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SECURITIES AND EXCHANGE COMMISSION

[Release No. 34-84524; File No. SR-OCC-2018-014]

Self-Regulatory Organizations; The Options Clearing Corporation; Notice of Filing of Proposed Rule Change, as Modified by Partial Amendment No. 1, Related to The Options Clearing Corporation's Margin Methodology for Incorporating Variations in Implied Volatility

November 2, 2018.

Pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 ("Exchange Act" or "Act"),¹ and Rule 19b-4 thereunder,² notice is hereby given that on October 22, 2018, The Options Clearing Corporation ("OCC") filed with the Securities and Exchange Commission ("SEC" or "Commission") the proposed rule change as described in Items I, II, and III below, which Items have been prepared by OCC. On October 30, 2018, OCC filed Partial Amendment No. 1 to the proposed rule change.³ The Commission is publishing this notice to solicit comments on the proposed rule change from interested persons.

I. Clearing Agency's Statement of the Terms of Substance of the Proposed Rule Change

The proposed rule change is filed in connection with proposed changes to enhance OCC's model for incorporating variations in implied volatility within OCC's margin methodology ("Implied Volatility Model"), the System for Theoretical Analysis and Numerical Simulations ("STANS").⁴ The proposed changes to OCC's Margins

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

³ In Partial Amendment No. 1, OCC corrected errors in Exhibits 1A and 5 without changing the substance of the proposed rule change.

⁴ OCC also has filed an advance notice with the Commission in connection with the proposed changes. See SR-OCC-2018-804.

Methodology document are contained in confidential Exhibit 5 of the filing. Material proposed to be added is marked by underlining and material proposed to be deleted is marked by strikethrough text. The proposed changes are described in detail in Item 3 below. The proposed rule change does not require any changes to the text of OCC's By-Laws or Rules. The proposed rule change is available on OCC's website at <https://www.theocc.com/about/publications/bylaws.jsp>. All terms with initial capitalization that are not otherwise defined herein have the same meaning as set forth in the OCC By-Laws and Rules.⁵

II. Clearing Agency's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

In its filing with the Commission, OCC included statements concerning the purpose of and basis for the proposed rule change and discussed any comments it received on the proposed rule change. The text of these statements may be examined at the places specified in Item IV below. OCC has prepared summaries, set forth in sections (A), (B), and (C) below, of the most significant aspects of these statements.

⁵ OCC's By-Laws and Rules can be found on OCC's public website: <http://optionsclearing.com/about/publications/bylaws.jsp>.

(A) Clearing Agency's Statement of the Purpose of, and Statutory Basis for, the Proposed Rule Change

(1) Purpose

Background

STANS Overview

STANS is OCC's proprietary risk management system for calculating Clearing Member margin requirements.⁶ The STANS methodology utilizes large-scale Monte Carlo simulations to forecast price and volatility movements in determining a Clearing Member's margin requirement.⁷ STANS margin requirements are calculated at the portfolio level of Clearing Member accounts with positions in marginable securities and consists of an estimate of two primary components: a base component and a stress test add-on component. The base component is an estimate of a 99% expected shortfall⁸ over a two-day time horizon. The concentration/dependence stress test charge is obtained by considering increases in the expected margin shortfall for an account that would occur due to (i) market movements that are especially large and/or in which certain risk factors would exhibit perfect or zero correlations rather than correlations otherwise estimated using historical data or (ii) extreme and adverse idiosyncratic movements for individual risk factors to which the account is particularly exposed. The STANS methodology is

⁶ See Securities Exchange Act Release No. 53322 (February 15, 2006), 71 FR 9403 (February 23, 2006) (SR-OCC-2004-20). A detailed description of the STANS methodology is available at <http://optionsclearing.com/risk-management/margins/>.

⁷ See OCC Rule 601.

⁸ The expected shortfall component is established as the estimated average of potential losses higher than the 99% value at risk threshold. The term "value at risk" or "VaR" refers to a statistical technique that, generally speaking, is used in risk management to measure the potential risk of loss for a given set of assets over a particular time horizon.

used to measure the exposure of portfolios of options and futures cleared by OCC and cash instruments in margin collateral.⁹

The econometric models underlying STANS currently incorporate a number of risk factors. A “risk factor” within OCC’s margin system is defined as a product or attribute whose historical data is used to estimate and simulate the risk for an associated product. The majority of risk factors utilized in the STANS methodology are the returns on individual equity securities; however, a number of other risk factors may be considered, including, among other things, returns on implied volatility risk factors.¹⁰

Current Implied Volatility Model in STANS

Generally speaking, the implied volatility of an option is a measure of the expected future volatility of the option’s underlying security at expiration, which is reflected in the current option premium in the market. Using the Black-Scholes options pricing model, the implied volatility is the standard deviation of the underlying asset price necessary to arrive at the market price of an option of a given strike, time to maturity, underlying asset price and the current risk-free rate. In effect, the implied

⁹ OCC notes that, pursuant to OCC Rule 601(e)(1), OCC also calculates initial margin requirements for segregated futures accounts using the Standard Portfolio Analysis of Risk Margin Calculation System (“SPAN”). No changes are proposed to OCC’s use of SPAN because the proposed changes do not concern futures. See Securities Exchange Act Release No. 72331 (June 5, 2014), 79 FR 33607 (June 11, 2014) (SR-OCC-2014-13).

¹⁰ In December 2015, the Commission approved a proposed rule change and issued a Notice of No Objection to an advance notice filing by OCC to its modify margin methodology by more broadly incorporating variations in implied volatility within STANS. See Securities Exchange Act Release No. 76781 (December 28, 2015), 81 FR 135 (January 4, 2016) (SR-OCC-2015-016) and Securities Exchange Act Release No. 76548 (December 3, 2015), 80 FR 76602 (December 9, 2015) (SR-OCC-2015-804). As discussed further below, implied volatility risk factors in STANS are a set of chosen volatility pivot points per product, depending on the tenor of the option.

volatility is responsible for that portion of the premium that cannot be explained by the then-current intrinsic value of the option (i.e., the difference between the price of the underlying and the exercise price of the option), discounted to reflect its time value. OCC considers variations in implied volatility within STANS to ensure that the anticipated cost of liquidating options positions in an account recognizes the possibility that implied volatility could change during the two-business day liquidation time horizon and lead to corresponding changes in the market prices of the options.

OCC models the variations in implied volatility used to re-price options within STANS for substantially all option contracts¹¹ available to be cleared by OCC that have a residual tenor¹² of less than three years (“Shorter Tenor Options”).¹³ To address variations in implied volatility, OCC models a volatility surface¹⁴ for Shorter Tenor Options by incorporating into the econometric models underlying STANS certain risk

¹¹ OCC’s Implied Volatility Model excludes: (i) binary options, (ii) options on commodity futures, (iii) options on U.S. Treasury securities, and (iv) Asians and Cliquets. These relatively new products were introduced as the implied volatility margin methodology changes were in the process of being completed by OCC, and OCC had *de minimus* open interest in those options. OCC therefore did not believe there was a substantive risk if those products were excluded from the implied volatility model. See id.

¹² The “tenor” of an option is the amount of time remaining to its expiration.

¹³ OCC also incorporates variations in implied volatility as risk factors for certain options with residual tenors of at least three years (“Longer Tenor Options”); however, the proposed changes described herein would not apply to OCC’s model for Longer Tenor Options. See Securities Exchange Act Release Nos. 68434 (December 14, 2012), 77 FR 57602 (December 19, 2012) (SR-OCC-2012-14); 70709 (October 18, 2013), 78 FR 63267 (October 23, 2013) (SR-OCC-2013-16).

¹⁴ The term “volatility surface” refers to a three-dimensional graphed surface that represents the implied volatility for possible tenors of the option and the implied volatility of the option over those tenors for the possible levels of “moneyness” of the option. The term “moneyness” refers to the relationship between the current market price of the underlying interest and the exercise price.

factors (i.e., implied volatility pivot points) based on a range of tenors and option deltas.¹⁵ Currently, these implied volatility pivot points consist of three tenors of one month, three months and one year, and three deltas of 0.25, 0.5, and 0.75, resulting in nine implied volatility risk factors. These pivot points are chosen such that their combination allows the model to capture changes in level, skew, convexity and term structure of the implied volatility surface. OCC uses a GARCH model¹⁶ to forecast the volatility for each implied volatility risk factor at the nine pivot points.¹⁷ For each Shorter Tenor Option in the account of a Clearing Member, changes in its implied volatility are simulated using forecasts obtained from daily implied volatility market data according to the corresponding pivot point and the price of the option is computed to determine the amount of profit or loss in the account under the particular STANS price simulation. Additionally, OCC uses simulated closing prices for the assets underlying the options in the account of a Clearing Member that are scheduled to expire within the liquidation time horizon of two business days to compute the options' intrinsic value and uses those values to help calculate the profit or loss in the account.¹⁸

¹⁵ The “delta” of an option represents the sensitivity of the option price with respect to the price of the underlying security.

¹⁶ The acronym “GARCH” refers to an econometric model that can be used to estimate volatility based on historical data. See generally Tim Bollerslev, “Generalized Autoregressive Conditional Heteroskedasticity,” Journal of Econometrics, 31(3), 307-327 (1986).

¹⁷ STANS relies on 10,000 price simulation scenarios that are based generally on a historical data period of 500 business days, which are updated daily to keep model results from becoming stale.

¹⁸ For such Shorter Tenor Options that are scheduled to expire on the open of the market rather than the close, OCC uses the relevant opening price for the underlying assets.

OCC performed a number of analyses of its current Implied Volatility Model and to support development of the proposed model changes, including backtesting and impact analysis of the proposed model enhancements as well as comparison of OCC's current model performance against certain industry benchmarks.¹⁹ OCC's analysis demonstrated that one attribute of the current model is that the volatility changes forecasted by the GARCH model are extremely sensitive to sudden spikes in volatility, which can at times result in over reactive margin requirements that OCC believes are unreasonable and procyclical.²⁰

For example, on February 5, 2018, the market experienced extreme levels of volatility, with the Cboe Volatility Index ("VIX")²¹ moving from 17% up to 37%, representing a relative move of 116% (which is the largest relative daily jump in the history of the index). Under OCC's current model, OCC observed that the GARCH forecast SPX volatility for at-the-money implied volatility for a one-month tenor was approximately 4 times larger than the comparable market index, the Cboe VVIX Index, which is a volatility of volatility measure in that it represents the expected volatility of the 30-day forward price of the VIX. As a result, aggregated STANS margins jumped

¹⁹ OCC has provided results of these analyses to the Commission in confidential Exhibit 3 of the filing.

²⁰ A quality that is positively correlated with the overall state of the market is deemed to be "procyclical." For example, procyclicality may be evidenced by increasing margin requirements in times of stressed market conditions and low margin requirements when markets are calm. Hence, anti-procyclical features in a model are measures intended to prevent risk-based models from fluctuating too drastically in response to changing market conditions.

²¹ The VIX is an index designed to measure the 30-day expected volatility of the Standard & Poor's 500 index ("SPX").

more than 80% overnight due to the GARCH model and margins for certain individual Clearing Members increased by a factor of 10.²²

In addition, volatility tends to be mean reverting; that is, volatility will quickly return to its long-run mean or average from an elevated level, so it is unlikely that volatility would continue to make big jumps immediately following a drastic increase. For example, based on the VIX history from 1990-2018, VIX levels jumped above 35 (about the level observed on February 5, 2018) for approximately 293 days (i.e., 4% of the sample period). From the level of 35 or higher, the range of daily change on the VIX index was between 27% and -35%. However, the largest daily changes on one-month at-the-money SPX implied volatility forecasted by OCC's current GARCH model on February 5, 2018, were far in excess of those historical realized amounts, which points to extreme procyclicality issues that need to be addressed in the current model.²³

OCC also performed backtesting of the current model and proposed model enhancements to evaluate and compare the performance of each model from a margin coverage perspective. OCC's backtesting demonstrated that exceedance counts²⁴ and overall coverage levels over the backtesting period using the proposed model

²² For example, under the current model the total margin requirement calculated for one particular Clearing Member jumped from \$120 million on February 2, 2018, to \$1.78 billion on February 5, 2018, representing a 14 times increase in the requirement.

²³ For example, OCC's current model resulted in a maximum variation of 1100% in the one-month at-the-money SPX implied volatility pivot when compared with a maximum 35% move in the VIX for VIX levels greater than 30. Additionally, the model-generated number is significantly higher than 116%, which is the largest realized historical move in the VIX that occurred on February 5, 2018.

²⁴ Exceedance counts here refer to instances where the actual loss on portfolio over the liquidation period of two business days exceeds the margin amounts generated by the model.

enhancements were substantially similar to the results obtained from the current production model. As a result, OCC believes the current model tends to be overly conservative/reactive, and the proposed model is more appropriately commensurate with the risks presented by changes in implied volatility.

OCC believes that the sudden, extreme and unreasonable increases in margin requirements that may be experienced under its current Implied Volatility Model may stress certain Clearing Members' ability to obtain sufficient liquidity to meet these significantly increased margin requirements, particularly in periods of sudden, extreme volatility. OCC therefore is proposing changes to its Implied Volatility Model to limit procyclicality and produce margin requirements that OCC believes are more reasonable and are also commensurate with the risks presented by its cleared options products.

Proposed Changes

OCC proposes to modify its Implied Volatility Model by introducing an exponentially weighted moving average²⁵ for the daily forecasted volatility for implied volatility risk factors calculated using the GARCH model. Specifically, when forecasting the volatility for each implied volatility risk factor at each of the nine pivot points, OCC would use an exponentially weighted moving average of forecasted volatilities over a specified look-back period rather than using raw daily forecasted volatilities. The exponentially weighted moving average would involve the selection of a look-back period over which the data would be averaged and a decay factor (or weighting factor), which is a positive number between zero and one, that represents the weighting factor for

²⁵ An exponentially weighted moving average is a statistical method that averages data in a way that gives more weight to the most recent observations using an exponential scheme.

the most recent data point.²⁶ The look-back period and decay factor would be model parameters subject to monthly review,²⁷ along with other model parameters that are reviewed by OCC's Model Risk Working Group ("MRWG")²⁸ in accordance with OCC's internal procedure for margin model parameter review and sensitivity analysis, and these parameters would be subject to change upon approval of the MRWG.

The proposed change is intended to reduce the oversensitivity of the current Implied Volatility Model to large, sudden shocks in market volatility and therefore result in margin requirements that are more stable and that remain commensurate with the risks presented during periods of sudden, extreme volatility.²⁹ The proposed rule change is expected to produce margin requirements that are very similar to those generated using OCC's existing model during quiet, less volatile market periods; however, during more volatile periods, the proposed changes would result in a more measured initial response to increases in the volatility of volatility with margin requirements that may remain elevated

²⁶ The lower the number the more weight is attributed to the more recent data (e.g., if the value is set to one, the exponentially weighted moving average becomes a simple average).

²⁷ OCC initially would use a look-back period of 22 days and an initial decay factor of 0.94 for the exponentially weighted moving average. OCC believes the 22-day look-back is an appropriate initial parameter setting as it would allow for close to monthly updates of the GARCH parameters used in the model. The decay factor value of 0.94 was selected based on the factor initially proposed by JP Morgan's RiskMetrics methodology (see JPMorgan/Reuters, 1996. "RiskMetrics - Technical Document", Fourth edition).

²⁸ The MRWG is responsible for assisting OCC's Management Committee in overseeing and governing OCC's model-related risk issues and includes representatives from OCC's Financial Risk Management department, Quantitative Risk Management department, Model Validation Group, and Enterprise Risk Management department.

²⁹ As noted above, OCC has performed analysis of the impact of the proposed changes, and OCC's backtesting of the proposed model demonstrates comparable exceedance counts and coverage levels to the current model during the most recent volatile period.

for a longer period of time after the shock subsides than experienced under OCC's current model. The proposed changes are intended to reduce procyclicality in OCC's margin methodology across volatile market periods while continuing to capture changes in implied volatility and produce margin requirements that are commensurate with the risks presented by OCC's cleared options products. The proposed changes therefore would reduce the risk that a sudden, extreme increase in margin requirements may stress Clearing Members' ability to obtain liquidity to meet such increased requirements, particularly in periods of extreme volatility.

Implementation Timeframe

OCC expects to implement the proposed changes within thirty (30) days after the date that OCC receives all necessary regulatory approvals for the proposed changes. OCC will announce the implementation date of the proposed change by an Information Memorandum posted to its public website at least 2 weeks prior to implementation.

(2) Statutory Basis

OCC believes that the proposed rule change is consistent with Section 17A of the Act³⁰ and the rules and regulations thereunder applicable to OCC. Section 17A(b)(3)(F) of Act³¹ requires, in part, that the rules of a clearing agency be designed to promote the prompt and accurate clearance and settlement of securities transactions, and in general, to protect investors and the public interest. As described above, the volatility changes forecasted by OCC's current Implied Volatility Model are extremely sensitive to large, sudden spikes in volatility, which can at times result in over reactive margin requirements that OCC believes are unreasonable and procyclical (for the reasons set forth above).

³⁰ 15 U.S.C. 78q-1.

³¹ 15 U.S.C. 78q-1(b)(3)(F).

Such sudden, unreasonable increases in margin requirements may stress certain Clearing Members' ability to obtain liquidity to meet those requirements, particularly in periods of extreme volatility, and could result in a Clearing Member being delayed in meeting, or ultimately failing to meet, its daily settlement obligations to OCC. OCC notes that the proposed rule change is expected to produce margin requirements that are very similar to those generated using OCC's existing model during quiet, less volatile market periods. The proposed changes would, however, result in a more measured initial response to increases in the volatility of volatility with margin requirements that may remain elevated for a longer period after the shock subsides than experienced under OCC's current model. The proposed changes are designed to reduce the likelihood that OCC's Implied Volatility Model would produce extreme, over reactive margin requirements that could strain the ability of certain Clearing Members to meet their daily margin requirements at OCC by reducing procyclicality in OCC's margin methodology and ensuring more stable and appropriate changes in margin requirements across volatile market periods while continuing to capture changes in implied volatility and produce margin requirements that are commensurate with the risks presented. As a result, OCC believes the proposed rule change is designed to promote the prompt and accurate clearance and settlement of securities transactions, and, in general, to protect investors and the public interest in accordance with Section 17A(b)(3)(F) of the Act.³²

Rules 17Ad-22(e)(6)(i) and (v)³³ require a covered clearing agency that provides central counterparty services to establish, implement, maintain and enforce written policies and procedures reasonably designed to cover its credit exposures to its

³² Id.

³³ 17 CFR 240.17Ad-2(e)(6)(i) and (v).

participants by establishing a risk-based margin system that (1) considers, and produces margin levels commensurate with, the risks and particular attributes of each relevant product, portfolio, and market and (2) uses an appropriate method for measuring credit exposure that accounts for relevant product risk factors and portfolio effects across products. As noted above, OCC's current model for implied volatility demonstrates extreme sensitivity to sudden spikes in volatility, which can at times result in over reactive margin requirements that OCC believes are unreasonable and procyclical. The proposed changes are designed to reduce the oversensitivity of the model and produce margin requirements that are commensurate with the risks presented during periods of sudden, extreme volatility. The proposed model enhancements are expected to produce margin requirements that are very similar to those generated using OCC's existing model during quiet, less volatile market periods; however, the proposed changes would result in a more measured initial response to increases in the volatility of volatility with margin requirements that may remain elevated for a longer period of time after the shock subsides than experienced under OCC's current model. The proposed change would therefore reduce procyclicality in OCC's margin methodology and ensure more stable changes in margin requirements across volatile market periods while continuing to capture changes in implied volatility and produce margin requirements that are commensurate with the risks presented by OCC's cleared options. As a result, OCC believes that the proposed changes are reasonably designed to consider, and produce margin levels commensurate with, the risk presented by the implied volatility of OCC's cleared options and uses an appropriate method for measuring credit exposure that

accounts for this product risk factor (i.e., implied volatility) in a manner consistent with Rules 17Ad-22(e)(6)(i) and (v).³⁴

The proposed rule changes are not inconsistent with the existing rules of OCC, including any other rules proposed to be amended.

(B) Clearing Agency's Statement on Burden on Competition

Section 17A(b)(3)(I) requires that the rules of a clearing agency do not impose any burden on competition not necessary or appropriate in furtherance of the purposes of Act.³⁵ OCC does not believe the proposed rule change would impose a burden on competition. The proposed rule change is expected to produce margin requirements that are very similar to those generated using OCC's existing model during quiet, less volatile market periods. The proposed changes would, however, result in a more measured initial response to increases in the volatility of volatility with margin requirements that may remain elevated for a longer period after the shock subsides than experienced under OCC's current model. As a result, the proposed model may impact different accounts to a greater or lesser degree depending on the composition of positions in each account. For example, a portfolio containing products that demonstrate higher volatility exposures may see more significant reductions in margin requirements than portfolios containing less volatile products during periods of increased volatility. However, those portfolios seeing larger initial reductions in margin requirements would also tend to experience margin levels that remain elevated for a longer period than would otherwise be experienced under the current model. As a result, OCC does not believe that the proposed rule change would unfairly inhibit access to OCC's services or disadvantage or

³⁴ Id.

³⁵ 15 U.S.C. 78q-1(b)(3)(I).

favor any particular user in relationship to another user. Accordingly, OCC believes that the proposed rule change would not impose any burden or impact on competition.

(C) Clearing Agency's Statement on Comments on the Proposed Rule Change Received from Members, Participants or Others

Written comments on the proposed rule change were not and are not intended to be solicited with respect to the proposed rule change and none have been received.

III. Date of Effectiveness of the Proposed Rule Change and Timing for Commission Action

Within 45 days of the date of publication of this notice in the Federal Register or within such longer period up to 90 days (i) as the Commission may designate if it finds such longer period to be appropriate and publishes its reasons for so finding or (ii) as to which the self-regulatory organization consents, the Commission will:

(A) by order approve or disapprove the proposed rule change, or

(B) institute proceedings to determine whether the proposed rule change should be disapproved.

IV. Solicitation of Comments

Interested persons are invited to submit written data, views and arguments concerning the foregoing, including whether the proposed rule change is consistent with the Act. Comments may be submitted by any of the following methods:

Electronic Comments:

- Use the Commission's Internet comment form (<http://www.sec.gov/rules/sro.shtml>); or
- Send an e-mail to rule-comments@sec.gov. Please include File Number SR-OCC-2018-014 on the subject line.

Paper Comments:

- Send paper comments in triplicate to Secretary, Securities and Exchange Commission, 100 F Street, NE, Washington, DC 20549-1090.

All submissions should refer to File Number SR-OCC-2018-014. This file number should be included on the subject line if e-mail is used. To help the Commission process and review your comments more efficiently, please use only one method. The Commission will post all comments on the Commission's Internet website (<http://www.sec.gov/rules/sro.shtml>). Copies of the submission, all subsequent amendments, all written statements with respect to the proposed rule change that are filed with the Commission, and all written communications relating to the proposed rule change between the Commission and any person, other than those that may be withheld from the public in accordance with the provisions of 5 U.S.C. 552, will be available for website viewing and printing in the Commission's Public Reference Room, 100 F Street, NE, Washington, DC 20549, on official business days between the hours of 10:00 a.m. and 3:00 p.m. Copies of such filing also will be available for inspection and copying at the principal office of OCC and on OCC's website at <https://www.theocc.com/about/publications/bylaws.jsp>.

All comments received will be posted without change. Persons submitting comments are cautioned that we do not redact or edit personal identifying information from comment submissions. You should submit only information that you wish to make available publicly.

All submissions should refer to File Number SR-OCC-2018-014 and should be submitted on or before **[INSERT DATE 21 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

For the Commission, by the Division of Trading and Markets, pursuant to delegated authority.³⁶

Eduardo A. Aleman,
Assistant Secretary.

³⁶ 17 CFR 200.30-3(a)(12).

