European Central Bank
SSM Secretariat
Sonnemannstrasse 22
60314 Frankfurt Am Main
Germany

Submission date: 31 August 2018

SUBJECT: Credit Risk – Prior notification of changes included in the calibration of the PD models and in the estimation of the LGD models carried out in 2018

Dear Sirs and Madams,

pursuant to Article 143, paragraph 4, of Regulation (EU) No.575/2013 and to EU Regulation 529/2014, paragraph 5, Banca Monte dei Paschi di Siena, as Parent Company (GMPS hereafter), being already authorized to use the advanced IRB models since June 2008, hereby notifies its intention to make changes considered non-material to the internal rating system.
In accordance with Article 179 of Regulation (EU) No.575/2013 which envisages that institutions review its own estimates when new relevant information emerge and in any case at least annually, GMPS updated the internal rating system with the calibration of the PD models and the estimation of the LGD models incorporating the evidence of the last years in the time series.
The PD calibration and LGD estimation activities were performed according with internal developing framework and were subject to revision by the Validation function.
In order to improve the accuracy of the internal rating system and to resolve some of the findings detected during the IMI40 and TRIMI investigations, the following changes have been introduced:

- extension of the time series length for the calibration of the PD models and for the estimation of the LGD model components: LGS, Danger Rate, LGD Performing (finding No.9 TRIMI);
- introduction of a MOC for the assignment of the PD for counterparties classified as forborne (finding No.8 IMI40).

These changes were assessed as non-material on the basis of the regulatory principles included in the Delegated Regulation (EU) No.529/2014 that have been transposed in the internal model change policy (D02221 *"Identificazione e gestione del model change - rischio di credito"*).
Below are the details of the assessment and attached the application forms in accordance with the *"Guidelines on submitting requests relating to internal models to the European Central Bank"* reported in the ECB communication of 7 June 2018.

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1. Model change 2018_1: time series lenght

Current situation

PD models and Danger Rate models, currently implemented, were estimated on a 7-year time series for Corporate and on a 5-year time series for Retail on the basis both of a through cycle oriented approach, adopted by the GMPS from the first IRB implementation, and both in the absence of a specific framework for the analysis of the "likely range of variability" of default rates.
The LGS was estimated on the following historical data:

- for closed bad loans the exposures classified as bad loans from 01/01/1999 to 31/12/2014 (16 years) and with the recovery process closed from 01/01/2005 (10 years closed files)
- for incomplete work-out the exposures still open as of 31/12/2014 and classified as bad loans from 01/01/1999 or before 01/01/2000 or regardless of the bad loan entrance date but with coverage ratio >= 99%.

Change Adopted

Since May 2017, GMPS adopted an internal framework for the evaluation of time series for models development, in line with the requirements provided for in Article 49 of the Final Draft Regulatory Technical Standards on the specification of the assessment methodology (EBA/RTS/2016/03). This framework had been included in the application package for the material model change request submitted to the ECB on 10 November 2017[1] and in the documentation supporting the TRIMI 2017 (ITMPS 2939).
In the TRIMI 2017, it was detected that current models were developed without taking into account the new internal framework and the analysis required by Article 49 of the assessment RTS (finding No.9 TRIMI[2]).
The internal framework includes analysis on the likely range of variability of default rates and analysis on specific macroeconomic indicators in order to identify a time series with an adequate mix of expansive and recessive periods. The analysis carried out are reported in the internal model documents.
Based on the results of the analysis , a 10-year time series, from January 2008 to January 2018, has been selected and used in the calibration of the PD models and in the estimation of the Danger Rate, both for Corporate and Retail segments[3]. The selected time series contains an equilibrate mix of positive and negative periods (4.5 recessive years and 5.5 expansive years) and guarantees a likely range of variability of default rates.
As regards the estimate of the LGS, the reference period remained fixed at 16 years with a shift of time series of current LGS model aimed to include the evidence of the most recent

[1] The request of model change was withdrawn on 1 June 2018 according with the review of the internal model change plan of the IRB system, which takes into account the resolution actions for regulatory findings and the implementation of the new regulatory DoD.,

[2] TRIMI 2017 Finding No.9: *"the lack of analysis in terms of representativeness of the period in calculating the long average default rate can hinder the model predictive ability. The current framework depicts a prudential choice of the historical period; anyway, the Istitution has introduced the analysis of the "the likely range of variability" of default rates in the model change application sent too Supervisory authority in 2017".*

[3] Only for the granting models of Retail, due to the unavailability of a longer time series, a time series from June 2013 to April 2018 was used.

years. Respect to the previous model, for closed bad loans no time limits have been set on the closing date of the files, in order to include a more complete information data set: the exposures classified as bad loans from 01/01/2002 to 31/12/2017 (16 years) and process of recovery closed from 01/01/2002 (16 years vs 10 years of the current model).
Regarding the incomplete work-out, the approach is unchanged: files open for more than 15 years or with coverage of at least 99%.

The model change has been assessed as "non-material", according with art. 5 c) of Annex 1, Part 1, Section 2 ("Changes requiring prior notification to competent authorities") of Delegated Regulation (EU) No.529/2014: "*change in the length and composition of time series used for parameter estimation*". The verification of the quantitative criteria envisaged in the internal policy (D02221) confirmed the non-material classification of the intervention, as the model change led to an increase of capital requirements: the model change involved 95% of the IRB system in terms of RWA and led to an increase of 1950 Eur/millions in terms of RWA.

Data as of 30/06/2018		as is					model change 1: new time series						
AIRB portofolio (Eur/millions)	**EAD**	**EL**	**RWA**	**RWA %**	**CET1 ratio**	**TC ratio**	**EL**	**RWA**	**RWA change absolute**	**RWA change relative**	**quantitative threshold**	**CET1 ratio**	**TC ratio**
model change perimeter	82100	9160	29323	95%			9405	31273	1950	+6,65%	-15,00%		
no model change	2176	230	1542	5%			230	1542					
Total IRB	84276	9390	30865	100%	**13,03%**	**14,38%**	9635	32815	1950	+6,32%	-1,50%	**12,64%**	**13,98%**

2. Model change 2018_2: MOC forborne

Current situation

Since 2009, forbearance transactions ("moratoria") granted to counterparties in economic difficulty have started to represent a significant phenomenon. Therefore GMPS introduced specific measures to correctly capture the riskiness of these counterparties.
This treatment provides for extension of the period to observe the occurrence of the default in order to verify the performance after the conclusion of moratoria: the end of observation period is then translated from 12 months after the reference date to 12 months after the conclusion of moratoria.
The treatment also provides for the elimination from RDS of performing counterparties with ongoing moratoria for which the observation period is considered not sufficient for the classification in bonis/default (phenomenon is present in the last reference dates of development population).

Change Adopted

GMPS decided to modify the approach for the treatment of the moratoria in order to achieve the following aims:

- to simplify the procedure for defining the calibration population without modifying or eliminating the original RDS information that may produce problems of representativeness of the development population (finding No.8 IMI40, obligation No.5)[4];

[4] IMI40 2015, Obligation No.5
Finding No.8: *The Supervised Entities use an approach aimed at classifying the forborne exposures through an ex-post rule in the calibration phase. This approach determines the exclusion of a significant share of counterparties for whom the observation period is not over yet. In order to offset this data exclusion, the Supervised Entities defined an add-on on the PDs. Although the internal validation function expressed a positive*

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- to take into account the change in the internal regulatory framework of the GMPS: in the first half of 2015 the internal regulatory document "1030D01991 GMPS Policy on classification and credit assessment" was published, which provides for greater severity in the detection of the default and in the classification of exposures forborne. It follows therefore that the follow-up of the position in moratorium takes place through the classification of the same in the forborne category;
- to take into account the greater riskiness of the current and future positions in forborne through the introduction of an explicit MOC, as required by the regulation.

The new approach is based on the new forborne credit classification process, implemented in November 2015, which allows a more accurate classification of counterparties with forbearance, and on the assignment of a rating aligned with the higher risk observed on forborne portfolio. Hereafter the steps carried out with the new methodology:

- detection of default observed on forborne portfolio since 2015;
- introduction of a MOC to be applied to counterparties classified as forborne through a definition of PD floor determined on the basis of the default rates observed on forborne portfolio;
- the PD pre MOC for forborne counterparties is compared with the PD floor; the PD post MOC has to be equal to the maximum between PD pre MOC and PD floor.

The new approach significantly improves the accuracy of the PD assigned to the forborne counterparties and resolves the criticality of the representativeness of the calibration population as detected in the IMI40 obligation No.5.
The model change was assessed as "non-material", according with art. 2 h) of Annex 1, Part 1, Section 2 ("Changes requiring prior notification to competent authorities") of Delegated Regulation (EU) No.529/2014: " *changes in the methodology for estimating PDs*". The MOC forborne led to RWA increase of 920 Eur/millions in terms of RWA. Consequently, the verification of the quantitative criteria confirmed the non-material classification of the intervention, as the model change led to a further increase in capital requirements.

Data as of 30/06/2018		**as is**					**model change 2: MOC forborne**						
AIRB portofolio (Eur/million)	**EAD**	**EL**	**RWA**	**RWA %**	**CET1 ratio**	**TC ratio**	**EL**	**RWA**	**RWA change absolute**	**RWA change relative**	**quantitative threshold**	**CET1 ratio**	**TC ratio**
model change perimeter	82100	9160	29323	95%			9268	30243	920	+3,14%	-15,00%		
no model change	2176	230	1542	5%			230	1542					
Total IRB	84276	9390	30865	100%	**13,03%**	**14,38%**	9498	31785	920	+2,98%	-1,50%	**12,84%**	**14,19%**

The assessment of the two model changes was verified by the Internal Validation function and subsequently formalized and approved by Comitato Gestione Rischi on 31/08/2018. The documentation approved by the Committee is attached to this notification letter.

opinion on this calibration process, a challenger model was not put in place by the internal control function to confirm the accuracy of the add-on. According to the understanding of ECB, the Supervised Entities do not fulfil the legal requirements set out for this finding since the data used to calibrate the model is not fully representative of the actual exposures of the institution. This understanding is reflected in Article 40 (2) of EBA/RTS/2016/03
Obligation: *The Supervised Entities shall strengthen the internal validation analysis supporting the appropriateness of the PD add-on set for taking into account the exclusion of a significant share of counterparties for whom the forborne observation period was not over yet from the calibration sample. The additional analysis shall be aimed at verifying soundness and robustness of the add-on with specific reference to data representativeness and consistency.*

Hereafter the overall impact of the two material changes are reported.

Data as of 30/06/2018		as is					model change 1 and 2						
AIRB portofolio (Eur/million)	**EAD**	**EL**	**RWA**	**RWA %**	**CET1 ratio**	**TC ratio**	**EL**	**RWA**	**RWA change absolute**	**RWA change relative**	**quantitative threshold**	**CET1 ratio**	**TC ratio**
model change perimeter	82100	9160	29323	95%			9513	32193	2870	+9,79%	-15,00%		
no model change	2176	230	1542	5%			230	1542					
Total IRB	84276	9390	30865	100%	**13,03%**	**14,38%**	9743	33735	2870	+9,3%	-1,50%	**12,47%**	**13,79%**

Finally, it is noted that:

- as regard LGS model, an intervention on the internal methodology for the indirect cost allocation was carried out in order to assign indirect costs to all files of RDS. The current methodology envisages an allocation of indirect costs based on residual debt of the customers; the new approach has introduced a replacement value in case of zero residual debt which is equal to the product between EAS exposure of the file and average indirect cost percentage, calculated on the files with residual different from zero.
  The new methodology resolves the IMI 40 finding No. 12, Obligation No.9[5].
- as regard LGD data quality documentation, a detail note of the process followed to control the accuracy and completeness of LGD Reference Data Set was included in the LGD methodological documentation, resolving the TRIMI finding No. 17[6].

After two months from the date of this notification, and unless you communicate otherwise, GMPS will proceed with the implementation of the solution described.

For any further clarification regarding the solution submitted herein, please refer to:
Lorenzo Boetti – Lending Risk Officer
Giancosimo Petraglia – Credit Risk models Unit
Stefano Moni – Risk System Validation Unit

Yours sincerely,

Gruppo Monte dei Paschi di Siena

Chief Risk Officer

[5] IMI40 2015, Obligation No.9
Finding No.12: *The indirect cost allocation mechanism assigns zero costs to approximately 15% of files in the Reference Data Set (RDS) for the LGD of the Supervised Entities. Such effect is due to the fact that the cost allocation is based on the residual debt of customers.*
Obligation No.9: *The Supervised Entities shall allocate indirect costs to all files included in the RDS for the LGD estimation.*

[6] TRIMI 2017 Finding No.17: "*Procedures for dealing with erroneous data are not appropriately documented* "

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