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11 November 2015

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# Mapping of Moody's Investors Service credit assessments under the Standardised Approach

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## 1. Executive summary

1. This report describes the mapping exercise carried out by the Joint Committee to determine the 'mapping'<sup>1</sup> of the credit assessments of Moody's Investors Service (Moody's).
2. The methodology applied to produce the mapping is the one specified in the Implementing Technical Standards on the mapping of ECAIs' credit assessments under Article 136(1) and (3) of Regulation (EU) No 575/2013 (Capital Requirements Regulation – CRR). These ITS employ a combination of the provisions laid down in Article 136(2) of Regulation (EU) No 575/2013.
3. The mapping neither constitutes the one which ESMA shall report on in accordance with Article 21(4b) of Regulation (EC) No 1060/2009 (Credit Rating Agencies Regulation - CRA) with the objective of allowing investors to easily compare all credit ratings that exist with regard to a specific rated entity<sup>2</sup> nor should be understood as a comparison of the rating methodologies of Moody's with those of other ECAIs. This mapping should however be interpreted as the correspondence of the rating categories of Moody's with a regulatory scale which has been defined for prudential purposes. This implies that an appropriate degree of prudence may have been applied wherever not sufficient evidence has been found with regard to the degree of risk underlying the credit assessments.
4. The resulting mapping tables have been specified in Annex III of the Implementing Technical Standards on the mapping of ECAIs' credit assessments under Article 136(1) and (3) of Regulation (EU) No 575/2013. Figure 1 below shows the result for the main ratings scale of Moody's, the Global long-term ratings scale.

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<sup>1</sup> According to Article 136(1), the 'mapping' is the correspondence between the credit assessments of and ECAI and the credit quality steps set out in Regulation (EU) No 575/2013 (Capital Requirements Regulation – CRR).

<sup>2</sup> In this regard please consider [http://www.esma.europa.eu/system/files/esma\\_\\_2015-1473\\_report\\_on\\_the\\_possibility\\_of\\_establishing\\_one\\_or\\_more\\_mapping....pdf](http://www.esma.europa.eu/system/files/esma__2015-1473_report_on_the_possibility_of_establishing_one_or_more_mapping....pdf).

Figure 1: Mapping of Moody's Global long-term ratings scale

Credit assessment	Credit quality step
Aaa	1
Aa	1
A	2
Baa	3
Ba	4
B	5
Caa	6
Ca	6
C	6

## 2. Introduction

5. This report describes the mapping exercise carried out by the Joint Committee (JC) to determine the 'mapping' of the credit assessments of Moody's Investors Service (Moody's).
6. Moody's is a credit rating agency that has been registered with ESMA in 31 October 2011 and therefore meets the conditions to be an eligible credit assessment institution (ECAI)<sup>3</sup>. Moody's is a provider of credit ratings, research, and risk analysis. The firm's ratings and analysis track debt covering more than 110 countries, 12,000 corporate issuers, 25,000 public finance issuers, and 106,000 structured finance obligations.
7. The methodology applied to produce the mapping is the one specified in the Implementing Technical Standards on the mapping of ECAIs' credit assessments under Article 136(1) and (3) of Regulation (EU) No 575/2013 (Capital Requirements Regulation – CRR). These ITS employ a combination of the provisions laid down in Article 136(2) of Regulation (EU) No 575/2013. The information base used to produce the mapping is the same that has been employed when performing the first mapping proposal which was disclosed during the consultation period to these ITS. Two sources of information have been used. On the one hand, the quantitative and qualitative information available in ESMA Central Repository (CEREP<sup>4</sup>) has been used to obtain an overview of the main characteristics of this ECAI and to calculate the default rates of its credit assessments. On the other hand, specific information has also been directly requested to the ECAI for the purpose of the mapping, especially the list of relevant credit assessments and detailed information regarding the default definition.
8. The following sections describe the rationale underlying the mapping exercise carried out by the Joint Committee (JC) to determine the applicable mapping. Section 3 describes the relevant ratings scales of Moody's for the purpose of the mapping. Section 4 contains the methodology applied to derive the mapping of Moody's main ratings scale whereas Sections 5 and 6 refer to the mapping of its remaining relevant ratings scales. The mapping tables are shown in Appendix 4 of this document and have been specified in Annex III of the Implementing Technical Standards on the mapping of ECAIs' credit assessments under Article 136(1) and (3) of Regulation (EU) No 575/2013.

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<sup>3</sup> It is important to note that the mapping does not contain any assessment of the registration process of Moody's carried out by ESMA.

<sup>4</sup> CEREP is the central repository owned by ESMA to which all registered/certified CRAs have to report their credit assessments. <http://cerep.esma.europa.eu/cerep-web/>.

### 3. Moody's credit ratings and rating scales

9. Moody's produces a variety of credit ratings. Column 2 of Figure 2 in Appendix 1 shows the relevant credit ratings that may be used by institutions for the calculation of risk weights under the Standardised Approach (SA)<sup>5</sup>:

- **Long-term issuer ratings**, defined as opinions of the ability of entities to honour senior unsecured financial counterparty obligations and contracts. As such, issuer ratings incorporate any external support that is expected to apply to all current and future issuance of senior unsecured financial obligations and contracts, such as explicit support stemming from a guarantee of all senior unsecured financial obligations and contracts, and/or implicit support for issuers subject to joint default analysis (e.g. banks and government-related issuers). Issuer ratings do not incorporate support arrangements, such as guarantees, that apply only to specific (but not to all) senior unsecured financial obligations and contracts.
- **Short-term issuer ratings**, defined as the long-term issuer ratings, with the only difference that they refer to obligations with an original maturity of thirteen months or less.
- **Long-term obligation ratings**, defined as long-term ratings assigned to long-term financial obligations with an original maturity of one year or more and reflect both on the likelihood of a default on contractually promised payments and the expected financial loss suffered in the event of default.
- **Short-term obligation ratings**, defined as Long-term obligation ratings described above, with the only difference that they refer to obligations with an original maturity of thirteen months or less.
- **Bond fund ratings**, defined as opinions of the credit quality of investments within mutual funds and similar investment vehicles which principally invest in medium- and long-term fixed income obligations. As such, these ratings primarily reflect Moody's assessment of the creditworthiness of the assets held by the fund. Other risks, such as liquidity, operational, interest rate, currency and any other market risk are excluded from the rating. In addition, as the ratings are intended to represent opinions on a fund's underlying assets, they specifically do not consider the historic, current, or prospective performance of a fund with respect to appreciation, volatility of net asset value, or yield.

10. Moody's assigns these credit ratings to different rating scales as illustrated in column 3 of Figure 2 in Appendix 1. Therefore, a specific mapping has been prepared for the following rating scales:

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<sup>5</sup> As explained in recital 4 of the ITS, Article 4(1) CRA allows the use of the credit assessments for the determination of the risk-weighted exposure amounts as specified in Article 113(1) CRR as long as they meet the definition of credit rating in Article 3(1)(a) CRA.

- **Global long-term rating scale.** The specification of this rating scale is described in Figure 3 of Annex 1.
- **Global short-term rating scale.** The specification of this rating scale is described in Figure 4 of Annex 1.
- **Bond fund rating scale.** The specification of this rating scale is described in Figure 5 of Annex 1.

11. The mapping of the Global long-term rating scale is explained in Section 4 and it has been derived in accordance with the quantitative factors, qualitative factors and benchmarks specified in the ITS.

12. The mapping of the Global short-term rating scale is explained in Section 5 and it has been indirectly derived from the mapping of the Global long-term rating scale and the internal relationship established by Moody's between these two scales, as specified in Article 13 of the ITS. This internal relationship is shown in Figure 6 of Appendix 1.

13. The indirect mapping approach described in the previous paragraph has also been applied in the case of the Bond fund rating scale, as explained in Section 6. In this case, however, the relationship with the Global long-term rating scale has been assessed, for the purpose of the mapping, by the JC based on the comparison of the meaning and relative position of the rating categories in both rating scales.

## 4. Mapping of Moody's Global long-term rating scale

14. The mapping of the Global long-term rating scale has consisted of two differentiated stages where the quantitative and qualitative factors as well as the benchmarks specified in Article 136(2) CRR have been taken into account.

15. In the first stage, the quantitative factors referred to in Article 1 of the ITS have been taken into account to differentiate between the levels of risk of each rating category:

- The *long run default rate* of a rating category has been used to arrive at an initial mapping proposal by comparing its value with the benchmark specified in point (a) of Article 14 of the ITS.
- The *short run default rates* of a rating category have been compared with the benchmarks specified in point (b) of Article 14 of the ITS, which represent the maximum expected deviation of a default rate from its long-term value within a CQS.

16. In a second stage, the qualitative factors proposed in Article 7 of the ITS have been considered to challenge the result of the previous stage, especially in those ratings categories where less default data has been available.

## 4.1. Initial mapping based on the quantitative factors

### 4.1.1. Calculation of the short-run and long-run default rates

17. The short run and long run default rates of each rating category have been calculated with the pools of items rated from 1 January 2000 to 1 July 2010, based on the information contained in CEREP and according to the provisions laid down in the ITS. The following aspects should be highlighted:

- For Aaa and Aa rating categories, the number of credit ratings cannot be considered to be sufficient for the calculation of the short run and long run default rates specified in Articles 3 – 5 of the ITS. Therefore the allocation of the CQS has been made in accordance with Article 6 of the ITS, as shown in Figure 14 of Appendix 3. In these cases, the long run default rate benchmark associated with the equivalent category in the international rating scale is a key qualitative factor that has been used for the mapping proposal.
- For the remaining rating categories, the number of credit ratings can be considered to be sufficient and therefore the calculation has followed the rules established in Articles 3 to 5 of the ITS. The result of the calculation of the short run and long run default rates for each rating category is shown in Figure 7 to Figure 9 of Appendix 3.

18. Withdrawn ratings have been weighted by 50% as indicated in Article 4(3) of the ITS.

19. The default definition applied by Moody's, described in Appendix 2, has been used for the calculation of default rates.

### 4.1.2. Mapping proposal based on the long run default rate

20. As illustrated in the second column of Figure 16 in Appendix 4, the rating categories of the Global long-term rating scale of Moody's have been initially allocated to each CQS based on the comparison of the long run default rates (see Figure 9 in Appendix 3) and the long run default rate benchmark intervals established in point (a) of Article 14 of the ITS.

21. In the case of rating categories Aaa and Aa, where the number of credit ratings cannot be considered to be sufficient, this comparison has been made according to Article 6 of the ITS. The result, as shown in Figure 14 of Appendix 3, is not clear. When the analysis is done for the 2006h1 – 2010h2 period, the 17 defaults observed in these categories suggest a mapping to CQS2. However, the analysis of the 2001h1 – 2005h2 period reveals that no defaults were observed during those years and that CQS 1 should be proposed instead. Therefore, the conclusion is not clear and should be based on the qualitative factors.

22. In case of rating category A, the observed long-run default rate is close to 0.61%, suggesting an initial mapping to CQS 3. However, many of the defaulted rated items correspond to subordinated debts that were affected by the decision adopted by some European countries, once the financial crises had begun, to withdraw the guarantee granted to non-senior debt of

financial institutions. Such subordinated debts were downgraded after this decision and therefore are not representative of the pool currently rated as A by Moody's, which is a necessary requirement for the calculation of long-run default rates in accordance with Article 3(1)(b) of the ITS. Once these rated items are eliminated from the pool of A-rated items, the long run default rate becomes representative of CQS 2.

#### 4.1.3. Reviewed mapping based on the short run default rates

23.As shown in Figure 10 to Figure 13 in Appendix 3, the short run default rates of rating categories A to B have been compared with the short run default rate benchmark values established in point (b) of Article 14 of the ITS<sup>6</sup>.

24.The objective is to assess, for each rating category, whether the short-run default rates have deviated from their corresponding benchmark values and whether any observed deviation has been caused by a weakening of the assessment standards. Therefore short run default rates experienced within a rating category have been confronted with the short run benchmarks "monitoring" and "trigger" levels specified in Annex I of the ITS: to perform this analysis confidence intervals for the short run default rates have been calculated. The result of this comparison can be found in the third column of Figure 16 in Appendix 4.

- **A:** the short run default rates have breached the monitoring level of default rates for 5 consecutive periods (2006-2008). However, the lower limit of the 95% confidence intervals reached the monitoring level only once at the end of the observation period. Therefore, this material breach cannot be considered as systematic and the initial mapping based on the long run default rate is confirmed at this stage.
- **Baa, Ba and B:** no short run default rate has breached the monitoring level during the observation period. Therefore no material and systematic breach of the monitoring/trigger levels has been observed and the initial mapping based on the long run default rate is confirmed at this stage.

#### 4.2. Final mapping after review of the qualitative factors

25.The qualitative factors specified in Article 7 of the ITS have been used to challenge the mapping proposed by the default rate calculation. Qualitative factors acquire more importance in the rating categories where quantitative evidence is not sufficient to test the default behavior<sup>7</sup>, as it is the case of Aaa and Aa rating categories.

26.The **definition of default** applied by Moody's and used for the calculation of the quantitative factors has been analysed:

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<sup>6</sup> For Aaa and Aa rating categories, the number of credit ratings cannot be considered to be sufficient and therefore no calculation of the short run default rate has been made. In the case of rating categories Caa-C, the review of the short run default rates is not necessary since they have been mapped to CQS6.

<sup>7</sup> The default behavior of a rating category is considered to be properly tested if the quantitative factors for that rating category are calculated under Articles 3 – 5 ITS.



- The types of default events considered are shown in Appendix 2 and correspond to the ones specified in Article 4(4) of the ITS. The default definition is consistent with letters (a), (b) and (c) of the benchmark definition.
- The information provided by Moody's reveals that the share of bankruptcy-related events is below 50%.

Therefore, no specific adjustment has been proposed based on this factor.

27.Regarding the **meaning and relative position of the credit assessments**, they are aligned with the initial mapping proposal resulting from the quantitative factors, if available. As for the other rating categories:

- In the case of the Aaa and Aa, where the quantitative evidence has been less conclusive, this factor suggests that both rating categories should be assigned CQS 1 according to the reference definitions established in Annex II ITS. Since the adjacent rating category (A) has been mapped on the basis of quantitative information to CQS 2, it can be concluded that the proposed mapping for Aaa and Aa rating categories is CQS 1.

28.Regarding the **time horizon** reflected by the rating category, Moody's rating methodology focuses on the long-term, especially in the high-quality categories. This is confirmed by the stability of the rated items in these categories by the end of the 1-year and 3-year time horizons shown in Figure 15 of Appendix 3, with values close to 88% and 70% respectively over the 2000 – 2013 period. Therefore, the mapping proposal of Aaa and Aa to CQS 1 is reinforced.

29.Finally, it should be highlighted the use of the long run default rate benchmark associated with the equivalent category in the international rating scale as the **estimate of the long run default rate** for the calculation of the quantitative factor of Aaa and Aa rating categories under Article 6 of the ITS.

## 5. Mapping of Moody's Global short-term rating scale

30.Moody's also produces short-term credit ratings and assigns them to the Global short-term rating scale (see Figure 4 and Figure 5 in Appendix 1). Given that the default information referred to these rating categories cannot be comparable with the 3-year time horizon that characterizes the benchmarks established in the ITS, the internal relationship established by Moody's between these two rating scales (described in Figure 6 of Appendix 1) has been used to derive the mapping of the Global short-term rating scale. This should ensure the consistency of the mappings proposed for Moody's.

31.More specifically, as each short-term rating can be associated with a range of long-term ratings, the CQS assigned to the short-term credit rating category has been determined based on the most frequent CQS assigned to the related long-term credit rating categories. In case of draw, the most conservative CQS has been considered. If the most frequent step is identified



as CQS 5 or 6, CQS 4 is allocated, as the risk weights assigned to CQS 4 to 6 are all equal to 150% according to Article 131 CRR.

32. The result is shown in Figure 17 of Appendix 4:

- **P-1.** This rating category indicates a *superior* ability to repay short-term debt obligations. It is internally mapped to long-term categories Aaa to A3, which are mapped to CQS 1 and 2, but mostly to CQS 1. Therefore, CQS 1 is the proposed mapping.
- **P-2.** This rating category indicates a *strong* ability to repay short-term debt obligations. It is internally mapped to long-term categories A1 to Baa2, which are mapped to CQS 2 and 3, but mostly to CQS 2. Therefore, CQS 2 is the proposed mapping.
- **P-3.** This rating category indicates an *acceptable* ability to repay short-term debt obligations. It is internally mapped to long-term categories Baa2 and Baa3, which are mapped to CQS 3. Therefore, CQS 3 is the proposed mapping.
- **NP.** This rating category indicates that the ability to repay short-term debt obligations. It is internally mapped to long-term categories Baa3 and C, which are mapped to CQS 4 to 6. Since the risk weights assigned to CQS 4 to 6 are all equal to 150% according to Article 131 CRR, the mapping proposed for the NP rating category is CQS 4.

## 6. Mapping of Moody's Bond fund rating scale

33. As mentioned in Section 3, Moody's produces a **Bond fund credit rating** that is assigned to the Bond fund rating scale.

34. Based on the methodology described in the previous section, the mapping of the Bond fund rating scale has been derived from the relationship established by the JC with the Global long-term rating scale. More specifically, as each rating can be associated with one or a range of long-term rating categories, its CQS has been determined based on the most frequent CQS assigned to the related rating categories. In case of draw, the most conservative CQS has been considered.

35. Given that investments in any of these funds cannot default (because they cannot be considered as credit obligations), these ratings scales are only partly comparable to the Global long-term rating scale. However, a mapping has been derived from the meaning and relative position of the rating categories and the mapping of the corresponding categories of the Global long-term rating scale. The result of the mapping of this scale is shown in Figure 18 of Appendix 4.

## Appendix 1: Credit ratings and rating scales

Figure 2: Moody's relevant credit ratings and rating scales

SA exposure classes	Name of credit rating	Credit rating scale
<b>Long-term ratings</b>		
Central governments / Central banks	Long-term issuer rating	Global long-term rating scale
	Long-term obligation rating	Global long-term rating scale
Regional and local governments and PSEs	Long-term issuer rating	Global long-term rating scale
	Long-term obligation rating	Global long-term rating scale
Institutions	Long-term issuer rating	Global long-term rating scale
	Long-term obligation rating	Global long-term rating scale
Corporates	Long-term issuer rating	Global long-term rating scale
	Long-term obligation rating	Global long-term rating scale
Covered bonds	Long-term obligation rating	Global long-term rating scale
CIUs	Bond fund rating	Bond fund rating scale
<b>Short-term ratings</b>		
Central governments / Central banks	Short-term issuer rating	Global short-term rating scale

SA exposure classes	Name of credit rating	Credit rating scale
Regional and local governments and PSEs	Short-term obligation rating	Global short-term rating scale
	Short-term issuer rating	Global short-term rating scale
	Short-term obligation rating	Global short-term rating scale
Institutions	Short-term issuer rating	Global short-term rating scale
	Short-term obligation rating	Global short-term rating scale
Corporates	Short-term issuer rating	Global short-term rating scale
	Short-term obligation rating	Global short-term rating scale

Source: Moody's

Figure 3: Global long-term rating scale

Credit assessment	Meaning of the credit assessment
Aaa	Obligations rated Aaa are judged to be of the highest quality, subject to the lowest level of credit risk.
Aa	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A	Obligations rated A are judged to be upper-medium grade and are subject to low credit risk.
Baa	Obligations rated Baa are judged to be medium-grade and subject to moderate credit risk and as such may possess certain speculative characteristics.
Ba	Obligations rated Ba are judged to be speculative and are subject to substantial credit risk.
B	Obligations rated B are considered speculative and are subject to high credit risk.
Caa	Obligations rated Caa are judged to be speculative of poor standing and are subject to very high credit risk.
Ca	Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.
C	Obligations rated C are the lowest rated and are typically in default, with little prospect for recovery of principal or interest.

Source: Moody's

Figure 4: Global short-term rating scale

Credit assessment	Meaning of the credit assessment
P – 1	Issuers (or supporting institutions) rated Prime-1 have a superior ability to repay short-term debt obligations.
P – 2	Issuers (or supporting institutions) rated Prime-2 have a strong ability to repay short-term debt obligations.
P – 3	Issuers (or supporting institutions) rated Prime-3 have an acceptable ability to repay short-term obligations.
NP	Issuers (or supporting institutions) rated Not Prime do not fall within any of the Prime rating categories.

Source: Moody's

Figure 5: Bond fund rating scale

Credit assessment	Meaning of the credit assessment
Aaa-bf	Bond Funds rated Aaa-bf generally hold assets judged to be of the highest credit quality.
Aa-bf	Bond Funds rated Aa-bf generally hold assets judged to be of high credit quality.
A-bf	Bond Funds rated A-bf generally hold assets considered upper-medium credit quality.
Baa-bf	Bond Funds rated Baa-bf generally hold assets considered medium credit quality.
Ba-bf	Bond Funds rated Ba-bf generally hold assets judged to have speculative elements.
B-bf	Bond Funds rated B-bf generally hold assets considered to be speculative.
Caa-bf	Bond Funds rated Caa-bf generally hold assets judged to be of poor standing.
Ca-bf	Bond Funds rated Ca-bf generally hold assets that are highly speculative and that are likely in, or very near, default, with some prospect of recovery of principal and interest.
C-bf	Bond Funds rated C-bf generally hold assets that are in default, with little prospect for recovery of principal or interest.

Source: Moody's

Figure 6: Internal relationship between Moody's Global long-term and short-term rating scales

Long-term issuer credit ratings scale		Long-term issuer credit ratings scale
Aaa	P-1	
Aa1		
Aa2		
Aa3		
A1	P-2	
A2		
A3		
Baa1	P-3	
Baa2		
Baa3		
Ba1	NP	
Ba2		
Ba3		
B1		
B2		
B3		
Caa1		
Caa2		
Caa3		
Ca		
C		

Source: Moody's



## Appendix 2: Definition of default

Moody's definition of default is applicable only to debt or debt-like obligations. Four events constitute a debt default under Moody's definition:

- a missed or delayed disbursement of a contractually obligated interest or principal payment (excluding missed payments cured within a contractually allowed grace period), as defined in credit agreements and indentures;
- a bankruptcy filing or legal receivership by the debt issuer or obligor that will likely cause a miss or delay in future contractually-obligated debt service payments;
- a distressed exchange whereby 1) an obligor offers creditors a new or restructured debt, or a new package of securities, cash or assets that amount to a diminished financial obligation relative to the original obligation and 2) the exchange has the effect of allowing the obligor to avoid a bankruptcy or payment default in the future; or d) a change in the payment terms of a credit agreement or indenture imposed by the sovereign that results in a diminished financial obligation, such as a forced currency re-denomination (imposed by the debtor, himself, or his sovereign) or a forced change in some other aspect of the original promise, such as indexation or maturity.

Moody's definition of default does not include so-called "technical defaults", such as maximum leverage or minimum debt coverage violations, unless the obligor fails to cure the violation and fails to honour the resulting debt acceleration which may be required. Also excluded are payments owed on long-term debt obligations which are missed due to purely technical or administrative errors which are 1) not related to the ability or willingness to make the payments and 2) are cured in very short order (typically, 1-2 business days).

Moody's also maintains a definition for "impairment" that includes all events constituting a default as well as a downgrade to Ca or C.

Source: Moody's

## Appendix 3: Default rates of each rating category

Figure 7: Number of rated items

Date	Aaa	Aa	A	Baa	Ba	B	Caa-C
01/01/2000	91	557	1032	874	404	892	292
01/07/2000	88	580	1066	888	388	873	278
01/01/2001	84	586	1087	899	368	837	288
01/07/2001	92	572	1095	950	379	750	303
01/01/2002	99	577	1088	995	397	627	325
01/07/2002	102	554	1069	1032	405	617	306
01/01/2003	94	530	1069	975	376	511	271
01/07/2003	96	515	1052	1002	358	542	258
01/01/2004	109	501	1055	1007	363	552	226
01/07/2004	105	506	1040	1023	374	579	238
01/01/2005	104	509	1090	1039	365	537	265
01/07/2005	101	531	1093	1034	370	534	270
01/01/2006	102	537	1119	1052	343	361	128
01/07/2006	104	570	1112	1031	379	352	128
01/01/2007	110	577	1147	1035	349	370	128
01/07/2007	150	646	1094	1031	361	388	140
01/01/2008	128	582	1063	1020	356	368	153
01/07/2008	109	584	1066	1034	347	357	160
01/01/2009	106	536	1074	1029	331	324	201
01/07/2009	69	481	1044	1071	341	296	217
01/01/2010	63	451	1038	1133	346	329	193
01/07/2010	63	423	1042	1172	368	367	176

Source: Joint Committee calculations based on CEREP data

Figure 8: Number of defaulted rated items

Date	Aaa	Aa	A	Baa	Ba	B	Caa-C
01/01/2000	0	0	4	17	20	213	122
01/07/2000	0	0	7	19	24	220	108
01/01/2001	0	0	8	18	20	208	117
01/07/2001	0	0	5	19	15	151	121
01/01/2002	0	0	3	15	15	75	129
01/07/2002	0	0	0	9	14	47	98
01/01/2003	0	0	0	2	8	34	85
01/07/2003	0	0	0	2	5	23	62
01/01/2004	0	0	0	2	5	21	41
01/07/2004	0	0	0	2	2	26	32
01/01/2005	0	0	0	2	3	14	29
01/07/2005	0	0	0	2	4	14	30
01/01/2006	0	0	10	3	6	22	22
01/07/2006	0	0	12	5	18	38	38
01/01/2007	0	0	14	13	22	59	45
01/07/2007	0	3	15	15	24	61	51
01/01/2008	0	5	15	14	28	66	61
01/07/2008	0	3	18	15	23	70	66
01/01/2009	0	3	8	15	11	45	87
01/07/2009	0	2	7	5	5	22	56
01/01/2010	0	0	10	2	2	17	32
01/07/2010	0	1	9	2	6	15	32

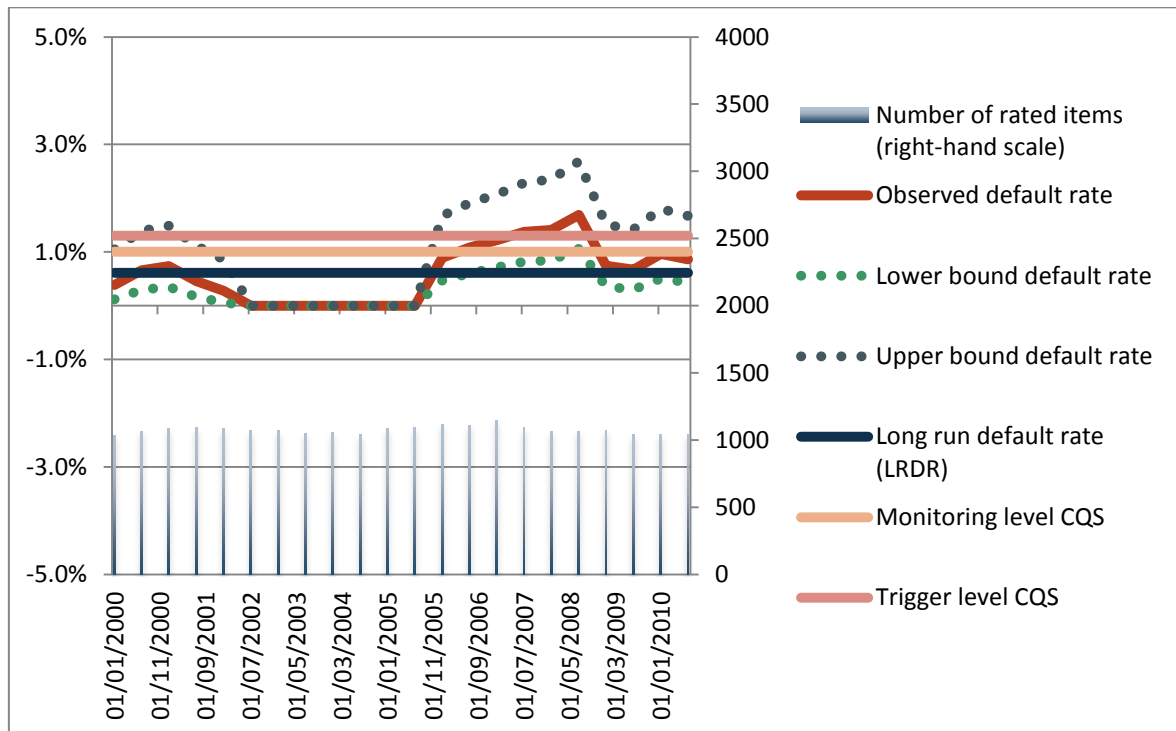
Source: Joint Committee calculations based on CERP data

Figure 9: Short-run and long-run observed default rates

Date	Aaa	Aa	A	Baa	Ba	B	Caa-C
01/01/2000	n.a.	n.a.	0.39	1.95	4.95	23.88	41.78
01/07/2000	n.a.	n.a.	0.66	2.14	6.19	25.20	38.85
01/01/2001	n.a.	n.a.	0.74	2.00	5.43	24.85	40.63
01/07/2001	n.a.	n.a.	0.46	2.00	3.96	20.13	39.93
01/01/2002	n.a.	n.a.	0.28	1.51	3.78	11.96	39.69
01/07/2002	n.a.	n.a.	0.00	0.87	3.46	7.62	32.03
01/01/2003	n.a.	n.a.	0.00	0.21	2.13	6.65	31.37
01/07/2003	n.a.	n.a.	0.00	0.20	1.40	4.24	24.03
01/01/2004	n.a.	n.a.	0.00	0.20	1.38	3.80	18.14
01/07/2004	n.a.	n.a.	0.00	0.20	0.53	4.49	13.45
01/01/2005	n.a.	n.a.	0.00	0.19	0.82	2.61	10.94
01/07/2005	n.a.	n.a.	0.00	0.19	1.08	2.62	11.11
01/01/2006	n.a.	n.a.	0.89	0.29	1.75	6.09	17.19
01/07/2006	n.a.	n.a.	1.08	0.48	4.75	10.80	29.69
01/01/2007	n.a.	n.a.	1.22	1.26	6.30	15.95	35.16
01/07/2007	n.a.	n.a.	1.37	1.45	6.65	15.72	36.43
01/01/2008	n.a.	n.a.	1.41	1.37	7.87	17.93	39.87
01/07/2008	n.a.	n.a.	1.69	1.45	6.63	19.61	41.25
01/01/2009	n.a.	n.a.	0.74	1.46	3.32	13.89	43.28
01/07/2009	n.a.	n.a.	0.67	0.47	1.47	7.43	25.81
01/01/2010	n.a.	n.a.	0.96	0.18	0.58	5.17	16.58
01/07/2010	n.a.	n.a.	0.86	0.17	1.63	4.09	18.18
<b>Weighted Average</b>	<b>n.a.</b>	<b>n.a.</b>	<b>0.61</b>	<b>0.89</b>	<b>3.47</b>	<b>12.86</b>	<b>29.61</b>

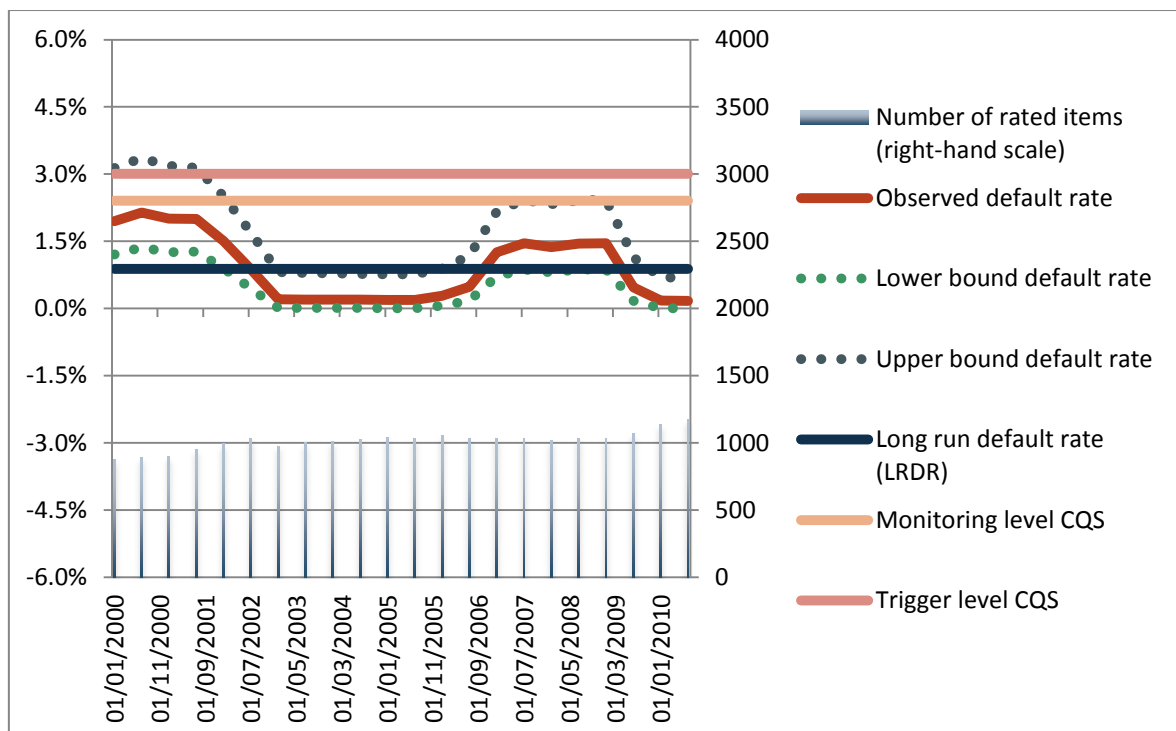
Source: Joint Committee calculations based on CERP data

Figure 10: Short-run and long-run observed default rates of A rating category



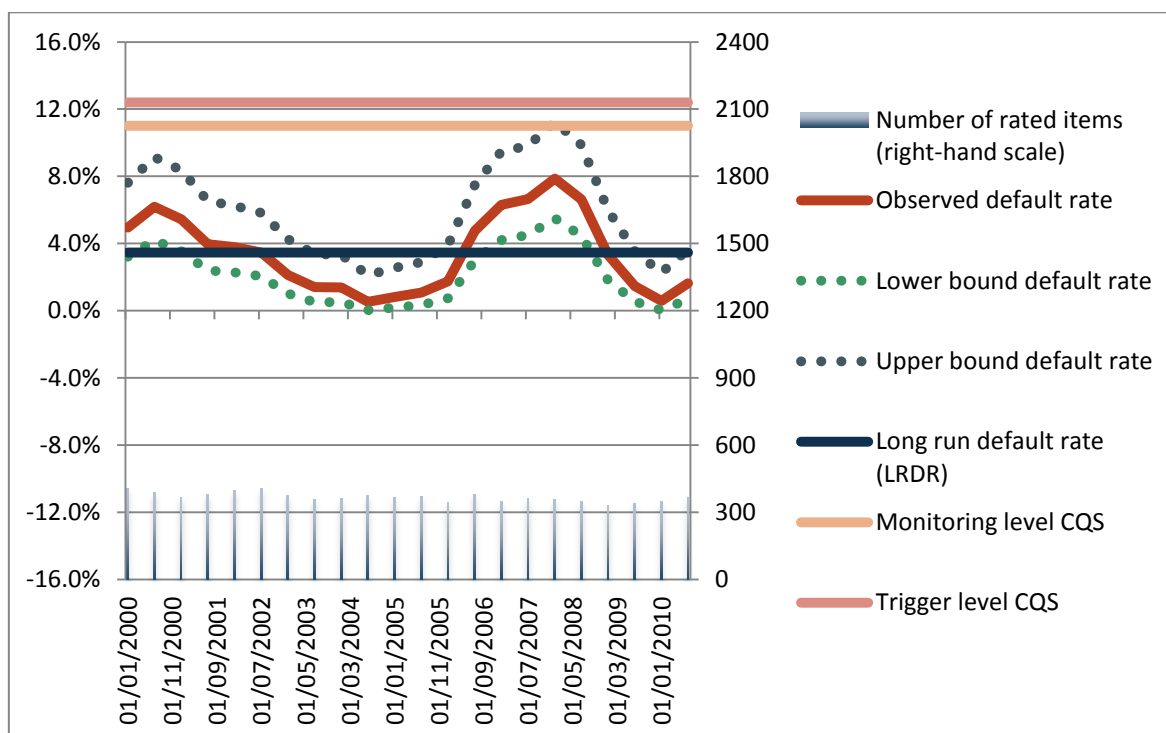
Source: Joint Committee calculations based on CERP data

Figure 11: Short-run and long-run observed default rates of Baa rating category



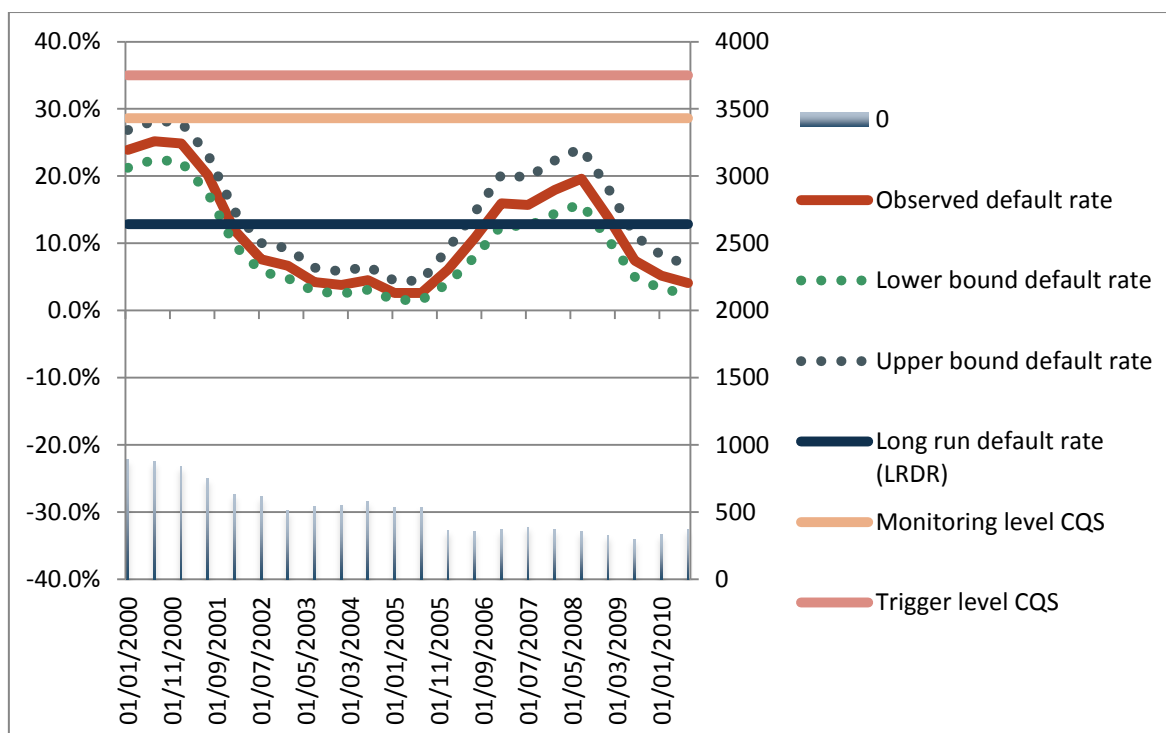
Source: Joint Committee calculations based on CERP data

Figure 12: Short-run and long-run observed default rates of Ba rating category



Source: Joint Committee calculations based on CERP data

Figure 13: Short-run and long-run observed default rates of B rating category



Source: Joint Committee calculations based on CERP data

Figure 14: Mapping proposal for rating categories with a non-sufficient number of credit ratings

2001 - 2005	Aaa/Aa
CQS of equivalent international rating category	CQS 1
N. observed defaulted items	0
Minimum N. rated items	496
Observed N. rated items	6367
<b>Mapping proposal</b>	<b>CQS1</b>

2006 - 2010	Aaa/Aa
CQS of equivalent international rating category	CQS 1
N. observed defaulted items	17
Minimum N. rated items	n.a.
Observed N. rated items	6,391
<b>Mapping proposal</b>	<b>CQS2</b>

Source: Joint Committee calculations based on CERP data



Figure 15: Transition matrix

3-year transition matrices, 10-year average (2000 - 2013)

Rating end period	Aaa	Aa	A	Baa	Ba	B	Caa-C
Rating start period							
Aaa	72.68	24.41	1.94	0.82	0.15	0	0
Aa	2.42	70.92	22.94	2.64	0.67	0.29	0.11
A	0.15	6.57	74.31	15.85	1.92	0.86	0.33
Baa	0.16	0.36	10.42	78.08	7.59	2.40	1.01
Ba	0	0.09	0.96	23.03	54.42	17.15	4.34
B	0.03	0.07	0.42	2.52	15.72	58.62	22.61
Caa-C	0	0	0.10	1.51	3.92	27.66	66.82

Source: Joint Committee analysis based on CEREP data. Only items rated both at the beginning and at the end of the time horizon have been considered in the calculation.

1-year transition matrices, 12-year average (2000 - 2013)

Rating end period	Aaa	Aa	A	Baa	Ba	B	Caa-C
Rating start period							
Aaa	88.25	11.04	0.58	0.12	0	0	0
Aa	1.02	88.51	9.80	0.55	0.06	0.01	0.04
A	0.06	2.56	89.77	6.84	0.53	0.14	0.09
Baa	0.04	0.16	3.73	91.38	3.56	0.78	0.34
Ba	0	0.03	0.20	8.63	80.69	8.90	1.56
B	0.01	0.01	0.11	0.28	6.35	81.58	11.7
Caa-C	0	0	0.02	0.12	0.57	10.27	89.00

Source: Joint Committee analysis based on CEREP data. Only items rated both at the beginning and at the end of the time horizon have been considered in the calculation.

## Appendix 4: Mappings of each rating scale

Figure 16: Mapping of Moody's Global long-term rating scale

Credit assessment	Initial mapping based on LR DR (CQS)	Review based on SR DR (CQS)	Final review based on qualitative factors (CQS)	Main reason for the mapping
<b>Aaa</b>	n.a.	n.a.	<b>1</b>	Quantitative evidence is not clear. The meaning, relative position and time horizon of the rating category are representative of the final CQS.
<b>Aa</b>	n.a.	n.a.	<b>1</b>	
<b>A</b>	2	2	<b>2</b>	The quantitative factors are representative of the final CQS. Some rated items have been removed from the pool because they were not considered representative.
<b>Baa</b>	3	3	<b>3</b>	The quantitative factors are representative of the final CQS.
<b>Ba</b>	4	4	<b>4</b>	The quantitative factors are representative of the final CQS.
<b>B</b>	5	5	<b>5</b>	The quantitative factors are representative of the final CQS.
<b>Caa</b>	6	6	<b>6</b>	The quantitative factors are representative of the final CQS.
<b>Ca</b>	6	6	<b>6</b>	The quantitative factors are representative of the final CQS.
<b>C</b>	6	6	<b>6</b>	The quantitative factors are representative of the final CQS.

Figure 17: Mapping of Moody's Global short-term rating scale

Credit assessment	Corresponding Global long-term rating scale assessment (established by Moody's)	Range of CQS of corresponding Global rating scale	Final review based on qualitative factors (CQS)	Main reason for the mapping
P-1	Aaa/A3	1 – 2	1	The final CQS has been determined based on the most frequent step associated with the corresponding long-term credit rating category.
P-2	A1/Baa2	2 – 3	2	The final CQS has been determined based on the most frequent step associated with the corresponding long-term credit rating category.
P-3	Baa2/Baa3	3	3	The final CQS has been determined based on the most frequent step associated with the corresponding long-term credit rating category. As there is a draw between CQS 2 and 3, the most conservative CQS has been considered.
NP	Ba1/C	4 – 6	4	The final CQS has been determined based on the most frequent step associated with the corresponding long-term credit rating category. The risk weights assigned to CQS 4 to 6 are all 150%, therefore CQS 4.

Figure 18: Mapping of Moody's Bond fund rating scale

Credit assessment	Corresponding Global long-term rating scale assessment (assessed by JC)	Range of CQS of corresponding Long-term issuer credit ratings scale	Final review based on qualitative factors (CQS)	Main reason for the mapping
Aaa-bf	Aaa	1	1	The final CQS has been determined based on the most frequent step associated with the corresponding long-term credit rating category.
Aa-bf	Aa	1	1	
A-bf	A	2	2	
Baa-bf	Baa	3	3	
Ba-bf	Ba	4	4	
B-bf	B	5	5	
Caa-bf	Caa	6	6	
Ca-bf	Ca	6	6	
C-bf	Ca	6	6	