



Date: 9 July 2009

Ref.: CESR/09-579

**CONSULTATION PAPER**

**CRAs Central Repository**

**Deadline for contributions:** CESR invites responses to this consultation paper by **Friday, 7 August 2009**.



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## I. INTRODUCTION

### A. Background

1. On 12 November 2008, the European Commission published a Draft Regulation on credit rating agencies (CRAs)<sup>1</sup>. The amended version of this Regulation was approved on 23 April by the European Parliament<sup>2</sup>. It is expected to enter into force by October 2009 and to apply by March 2010.
2. According to this Draft Regulation, CESR will be required to discharge important coordination and advisory functions alongside its traditional role of promoting convergence through Level 3 guidelines and recommendations.
3. Amongst other tasks, the Commission's proposal article 9(2) and 18(2) lit. c). requires CESR to:
  - Establish a central repository (CRep) where credit rating agencies shall make available information on their historical performance data including the ratings transition frequency and information about credit ratings issued in the past and changes thereto.
  - Define a standardised form which the credit rating agencies shall use to provide information for this repository.
  - Make the information provided accessible to the public and publish summary information on the main developments observed on an annual basis (Art. 9 (2)).
  - Issue guidance on common standards on the presentation of the information, including structure, format, method and period of reporting, which credit rating agencies shall disclose in accordance with Article 9(2) and Annex I, Section E, Part II, Point 1<sup>3</sup> of the proposed Regulation.
4. CESR has to provide guidance on common standards on the presentation of historical performance data within 6 months of the entry into force of the proposed Regulation, i.e. by March 2010. There is no deadline with regard to the implementation of the central repository. This step will largely depend on the need for a public tender process and IT development work.
5. A CESR expert group (EG) has been set up to assist in preparing CESR for these new tasks relating to CRAs. Three subgroups have been set up within the EG to deal with the different topics on which CESR is requested to issue guidance. The 3 subgroups work in parallel and with full transparency and the CESR Secretariat and the Chair of the EG ensure coordination between the three groups. Subgroup 1 focuses on the registration process, co-operation, and mediation; Subgroup 2 focuses on applications, surveillance and enforcement and Subgroup 3 deals with disclosure by CRAs of historical performance data and the CRep.

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<sup>1</sup> [http://ec.europa.eu/internal\\_market/securities/agencies/index\\_en.htm](http://ec.europa.eu/internal_market/securities/agencies/index_en.htm)

<sup>2</sup> <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0279+0+DOC+XML+V0//EN&language=EN#BKMD-56>

<sup>3</sup> Annex I , Section E, Part II, point 1 refers to "Every six months, data about the historical default rates of its rating categories, distinguishing between the main geographical areas of the issuers and whether the default rates of these categories have changed over time".



6. The EG has decided to establish a consultative working group (CWG) composed of senior practitioners from the industries concerned by the Regulation to continuously support it in its work program by advising on all matters relating to the implementation and application of the future legal framework. In particular, the CWG is to be asked to comment on draft documents prior to public consultation.
7. As an initial step in the analytical process to develop common standards and the technical specifications for the CRep, CESR gathered information on the historical and performance data available from CRAs by means of questionnaires. These questionnaires related specifically to the 3 large classes of ratings, i.e. corporate, sovereigns/public and structured finance. CESR submitted the questionnaires to the largest CRAs as well as to smaller players <sup>4</sup>.
8. In a second step, CESR asked the CWG to comment on a Pre-Consultation Paper by 29 May 2009. Based on the feedback it received, CESR has produced this Consultation Paper.<sup>5</sup>

## **B. Purpose**

9. The purpose of this consultation document is to seek comments on the conclusions CESR has drawn for setting common standards for presentation of historical and performance information and for the design of the potential output from the CRep.
10. **The consultation period closes on Friday, 7 August 2009.** Respondents are invited to send their comments via CESR's website ([www.cesr.eu](http://www.cesr.eu)) under the section "Consultations". All responses that have not been labelled as confidential will be published on CESR's website. CESR will analyse the responses received and revise its proposal accordingly. The revised proposals will form the basis of the guidance on reporting standards and the scope of the CRep. If needed, a public hearing might be convened to discuss the responses.

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<sup>4</sup> See list of respondents in Annex I.

<sup>5</sup> See list of respondents in Annex II.

## II. SCOPE OF THE CENTRAL REPOSITORY

11. The content of the CRep according to the proposed Regulation includes: (i) information about credit ratings issued in the past and on their changes, (ii) information on historical performance data including rating transition frequency.
12. The first item is a broad and partially vague concept. Assuming this information is supposed to be made available by means of a central repository that also contains statistics on historical performance of ratings, we presume that this information about past credit rating activities also consists of quantitative information.
13. Another approach to interpret what is meant by article 9(2) is by elimination. This method implies looking at other information regarding the rating activities of CRAs which are mentioned in the Regulation but for which the disclosure process is not defined as via the CRep. This includes the following information:
  - Annex 1 section D: Information to be presented with individual credit ratings, i.e. in a rating report or press release, such as the name and job title of the analyst, sources, methodologies used, ...
  - Annex 1, Section E, part I: General disclosures on conflict of interests, ancillary services, methodologies, models and key rating assumptions, ...
  - Annex 1, Section E, Part II, point 2: Revenues per client.
  - Annex 1, Section E, Part III: Legal structure, ownership, internal controls, statistics on staff, ...
14. In addition, article 8 of the Regulation, which relates to the disclosure of credit ratings, does not define a specific disclosure channel for credit ratings themselves and only requires that ratings and ratings withdrawals be disclosed on a non-selective basis and in a timely manner. Therefore, there is no indication that the CRep might include individual credit ratings or rating withdrawals.
15. The concept of "rating changes" is very closely related to the rating transition metrics that are dealt with in the historical performance part of this section. Therefore, rating changes have been included in performance metrics.
16. In conclusion, CESR has defined "information about credit ratings issued in the past", with a view to the usefulness of such information in connection with historical performance data, as follows:
  - Number of ratings issued (during the period or cumulative at period end).
  - Number of ratings withdrawn (during the period or cumulative at period end).
  - Number of ratings issued in total.
17. The **second item** to be included in the CRep is information on historical performance data including rating transition frequency. This requirement will also deal with rating changes. CRAs usually publish, at least on an annual basis, performance studies designed to report on different types of statistics such as default rates and transition matrices and to demonstrate, in part perhaps, the predictive power of their credit ratings.



18. CESR has gathered together performance reports by the largest 3 CRAs and, on the basis of these, has listed the different indicators presented. Although statistical methodologies and denominations are not always comparable, the core metrics include the following:
- Default rates.
  - Cumulative default rates.
  - Rating changes (upgrades, downgrades).
  - Transition or migration matrices.
  - Accuracy ratios.
19. These statistics can be produced on an annual, multi-year or average basis. Averages can be calculated over different periods, rendering the data largely impossible to compare between different CRAs. This problem of lack of comparability has been highlighted by SIFMA's Credit Rating Agency Task Force<sup>6</sup>, which recommended that CRAs publish historical information regarding the performance of their ratings in a format that facilitates comparisons between different CRAs. This issue is tackled in chapter IV of this paper.
20. When analyzing the potential content of the CRep, the question of geographical scope was also raised. CESR opted in accordance with the scope of article 2 of the Regulation for the inclusion of all credit ratings (i) issued or endorsed by credit rating agencies registered in the Community; or (ii) issued by any certified credit rating agency or (iii) used for regulatory purposes in the EU and which are disclosed publicly or distributed by subscription.

***21. Do you agree with the suggested scope of the CRep?***

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<sup>6</sup> SIFMA, *Recommendations of the Securities Industry and Financial Markets Association Credit Rating Agency Task Force*, page 9, July 2008.



### **III. CONCLUSIONS DRAWN FROM CESR QUESTIONNAIRE TO CRAs ON AVAILABLE INFORMATION**

22. In March 2009, CESR sent a request to CRAs to fill in questionnaires regarding the data available in their database relating to past rating activities and historic performance information.
23. A total of 9 CRAs responded, amongst them 3 large CRAs, providing 9 completed questionnaires on corporate ratings, 4 on Sovereign and public finance and 4 on structured finance.

#### **A. Corporate ratings**

24. With regard to the information on ratings issued in the past, all CRAs track the numbers of ratings issued and withdrawn. The reason for withdrawal is made available by small CRAs but not by large ones. The volume rated (in monetary terms) is made available only by 4 out of 9 CRAs. Data are usually available per rating category and rating modifier and the frequency is annual, although most agencies point out the possibility of gathering 6-month data going forward.
25. Depending on the date of establishment of the CRA, databases include information dating back between 1970 and 2004.
26. Most CRAs segment their data, although the standards applied can differ. In terms of industry segmentation, NACE codes are used by 3 agencies out of 8. For global CRAs, 4 or 5 large geographic areas are generally presented being Europe or EMEA, US or North America, Asia/Pacific and Latin America.
27. With regard to historical performance statistics, default rates and cumulative default rates are generally available, on an issuer basis whilst volume weighted statistics are available from a minority of CRAs. Frequency is usually annual and multiple period statistics can go back as far as 20 years.
28. All CRAs track rating changes (upgrade/downgrade), usually at the rating modifier level and on an issuer basis (only 2 CRAs also record rating changes on a volume basis). Most CRAs also compute different ratios such as up/down ratio or the average size of upgrade/downgrade as well as transition rates presented as transition matrices. Finally, the larger CRAs monitor the predictability of their rating models by using a Gini coefficient.

#### **B. Public and sovereign ratings**

29. The 4 CRAs that have filled in a questionnaire on public finance and sovereign ratings presented very similar patterns. Statistics are available on an issuer-basis only with very limited segmentation and frequency being annual but with the possibility of gathering figures on a 6-month basis.
30. All CRAs compute default rates on an annual and cumulative basis and rating changes, ratios and transition rates are also available. Methodologies appear similar to corporate rating methodologies.



### **C. Structured finance ratings**

31. CESR received 4 questionnaires related to structured finance. Statistics are available on an issuer-basis only from 3 CRAs and on volume-basis from 1 CRA. Segmentation appears rather similar in terms of asset classes with the main classes ABS, CMBS, RMBS, CDOs available at all CRAs. Frequency is usually annual and semi-annual.
32. All CRAs compute default rates on an annual and cumulative basis and rating changes, ratios and transition rates are also available. Multiple period statistics are generally on a 10-year basis.

### **D. Methodologies**

33. The main statistical methodologies appear to be pretty similar across the different types of ratings but may differ from one CRA to another, especially when comparing small and large CRAs.
34. The definitions or methodologies that are comparable across a large number of CRAs include the definition of default, composition of cohorts and the exclusion of intra-year rating changes in transition matrices which are mainly constructed by comparing the rating of an entity at the beginning of the year (BOY) and at the end of the year (EOY). Differences exist in rating scales and the treatment of subsidiaries ratings and unsolicited ratings.
35. Rating changes due to changes in methodologies are included as regular rating changes by a majority of CRAs which have implemented methodology changes. In one case, the CRA provided separate tables differentiating rating transition with and without methodology changes.





#### IV. POTENTIAL FOR SETTING COMMON STANDARDS FOR THE PRESENTATION OF INFORMATION IN THE CENTRAL REPOSITORY

36. Based on the observations described in the previous chapter, historic performance data can differ between CRAs in terms of metrics' names, periods and definitions. These differences cause difficulties for investors seeking directly to compare historical rating and performance data disclosed by different CRAs and therefore highlight the need for common standards.
37. As has been advocated by SIFMA, these common standards should not interfere with the unique rating process of each individual CRA and with individual methodologies being used to assess ratings' performance. Also, CESR is aware of the fact that a balance should be struck between the level of information required to meet the needs of users and compliance costs for credit rating agencies.
38. However, given recent concerns raised by the financial turmoil, it is in CRAs' best interests to produce and disclose a minimum level of simple and unambiguous rating and performance metrics in a format that enables investors to compare the performance of different CRAs directly.
39. The following sections outline a proposal regarding a minimum data set and common standards for its presentation as would be represented in the Central Repository.

##### A. General standards

###### A.1 Rating categories

40. The core element in performance statistics presented by CRAs is the rating itself. Ratings are alpha-numeric symbols, defining different rating categories ranked according to a specific scale. Different CRAs use different rating scales as can be seen, for instance, by comparing rating categories of Standard&Poors and Moody's:

	Rating categories			Rating modifiers
	<i>Investment grade</i>	<i>Speculative grade</i>	<i>Default</i>	
S&P	AAA, AA, A, BBB	BB, B, CCC, CC	R, SD, D	+ or -
Moody's	Aaa, Aa, A, Baa	Ba, B, Caa, Ca, C	D, LD	1,2 or 3

41. Taking into account the fact that investors are highly familiar with these rating scales and with the existence of different rating scales among CRAs, CESR does not believe it is advisable to introduce a new common standard for these scales as such a new common standard would coexist in any event with the CRAs' own scales thus blurring the readability of performance statistics being reported by CRAs via the CRep.
42. However, it may prove useful to users if CRAs could provide specific information relating to their assessment of rated entities' ability to meet financial commitments or of the expected default rates within their particular rating scale, so that investors can compare different rating scales using a common tool. CESR considers providing hyperlinks to the rating and default definitions of the individual CRAs to enable users



to identify the differences between the CRAs ratings might also prove useful in this respect.

43. A mapping of different rating scales for registered External Credit Assessment Institutions (ECAI) can be found on the website of the Committee of European Banking Supervisors (CEBS).<sup>7</sup> CESR believes the provision of hyperlinks to CEBS's ECAI-mapping of the CRAs concerned would be useful to enable users of the CRep to identify the differences between the CRAs ratings.
44. The definition of 'credit rating' itself is also open for discussion as there currently exist different types of credit ratings such as long term versus short term, issuer vs issue ratings, liquidity ratings, financial strength ratings, etc. Generally, though, performance studies are based on one type of rating. For corporate ratings, the long-term issuer ratings or a proxy thereof (e.g., senior unsecured long-term rating) is usually used. This discipline prevents the existence of multiple default or transition occurrences for the same single issuer.
45. With regard to the different types of issuers being rated, existing performance studies published by CRAs usually segment ratings into 3 large "families" of ratings: corporate, structured finance, sovereign and public finance (the latter subdivided into US and international public finance). These different classes each have their own specific segmentations: for instance into different industries (utilities, banks, industrials,...), by corporate or asset class (ABS, CDO,...), or into structured finance products. Therefore, it would appear necessary to segregate statistics in the CRep according to these categories.

## ***A.2 Data categories***

46. In chapter II, the analysis of the potential scope of the CRep resulted in a first list of data, labelled as "information on past rating activities", that should be included in the repository, being:
  - Number of ratings issued.
  - Number of ratings withdrawn..
47. These data categories are defined more precisely in the following paragraphs. The aim is to come to a general definition of these data categories.
48. The "number of ratings issued" is the count of ratings issued by a CRA. It can be computed as ratings issued during a specific period or as ratings existing at a certain point in time (cumulative). This number should be the basis for computing other statistics such as default rates, for instance.
49. CESR plans to gather information on past rating activities but limited to those ratings that are used for historical performance statistics (i.e. corporate finance would include all long-term issuer rating (or alternatively long-term debt rating) as well as short-term ratings). Including all different types of ratings (e.g. financial strength ratings, recovery ratings, servicer ratings etc.) would make it more difficult for investors to link and compare the information presented in this first part of the CRep with the information presented in the historical performance part.

***50. Do you agree with this definition and limitation on the data to be reported?***

<sup>7</sup> [http://www.c-eps.org/documents/Supervisory-Disclosure/spreadsheets/rules/ecai\\_recognition.aspx](http://www.c-eps.org/documents/Supervisory-Disclosure/spreadsheets/rules/ecai_recognition.aspx)



51. The "number of ratings withdrawn" is the count of ratings having been withdrawn by a CRA, whatever the cause, during a specific period or the cumulative count of all withdrawn ratings at a certain point in time.
52. Based on responses to the questionnaires submitted to CRAs, it appears that CRAs' databases do not generally include a segmentation of withdrawn ratings by cause of withdrawal. CESR suggests that CRAs distinguish the reason for the rating withdrawal between two broad categories: i) Merger etc., which do not imply rating agency initiative and ii) Agency action in response to lack of information, loss of trust in the information by the rating agency, etc.
53. These figures shall be reported on a global basis as well as broken down into different categories, depending on the class of credit rating, i.e.:

<u>Corporate ratings</u>	<u>Sovereign &amp; Public finance ratings</u>	<u>Structured Finance ratings</u>
<ul style="list-style-type: none"> <li>• Per rating category and rating modifier</li> <li>• Per geographic area</li> <li>• Per industry sector</li> </ul>	<ul style="list-style-type: none"> <li>• Per rating category and rating modifier</li> <li>• Per geographic area</li> <li>• Per issuer type</li> <li>• Per currency</li> </ul>	<ul style="list-style-type: none"> <li>• Per rating category and rating modifier</li> <li>• Per geographic area</li> <li>• Per asset class</li> <li>• Per vintage year</li> </ul>

54. The second set of data identified in chapter II related directly to measuring credit defaults and performance of credit ratings and includes the following data:
  - Default rates.
  - Cumulative default rates.
  - Rating changes.
  - Performance ratios.
55. Defaults can be computed in absolute or relative terms: Number of defaults during a specific period or the number of defaults divided by the number of ratings during a specific period (net of withdrawals). These ratios can relate to a single period or multiple periods (cumulative default rates). The comparability of these ratios depends on both the definition of default and the definition of rating. For instance, in the corporate segment, CRAs usually use only long-term issuer ratings for computing default rates. This choice should therefore have to be prominently presented in the CRep to enable users to understand how default rates are calculated.
56. Rating changes include rating upgrades or rating downgrades, which can occur per rating category (e.g. from AAA to AA) or per notch (e.g. from AA+ to AA). They can be single-notch or multi-notch (e.g. from AA+ to A-).
57. Rating changes can be analysed by way of different ratios such as the up/down ratio, the ratio of change from investment to speculative grade (and vice versa), the average size of upgrades or downgrades (in number of notches). These ratios should be included in the CRep.
58. Whether a rating change was preceded by a specific outlook or presence on a watch list, i.e. whether those specific status and lists are predictive of rating changes might also be of particular interest. However, based on responses to the questionnaires, most CRAs do

not differentiate statistical information on defaults based on outlooks or watch lists. Thus, for the CRep, there will be no distinction between 'ordinary' rating changes and rating changes which were preceded by an outlook or by presence on a watch list. However, information on the predictive power of rating outlooks and/or credit watches will be provided in the CRep by including the number of rating actions following an outlook or credit watch status. CRAs not publishing such data are not requested to provide this information.

59. Another performance indicator relating to rating changes is what is usually called 'transition matrices' or 'migration tables'. These map transition rates over the whole rating scale. Transition rates for each given period are usually calculated by comparing the number of issuers with a specific rating at the beginning of the period with the distribution of the ratings of these same issuers at the end of the period. CRAs will be required to provide migration tables, at the rating modifier level, for different periods (annual or multi-year) for inclusion in the CRep.
60. Finally, the most commonly used performance ratio is the Gini coefficient. The Gini coefficient is a number between 0 and 1, with 0 corresponding to random differentiation of defaults (all defaults being equally distributed across all rating categories) versus 1 representing perfect differentiation (all defaults occurring at the lowest end of the rating scale). For a technical note on the calculation of the Gini coefficient refer to Annex IV.

### ***A.3 Time periods***

61. Based on the information gathered from CRAs, default databases cover varying periods with some data dating back to as far as 1920. For example, picking the 2008 default studies of 4 CRAs, the following periods are covered: 1920-2008 for Moody's, 1976-2008 for DBRS, 1981-2008 for S&P, and 1990-2008 for Fitch. Data presented in these studies usually refer to the last 12-month period or to multi-year periods.
62. In order to obtain comparable statistics, data to be reported on a multi-year basis should be presented by all CRAs covering the same period.
63. If available data is limited, CRAs should present information covering the short, medium and long-term. That means CRAs should present information for the most recent 1, 3, 5, 10, 20, 30 years. CESR is considering whether CRAs should provide this information also for the average of those periods. As is already the case for existing performance reports, periods would be calculated on a calendar year basis and, as required by the Regulation, updated every six months. This means as of 31 December and 30 June of each year.
64. Based on most CRAs responses to the questionnaires, 6-month data is not currently available in default databases but CRAs should collect statistics twice a year going forward from the entry into force of the Regulation.
65. CRAs should report to the central repository within two months after each reference date which means by 28 February and 31 August of each year.
66. At the set-up of the CRep, CRAs should submit information on their rating activity and on the historical rating performance covering the last ten years before entry-into-force of the Regulation. They should report on a yearly basis in the format set out in this Consultation Paper. CRAs which have not been in existence for that long will be required to report only the data they have available.

***67. Are the given data requirements and time periods appropriate? In structured finance, it appears in some cases that the data required to track material impairments or defaults is not reported on a systematic basis and not reported or tracked on an electronic basis. Thus, would it be reasonable to set the reference date for reporting structured finance defaults or material impairments to one reporting period earlier than the reference date for the other segments (possibility to report 6 months delayed)? Are CRAs able to provide historical information for the period before entry-into-force of the Regulation in the granularity presented in this CP? If not, which minimum (top-level) information could be provided?***

#### ***A.4 Methodologies***

68. From a comparison of CRAs methodologies based on responses to questionnaires, it appears that some methodologies are already pretty standard while differences remain in some areas.
69. Taking into account the importance of historical data in the computation of performance ratios, the benefits of introducing a full set of standard methodologies to be applied by all CRAs need to be weighed against the cost of losing the comparability with the historical information collected in CRAs databases before the entry into force of the Regulation.
70. Therefore, in some specific cases where there remain differences in the methodologies used, adequate transparency on methodological divergences might be favoured over forcing CRAs to use common standard methodologies exclusively. In such cases, CRAs should complement quantitative data on rating activities and rating performance with qualitative information sufficiently detailed to allow the users of the central repository to interpret data correctly.
71. Based on information gathered from CRAs, the following methodologies appear to be similar at a majority of CRAs and should entail no significant resources being applied to existing rating statistics:
- Definition of cohort (or static pools): All ratings existing at the beginning of the year are included in a single cohort or static pool, ratings withdrawn or defaulted issuers are excluded from subsequent cohorts (or static pools). Defaults shall be assigned back to all cohorts in which the defaulted issuer is included.
  - Treatment of rating changes: Rating changes are identified by comparing end of year ratings with beginning of year ratings; therefore intra-year rating changes (up/down) are not captured in default and performance statistics.
72. Definitions of default by the CRAs that responded to the questionnaires are described in different terms and may appear significantly different from a legal point of view. However, a common denominator at most CRAs is a set of 3 non-cumulative conditions that are considered as an event of default, being:
- Non-payment of principal and/or interest on a certain maturity.
  - Situations such as bankruptcy, administration, receivership, liquidation, etc.
  - Debt restructuring with reduced financial obligations imposed to creditors.



73. This set of 3 conditions may be used as a minimal standard definition of default combined with the requirement of all CRAs to describe, in the CRep, their own definition of default, how they diverge from the standard and the consequences thereof for the significance of default statistics.
74. With regards to unsolicited ratings, a slight majority of CRAs which provide such ratings mentioned they include such ratings in their statistics, arguing that the process of issuing an unsolicited rating is no different to that for issuing an issuer-paid rating and therefore does not justify being excluded from statistics. Indeed, unsolicited ratings should match solicited ones in terms of quality.
75. CESR therefore believes that it should be a requirement that data provided by CRAs include both solicited and unsolicited ratings provided they are not based on public information only. However, CRAs should explicitly indicate whether they issue solicited ratings only.
76. With regard to rating changes due to methodology changes, these are included as regular rating changes by a majority of CRAs which have implemented methodology changes. In one case, the CRA provided separate tables differentiating rating transition with or without methodology changes. CESR does not consider it necessary to require CRAs to provide migration tables with and without rating changes due to methodology changes.

## **B. Specific standards for corporate ratings**

### ***B.1 Geographic breakdown***

77. Based on the information gathered from CRAs active at an international level, it appears that the geographic segmentations used are already mostly similar. In order to ensure adequate comparability from a geographic point of view, CESR proposes defining a common standard geographic segmentation that would be used by all CRAs to report data in the CRep.
78. There would be 5 broad regions defined as follows<sup>8</sup>:
- North America: US and Canada.
  - Latin America (including Mexico and Caribbean).
  - Europe.
  - Middle East & Africa.
  - Asia-Pacific.
79. These broad geographic segments might be supplemented by sub-segments for North America, i.e. US and Canada and for Europe, i.e. Western Europe and Eastern Europe, the latter including the following countries: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, The Former Yugoslav Republic of Macedonia, Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Ukraine.

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<sup>8</sup> See Annex III for a complete list of countries per region.





80. CRAs that are only active at a national level shall specify the country for which ratings are reported in the CRep.

### ***B.2 Industry segmentation***

81. Based on the information gathered from the CRAs responding to the questionnaires, it appears that the industrial segmentation used is also already fairly similar. In fact, some smaller rating agencies use the NACE code.<sup>9</sup> However, CESR considers the NACE code too detailed for the scope of the disclosure intended in the Regulation. In order to ensure adequate comparability, CESR proposes to define a single industrial segmentation based on the NACE code but with a lower granularity that would be used by all CRAs to report data in the CRep. The categories listed would always include all subcategories of the listed category.

82. Industry segments would be defined as following:

<b>Segment</b>	<b>NACE Rev. 2.2</b>	<b>ISIC<sup>10</sup></b>
Basic Production (Agriculture , Forestry, Fishing, Mining and Quarrying)	A, B	01 to 09
Advanced Production (Manufacturing, Construction)	C , F	10 to 33 and 40 to 43
Utilities (Electricity, Water)	D, E	35 to 39
Financials – Banks	K	64
Financials – Insurances	K	65
Financials - Other (category includes SPV)	K	66
Trading (Retail, Wholesale)	G	45 to 47
Services (Transportation, Storage, Information, Communication, Real Estate Activity and Professional, Scientific and Technical Activities)	H, I, J, L,M, N, R, S T	49 to 53, 55, 56; 58 to 63, 68 to 75, 77 to 82, 94 to 98

Public Services (NACE codes O, P and Q) are included in public finance (C2).

### ***B.3 Treatment of subsidiaries ratings***

83. Subsidiary ratings tend generally to be influenced by their parent company. However, they may differ positively (e.g. Monoliners) and negatively due to individual factors. The treatment of subsidiary ratings is not the same by all CRAs responding to the questionnaire. In order to ensure adequate comparability, CESR proposes to define a

<sup>9</sup> For a detailed presentation of the Statistical Classification of Economic Activities in the European Community, Rev. 2 (NACE Rev. 2) see the website of Eurostat ([http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP\\_PUB\\_WELC](http://ec.europa.eu/eurostat/ramon/index.cfm?TargetUrl=DSP_PUB_WELC)).

<sup>10</sup> ISIC: International Standard Industrial Classification. For a detailed presentation of the ISIC Rev. 4 see the website of the United Nation's Department of Economic and Social Affairs (<http://unstats.un.org/unsd/cr/registry/isic-4.asp>).



single treatment of subsidiary ratings to be used by all CRAs to report data into the CRep.

84. Subsidiary ratings shall be treated as individual ratings in cases where the subsidiary can be regarded as autonomous from a rating perspective. This means that rating changes in the parent company are, in the majority of cases, not reflected in the ratings of the subsidiary and the subsidiary has its own outstanding debt or securities.
85. Subsidiary ratings shall not be regarded as individual ratings in cases where the subsidiary can be regarded as fully integrated into the parent company. This means the ratings of the subsidiary usually reflect the ratings of the parent company or the subsidiary has no debt or securities issued in its own right.

**86. Do you agree with the suggested differentiation of subsidiary ratings or would it make sense not to differentiate subsidiary ratings?**

#### ***B.4 Issuer rating versus debt rating, types of debt***

87. Based on the information gathered from CRAs, it appears that the rating definitions used are fairly similar. In order to ensure adequate comparability between the CRAs of the rating migration in the corporate sector, CESR proposes reporting the following ratings for corporate finance:
- “Issuer rating” (or similar) if available, otherwise, if issuer ratings are not available, use of “long-term debt rating” (or similar).
  - “Short-term rating” (or similar).

**88. Do you agree with the proposed breakdown into issuer (long-term) ratings and short-term ratings? Would you prefer additional types of credit ratings to be included in the CRep?**

### **C. Specific standards for sovereign and public finance ratings**

#### ***C.1 Geographic breakdown***

89. Based on the information gathered from CRAs active at an international level, it appears that the geographic segmentations used are already fairly similar. In order to ensure adequate comparability from a geographic point of view, CESR proposes to define a common standard geographic segmentation that would be used by all CRAs to report data into the CRep.
90. CRAs should split their statistics in two geographical groups:
- US.
  - Non-US.
91. An additional breakdown in 5 broad regions is defined as follows<sup>11</sup>:

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<sup>11</sup> See Annex III for a complete list of countries per region.





- North America: US and Canada.
- Latin America (including Mexico and Caribbean).
- Europe.
- Middle East & Africa.
- Asia-Pacific.

***92. Do you agree with the proposed geographic breakdown for sovereign and public finance ratings? Is a more granular approach required? If yes, please provide details of the level of granularity that would prove adequate in your view.***

### ***C.2 Segmentation***

93. Based on the information gathered from the CRAs it appears that the segmentation used is already fairly similar from one CRA to another.

94. Segments are defined as follows:

- Sovereigns.
- Sub-sovereigns, municipalities.
- Supranational organisations: This segment includes NACE code U.
- Public entities: This segment includes NACE codes O, P and Q.

95. Due to the small sample size, performance data concerning supranational organisations would only be included in the totals of the “Sovereign and Public Finance” category.

***96. Do you agree with the provided segments?***

### ***C.3 Local versus foreign currency ratings***

97. CRAs assign foreign and local currency ratings to sovereign and debt instruments issued by sovereigns. Local currency ratings reflect the capacity of a sovereign to service debt payable in its own currency. Similarly, foreign currency ratings reflect the capacity of a sovereign to service debt payable in foreign currencies. Both local and foreign currency would be included in the CRep.

## **D. Specific standards for structured finance ratings**

### ***D.1 Geographic breakdown***

98. Based on the information gathered from CRAs active at an international level, it appears that the geographic segmentations used are already fairly similar. In order to ensure adequate comparability from a geographical point of view, CESR proposes to define a common standard geographical segmentation that would be used by all CRAs to report data into the CRep.



99. There would be 6 broad regions or sub-regions defined as follows<sup>12</sup>:

- North America: US and Canada,
  - of which US.
- Latin America (including Mexico and Caribbean).
- Europe, Middle East & Africa,
  - of which Europe.
- Asia-Pacific.

100. CRAs that are only active at a national level shall specify the country for which ratings are reported into the CRep.

101. For structured finance ratings in particular, this classification may prove trickier than for corporate, sovereign and public ratings. The geographical status of an issue may indeed depend on different factors.

#### ***D.2 Criteria used to define the nationality/region of issue***

102. Based on the information gathered from CRAs active at an international level, it appears that criteria used to define the nationality/region of a transaction are quite similar: The primary variable is the domicile of the underlying assets. CRAs generally classify a transaction as being in a country if the majority of assets are based in that country.

103. On the other hand criteria can differ in the case of multi-country asset pools. In this case, deals are mostly classified by the location from which they are monitored or the location of the arranger.

104. CESR proposes to use the domicile of the absolute majority of the underlying assets as a primary variable in defining the region of issue. If this criterion fails to provide insight into the region in the case of multi-region asset pools, CESR proposes to use the domicile of the relative majority of the underlying assets as the secondary variable. These two criteria have the advantage of not being connected to the functional organisation of CRAs.

***105. Do you agree with the provided criteria used to define the region of issue?***

#### ***D.3 Asset classes***

106. Based on the information gathered from CRAs active at an international level, it appears that the asset segmentations used are already fairly similar. In order to ensure adequate comparability of data, CESR proposes to define a common standard segmentation of asset classes that would be used by CRAs to report data into the CRep. This segmentation is largely based on Bloomberg's classification.

107. There would be 6 asset classes defined as follows:

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<sup>12</sup> See Annex III for a complete list of countries per region.

- ABS: Asset-backed securities including securities backed by auto/boat/airplane loans, student loans, consumer loans, health care loans, manufactured housing loans, film loans, utility loans, equipment leases, credit card receivables, tax liens, non performing loans, home equity loans (HEL). This category would be further segmented in 4 sub-categories that tend to perform according to specific features:
  - Credit card receivable backed securities.
  - Auto/boat/airplane loan backed securities.
  - Home equity loans (HEL).
  - Other ABS.
- RMBS: Residential mortgage-backed loans. This category would be further segmented in:
  - Prime RMBS.
  - Non-Prime RMBS (including sub-prime and Alt-A, non-conforming mortgage loans, et al.).
- CMBS: Commercial mortgage-backed securities. This segment includes asset types such as office property loans, hospital loans, care residences, storage facilities, hotel loans, nursing facilities, industrial loans.
- CDO: Collateralized debt obligations are securities backed by a portfolio of bonds and/or loans. This segment includes cash flow/synthetic CDOs/CLOs, hybrid CDOs, Market value CDOs. This last category would be further segmented in:
  - Cash flow and hybrid CDOs/CLOs.
  - Synthetic CDOs/CLOs.
  - Market value CDOs.
- Asset-backed commercial papers (ABCP).
- Other structured finance consists of structured finance securities which cannot be categorized into the 6 majors sectors above including structured covered bonds, structured investment vehicles (SIV), insurance-linked securities and derivative product companies.

CESR will monitor future developments in the area of structured finance and adapt categories if major structural changes occur.

**108. Do you agree with the proposed definition of asset classes?**

## V. POTENTIAL OUTPUT DESIGN OF THE CENTRAL REPOSITORY

### A. Statistical significance of data

109. Data presented in the central repository should be interpreted with care in relation to its statistical significance. Small sample sizes could distort the impression of actual rating activity and performance. In order to minimise the room for misinterpretation, CESR sets out some standards which would apply both to small CRAs and to all CRAs who only rate a few entities in a certain region/segment.
110. With regard to past rating activity full information (number of ratings, number of new ratings, number of ratings withdrawn, etc.) has to be provided by newly founded CRAs only after one full year of being in business.
111. Information of rating performance should be provided only if certain minimum numbers of ratings, rating actions or defaults are met. This condition would also apply for the breakdown of information within certain regions/segments or other granular subsets of the rating universe of a CRA. The detailed thresholds are outlined in the following sections.

***112. Do you share the general idea of presenting information on rating activities for all CRAs irrespective of the number of assigned ratings (only after being in business for one full year)? Do you agree with the proposal to present information on rating performance only for prescribed minimum sample sizes? What other ways could you envisage to ensure the statistical validity of information presented in the CRep?***

### B. Structure of the information presented in the central repository

113. The output presented in the central repository is structured in four sections:
- Number of ratings and rating actions.
  - (Cumulative) Default rates.
  - (Cumulative) Transition matrices.
  - Accuracy ratios.

**B.1 Number of ratings and rating actions**

	Beginning of period	During period	End of period
Number of ratings	To be reported	XXX	To be reported
Number of upgrades	XXX	To be reported	XXX
of which following a positive rating outlook	XXX	To be reported	XXX
of which following a positive credit watch	XXX	To be reported	XXX
Number of downgrades	XXX	To be reported	XXX
of which following a negative rating outlook	XXX	To be reported	XXX
of which following a negative credit watch	XXX	To be reported	XXX
Number of withdrawals, discontinuations	To be reported	To be reported	To be reported
Upgrade/downgrade ratio	XXX	To be reported	XXX
Average number of notches for upgrades	XXX	To be reported	XXX
Average number of notches for downgrades	XXX	To be reported	XXX

114. The table will be presented in the central repository showing the total numbers for each CRA, as well as (for each CRA) all relevant segments/regions irrespective of the number of ratings in each segment/region.

115. The number of upgrades and downgrades would be calculated by individually comparing for each individual rating the class at the beginning of each reference period and at the end of this period. Multiple upgrades or downgrades within a reference period would therefore be reported as one single rating action event.

116. The predictive power of rating outlooks and/or credit watches will be included in the CRep. However, due to their mostly short-term nature, it is not considered useful to include the number of outlooks or credit watches, but instead to include the number of rating actions following a defined status. CRAs not publishing rating outlooks or credit watches will not be requested to provide this information.

**117. Do you agree with the scope of information presented in the table on rating activities? Do you agree with the method of calculating the number of upgrades/downgrades? Do you consider the conditional number of defaults, i.e. the number of defaults following a rating outlook or credit watch to be useful information? Are there further information needs from a user's perspective?**

**B.2 (Cumulative) default rates**

118. (Cumulative) default rates will be presented in tables summarising different time periods. The default rates should show, for each rating class, the number of defaults within a time period as a percentage of the number of ratings in each rating class at the beginning of the respective time period.
119. Default rates for the most recent 1-year-period should be presented both as absolute numbers of defaults and as a percentage of the number of ratings at the beginning of the reference period.

1 year	number of defaults	default rate (issuer-weighted)
AAA		
AA		
A		
BBB		
BB		
B		
CCC		

120. All CRAs default rates covering the whole universe of all issuers should be presented at the broad rating class level in the CRep, irrespective of the number of assigned ratings.
121. For ratings assigned by a CRA in certain segments/regions, default rates at the broad rating class level will only be presented if the number of ratings in this segment/region at the beginning of the reference period was greater than [100] ([50] in the category of sovereign ratings).
122. Default rates at the finer notch level will only be presented if the number of ratings at the beginning of the reference period was greater than [200] (all ratings of a CRA and within a certain segment/region; [100] in the category of sovereign ratings).

**123. Do you agree with the proposed minimum numbers of ratings for presenting data with respect to default rates, both at rating class and a notch level?**

Cumulative default rates	3 years	5 years	7 years	10 years	20 years	30 years
AAA						
AA						
A						
BBB						
BB						
B						
CCC						

124. Cumulative default rates at the broad rating class level will only be presented if the number of ratings assigned by a CRA at the beginning of the reference period was greater than [100].
125. For ratings assigned by a CRA in certain segments/regions, default rates at the broad rating class level will only be presented if the number of ratings in this segment/region at the beginning of the reference period was greater than [100] ([50] in the category of sovereign ratings).
126. Cumulative default rates at the finer notch level will only be presented if the number of ratings at the beginning of the reference period was greater than [200] (all ratings of a CRA or a certain segment/region; [100] in the category of sovereign ratings).
127. Cumulative default rates should be presented for periods of [3], [5], [7], [10], [20] and [30] years, both for the most recent period and for averages over these periods.

**128. Do you agree with the proposed minimum numbers of ratings for presenting data with respect to cumulative default rates, both at rating class and a notch level?**

### ***B.3 (Cumulative) transition matrices***

129. A transition matrix shows the actual changes of ratings within a given time period. For each rating class at the beginning of a period (first column of the matrix) the migration rates to other rating classes and the share of withdrawn ratings is shown as a percentage of the number of ratings in the stated rating class. The sum of probabilities in a horizontal line is 1.

	AAA	AA	A	BBB	BB	B	CCC	D	WD
AAA									
AA									
A									
BBB									
BB									
B									
CCC									

130. (Cumulative) transition matrices at the rating category level will only be presented if the number of ratings at the beginning of the reference period was greater than [100] (all ratings of a CRA or a certain segment/region; [50] in the category of sovereign ratings).
131. (Cumulative) transition matrices at the notch level will only be presented if the number of ratings at the beginning of the reference period was greater than [200] (all ratings of a CRA or a certain segment/region; [100] in the category of sovereign ratings).
132. Cumulative transition matrices should be presented for periods of [3], [5], [7], [10], [20] and [30] years, both for the most recent period and for averages over these periods.

**133. Do you agree with the proposed minimum numbers of ratings for presenting data in a transition matrix, both at rating class and a notch level?**

#### **B.4 Accuracy ratios**

134. Accuracy ratios should provide users of ratings with a certain degree of confidence in the historical performance of ratings. CRAs should calculate a Gini coefficient for periods of the last [1], [3] and [5] years prior to the reporting date. The Gini coefficient shows the discrimination power of ratings, being close to 0 if the default-predictive power of ratings is low (defaults equally distributed across all rating classes) and close to 1 if defaults occur only at the lowest end of the rating scale.
135. A Gini coefficient should be calculated for all ratings assigned by a CRA, and for each of the three broad categories (corporate finance, sovereign and public finance ratings, structured finance). The calculation should only be performed if the number of defaults during the stated time period was greater than [25].

**136. Do you agree with the proposed minimum number of defaults for calculating a Gini coefficient?**

#### **C. Navigation in the central repository**

137. In a first step, users of the central repository choose either:
1. A particular CRA (CRA 1, CRA 2, CRA 3, ...), and then rating type (corporate, sovereign, structured finance), region, segment; or
  2. A particular rating type (corporate, sovereign, structured finance), region, segment, before selecting a particular CRA.
138. During the selection process, the central repository will guide the user by displaying only those options which are relevant (i.e. after having selected in procedure 1 a CRA which provides only corporate ratings in one country, the selection process for the rating type and the region will be automatically skipped).
139. Users will have the possibility, after having chosen a specific table/matrix of a CRA for a segment/country/type of debt to select historical versions of this table/matrix (i.e. referring to a previous reference date) by switching back and forth through the historical versions.





140. Each table can be exported in either a pdf or csv format.

***141. Do you agree with the basic design principles for the CRep? Which further functions could you envisage regarding presentation and navigation? How should the output be designed to fit the needs of a user?***

#### **D. Additional qualitative information**

142. CRAs shall complement quantitative data on rating activities and rating performance by qualitative information sufficiently detailed to allow the users of the central repository to correctly interpret the data. Where appropriate, definitions and further information will be displayed within the tables either in footnotes, by using “OnMouseOver” info boxes, or in separate documents.

143. As a minimum, the following information should be provided:

- Description of the rating scale.
- Definition and use of rating outlooks and credit watches.
- Definition and use of rating withdrawals or discontinuations.
- Treatment of rating changes due to changes in rating methodology.
- Definition of default.

***144. Do you agree with the list of minimum information to be provided in the CRep? Which further information do you think of being indispensable to allow users of the CRep the correct interpretation of presented data?***

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## **Annex I: List of respondents to the questionnaires**

BCRA (Bulgaria)

Coface

Companhia Portuguesa de Rating, S.A. (CPR)

Creditreform Rating AG

DBRS

Fitch Ratings

Moody's Investors Service

Prof. Dr. Schneck Rating GmbH

Standard & Poor's Rating Services



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<b>Annex II: List of respondents to the CWG pre-consultation process</b>
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Coface

Companhia Portuguesa de Rating, S.A. (CPR)

DBRS

European Association of Cooperative Banks (EACB)

European Association of Corporate Treasurers (EACT)

European Federation of Financial Analysts Societies (EFFAS)

European Federation of Retirement Provisions (EFRP)

European Fund and Asset Management Association (EFAMA)

European Issuers

European Savings Banks Group (ESBG)

Fitch Ratings

International Capital Markets Association (ICMA)

Lince Spa

Moody's Investor Service

Standard & Poor's Rating Services



## **Annex III: Country list per geographic area**

This list is derived from the UN geographic classification, with some changes being the classification of UN's category 'Western Asia' in the category 'Middle East' and the treatment of some overseas territories.

### **North America**

Canada

United States of America (incl. the following territories and commonwealths: American Samoa, Guam, Northern Mariana Islands, Puerto Rico, United States Virgin Islands)

Bermuda

### **Latin America and Caribbean**

Anguilla

Antigua and Barbuda

Argentina

Aruba

Bahamas

Barbados

Belize

Bolivia

Brazil

British Virgin Islands

Cayman Islands

Chile

Colombia

Costa Rica

Cuba

Dominica

Dominican Republic

Ecuador

El Salvador

Grenada

Guatemala



Guyana

Haiti

Honduras

Jamaica

Mexico

Montserrat

Netherlands Antilles

Nicaragua

Panama

Paraguay

Peru

Saint-Barthélemy

Saint Kitts and Nevis

Saint Lucia

Saint Martin (French part)

Saint Vincent and the Grenadines

Suriname

Trinidad and Tobago

Turks and Caicos Islands

Uruguay

Venezuela

**Europe**

Albania

Andorra

Austria

Belarus

Belgium

Bosnia and Herzegovina

Bulgaria

Croatia

Cyprus

Czech Republic



Denmark (including the Faroe Islands and Greenland)

Estonia

Finland (including Åland)

France (including the overseas regions/departments French Guiana, Guadeloupe, Martinique, Réunion, Saint Pierre and Miquelon)

Germany

Greece

Guernsey

Hungary

Iceland

Ireland

Isle of Man

Italy

Jersey

Latvia

Liechtenstein

Lithuania

Luxembourg

Malta

Monaco

Montenegro

Netherlands

Norway (including Swalbard and Jan Mayen Islands)

Poland

Portugal

Republic of Moldova

Romania

Russian Federation

San Marino

Serbia

Slovakia

Slovenia

Spain



Sweden

Switzerland

The Former Yugoslav Republic of Macedonia

Ukraine

United Kingdom of Great Britain and Northern Ireland

**Middle East & Africa**

Algeria

Angola

Armenia

Azerbaijan

Bahrain

Benin

Botswana

Burkina Faso

Burundi

Cameroon

Cape Verde

Central African Republic

Chad

Comoros

Congo

Cote d'Ivoire

Democratic Republic of the Congo

Djibouti

Egypt

Equatorial Guinea

Eritrea

Ethiopia

Gabon

Gambia

Georgia

Ghana



Guinea  
Guinea-Bissau  
Iraq  
Israel  
Jordan  
Kenya  
Kuwait  
Lebanon  
Lesotho  
Liberia  
Libyan Arab Jamahiriya  
Madagascar  
Malawi  
Mali  
Mauritania  
Mauritius  
Morocco  
Mozambique  
Namibia  
Niger  
Nigeria  
Oman  
Qatar  
Rwanda  
Saint Helena  
Sao Tome and Principe  
Saudi Arabia  
Senegal  
Seychelles  
Sierra Leone  
Somalia  
South Africa





Sudan

Swaziland

Syrian Arab Republic

Togo

Tunisia

Turkey

Uganda

United Arab Emirates

United Republic of Tanzania

Western Sahara

Yemen

Zambia

Zimbabwe

**Asia-Pacific**

Afghanistan

Australia

Bangladesh

Bhutan

Brunei Darussalam

Cambodia

China

Cook Islands

Democratic People's Republic of Korea

Fiji

French Polynesia

Hong Kong Special Administrative Region of China

India

Indonesia

Iran (Islamic Republic of)

Japan

Kazakhstan

Kiribati



Kyrgyzstan  
Lao People's Democratic Republic  
Macao Special Administrative Region of China  
Malaysia  
Maldives  
Marshall Islands  
Micronesia (Federated States of)  
Mongolia  
Myanmar  
Nauru  
Nepal  
New Caledonia  
New Zealand  
Niue  
Norfolk Islands  
Occupied Palestinian Territory  
Pakistan  
Palau  
Papua New Guinea  
Philippines  
Pitcairn  
Republic of Korea  
Samoa  
Singapore  
Solomon Islands  
Sri Lanka  
Taiwan, Republic of China  
Tajikistan  
Thailand  
Timor-Leste  
Tokelau  
Tonga



Turkmenistan

Tuvalu

Uzbekistan

Vanuatu

Viet Nam

Wallis and Futuna Islands

**Annex IV: Cumulative accuracy profile**

The cumulative accuracy profile (CAP), also known as power curve or Lorenz curve, is a popular technique for evaluating the quality of a rating model. To obtain the CAP curve, all debtors are first ordered on the x-axis by their respective credit scores/ratings from riskiest to safest. For a given proportion  $x$  of all debtors, the CAP curve is constructed by calculating the proportion  $y$  of the defaulters whose rating scores are equal to or worse than the maximum score of proportion  $x$ .<sup>13</sup>

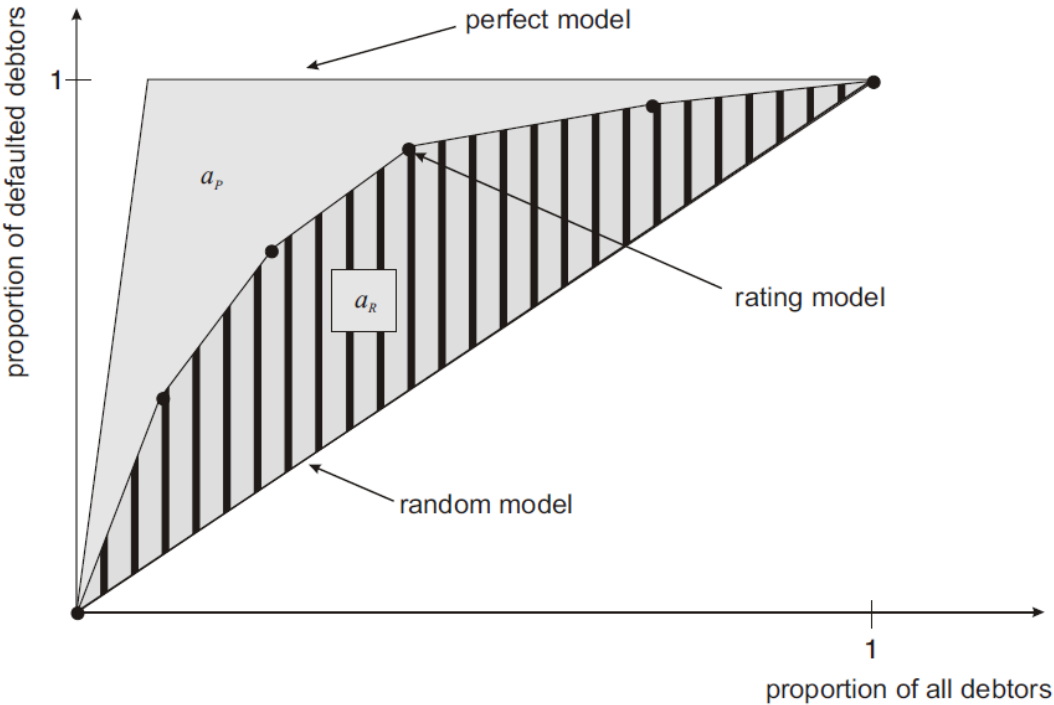


Chart 1: Cumulative Accuracy Profile <sup>14</sup>

Example: Assume out of 100 rated debtors 10 defaulted. A perfect model would have assigned the lowest score(s) to the 10 debtors who eventually defaulted and higher scores to the debtors that did not default. Therefore, at a portion of 10% of all debtors (x-axis), the perfect model would have located 100% of all defaulters. A random model would assign the 10 lowest scores randomly to 10 debtors out of the 100 debtors. Therefore, at a portion of 10% of all debtors (x-axis), the random model would have located 10% of all defaulters on average, at a portion of 20% of all debtors, it would have located 20% of a defaulters on average and so on. Therefore, the random model is represented by a diagonal line. A rating model should be between those two extremes.

The quality of a rating system is measured by the accuracy ratio AR. It is defined as the ratio of the area  $a_R$  between the CAP of the rating model and the diagonal, and the area  $a_P$

<sup>13</sup> Compare Engelmann et al., Testing rating accuracy, Risk, January 2003.

<sup>14</sup> Engelmann et al., Measuring the Discriminative Power of Rating Systems; Quanteam Research Paper, 2003.



between the CAP of the perfect model and the diagonal. This is the same as the Gini coefficient of the rating model,  $2a_R$ , divided by the Gini coefficient of the perfect model,  $2a_P$ .

$$AR = \frac{a_R}{a_P} = \frac{G_R}{G_P}$$

The Accuracy Ratio can be estimated by the unbiased estimator:

$$\hat{U} = \frac{1}{N_D N_{ND}} \sum_{(D, ND)} v_{D, ND}$$

with  $v_{D, ND}$  defined as

$$v_{D, ND} = \begin{cases} 1, & \text{if } s_D < s_{ND} \\ 0, & \text{if } s_D = s_{ND} \\ -1, & \text{if } s_D > s_{ND} \end{cases}$$

where  $s_D$  and  $s_{ND}$  are the scores of a randomly chosen defaulter and a randomly chosen non-defaulter. The sum in equation 1 is over all pairs of defaulters and non-defaulters.