Banking Supervision Department, Onsite Examination Division
October 12, 2020

9.33.307

To:

The Banking Corporations and Credit Card Companies **Attn: CEO**

Chief Risk Officer

Re: <u>Emphases for Managing and Monitoring Model Risks in the COVID-19 Crisis</u>

Dear Madam/Sir:

Background

1. The potential risks arising from the use of models in banking corporations and credit card companies (hereinafter – "the banking corporations") recently increased in the context of the COVID-19 crisis (hereinafter – "the crisis").This is due to the continuing lack of certainty and the radical and rapid changes in the economic conditions, in financial markets, in business activity and in customer behavior, which challenge the performance of the models in use.
2. The Supervisor of Banks attaches great importance to the quality of model risk management and to ensuring the informed use of models in banking corporations, as well as, where necessary, to strengthening and increasing the means and resources necessary to optimize the models' use.
3. One of the criteria for the models' validity is their stability and their functioning in a changing economic environment. Banking corporations in Israel and around the world are faced with questions about the suitability of various models for use in the currently unconventional market conditions. According to professional literature, the predictive power of models, designed and constructed on the basis of data reflecting a given macroeconomic environment, can be significantly impaired when used in other economic conditions, both for the traditional statistical method based on a **logistic regression** and for the **Random Forests** method from the field of machine learning. Many researchers believe that these may be structural limitations of the models, although **it is possible, to some extent, to improve model performance in changing economic environments, especially in the traditional statistical models**.
4. In order to examine how the banking corporations deal with the crisis in terms of model risk management (hereinafter – MRM[1]), as well as the functioning and performance of the models at this time, we held a round of discussions with MRM teams in the banking corporations. The discussions revealed that in the context of the crisis, the challenges relating to each of the life stages of the models – development, use, monitoring and validation – are intensifying.

[1] Model Risk Management (MRM).

The difficulties arising at this time include, for example:

- Difficulty in obtaining reliable model results with extreme changes in macroeconomic variables
- A break in the familiar statistical relationships between macroeconomic variables (e.g., a change in the relationship between the unemployment rate and non-payment of debts due to the impact of government assistance plans)
- Difficulty predicting credit failures or customer behavior given deferred loan repayment plans
- Doubt regarding the ability to rely on historical data that does not yet reflect current crisis data and assumptions, some of which are not valid at such a time
- Increased need for reliance on expert judgment

5. It also emerged that as part of the banking corporations' response to the challenges and constraints that arose, changes were made to some of the models and/or the manner in which they were used, in order to improve and adapt them to the special circumstances of the crisis. Examples of changes made (of course, each corporation according to its considerations):

   - In credit risk rating models, there have been across-the-board reductions in the ratings of certain groups of customers who have been particularly affected by the crisis.
   - In the models for automatic approval of credit, the conditions and thresholds for approval and the amounts of credit that can be approved were changed, and the use was blocked for business customers from certain industries or for certain credit products.
   - Security coefficients have been tightened in models for estimating collateral value
   - In financial models, the scenarios from which trading room activity limits are derived have been changed
   - In the models for calculating credit loss allowances, the method of calculating the group allowance has been changed or an expert assessment is used instead of relying on the model.

6. In the context of the above challenges, it is apparent that model developers, users, validators and risk managers are currently facing an increased potential for the realization of model risks, under time and resource constraints. MRM activity, both routinely and at this time, is essential to the banking corporation and is intended to strengthen the resilience and credibility of the models on which the corporation relies, among other things in order to improve business efficiency and managerial decision-making.

7. In order to ensure as solid a foundation as possible for how models are used at this time, as well as to reduce the increasing model risks in the context of the crisis, in addition to the routine activity of model risk management, banking corporations must **first** perform the following steps:

   7.1 Prepare a **list** of MRM aspects that arose as a result of the crisis, including:

   7.1.1. Details of areas where there is concern regarding an increase in model risks; details of changes, adjustments and **overlays**[2] added to models in which problems were identified or problems are expected to arise; anomalies and **overrides** in the use of models; what has been validated/reviewed and what else remains to be checked.

[2] Adjustments made "above the model" in the parameters, input and/or output of the model, as compensatory control in view of the model's known limitations or lack of data, or in order to focus on a specific risk.

7.1.2. Details of areas in which the models functioned well during the crisis and no overlays, anomalies and/or overrides were required.

7.1.3. **Details of new models** developed ad hoc as a temporary or permanent replacement for failed models – summarizing and mapping of these new models is required.

7.1.4. **Prioritizing** the issues that need to be addressed regarding models, depending on factors such as the level of essentiality of each model to the banking corporation's activity, the amount of deterioration in the model's performance, the availability of information needed to address the deterioration, to what extent the model affects other models in use and the potential risk level involved in the model's use.

7.1.5. **Examining the across-the-board effects** of changes made to or using models on other models in the banking corporation due to the crisis, while identifying dependencies between related models.

7.2. **In significant models**, about which there are doubts regarding their functioning and reliability in crisis conditions:

7.2.1. Examine whether the model is relevant and suitable for use at this time in view of the purpose, assumptions and conceptual structure of the model, and how it was designed.

7.2.2. To the extent that significant models are found that are **not relevant/appropriate** at this time:

7.2.2.1 Ensure that users of these models, as well as management and the board of directors, have been updated that these models have been found to be irrelevant/inappropriate.

7.2.2.2. Document the output values of the models that replace these models (see Section 7.1.3 above). As long as alternative models are not used, the assumptions or estimates based on which the Bank operates as a substitute for the use of models that were found to be irrelevant/inappropriate should be documented (even if these assumptions/estimates were not directly used).

7.2.3. In relevant cases, ensure that there is a correlation between the assumptions used in the model, its calibration and/or the overlays added to it, if added, to the estimates and forecasts obtained in the stress tests currently being conducted to test the banking corporations' resilience to various crisis development scenarios.

7.2.4. Examine the need to conduct sensitivity tests to test the model's performance across a range of inputs and parameter values, including extreme values, in order to verify its strength and suitability for use at this time, from a technical and applied aspect as well.

7.3. Conduct **rapid and effective challenge processes** for changes and adjustments made to models or their use in the crisis, to assess their reasonableness and reliability, in collaboration between "model owners" in the first line of defense and MRM teams in the second line of defense. In this context:

7.3.1. When examining how the models are used, it should be taken into account that the banking corporation must strive for a balance between considerations of increased conservatism and prudence that may be reflected at this time in the models' results as they are adapted for the period, and fairness, flexibility and sensitivity considerations regarding the corporation's customers in line with the directive of the Supervisor of Banks dated June 24, 2020[3], which are "outside the model". Therefore, at this time more business decisions may be made that will be considered as overrides of the model results than in routine times.

7.3.2. Overlays added to the models, if added, due to the crisis should be particularly examined. As a rule, cautious skepticism should be exercised in the implementation of overlays, especially when they rely heavily on managerial/expert judgment and do not yet have a quantitative basis.

7.3.3. In relevant cases, reference should be made to the various segments of the banking corporation's areas of activity, as well as its customers', and to possible heterogeneity in the level of vulnerability to the shocks of the crisis. For example, the impact of the crisis on industries such as aviation, catering and tourism may be greater, at least in the short term, than the impact on other industries. If necessary, the model assumptions should be updated in line with current expectations regarding the retail and business credit portfolios, with reference to sectoral exposures.

7.4. Bring for discussion, in the senior management and the board of directors / risk management committee, the findings and actions planned to be carried out in accordance with Sections 7.1-7.3 above, including a work plan to close gaps found in the area of MRM.

7.5. Submit to senior management and to the board of directors in an orderly manner, on an ongoing basis and at a frequency to be determined, a review of the changes introduced in significant models and/or their use due to the crisis, together with an explanation of their significance. For each model included in this review, ensure that the users of the model have also been updated on the changes made and their significance.

7.6. It is clarified that the banking corporation must adjust the practical application of the content of this letter to the extent of its use of models, to the level of complexity of the models used, to the degree of reliance on models when making decisions and to the level of risk involved in using them in the specific corporation.

8. Next, **in the second stage** the banking corporations must carry out a thorough internal process of dealing with the MRM aspects that have arisen due to the crisis.

[3] Letter from the Supervisor of the Banking System regarding Customers who Encountered Difficulties due to the Corona Crisis, the Supervisor of Banks, June 24, 2020 (Ref: 20LM3285). https://www.boi.org.il/en/BankingSupervision/LettersAndCircularsSupervisorOfBanks/LettersOfTheBankingSupervisionDepartment/202025en.pdf

As part of this process, the banking corporation is expected to make as intelligent use as possible of the experience and data accumulated since the beginning of the crisis, taking into account that the statistical relationships emerging from the data at this time may reflect, among other things, anomalous external influences.

As part of the internal process, the banking corporation will, at the very least, perform the following actions:

8.1. Update the review, monitoring and validation programs of the models used, while considering the need to take the following steps:

8.1.1. "Back Testing" for models whose performance and reliability are in doubt as a result of the crisis.

8.1.2. Analysis of the source of the deterioration in models in which the prediction capability is impaired and making the necessary adjustments or corrections.

8.1.3. Validation or review, independently, of the overlays added to the models, if added, in accordance with the standards for ongoing monitoring of anomalies and overrides appearing in the American Directive SR 11-7.[4]

8.2. Review limitations identified in the functioning of models during the crisis and define market conditions in which certain models can no longer be relied on and/or their performance and strength need to be re-examined.

8.3. Integrate the findings and insights that have arisen or will arise regarding MRM due to the crisis into the risk appetite documents, policies and procedures dealing with this issue in the banking corporation.

8.4. Paying attention to the findings, review the catalog of models, including an examination of the risk ratings determined for the models, their stability, their use during the crisis, the need for their calibration and more.

8.5. Reassess the risk level of the modified models, and of the aggregate level of model risks.

8.6. Examine the effects of the crisis from MRM aspects on the banking corporation's work plan, on the risk map, on the control environment and on the work plans of the gatekeepers, in line with Section 6.5 of the letter from the Supervisor of Banks on the subject "**The Corona Event – Lessons Learned and Looking Ahead**" from May 2020.[5]

8.7. Define a comprehensive and flexible plan for handling models and managing model risks in crisis conditions in the policy documents dealing with MRM.

[4] **SR Letter 11-7 Attachment: Supervisory Guidance on Model Risk Management**, Board of Governors of the Federal Reserve System and Office of the Comptroller of the Currency, April 2011.

[5] **"The Corona Event - Lessons Learned and Looking Ahead",** Supervisor of Banks, May 27, 2020 (Ref: BC19028).

General

9. The Chief Risk Officer will be the person responsible for the management and implementation of the above guidelines, including through the entities involved in model risk management (MRM).

10. The banking corporation will perform the tasks detailed above in accordance with the following schedules:

    10.1. The tasks in Sections 7.1-7.4 above, as well as the initial report as stated in Section 7.5, **by March 31, 2021**.

    10.2. The banking corporation will transfer to the Supervisor of Banks the list as stated in Section 7.1, close to the date of its preparation, by means of a partition of the secure vault of the Model Management Audit Unit (partition name: Root\PKXX_Models) which is located in from-bank0XX (XX- bank number).

    10.3. The tasks as stated in Section 8 will be performed **by September 30, 2021**.

11. In addition, the internal audit system must conduct an audit of the MRM **by December 31, 2021**.

Sincerely,

Dudi Bavli
Head of the MRM Examination Unit
On behalf of the Supervisor of Banks

CC:
Mr. Yair Avidan, Supervisor of Banks
Mr. Or Sofer, Deputy Supervisor of Banks
Chief Internal Auditor