BANCO CENTRAL DO BRASIL

CIRCULAR 3,646 OF MARCH 4, 2013

Establishes minimum requisites and procedures for calculating, using internal models for market risk, the daily value of the RWA_{MINT} component of the risk-weighted assets (RWA), mentioned in Resolution 4,193 of March 1, 2013, and provides for the authorization for the use of such models.

The Board of Directors of the Central Bank of Brazil, in an extraordinary session held on March 1, 2013, based on arts. 9º, 10, item IX, and 11, item VII, of Law 4,595 of December 31, 1964, and on arts. 3, paragraph 2, and 15 of Resolution 4,193 of March 1, 2013,

R E S O L V E S :

Art. 1. The use of internal models for market risk is hereby permitted in order to calculate the daily value of the RWA_{MINT} component, as referred to in Resolution 4,193, of March 1, 2013, replacing the RWA_{MPAD} component, by the following institutions:

I – universal banks, savings banks and commercial banks, with the exception of cooperative banks that are not members of a financial conglomerate or a prudential conglomerate, and the Banco Nacional de Desenvolvimento Econômico e Social (BNDES); and

II – institutions that are members of a financial conglomerate or a prudential conglomerate under the Accounting Plan for Financial Institutions (Cosif), and the economic-financial consolidate, composed of at least one of the institutions mentioned in item I.

Paragraph 1. The use of internal models for market risk requires a prior authorization from the Central Bank of Brazil.

Paragraph 2. The authorization can be canceled at the discretion of the Central Bank of Brazil in case the minimum requirements set forth in this Circular are no longer met or the calculated values cease to reflect accurately the market risk of the exposures.

Paragraph 3. The institutions are assigned the task of proving that they meet the minimum requirements set forth in this Circular, and must timely inform the Central Bank of Brazil in case they no longer meet them.

Paragraph 4. Once the permission is granted, the institutions must use internal models for market risk to calculate the daily value of the RWA_{MINT} component of the risk weighted assets (RWA).

Paragraph 5. The institutions will depend on a prior authorization from the Central Bank of Brazil to stop using internal models.

Paragraph 6. At the discretion of the Central Bank of Brazil, institutions authorized to use internal models for market risk may be required to allocate capital for market risk in an amount equivalent to the one calculated according to the standardized approaches defined in circulars 3,634; 3,635; 3,636; 3,637; 3,638; 3,639 and 3,641; all of March 4, 2013, due to an occasional need of correction or improvement in internal models. (Included by Circular 3,674 of October 31, 2013)

Qualitative Requirements

Art. 2. The internal models for market risk must:

I - be integrated into the structure for management of market risk and be used in conjunction with the limits defined by the institution to measure, monitor and control exposure to market risk;

II – have a degree of sophistication, technological infrastructure and controls consistent with the nature of operations, the complexity of products and the extent of exposure to market risk by the institution;

III – measure all relevant market risks, including correlation risk, base risk spread risk and specific risk; (As amended by Circular 3,674 of October 31, 2013)

IV – measure adequately risks associated to non-linear instruments, including the risk of volatility of the underlying asset (vega risk), valuating positions in full; (As amended by Circular 3,674 of October 31, 2013)

V – evaluate conservatively new products and financial instruments with low liquidity;

VI – allow for the measurement of market risk through the use of hypothetical portfolios, and

VII – treat properly portfolios concentrated in certain risk factors.

Paragraph 1. Specific risk is defined as the one related to adverse movements in the price of an instrument due to factors related to its issuer. (As amended by Circular 3,674 of October 31, 2013)

Paragraph 2. At the discretion of the Central Bank of Brazil, based on the relevance of positions held in non-linear instruments, proxies to full valuation as mentioned in item IV of this article may be used, without neglecting risk factors. (As amended by Circular 3,674 of October 31, 2013)

Art. 3. Institutions must allocate a sufficient number of technically qualified personnel in their areas of business, of operations, of risk management, of internal audit, of information technology, as well as any other involved in the development, validation, evaluation and use of internal models.

Art. 4. Institutions must maintain adequate and updated documentation on all relevant aspects of the internal market risk model, including at least:

I – policies and strategies adopted;

II – internal controls;

III – theoretical fundaments;

IV – description of valuation methodologies, measurement and monitoring;

V – operational procedures;

VI – evaluation reports, including from internal audit, on validation processes and backtests;

VII – risk reports, including reports on value at risk (VaR) and stress testing;

VIII – management reports that provide subsidy to the decision-making process of senior management and the board, when such an instance is in place; and

IX – track record of changes made to the internal model, including to the validation process.

Art. 5. The senior management and the board of directors, when such an instance is in place, must establish guidelines for internal control activities, authorization levels required for the assumption of different levels of risk, as well as information and periodic reports to be submitted to their own consideration.

Sole paragraph. The senior management must define the structure of the risk limits assumed by the institution and verify the adequacy of the results of the internal model for market risk to the risk profile of the institution.

Quantitative Requirements

Art. 6. The daily value of the RWA_{MINT} component must correspond to the following formula:

$$RWA_{MINT\,t} = \max\left\{\left[\frac{1}{F}\times\max\left(\left(\frac{M}{60}\times\sum_{i=1}^{60}VaR_{t-i}\right), VaR_{t-1}\right)+\frac{1}{F}\times\max\left(\left(\frac{M}{60}\times\sum_{i=1}^{60}sVaR_{t-i}\right), sVaR_{t-1}\right)+RWA_{MINT\,(Parcial)\,t}\right], \left[S_M\times RWA_{MPADt}\right]\right\}$$

where: (As amended by Circular 3,674 of October 31, 2013)

I – F = factor set forth in art. 4 of Resolution 4,193 of 2013;

II – $RWA_{MINT\,t}$ = daily value of the RWA_{MINT} component on working day t

III – VaR_t = Value at risk (VaR) on working day t;

IV – $sVaR_t$ = stressed VaR on working day t;

V – M = multiplier defined in art. 13;

VI – RWA_{MPADt} = daily value of the sum of the components relative to the calculation of capital for market risk under standardized approaches on working day t, as prescribed in Circulars 3,634, 3,635, 3,636, 3,637, 3,638, 3,639 and 3,641; all of March 4, 2013; (As amended by Circular 3,674 of October 31, 2013)

VII – S_M = transition factor for internal models for market risk; and

VIII – $RWA_{MINT(Parcial)t}$ = value of RWA component for market risk calculated by a conglomerate that employs partially internal models for market risk, as prescribed in paragraphs 2 and 3 of this article, on working day t. (Included by Circular 3,674 of October 31, 2013)

Paragraph 1. The factor S_M is equal to:

I – 0.90 (ninety hundredths) along the first year of use of the internal model for market risk, as counted from the date of authorization for its use; and

II – 0.80 (eighty hundredths), from the second year of use of the internal model for market risk onwards, counted from the date of authorization for its use.

(Wording of paragraph 1 amended by Circular 3,674 of October 31, 2013)

Paragraph 2. For exposures deemed non relevant in selected market risk factors, a partial use is admitted, in which the daily value of the RWA components for these factors may be calculated, conditioned on a previous approval by the Central Bank of Brazil, in accordance with Circulars 3,634; 3,635; 3,636; 3,637; 3,638; 3,639 and 3,641; all of 2013. (As amended by Circular 3,674 of October 31, 2013)

Paragraph 3. For institutions that are member of a conglomerate and whose exposures are deemed non relevant, a partial use is admitted, in which the daily value of the RWA_{MINT} component may be calculated, conditioned on a previous approval by the Central Bank of Brazil, in accordance with Circulars 3,634; 3,635; 3,636; 3,637; 3,638; 3,639 and 3,641; all of March 4, 2013. (As amended by Circular 3,674 of October 31, 2013)

Paragraph 4. In case of relevant changes in equity structure, an implementation plan must be produced, subject to authorization by the Central Bank of Brazil, for calculation of the daily value of the RWA_{MINT}. (As amended by Circular 3,674 of October 31, 2013)

Art. 7. The risk factors used for measuring market risk of exposures must be segregated in the following categories:

I – interest rate;

II – exchange rate;

III – stock price, and

IV – commodities' price.

Paragraph 1. The risk factors for each of the currencies and markets to which the institution has significant exposure must be identified.

Paragraph 2. For exposures to interest rate on a particular currency and market, the internal model for market risk should use a sufficient term structure and number of vertices so as to adequately assess the risk of all financial instruments with which the institution operates .

Paragraph 3. Correlations between risk factors can be incorporated into the internal model of market risk, as long as the verification process is consistent and verifiable.

Art. 8. The VaR mentioned in art. 6, paragraph III, must be calculated daily, representing the maximum loss based on a confidence-tailed 99% (ninety nine percent) and maintenance period (holding period) of at least ten working days, appropriate to the size of the exposure and the liquidity of the instrument.

Paragraph 1. VaR values for shorter maintenance periods can be used calculation, if converted to ten working days or more.

Paragraph 2. The methodologies for estimating the VaR of the heading should consider an appropriate degree of conservatism to mitigate potential hazards model.

Art. 9. The historical periods of observations used to calculate the VaR must be at least one year.

Paragraph 1. The use is admissible, subject to the assessment of the Central Bank of Brazil:

I - of an observation history of less than one year, provided its adequacy to the charcteristics of volatilities and to the model used, conditioned to the provisions of paragraph 4 of this article; and (As amended by Circular 3,674 of October 31, 2013.)

II - of decaying factors adequate to the characteristics of volatilities and to the model used, conditioned to the provisions of paragraph 5 of this article. (As amended by Circular 3,674 of October 31, 2013.)

Paragraph 2. The Central Bank of Brazil may determine the use of historical periods of observations of less than one year, and as well as changes in the time value decaying factors used.

Paragraph 3. The use of the powers referred to in paragraph 1 of this Article must be based on consistent and verifiable criteria, and documented with information available to the Central Bank of Brazil.

§4º The VaR resulting from the use of the prerogative mentioned in item I of paragraph 1 of this article must be compared to the VaR resulting from the consideration of a minimum history period of one year, and the value to be used in calculation of the RWA_{MINT} component should be the greater of these two values. (Included by Circular 3,674 of October 31, 2013.)

§ 5º The VaR resulting from the use of the prerogative mentioned in item II of paragraph 1 of this article must be compared to the VaR resulting from the consideration of such a history period and decaying factors that their use does not result in an effective history period lesser than six months, and the value to be used in calculation of the RWA_{MINT} component should be the greater of these two values. (Included by Circular 3,674 of October 31, 2013.)

Art. 10. The stressed VaR (SVAR) mentioned in art. 6, section IV, must be calculated in order to replicate the VaR calculation which would be done in a certain historical period of stress, but using the current portfolio of the institution.

Paragraph 1. The calculation of SVAR must observe the provisions of arts. 8 and 9, the calculation should be made available weekly.

Paragraph 2. All parameters of the model must be calibrated with data from a historical period of twelve months representing a relevant stress to the current profile of the institution's portfolio.

Paragraph 3. The historical period of stress to be used should be selected by the institution, based on data from January 1, 2004, and reviewed regularly.

Paragraph 4. The use of time value decaying factors for the SVAR is optional.

Art. 11. The information used to calculate the VaR must be updated at least monthly, considering the appropriateness of the methodology used.

Adherence Tests (Backtests)

Art. 12. Compliance tests that allow for the comparison of actual and hypothetical outcomes with VaR calculated by the internal model for market risk, should be conducted to ensure the adherence of consistent assessments of the model used.

Paragraph 1. The adhesion tests must meet at least the following requirements:

I – holding period of a day;

II – at least once a month;

III – use of different observation periods;

IV – use of various confidence intervals, and

V – coverage of all operations in a jointly manner and a segregated manner.

Paragraph 2. The effective result corresponds to the variation in portfolio value by the end of the day, including intraday operations and disregarded values unrelated to variation in market prices, such as tariffs, brokerage fees and commissions.

Paragraph 3. The hypothetical result corresponds to the application of price variations of the market day the portfolio at the end of the previous business day.

Paragraph 4. The adhesion tests should be used to improve the model.

Multiplier M

Art.13. The value of the multiplier M mentioned in art. 6, section V must be calculated based on the following formula:

M = 3 + Abkt + Aqlt, wherein:

I - = Abkt additional concerning compliance tests, and

II - = Aqlt additional related to qualitative evaluation which value is set between 0 and 1.

Art. 14. The value of additional Abkt should be determined in the base dates March 31, June 30, September 30 and December 31, as follows:

I – identification, among the last 250 days, of the number of days in which it actual losses occur which exceeded their VaR, considering the total portfolio, based on a one-tailed confidence interval of 99% (ninety-nine percent) and maintenance period of a day;

II – identification, among the last 250 days, of the number of days on which hypothetical losses occur that exceeded their VaR, considering the total portfolio, based on a one-tailed confidence interval of 99% (ninety-nine percent) and maintenance period of a day, and

III – consideration of the maximum values identified in sections I and II in the following table:

Maximum of losses that exceeded VaR	A_{bkt}
4 or less	0,00
5	0,40
6	0,50
7	0,65
8	0,75
9	0,85

10 or more	1,00

Paragraph 1. The losses mentioned in items I and II should be analyzed and documented.

Paragraph 2. The information referred to in paragraph 1 must be sent to the Central Bank of Brazil until the 15th business day following the respective base date mentioned in the heading.

Paragraph 3. The new value of A should be used from the first day of the second month following the respective base date mentioned in the heading.

Paragraph 4. Based on the analysis of the information referred to in paragraph 2, the Central Bank of Brazil may require adjustments in the institution's internal model, without prejudice to art. 1, paragraph 1.

Art. 15. The value added is determined by the Central Bank of Brazil, for each institution, based on the evaluation of the qualitative aspects of the internal model for market risk and the management structure of market risk.

Stress Tests

Art. 16. Must be simulated in extreme market conditions (stress tests), at least once a week, which comprise a rigorous and comprehensive program, in order to consider situations that could produce extraordinary gains or losses.

Paragraph 1. The stress tests mentioned in the heading must meet at least the following requirements:

I – be integrated into the risk management framework;

II – associate potential losses to plausible events;

III – be considered in the development of strategies for risk mitigation and contingency plans of the institution;

IV – be undertaken by individual and jointly risk factors, and

V – consider focusing on certain risk factors, non-linear instruments and breaking the assumptions of the VaR model.

Paragraph 2. The institution must seek continuous improvement of its program of stress tests.

Paragraph 3. The results of stress testing should be used to assess the capacity to absorb large losses and identify any measures to reduce the risks.

Art. 17. Scenarios should be developed that:

I – reproduce historical periods of market stress;

II – reproduce periods of higher losses of the institution, and

III – simulate, prospectively, adversity based on characteristics of the portfolio of the institution and the macroeconomic environment presenting severe but plausible conditions.

Sole paragraph. The scenarios mentioned in the heading should include price shocks, including their effects on banks and clearing houses, illiquidity of the financial instruments, risks of the event and significant change in correlations.

Art. 18. The stress testing program, including the definition of scenarios, must be approved and periodically reviewed by the institutional review board.

Sole paragraph. The board should consider the results of stress tests in the definition of policies and strategies of the institution, without prejudice to art. 3, paragraph V of Resolution 3,464, of June 26, 2007.

Validation

Art. 19. Institutions must have a validation process to critically assess their internal models for market risk.

Paragraph 1. In the validation process mentioned in the heading, there should be at least an evaluation of:

I – the methodologies, assumptions and theoretical foundations of the model, including the mapping of the positions and the pricing methods;

II – the accuracy and appropriateness of the assumptions of volatility and correlation;

III – the inclusion of all relevant risks;

IV – the comprehensiveness, consistency, integrity and reliability of the input data of the model as well as the independence of their sources;

V – the ability to adequately consider the characteristics of new products that could impact the market risk of the institution;

VI – the adequacy of compliance tests and stress tests, including the suitability of the reports and their use in the prediction of the measurement process, monitoring and managing market risk;

VII – the adequacy of internal controls related to the model;

VIII – the adequacy of the technological infrastructure and the operation of the systems used in the model, including testing, approvals and certifications;

IX – the compatibility of the calculations performed by the operating systems and the logic of the assumptions and methodologies used;

X – the integrity, completeness and adequacy of the documentation of the model, and

XI – the content and scope of the risk measurement reports.

Paragraph 2. The validation process is the sole responsibility of the institution, who must demonstrate the adequacy of the model used and adherence to their risk profile.

Paragraph 3. The validation process of the heading should be conducted at least every three years and, in particular, whenever there is any material change in the model or the risk profile of the institution.

Paragraph 4. The validation process should include tests with hypothetical portfolios to ensure the robustness of the model in relation to structural specific aspects, such as focusing on certain risk factors, basis risk and other potential risks not present in the usual portfolio of the institution.

Paragraph 5. The validation process must be independent of the use and development process of the model and should be conducted by technically qualified personnel.

Paragraph 6. The validation process must be conducted within an appropriate structure of incentives and should be insulated from pressures of people who might benefit from it, in particular, the people involved in the validation process cannot obtain any gains from the result of the validation model.

Paragraph 7. The models and information technology systems acquired from third parties must be subject to the same procedures set forth in this article.

Paragraph 8. The validation process must be properly documented and its results submitted to board of directors.

Assessment of Internal Audit

Art. 20. The process of managing market risk of the institution must be subject to review, at least annually, covering at minimum:

I – checks on the effectiveness of the validation process that treats art. 19;

II – checks on process validation in the case of relevant changes in the model or the risk profile of the institution, pursuant to art. 19, paragraph 3;

III – organization of the management structure of market risk;

IV – integration of the internal model for market risk activities to the daily management, including stress testing;

V – integrity adherence tests and their effective use in reviewing the performance and improvement of the model;

VI – compliance with risk management policies, including structural limits and related policies;

VII – sufficient and technically qualified professionals in the areas of business, operational, risk management, information technology, as well as any others involved in the development, validation and use of the internal model;

VIII – integrity and adequacy of management information systems;

IX – involvement of the executive committee in the market risk management process and

X – timeliness and quality of information provided to the board of administration.

Paragraph 1. The evaluation process of this article, which is the responsibility of the internal audit of the institution should be independent of the development processes and the use of the model and be driven by technically qualified personnel.

Paragraph 2. The provisions of sections I, II and VII of the heading should be conducted in an independent manner of the validation process that treats the art. 19.

Disclosure of Information

Art. 21. As from the granting of the authorization referred to in art. 1, the institution must disclose in public reports the following information:

I – for the base date of March 31, June 30, September 30 and December 31:

a) VaR maximum, minimum, average and end of the quarter, calculated using the parameters specified in art. 8th, for the whole portfolio and categories of risk factors set forth in art. 7;

b) SVAR maximum, minimum, average and end of the quarter, calculated in accordance with the provisions of art. 10, for the whole portfolio and categories of risk factors laid down in art. 7;

c) results of the comparisons mentioned in art. 14, sections I and II, followed by analysis of the exceptions identified, and

d) amount corresponding to RWA_{MINT}, and

II – at least annually the:

a) policies, procedures and pricing methodologies;

b) characteristics of the internal model;

c) indication of the risk factors and of the institutions using them as mentioned in paragraph 2 and 3 of art. 6;

d) description of stress tests that treat the arts. 16 and 17;

e) description of the tests adhesion referred to in art. 12, and

f) description of the validation process that treats art. 19.

Paragraph 1 The information update:

I – the updates defined in item I of the heading must be undertaken within sixty days to the base date of March 31, June 30and September30, and ninety days from the base date of December 31, and

II – under item II of the heading, it must be undertaken within ninety days after the period of which the information relates.

Paragraph 2. The information provided in Item I of the heading referring to the last five years must be available for public inspection at the same location, accompanied by a benchmarking and relevant explanation for the variations.

Art. 22. The institution authorized to use the model must disclose any additional information it deems relevant, in order to ensure appropriate transparency of its internal model for market risk.

Sole paragraph. The Central Bank of Brazil may order the disclosure of additional information to the ones mentioned in this Circular in relation to the use of the internal model.

Art. 23. The information mentioned in articles. 21 and 22 should be jointly available with those laid down in Circular 3,477, of December 24, 2009.

Art. 24. The director appointed pursuant to art. 10 of Resolution 3,464, of 2007, must be responsible for the information to be disclosed in the form of articles 21 and 22.

Other requirements

Art. 25. The institution must be using internal VaR models for market risk management, observing the art. 2, paragraph I, for a minimum period of two years prior to the authorization request referred to in art. 1.

Art. 26. Material changes in the risk profile of the institution must be reported to the Central Bank of Brazil and, also, relevant changes in the methodology used in the internal models of market risk, including the validation process, as well as those that cause a significant impact on the calculation of the daily value related to the component RWA_{MINT}.

Sole paragraph. The provisions in the heading apply also to changes that are not individually significant, but which are significant on aggregate.

Art. 27. The levels of relevance in data changes, as well as other significant changes in the development and operation of the model must be defined according to consistent and verifiable criteria, properly documented and subject to review by the Central Bank of Brazil.

Art. 28. The Central Bank of Brazil may authorize an adequacy plan for eventual requirements which were not fully met, as long as they do not compromise the internal model or the market risk management of the institution.

Art. 29. As from the granting of the authorization referred to in art.1, the institution must keep available to the Central Bank of Brazil, for a period of five years, the information in this Circular.

Request Authorization

Art. 30. The institutions referred to in art. 1 interested in using internal models for market risk must request authorization from the Central Bank of Brazil, through an application filed in one of Regional Management Administration centers addressed to the Supervision Department of Banks and Bank Conglomerates (Desup), signed by the CEO of the institution and the officers nominated in the form of articles 10 of Resolution 3,464, 2007, and 14 of Resolution 4,193, of March 1, 2013.

Sole paragraph. The request of the heading should be accompanied by the following documents:

I – statements attesting that the institution:

a) is aware that, once authorization is granted for the use of the internal model, the methodologies set forth in Circular 3,634, 3,635, 3,636, 3,637, 3,638, 3,639 and 3,641, all of 2013 can no longer be used, except in special circumstances and with prior authorization from Desup;

b) compliance with the minimum requirements established in this Circular and awareness that the lack of compliance in punctual aspects does not compromise the internal model and the market risk management, and

c) uses internal models of value at risk (VaR) for at least two years for the market risk management, given the provisions of art. 2;

II – statement attesting to the accuracy and integrity of the information submitted;

III – report prepared by the institution, based on the document "Information Model Internal Market Risk", to be released by the Central Bank of Brazil;

IV – adequacy plan, containing schedule, arrangements and responsibilities to fully meet the specific aspects mentioned in section I, paragraph "b", and

V – internal audit opinion containing findings on the evaluation referred to in art. 20.

Art. 31. Institutions requesting the authorization must be submitted to a selection and prioritization process, which will define those that will have their internal models analyzed.

Sole paragraph. In the selection and prioritization process of the heading the following criteria will be taken into account:

I – completeness and appropriateness of the documents mentioned in art. 31;

II – track record of the institution in the Central Bank of Brazil, regarding their risk assessments and controls, their economic-financial soundness, the transparency in their relationship with the Central Bank of Brazil and in disclosure of information, the compliance with regulation and the timely responsiveness to requests; (As amended by Circular 3,674 of October 31, 2013.)

III – stage of development of the internal model and management structure of market risk;

IV – the proportion of the daily value of the component RWA_{MINT} referring to the institution, mentioned in Resolution 4,193, of 2013, compared to aggregate RWA of the financial system;

V – the proportion of the daily value of the RWA_{MINT} component in relation to the RWA of the institution;

VI – performance and level of expertise focused on treasury;

VII – volume of assets, and

VIII – the date of the authorization request.

Art. 32. During the analysis of the internal models for market risk, the institution must:

I – promptly provide any additional information;

II – inform, in order to be established, the daily value of the RWA_{MINT} component, and

III – enable access to people, documents and systems.

Art.33. The use of internal models for market risk under this Circular should only occur after the date specified in the permit.

Art.34. This Circular enters into force on 1 October 2013.

Art. 35. Circular 3,478, of December 24, 2009 is revoked as from October 1, 2013,

Sole paragraph. Citations to Circular 3,478 of 2009 now have as a reference this Circular.

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