel.
- Ammer, J. and F. Packer (2000), "How Consistent are Credit Ratings? A Geographical and Sectoral Analysis of Default Risk", Board of Governors of the Federal Reserve System International Discussion Paper No. 668.
- Bae, S., D. Klien and R. Padmaraj (1994), "Event-Risk Covenants and Shareholder Wealth: An Empirical Investigation", *Financial Management*, Winter, pp. 28-41.
- Bangia, A., F. X. Diebold and T. Schuermann (2002), "Ratings Migration and the Business Cycle, With Applications to Credit Portfolio Stress Testing", *Journal of Banking & Finance*, Vol. 26, Nos. 2 and 3, pp. 445-474.
- Barnhill, T. M., F. L. Joutz and W. F. Maxwell (2000), "Factors affecting the yields on non investment grade bonds indices: a cointegration analysis", *Journal of Empirical Finance*, Vol. 7, pp. 57-86.
- Basel Committee on Banking Supervision (2001), "Overview of The New Basel Capital Accord".
- Blume, M., F. Lim and C. MacKinlay (1998), "The declining Credit Quality of U.S. Corporate Debt: Myth or Reality?", *Journal of Finance*, August, pp. 1389-1413.
- Boot, A. W. and T. T. Milbourn (2002), "Credit ratings as co-ordination mechanisms" *Davidson Institute*, Ann Arbor.
- Brand, L. and R. Bahar (1999), "Ratings performance 1998", Standard and Poor's Corporation.
- Campbell, J. Y. and G. B. Taksler (2003), "Equity Volatility and Corporate Bond Yields", *Journal of Finance*, December.
- Cantor, R. (2001), "Moody's Investors Service response to the consultative paper issued by the Basel Committee on Banking Supervision and its implications for the rating agency industry", *Journal of Banking and Finance*, Vol. 25, pp. 171-186.

- Cantor, R. and F. Packer (1995), “The Credit Rating Industry”, *The Journal of Fixed Income*, Vol. 5, No. 3, December, pp. 10-34.
- Cantor, R., T. Collins, E. Falkenstein, D. Hamilton, C. M. Hu, C. M. Chair, S. Nayar, R. Ray, E. Rutan and F. Zarin (2001), “Testing for Rating Consistency in Annual Default Rates”, Moody’s Investors Service.
- Carty, L. V. and J. S. Fons (1993), “Measuring Changes in Corporate Credit Quality”, Moody’s Special Report, New York.
- Catarineu-Rabell, E. et al., “Procyclicality and the new Basel Accord – banks’ choice of loan rating system”, Bank of England Working Paper No. 181, 2003.
- Caton, G. L. and J. Goh (2003), “Are all Rivals Affected Equally by Bond-Rating Downgrades?”, working paper.
- Committee on Global Financial Systems, “Incentives structures in Institutional Asset Management and their Implications for Financial Markets”, March 2003.
- Chen, L., D. A. Lesmond and J. Wei (2003), “Bond Liquidity estimation and the Liquidity Effect in Yield Spreads”, working paper.
- Collin-Dufresne, P., R. S. Goldstein and J. S. Martin (2001), “The Determinants of Credit Spread Changes”, *Journal of Finance*, December, pp. 2177-2208.
- Collins, Stephen, Ronald L. Johannes, Ian W. Marsh and Laurence Roberts, “Ratings: A Post-Enron Review”, mimeo, Bank of England, June 2003.
- Crabbe, L. (1991), “Event-risk: An Analysis of Losses to Bondholders and “Super Poison Put” Bond Covenants”, *Journal of Finance*, June, pp. 689-706.
- CreditMetrics* J.P. Morgan & Co. Incorporated, New York, 1997.
- Delianedis, G. and Robert Geske (2003), “Credit Risk And Risk Neutral Default Probabilities: Information About Rating Migrations and Defaults”, mimeo, The Anderson School of Business at UCLA, Los Angeles.
- Dichev, I. D. and J. D. Piotroski (2001), “The Long-Run Stock Returns Following Bond Ratings Changes”, *Journal of Finance*, Vol. 56, No. 1, pp. 173-204.
- Ederington, L. H., J. C. Goh and J. Nelson (1996), “Bond Rating Agencies and Stock Analysts: Who Knows What When?”, *Journal of Financial and Quantitative Analysis*, Vol. 33, pp. 569-585.
- Elton, E. J., M. J. Gruber, D. Agrawal and C. Mann (2001), “Explaining the Rate Spread on Corporate Bonds”, *Journal of Finance*, February, pp. 247-277.
- Ferri, G., L. G. Liu and J. E. Stiglitz (1999), “The Procyclical Role of Rating Agencies: Evidence from the East Asian Crisis”, *Economic Notes*, Vol. 28, No. 3, pp. 335-355.

- Gabbi, G. and A. Sironi (2002), "Which Factors Affect Corporate Bond Pricing? Empirical Evidence From Eurobonds Primary Market Spreads", working paper, Newfin Research Center, Bocconi University.
- Galil, K. (2002), "The Quality of Corporate Credit Rating: An Empirical Investigation", mimeo, Tel-Aviv University, Tel-Aviv.
- Geske, R. (1977), "The Valuation of Corporate Liabilities as Compound Options", *Journal of Financial and Quantitative Analysis*, pp. 541-552.
- Griffin, P. A. and A. Z. Sanvicente (1982), "Common Stock Returns and Ratings Changes: A Methodological Comparison", *Journal of Finance*, Vol. 37, pp. 103-119.
- Hand, John R. M., Robert W. Holthausen and Richard W. Leftwich (1992), "The Effect of Bond Rating Agency Announcements on Bond and Stock prices", *Journal of Finance*, Vol. 47, pp. 733-752.
- Hilderman, M. (1999), "Opening the Black Box: The Rating Committee Process at Moody's", Moody's Investors Service, New York, July.
- Holthausen, Robert W. and Richard W. Leftwich (1986), "The Effect of Bond Rating Changes on Common Stock Prices", *Journal of Financial Economics*, Vol. 17, pp. 57-89.
- Johnson, R. (2003), "An Examination of Rating Agencies' Actions Around the Investment-Grade Boundary", working paper, Federal Reserve Bank of Kansas City.
- Kavvathas, D. (2001), "Estimating Credit Rating Transition Probabilities for Corporate Bonds", University of Chicago, Chicago.
- Keenan, S. C. (1999), "Historical default rates of corporate bond issues, 1920-1998", Special Comment, Moody's Investors Service.
- Kliger, D. and O. Sarig (2000), "The Information Value of Bond Ratings", *Journal of Finance*, December, pp. 2879-2902.
- Lando, D. and T. M. Skødeberg (2002), "Analyzing rating transitions and rating drift with continuous observations", *Journal of Banking and Finance*, Vol. 26, Nos. 2 and 3, pp. 423-444.
- Levy, S. (2002), "The development of contingency clauses: appraisal and implications for financial stability", *Financial Stability Review*, Banque de France, November.
- Löffler, G. (2001), "An Anatomy of Rating through the Cycle", University of Frankfurt, Frankfurt.
- Löffler, G. (2003), "Avoiding the Rating Bounce: Why Rating Agencies are Slow to React to New Information", *Journal of Banking and Finance*.

- Lowe, P. (2002), "Credit risk measurement and procyclicality", BIS Working Paper No. 116, September.
- Lucas, D. J. and J. G. Lonski (1992), "Changes in Corporate Credit Quality 1970-1990", *Journal of Fixed Income*, pp. 7-14.
- Merton, R. C. (1974), "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates", *Journal of Finance*, Vol. 29, pp. 449-470.
- Moody's Investors Service, "Measuring the performance of corporate bond ratings", April 2003.
- Moody's Investors Service, "Understanding Moody's Corporate Bond Ratings and Rating Process", May 2002.
- Moody's Investors Service, "The Unintended Consequence of rating triggers", December 2000.
- Nickell, P., W. Perraudin and S. Varotto (2000), "Stability of Rating Transitions", *Journal of Banking and Finance*, Vol. 24, pp. 205-229.
- Resti, A. and A. Sironi (2002), "The Basel Committee Proposal on Risk-Weights and External Ratings: What Do We Learn from Bond Spreads?", working paper, Bocconi University, Milan.
- Schuermann, T. and Y. Jafry (2003), "Measurement and Estimation of Credit Migration Matrices", Federal Reserve Bank of New York, New York.
- Standard & Poor's, "Playing out the Credit Cliff Dynamic", December 2001.
- Standard & Poor's, "Survey on Rating Triggers, Contingent Calls on Liquidity", 2002.
- Vassalou, M. and Y. Xing (2003), "Equity returns following changes in default risk: New insights into the informational content of credit ratings", mimeo, Graduate School of Business, Columbia University, New York.

**EUROPEAN CENTRAL BANK
OCCASIONAL PAPER SERIES**

- 1 “The impact of the euro on money and bond markets” by J. Santillán, M. Bayle and C. Thygesen, July 2000.
- 2 “The effective exchange rates of the euro” by L. Buldorini, S. Makrydakis and C. Thimann, February 2002.
- 3 “Estimating the trend of M3 income velocity underlying the reference value for monetary growth” by C. Brand, D. Gerdesmeier and B. Roffia, May 2002.
- 4 “Labour force developments in the euro area since the 1980s” by V. Genre and R. Gómez-Salvador, July 2002.
- 5 “The evolution of clearing and central counterparty services for exchange-traded derivatives in the United States and Europe: a comparison” by D. Russo, T. L. Hart and A. Schönenberger, September 2002.
- 6 “Banking integration in the euro area” by I. Cabral, F. Dierick and J. Vesala, December 2002.
- 7 “Economic relations with regions neighbouring the euro area in the ‘Euro Time Zone’” by F. Mazzaferro, A. Mehl, M. Sturm, C. Thimann and A. Winkler, December 2002.
- 8 “An introduction to the ECB’s survey of professional forecasters” by J. A. Garcia, September 2003.
- 9 “Fiscal adjustment in 1991-2002: stylised facts and policy implications” by M. G. Briotti, February 2004.
- 10 “The acceding countries’ strategies towards ERM II and the adoption of the euro: an analytical review” by a staff team led by P. Backé and C. Thimann and including O. Arratibel, O. Calvo-Gonzalez, A. Mehl and C. Nerlich, February 2004.
- 11 “Official dollarisation/euroisation: motives, features and policy implications of current cases” by A. Winkler, F. Mazzaferro, C. Nerlich and C. Thimann, February 2004.
- 12 “Understanding the impact of the external dimension on the euro area: trade, capital flows and other international macroeconomic linkages” by R. Anderton, F. di Mauro and F. Moneta, March 2004.
- 13 “Fair value accounting and financial stability” by a staff team led by A. Enria and including L. Cappiello, F. Dierick, S. Grittini, A. Maddaloni, P. Molitor, F. Pires and P. Poloni, April 2004.
- 14 “Measuring Financial Integration in the Euro Area” by L. Baele, A. Ferrando, P. Hördahl, E. Krylova, C. Monnet, April 2004.

- 15 “Quality adjustment of European price statistics and the role for hedonics” by H. Ahnert and G. Kenny, May 2004.
- 16 “Market dynamics associated with credit ratings: a literature review” by F. Gonzalez, F. Haas, R. Johannes, M. Persson, L. Toledo, R. Violi, M. Wieland and C. Zins, June 2004.

