Morgan Stanley

June 20, 2018

Secretariat
Basel Committee on Banking Supervision
Bank for International Settlements
CH-4002 Basel, Switzerland

Re: Revisions to the minimum capital requirements for market risk

Ladies and Gentlemen:

Morgan Stanley appreciates the opportunity to provide comments to the Basel Committee on Banking Supervision (the "**Basel Committee**") regarding its March 2018 consultative document entitled *Revisions to the minimum capital requirements for market risk* (the "**Proposal**"), which builds on many years of work by the Basel Committee to complete the Fundamental Review of the Trading Book ("**FRTB**").

Morgan Stanley is a global financial services firm that provides its products and services to a large and diversified group of clients and customers, including corporations, governments, financial institutions and individuals. We are registered as a financial holding company with the Board of Governors of the Federal Reserve System (the "**Federal Reserve**"), and are subject to the Federal Reserve's consolidated regulation and supervision, including regulatory capital requirements that are based on standards developed by the Basel Committee.

We support the comment letter on the Proposal submitted by the International Swaps and Derivatives Association, the Global Financial Markets Association and the Institute of International Finance (collectively, the "**Associations**"), which contains many technical recommendations that would improve the reliability and accuracy of market risk standards. We have submitted this letter to highlight issues of particular concern to Morgan Stanley and our clients.

I. Executive Summary

FRTB is a critical component in the finalization of Basel III standards. We support a robust regulatory capital framework and believe that the principles of risk-sensitivity, simplicity and global harmonization should guide the development of risk-weighted asset ("**RWAs**") standards, including those pertaining to market risk. In this letter we highlight areas where, we believe, the design and calibration of FRTB standards could be further strengthened and enhanced to more accurately capture market risk, while also improving operational efficiency and avoiding ambiguities or uncertainties that could result in jurisdictional divergences. Failing to address unresolved issues in the Proposal could result in disruptions to banks' ability to serve clients as capital markets intermediaries, the creation of a potentially brittle framework that will not perform reliably over time across a range of market

conditions, and the imposition of poorly calibrated capital requirements on otherwise prudently risk-managed portfolios.

The principle of risk sensitivity is particularly important in the context of market risk standards. The Proposal contemplates two market risk methodologies, the FRTB Internal Models Approach ("**FRTB IMA**") and the FRTB Standardized Approach ("**FRTB SA**"), with FRTB IMA generally expected to be more risk-sensitive. In its current design, however, FRTB IMA includes a range of features that result in add-ons, loss of diversification, and calibrations leading to indicative RWAs that are similar to, or even higher than, indicative FRTB SA RWAs.

Our comments in this letter cover a range of issues related to both FRTB IMA and FRTB SA. While we support the recommendations in the Associations' letter, we have also included additional comments that reflect the specific products and markets in which our clients operate, including:

- ***Recalibrate NMRF charges***. Indicative pro forma results suggest that Non-Modellable Risk Factor ("**NMRF**") charges are disproportionately large relative to other components of FRTB IMA—an outcome which appears to be inconsistent with basic design of FRTB IMA. We recommend that the Basel Committee place Expected Shortfall ("**ES**") at the center of FRTB IMA and avoid NMRF calibrations that effectively override and dominate ES. A final standard that elevates NMRFs above all other elements of FRTB IMA would result in a misalignment of capital management and risk management practices. Further, NMRF charges on certain products, such as new issuances, appear outsized relative to risk and are driven by technical data requirements rather than actual asset riskiness. Distortive capital charges, particularly those associated with new issuances, will harm corporations' ability to raise capital.

- ***Completing FRTB and preparing for the initial implementation period.*** FRTB is one of the most complex and far-ranging regulatory standards ever developed. In addition to the calibration of NMRFs, substantial work remains to finalize critical components of FRTB IMA and FRTB SA, as discussed in greater length in this letter. To achieve an orderly implementation of FRTB, we recommend that the Basel Committee sponsor workshops in the coming months on NMRF technical issues; recognize a nine-month P&L attribution test ("**PLA Test**") monitoring period during initial FRTB implementation in 2021 to permit any necessary recalibrations; and modify, on an interim basis pending final recalibration, the amber zone and red zone thresholds within the PLA Test to better align with evidence of model reliability.

- ***Commodity buckets in FRTB SA***. In its current design, FRTB SA classifies North America electricity and North America natural gas as separate and distinct commodity classes with very low hedge recognition between them. North America electricity and natural gas, however, trade in the same markets and are used by commercial and industrial firms, along with banks, as reliable hedges to one another. We recommend that FRTB SA commodity buckets classify North America electricity and natural gas within a single commodity bucket, which would better align market risk measurements with risk management practices.

- ***Ensuring broad-based access to capital markets.*** While FRTB correctly emphasizes the need for banks to have reliable data in model-based calculations, there is a substantial risk that inflexible, rigidly designed standards will impede banks' ability to make markets in instruments tied to small- and medium-sized firms in both emerging and developed markets. A framework that elevates the scope and volume of market data above all other considerations will naturally favor the largest issuers operating in the deepest markets. When finalizing the technical standards within FRTB, we encourage the Basel Committee to recognize the role of banks as capital markets intermediaries across all markets and products, and to avoid a regime that would structurally disincentivize banks from supporting broad-based and equitable economic growth by placing punitive charges on products that have lower trading volumes. Finally, we believe that pro-cyclicality risks within FRTB—IMA charges are likely to rise in economic downturns as market liquidity weakens—could also be mitigated through market risk standards that minimize "cliff effects" and recognize the reliability of approved models throughout the economic cycle.

II. Internal Models Approach Issues

A. PLA Test

1. Methodology

The Proposal solicits comments on two potential PLA Test methodologies: the Kolmogorov-Smirnov test ("**KS Test**") and the Chi-squared test ("**Chi-Squared Test**").[1] Both the KS Test and the Chi-Squared Test are potentially viable; however, we believe that the Chi-Squared Test is more robust under a wide variety of market conditions.

We believe that the Chi-Squared Test better accommodates small differences between risk theoretical P&L ("**RTPL**") and hypothetical P&L ("**HPL**") that can occur under certain market conditions while preserving the reliability of the PLA Test and a bank's market risk modelling practices. The 2016 FRTB final standards recognized that small variations between RTPL and HPL are both inevitable and acceptable, and imposed a standard deviation limit of 10 percent/-10 percent when assessing unexplained daily P&L differences between RTPL and HPL.[2]

By contrast, our analysis suggests that the KS Test operates more rigidly and may result in PLA Test violations based on relatively minor and explainable differences between RTPL and HPL. As such, in their current forms, we believe that the Chi-Squared Test is more robust than the KS Test.

2. Monitoring period

While FRTB IMA standards represent significant evolution in market risk methodology, substantial uncertainties exist around how the PLA Test will perform in practice, and whether jurisdiction-specific market practices will require adjustments to the test. We believe that an orderly

[1] Proposal ¶ 2.1.1.
[2] Basel Committee, *Minimum capital requirements for market risk* (Jan. 2016) ("**FRTB (2016)**") ¶ 183(b).

implementation of FRTB should seek to avoid unnecessary disruptions to client service businesses resulting from thresholds that could be more appropriately calibrated and tested against actual trading portfolios as opposed to hypothetical portfolios. PLA testing of actual trading portfolios requires modelling and infrastructure changes that, while underway, will require additional time to implement and evaluate all relevant data.

Accordingly, we recommend that the Basel Committee recognize a monitoring period to evaluate the performance of the PLA Test against actual portfolios. At the conclusion of the monitoring period, we recommend that the Basel Committee adjust PLA Test thresholds, as necessary, to reflect monitoring period results. Such a monitoring period could start, for instance, in January 2021, and continue for up to nine months to allow time before PLA Test requirements are finalized.

3. Amber zone/red zone thresholds (interim recommendation)

Acknowledging the need for reasonable thresholds during the monitoring period, we recommend that the Basel Committee incorporate modest changes to amber zone and red zone thresholds, at least on an interim basis, to avoid unwarranted migrations across the zones. In developing these recommendations, we used simulation analysis on hypothetical portfolios to incorporate certain realistic market dynamics such as fat tails and volatility clustering while minimizing the likelihood of false negatives.[3] These recommendations are consistent with the calibration of zone boundaries in backtesting included in Appendix B to the 2016 FRTB final standards.[4]

Interim Amber Zone/Red Zone Calibration Recommendations

	Amber Zone		Red Zone	
Test Metric	**Proposal**	**Recommendation**	**Proposal**	**Recommendation**
Spearman	0.825	0.725	0.75	0.65
Kolmogorov-Smirnov	0.083 (p-value = 0.35)	0.083 (p-value = 0.35)	0.095 (p-value = 0.20)	0.121 (p-value = 0.05)
Chi-Squared	14	14	18	24

We recommend that the Basel Committee adopt these recalibrations for an interim period, pending further analysis of the performance of PLA Test standards in practice.

4. Traffic light approach and capital charges for amber zone trading desks

The inclusion of a "traffic light" approach in the Proposal improves the reliability and risk-sensitivity of FRTB.[5] It avoids cliff effects when a reliable model does not meet the full requirements

[3] Supporting evidence will be made available to Basel Committee representatives upon request.
[4] See FRTB (2016) Appendix B, Section III.
[5] Proposal ¶ 2.1.3.

of the PLA Test due to transient effects unrelated to the fundamental soundness of the model. We have two comments to further improve the functioning of the traffic light approach.

First, the Proposal prohibits a trading desk that is in the red zone to return to the amber zone; instead, a red zone trading desk must pass all of the PLA Test standards again for green zone status to be IMA-eligible. We recommend that FRTB permit red zone trading desks to return to amber zone calculations when the relevant amber zone standards are met, mirroring the green-to-amber-to-red trading desk downgrade process. In addition to creating a consistent process for trading desk upgrades and downgrades, this approach would also allow for a uniform approach to amber zone trading desks. Under the Proposal, if a previously green zone desk falls into the amber zone, the desk would apply amber zone calculations; however, if a red zone desk now meets amber zone criteria, it would still apply red zone calculations. Trading desks with comparable results would be subject to different capital standards unless there is a consistent process for trading desk upgrades and downgrades. In addition, permitting red-to-amber IMA eligibility would appropriately incentivize banks to actively improve and remediate red zone trading desks.

Second, while the Proposal includes an amber zone with FRTB SA-based add-ons, the proposed formula does not include a cap to ensure that FRTB requirements do not exceed FRTB SA results when a bank's trading desks operate in the amber zone. We recommend that FRTB include a cap equal to the sum of FRTB IMA RWAs for green zone trading desks and FRTB SA RWAs for all remaining desks. Capping capital requirements in this manner would still result in higher charges than apply to green zone desks, thereby imposing graduated charges for desks where internal models are not fully meeting the PLA Test.

5. Model approval process

We recommend that FRTB standards include a streamlined process for trading desks that a bank has determined are FRTB IMA-eligible. Beginning on the date on which a bank notifies, and provides supporting documentation to, its regulator that the trading desk passes the PLA Test and backtesting, and satisfies other requirements for IMA eligibility, the bank should be permitted, on an interim basis pending regulatory review, to calculate its market risk RWAs under FRTB IMA requirements.

B. Non-Modellable Risk Factors (NMRFs)

The Proposal includes an extensive discussion of NMRFs, one of the more complex areas within FRTB. We support the Basel Committee's efforts to clarify NMRF standards through the Proposal, with the goal of achieving a final market risk standard that is both risk-sensitive and globally consistent.

In light of the significant range and complexity of open issues related to NMRFs in FRTB, we recommend that, after receiving comments on the Proposal, the Basel Committee sponsor workshops with banks to discuss all of the underlying technical issues, similar to previous workshops on the PLA Test. Such engagement would facilitate the development of future responses to frequently asked questions on a timely basis and mitigate the risk of divergent implementation approaches where

NMRF standards are potentially ambiguous or unclear. Substantial work is still necessary to fully implement NMRF standards in a consistent manner across all products and markets.

We also observe that our internal estimates of NMRF charges suggest that they are disproportionately large relative to other elements of FRTB IMA. In particular, indicative NMRF estimates suggest that they are a multiple of indicative ES estimates. While NMRF charges are designed to ensure conservatism in FRTB IMA results, we do not believe that NMRF charges should be the dominant element of FRTB IMA. Our recommendations below would improve the simplicity, accuracy and risk-sensitivity of NMRF charges while still ensuring that they play their appropriate role in FRTB IMA.

Furthermore, the inclusion of NMRF estimates in overall FRTB RWA estimates, reflecting anticipated trading desk model approvals, results in a projected IMA-to-SA RWA ratio of 1:1 or higher. We believe that equivalent IMA and SA results, or potentially higher IMA results, do not appropriately incentivize banks to make the considerable investments in personnel, infrastructure and data analytics required for FRTB IMA calculations.

1. Seasonality

FRTB standards require that an NMRF charge apply where there is a gap of greater than 30 days between price observations.[6] In place of this requirement, we recommend that an NMRF charge apply where there are not at least three price observations within 90 days to account for normal course volatility in transaction volumes.

Transaction volume seasonality arises from a variety of sources and varies by asset class, often due to the operation of the real economy. Certain asset classes trade more lightly or more heavily in response to political events, periodic monetary policy statements, quarterly corporate earnings announcements, or other financial market developments. The variability in transaction volumes that naturally occurs in trading products is compounded by episodic client activity. Outsized capital charges due to seasonality could have a significant impact on access to liquidity, be pro-cyclical, impact customer hedging and limit the real economy's access to a range of products.

Requiring three price observations in 90 days would achieve a functionally similar standard to the one-in-30 days standard while avoiding unnecessary, predictable disruptions to model-based RWAs arising in response to normal course transaction volume volatility. Our internal analysis suggests that, from a representative sample of U.S. corporate bonds, only 43 percent would meet the one-in-30 days observation standard. By contrast, our analysis indicates that 60 percent of the same representative sample would meet a three-in-90 days test. Application of unnecessarily high market risk charges to corporate debt instruments would impair economic growth and job creation, particularly for medium-sized issuers whose corporate bonds trade at lower frequencies than larger issuers' instruments.

[6] FRTB (2016) ¶ 183(c).

2. New issuances

An NMRF charge applies where firms do not have at least 24 annual observations for the risk factor with no more than a 30-day gap between real price observations.[7] This standard creates a practical problem for new issuances since, for nearly a full year following issuance, banks will not have a full data set to avoid application of NMRF charges. We believe the classification of new issuances as non-modellable is particularly problematic since new issuances are typically very liquid securities, often more so than older issuances.

Annex 1, for instance, includes evidence showing that, for U.S. corporate bonds, new issuances that are less than six months from issue are more liquid than those over six months from issue. Unless the Basel Committee adopts a tailored requirement for new issuances, the revised market risk framework will include structural disincentives for banks to facilitate not only initial public offerings ("**IPOs**") but also new series of debt offerings for seasoned issuers, which would have substantial impacts on the real economy, particularly in jurisdictions with developed capital markets.

Well-functioning capital markets require that banks provide robust liquidity for new issuances. Application of punitive FRTB IMA charges to all new issuances would substantially inhibit banks' ability to facilitate capital formation and capital markets access more broadly, harming the real economy. Morgan Stanley, for example, has consistently underwritten about 7 to 8 percent of U.S. investment grade corporate credit primary issuances in recent years, which directly supports corporate clients' ability to expand operations and thereby grow the economy and jobs. Similarly, for IPOs, Morgan Stanley has averaged about 7 to 8 percent of global IPOs in the past five years.

We recommend that, for new issuances, the NMRF standard begin measuring any gaps in real price observations only after the first day of new issue trading and prorate the 24 annual observation requirement.

3. NMRF bucketing

The Proposal includes two potential NMRF bucketing approaches. Alternative 1 would require that banks define the buckets that they use, subject to RTPL/PLA risk factor bucket alignment. Alternative 2 would require that banks use regulatory prescribed, standardized NMRF buckets.[8] We recommend that banks be permitted to develop internally defined buckets, including with multiple risk factors per bucket, subject to regulatory approval to ensure consistency in approach. The Basel Committee should use NMRF workshops in the coming months to develop metrics to assess banks' internally defined buckets, which could be similar to standardized, industry-wide benchmarks (e.g., variance explained or correlation distance).

Notwithstanding our recommendation above, if the Basel Committee adopts Alternative 2, we recommend increased flexibility within Alternative 2 to better reflect dynamic market liquidity and to capture the unique aspects of diverse markets, including:

[7] FRTB (2016) ¶ 183(c).
[8] Proposal Annex B.2 (modifying FRTB (2016) ¶ 183(c)).

- Differences between G10 vs Emerging Markets currencies;
- Differences in strike conventions between Rates and FX; and
- Seasonality-driven changes in inflation liquidity.

Annex 2 to this letter includes indicative recommended descriptions for Alternative 2 by market and product type. The Basel Committee would need to periodically review and revise these indicative calibrations.

4. Annex D Principles

Annex D to the Proposal includes seven principles for the supervisory assessment of data used for ES models ("**Annex D Principles**"). We have included, in Annex 3 to this letter, various technical recommendations to improve the coherence and operation of the Annex D Principles.

In addition to our comments in Annex 3, we would highlight particular concerns with Principles 6 and 7.

Principle 6 indicates that if a risk factor did not exist during a stressed period, it is not allowed to be part of the reduced risk factor set used in the ES calculation. We believe this restriction is overly punitive as it precludes well-accepted approaches to time-series modelling from being utilized to capture the behavior of such risk factors during the stressed period. We recommend that banks be allowed to use a risk factor in the reduced risk factor set if they are able to demonstrate the use of fit-for-purpose modelling techniques to backfill (proxy) data for the risk factor during the stress period.

In addition, Principle 7 includes a statement that combinations of modellable risk factors are proxies and proxy use must be limited. We recommend removing this sentence, as defining all such combinations as proxies would greatly increase the number and range of proxies beyond accepted definitions of that term, since most risk factors can be considered combinations of other risk factors. Such an expansion of proxies may introduce operational complexity and inhibit banks' ability to fulfil monitoring requirements. In addition, we also request guidance on how supervisors will assess proxy appropriateness and ensure globally consistent proxy standards. Finally, an overly prescriptive ES proxy standard is unnecessary since other elements of FRTB IMA, including NMRFs, already address proxy weakness.

5. Mapping real price observations (RPOs) to risk factors

The Proposal includes standards for mapping real price observations ("**RPOs**") to risk factors that are potentially unclear.[9] We request that the Basel Committee clarify RPO standards to avoid potentially different implementation approaches across jurisdictions. In particular, we recommend that a "representative" RPO be defined such that all risk factors that are used as an input and have a meaningful impact on the pricing of an instrument can be deemed modellable based on the RPO.

[9] Proposal ¶ 183.

6. Liquidity horizon

The 2016 FRTB final rule provides that, for each NMRF, the liquidity horizon of the stress scenario is the greater of the longest time interval between two consecutive price observations over the prior year and the liquidity horizon assigned to the risk factor in the final standard.

We recommend that the NMRF liquidity horizon be the maximum of (i) the ES liquidity horizon and (ii) the average gap, rather than the longest gap, between price observations over the prior year. This approach would use more relevant time series information and retain the current "max of" feature in FRTB IMA.

The ES liquidity horizon is a relevant metric to include in the formula because NMRF and ES calculations involve similar assessments of a bank's ability to liquidate positions in distressed markets. The ES liquidity horizon begins with a ten-day liquidation assumption, which can be scaled up to 120 days for less liquid products. Applying the same ten-day starting assumption to the NMRF liquidity horizon as the ES liquidity horizon would align the two frameworks.

Similarly, the average gap between price observations is more likely to be indicative of market liquidity than relying on the longest single gap. An average gap analysis incorporates a larger data set rather than focusing on a single gap, the latter of which may be driven by normal course fluctuations in transaction volumes rather than by underlying market dynamics.

7. Interplay with Expected Shortfall (ES) and Value at Risk (VaR)

In its current design, FRTB IMA excludes NMRFs from ES and Value at Risk ("**VaR**") calculations. The exclusion of NMRFs from ES/VaR introduces an asymmetry in FRTB IMA, since NMRFs are included in HPL calculations against which VaR is compared, increasing the risk of backtesting exceptions. Additionally, excluding NMRFs from ES would introduce complexity in banks' implementation of ES because of the need to move risk factors in and out of ES as they drop in and out of the modellable set. It would also increase the risk of cliff effects because of the difference between Stressed ES ("**SES**"), which applies to NMRFs, and ES, which does not.

This asymmetry could be resolved in one of two ways. The first, and most direct, solution would be to include NMRFs in ES and VaR while continuing to capitalize them using the SES calculation. This approach would restore the symmetry between ES/VaR and HPL. The second approach would be to permit firms to discard backtest breaches at a desk- or bank-level and, instead, require that daily loss be compared against the sum of VaR and the aggregated scaled NMRF charges.

8. NMRF stress testing and capital charge

The NMRF framework recognizes diversification benefits only for credit products, and NMRF is the one methodology within FRTB that, except for credit products, does not recognize diversification benefits at all.[10] Given the large number of risk factors that could become non-

[10] FRTB (2016) ¶ 190.

modellable, we believe a simple sum approach to NMRF aggregation—which implies 100 percent correlation between every NMRF—is overly punitive. We believe this combination of simple sum aggregation and the large number of NMRFs is the single largest contributing factor to the high NMRF:ES pro forma ratios that have been observed both at Morgan Stanley as well as in the Associations' letter.

We believe that the Basel Committee should extend the zero correlation, sum-of-squares approach that currently only applies to credit NMRFs to other asset class NMRFs. This approach would permit appropriate recognition of diversification benefits, which should not be limited to a single asset class, in recognition of the fact that most NMRFs will be expressed as a basis to relevant combinations of modellable risk factors. The application of this formula beyond credit products could be restricted to instances where banks either express NMRFs as bases to relevant combinations of modellable risk factors, as described above, or where banks can otherwise demonstrate suitably low correlation among NMRFs to their supervisors.

In addition, we recommend that a common stress period apply to all NMRFs for purposes of calculating capital charges, which would greatly simplify the operation of computing stress periods and stressed capital charges for each NMRF.

C. Backtesting and P&L attribution framework

FRTB IMA includes requirements for banks to adhere to the PLA Test and backtesting requirements, including through evaluations of HPL and RTPL. As a general principle, we believe that HPL and RTPL should, to the greatest extent possible, rely on similar calculation principles and avoid artificial add-ons that would introduce asymmetry.

Following this principle, we recommend that desk-level HPL should not require inclusion of daily Valuation Adjustments ("**VAs**"), since these VAs are not included in RTPL. Excluding such VAs from HPL would promote symmetry between HPL and RTPL and best facilitate an evaluation of risk model performance. To the extent there is concern that regulatory capital requirements at the trading desk level would be inaccurate or insufficient without inclusion of such VAs in HPL, these VAs will be included in firm-wide backtesting against actual P&L ("**Actual P&L**"), which does not require evaluating trading model performance through HPL/RTPL comparisons. Hence, we recommend eliminating the requirement to maintain two sets of HPL, with and without VAs.

Similarly, we also recommend including above-desk level VAs in Actual P&L for FRTB IMA completeness, even though these VAs may relate to both IMA and non-IMA desks. As these VAs could relate to the P&L from a mixture of IMA-approved and non-IMA-approved desks, it may be unclear how to separate the contribution to the total VAs of the two sets of desks. To account for the inclusion of non-IMA desk risk in Actual P&L, banks would still be given the opportunity to justify to supervisors that a backtest breach was caused by the non-IMA desk P&L and discard the breach.

We also recommend removing the requirement to include "passage of time" P&L in Actual P&L and, instead, permit banks to treat passage of time consistently in Actual P&L and RTPL, similar to HPL to the extent the associated effects are included in VaR.

While, in theory, inclusion of passage of time in Actual P&L aligns with its overarching purpose of acting as a "reality check," in practice this will likely lead to P&L that is deterministic being added to Actual P&L. In line with the treatment of other P&L elements which are independent of market risk factors (e.g., fees and commissions), we suggest not capturing this type of P&L in backtesting unless the corresponding effects are captured in VaR. This maintains backtesting as a true test of aligned P&L and VaR while avoiding any distortion of the actual test that might arise from inclusion of deterministic P&L if it is not also included in VaR.

We also recommend eliminating the requirement to maintain two sets of RTPL, with and without market data alignment. RTPL without market data alignment is covered in the backtesting process and market data requirements are covered by the Annex D Principles. If the time series used in VaR/ES are materially inconsistent with the market data used by business units or for HPL, banks may either fail desk-level backtesting or increase their firm-wide multiplier, or alternatively have risk factors that do not meet Annex D Principles for time series, resulting in increased NMRF charges.

III. Standardized Approach Issues

Our comments on FRTB SA include issues raised by the Proposal, the March 2018 FAQs, and the January 2016 FRTB final standards.[11] While some issues extend beyond the scope of the Proposal, we believe that any revisions to FRTB should consider the holistic operation of the revised market risk standards.

A. Commodities

FRTB SA recognizes eleven buckets for purposes of determining commodity hedge recognition and assigning risk-weights.[12] In its current form, electricity is assigned to Bucket 3 while natural gas is assigned to Bucket 6.[13] As a result, FRTB SA would limit, using at most a 20 percent correlation factor, the recognition of electricity positions as hedges to natural gas positions and vice versa. Failure to appropriately recognize North America electricity and natural gas as hedges to one another in FRTB SA would introduce an artificial divergence between risk management and capital management and potentially disrupt power servicing markets.

We recommend that the FRTB SA commodity buckets be revised such that:

- All North America commodities currently in Bucket 3 and Bucket 6 be placed in the same bucket, subject to a minimum intra-bucket correlation factor of 75 percent and a risk-weight of 35 percent; and

[11] Basel Committee, *Frequently asked questions on market risk capital requirements* (Mar. 2018) ("**March 2018 FAQs**").
[12] FRTB (2016) ¶¶ 115, 117.
[13] While we use the term "natural gas" in this letter, Bucket 6 refers to "gaseous combustibles," which includes natural gas.

- All other regional commodities currently in Bucket 3 and Bucket 6 be placed in the same bucket, subject to a minimum intra-bucket correlation factor of 60 percent and a risk-weight of 35 percent.

There is a strong, observable correlation between the prices of North America electricity and natural gas, as demonstrated by the evidence included in Annex 4. The strong correlation between North America electricity and natural gas is further demonstrated by the fact that market participants, including banks but also industrial and commercial firms, regularly rely on natural gas futures contracts to hedge electricity power price exposure and vice versa. Market regulators, including the U.S. Commodity Futures Trading Commission, have solicited comments and evidence on the correlation between electricity and natural gas.[14] Including North America electricity and natural gas in the same bucket, and applying a correlation factor of no less than 75 percent, is consistent with the evidence in Annex 4.

In addition to our bucketing and intra-bucket correlation recommendations, the risk-weight for the combined North America electricity and gas bucket should be reduced. The 2016 FRTB final standards impose commodity risk-weights that vary by bucket. Empirical evidence suggests that the market risk profiles of liquid combustibles (Bucket 2) and North America electricity and natural gas are comparable, and that all three should be subject to no greater than a 35 percent risk-weight.[15]

B. Correlation trading products (CTPs) constituent decomposition

Correlation trading products ("**CTPs**") involve synthetic credit securitizations divided into tranches with the index and single name hedges to the tranches meeting a range of investors' risk appetites and investment objectives. Among other benefits, CTPs broaden investor demand for corporate debt, which in turn increases the depth of funding markets for corporate issuers. Unlike many other securitization markets, CTPs incorporate market-traded credit default swaps ("**CDS**") in the underlying collateral pool, which enhances banks' ability to value and risk manage these products.

In its current form, FRTB SA includes calculation principles that may interfere with the accurate recognition of CTP hedges. In particular, the March 2018 FAQs imply that, when calculating Credit Spread Risk ("**CSR**"), banks are not permitted to decompose index tranches and index hedges into single name exposures even where such decomposition is common market practice and is permitted for bespoke tranches.[16]

A prohibition on decomposing CTPs into their constituent elements would deviate from widely accepted risk management practices, result in inaccurate market risk measurements, and exaggerate CTP-related market risks where such positions are well-hedged. Such a blanket prohibition on hedge recognition is particularly unwarranted in the case of CTPs, which include market-traded CDS that can be accurately priced on a daily basis.

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[14] See, e.g., Comment Letter from Morgan Stanley Capital Group, Inc. to the CFTC (Feb. 10, 2014), pp. 11-18; Comment Letter from ISDA and SIFMA to the CFTC, pp. 7-8 (Feb. 10, 2014).
[15] Supporting evidence will be made available to Basel Committee representatives upon request.
[16] March 2018 FAQs, Section 1.6 Q2.

We recommend that the Basel Committee, when finalizing the Proposal, adopt clarifying guidance related to the treatment of CTPs to better align underlying economic risk with market risk calculation principles. In particular, we recommend that: (i) CTP securitizations be decomposed to single name equivalent exposures for credit spread risk ("**CSR**"), (ii) the CSR bucketing and risk-weight of the single name equivalent for the correlation trading portfolio be applied, and (iii) FRTB SA determine capital requirements as would be measured based on aggregated decomposed exposures. This approach would, we believe, be consistent with design of the 2016 FRTB final standard, which includes a specific calculation methodology that may be inoperable unless decomposition is permitted.[17]

C. Volatility assumptions

The 2016 FRTB final standards would require banks to perform delta, vega, and curvature calculations for General Interest Rate Risk ("**GIRR**") by applying either normal or lognormal volatilities.[18] Banks, however, generally do not price or risk manage GIRR volatility using strictly normal or lognormal distributions. Instead, banks calibrate their interest rate models to observed market prices and business units design and execute products in the same manner.

We recommend that the Basel Committee clarify that banks are permitted to use, in FRTB SA calculations, business unit pricing models' volatility assumptions, which can deviate from normal or lognormal volatilities (e.g., $0 < \beta < 1$ in a Stochastic Alpha Beta Rho model), subject to independent risk management oversight and controls. This approach would align capital requirements with business unit pricing and risk management systems, consistent with one of the underlying policy goals of FRTB. Permitting the use of calculation methodologies most consistent with trading desks' pricing models in FRTB SA would also improve the reliability and accuracy of FRTB SA results.

D. Residual Risk Add-On (RRAO)

The purpose of the RRAO is to apply a supplemental capital charge for "instruments bearing residual risk separately and in addition to other components of the capital requirement under the standardized approach for market risk."[19] Stated differently, an RRAO should apply where other FRTB SA standards would result in a market risk charge that does not capture a product's material market risk. Because the RRAO relies on notional value-based charges, it is necessarily less risk sensitive than other FRTB SA standards and, accordingly, should be applied only where strictly necessary.

While the Basel Committee has provided some helpful clarifications, we believe that there is still a substantial risk that certain products that trade in deep and liquid markets will nonetheless be subject to RRAO charges. We recommend that RRAO charges be eliminated for each of the product categories below or, in the alternative, that any RRAO charge be limited to 0.1 percent of notional value.

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[17] See FRTB (2016) ¶¶ 89-92 (imposing no constituent decomposition restrictions in CSR).
[18] FRTB (2016) ¶ 72.
[19] FRTB (2016) ¶ 58.

1. CMS Spread Options

CMS Spread Options are liquid products that capture the yield curve difference between different points on a single interest rate curve. For instance, a common CMS Spread Option product captures the yield difference between two- and five-year maturity USD swap rates.

The January 2016 FRTB standard provides than an RRAO charge applies to a "spread option," a term which is not defined. The Proposal observes that vanilla options with multiple underliers, regardless of whether the underliers' deltas are of the same direction, should not be deemed to have correlation risk.[20] In context, we believe that the Basel Committee intended to apply RRAO charges to spread options where other FRTB components would fail to adequately capture the underlying market risk. An RRAO charge might apply, for instance, to a product providing exposure to the yield curve difference between the five-year USD swap rate and the 20-year JPY swap rate.

The risk characteristics of CMS Spread Options, by contrast, are adequately captured by other components of FRTB SA. A common example of a CMS Spread Option is a product providing exposure to the yield curve difference between five-year constant maturity swap rate and 20-year constant maturity swap rate in the same yield curve. In this example, FRTB SA would impose delta, vega and curvature charges that adequately capture the underlying market risk without inclusion of a notional-based, risk-insensitive RRAO.

We recommend that the Basel Committee clarify that CMS Spread Options are excluded from RRAO charges, along with any other spread option with vanilla payoffs that capture yield curve differences of a single risk-free yield curve in a single currency.

2. Volatility and variance swaps

Volatility swaps are contracts with payoffs based on future realized price volatility while variance swaps are contracts with payoffs based on future realized price variance. Both products are often linked to equity index underliers. Such instruments are used by institutional investors, including pensions, to gain exposure to anticipated changes in volatility or variance or to hedge the investors' own exposure. These swaps have maturity and liquidity characteristics comparable to exchange-traded benchmarks and, accordingly, their profile is inconsistent with the design and purpose of RRAO.

FRTB SA standards may be viewed as applying one percent-of-notional RRAO charge to volatility and variance swaps because such products are based on future realized volatilities. Similar to CMS Spread Options, however, FRTB SA applies stringent delta, vega and curvature charges to volatility and variance swaps, eliminating the need for a separate RRAO. The standard pricing model for variance and volatility swaps generates delta and vega sensitivities for risk management purposes and can generate a curvature measure for FRTB SA purposes. Therefore, FRTB SA would impose delta, vega and curvature charges that adequately capture the underlying market risk, eliminating the need for inclusion in RRAO. Accordingly, we recommend that the Basel Committee clarify that

[20] Proposal Annex A.4 (modifying FRTB (2016) ¶ 58(h)(iii)).

RRAO charges do not apply to volatility or variance swaps (or that, if they do apply, the RRAO be limited to 0.1 percent of the notional amount).

E. Default Risk Charge

1. Equity securities hedge recognition

The March 2018 FAQs included a clarification related to the jump-to-default ("**JTD**") treatment of equity securities that hedge short-dated total return swaps. Specifically, the Basel Committee clarified that: "If the contractual/legal terms of the derivative allow for the unwinding of both legs of the position at the time of expiry of the first to mature with no exposure to default risk of the underlying credit beyond that point, then the JTD for the maturity-mismatched position is equal to zero."[21]

The March 2018 FAQs indicated that this clarification applied to paragraph 149 of the January 2016 FRTB final standard, which covers products with remaining maturities of less than 3 months.[22]

We recommend that the Basel Committee clarify that the JTD for an equity security is zero if the contractual/legal terms of the derivative, regardless of the remaining maturity of the derivative, allow for the unwinding of both legs of the position at the time of expiry of the first to mature with no exposure to default risk of the underlying credit beyond that point. The remaining maturity of derivatives is entirely unrelated to whether their legal and contractual terms will permit the bank to unwind both positions at maturity. Indeed, since the contractual and legal terms of short-dated or long-dated derivatives will be set at the time of transaction execution, it would be an odd outcome to only recognize the enforceability of such contractual and legal terms in the final three months of remaining maturity.

2. Treatment of defaulted and highly distressed debt positions

FRTB SA imposes a variety of charges to defaulted and highly distressed debt positions which, in some situations, could result in capital requirements that exceed the carrying value of the securities through application of the entire sensitivity based method ("**SBM**") together with Default Risk Charge ("**DRC**") charges. To address this anomaly and otherwise simplify the calculation principles of FRTB SA, we recommend that capital requirements for these positions be determined through application of the DRC alone or, in the case of senior debt exposures, the DRC and an adjusted 0.1 percent RRAO charge.

These charges by themselves conservatively capture the market risk in defaulted and highly distressed debt positions because such positions, as a general rule, trade based on price rather than on yield rates, and market movements in credit spreads or swap rates are not major drivers. Instead, the market generally evaluates these products based on anticipated recovery rates and the timing of such recovery. Therefore we recommend not applying the SBM to these positions.

[21] March 2018 FAQs, Section 1.10, FAQ 4.
[22] FRTB 2016 ¶ 149.

3. Sovereign exposures in local currencies

FRTB SA appears to apply the same treatment to sovereign bonds issued in the sovereign's own currency and foreign currencies. While this point is not entirely clear in the existing FRTB SA standards, there is no apparent methodology for adjusting DRC charges on sovereign bonds based on currency of issuance. We recommend that FRTB SA impose a lower DRC on sovereign bonds issued in the sovereign's own currency in recognition of the fact that, in practice, sovereigns can devalue their currencies to avoid defaults, which is not true for sovereign debt issued in foreign currencies.

While sovereign bonds issued in local currencies certainly present market risks, these risks are primary FX and interest rate risks, which are separately captured in FRTB SA charges. Applying a local currency adjustment to DRC charges on sovereign bonds is also validated by historical experience, as sovereigns have defaulted at a lower rate on local currency-denominated debt than in foreign currency-denominated debt.

4. Treatment of Public Sector Entity (PSE) debt securities

FRTB SA applies a relatively high DRC to banks' exposures to Public Sector Entities ("**PSEs**"), even where such exposures pose risks comparable to covered bonds. Specifically, PSE debt securities receive a loss given default ("**LGD**") of 75 percent as compared with covered bonds, which receive an LGD of 25 percent.[23] While we agree that FRTB SA should apply higher charges to PSE exposures than to high-quality sovereign exposures, FRTB SA calibrations should be aligned with other Basel Committee standards and charges on PSE exposures should not be more severe than those that apply to covered bonds.

Applying a 75 percent LGD to PSE exposures would create conceptual and practical tensions with the Basel Committee's Liquidity Coverage Ratio ("**LCR**"). The LCR treats qualifying PSE securities as Level 2A high-quality liquid assets subject to only a 15 percent haircut.[24] Stated differently, the LCR encourages banks to hold large volumes of PSE assets, with only modest haircuts, whereas FRTB SA assigns relatively severe LGD assumptions. There is a substantial risk that adopting FRTB SA in its current form will interfere with banks' liquidity management practices, where Level 2A assets play a critical role.

Setting aside conflicts with LCR assumptions, we do not believe that the 75 percent LGD assumption is empirically valid for all PSE securities. In particular, we recommend that any PSE securities that meet the Basel Committee's LCR Level 2A criteria should receive an LGD of no greater than 25 percent, the LGD applied to covered bonds. The relevant LCR 2A criteria include that PSE securities "trade[] in large, deep and active repo or cash markets characterized by a low level of concentration" and "have a proven record as a reliable source of liquidity in the markets (repo or sale) even during stressed market conditions (i.e. maximum decline of price not exceeding 10% or increase

[23] FRTB (2016) ¶ 144.
[24] Basel Committee, LCR ¶ 52(a) (Jan. 2013). PSE securities may receive non-Level 2A treatment where Level 2A criteria are not met.

in haircut not exceeding 10 percentage points over a 30-day period during a relevant period of significant liquidity stress)."[25]

Finally, we note that the LCR treats covered bonds meeting similar criteria as Level 2A assets, subject to the same 15 percent haircut as PSE securities.[26] Accordingly, aligning the market risk treatment of PSE securities and covered bonds would follow the Basel Committee's existing approach in the LCR.

F. Negative credit spreads

The March 2018 FAQs included guidance that banks should not apply risk-weight floors for GIRR and CSR calculations, given the possibility of interest rates being negative.[27] This guidance was potentially ambiguous, however, since the question submitted referenced negative interest rates but the response indicated that a floor should not apply to either GIRR or CSR calculations.

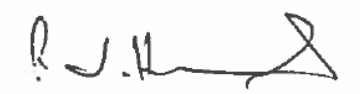
We agree with the March 2018 FAQs that floors should not apply to interest rate instruments, given that several major jurisdictions have already experienced negative interest rates. The same guidance, however, should not apply to credit instruments, where a floor logically applies. In particular, given the levels of credit spreads for many investment grade obligors, the application of a negative absolute shock of the magnitude of the CSR risk-weights would result in significantly negative post-shock credit spreads. Unlike interest rates, negative credit spreads do not have precedence in markets and are implausible, as this would imply default probabilities greater than 100 percent. We recommend that the Basel Committee clarify that the guidance in the March 2018 FAQs is limited to GIRR and post-shock hazard rates can be floored at zero for CSR curvature calculations.

* * *

[25] Basel Committee, LCR ¶ 52(a) (Jan. 2013).
[26] Basel Committee, LCR ¶ 52(b) (Jan. 2013).
[27] FAQ, March 2018, Section 1.1, Q4

Morgan Stanley appreciates the opportunity to provide comments to the Basel Committee. Please do not hesitate to contact us if you have any questions.

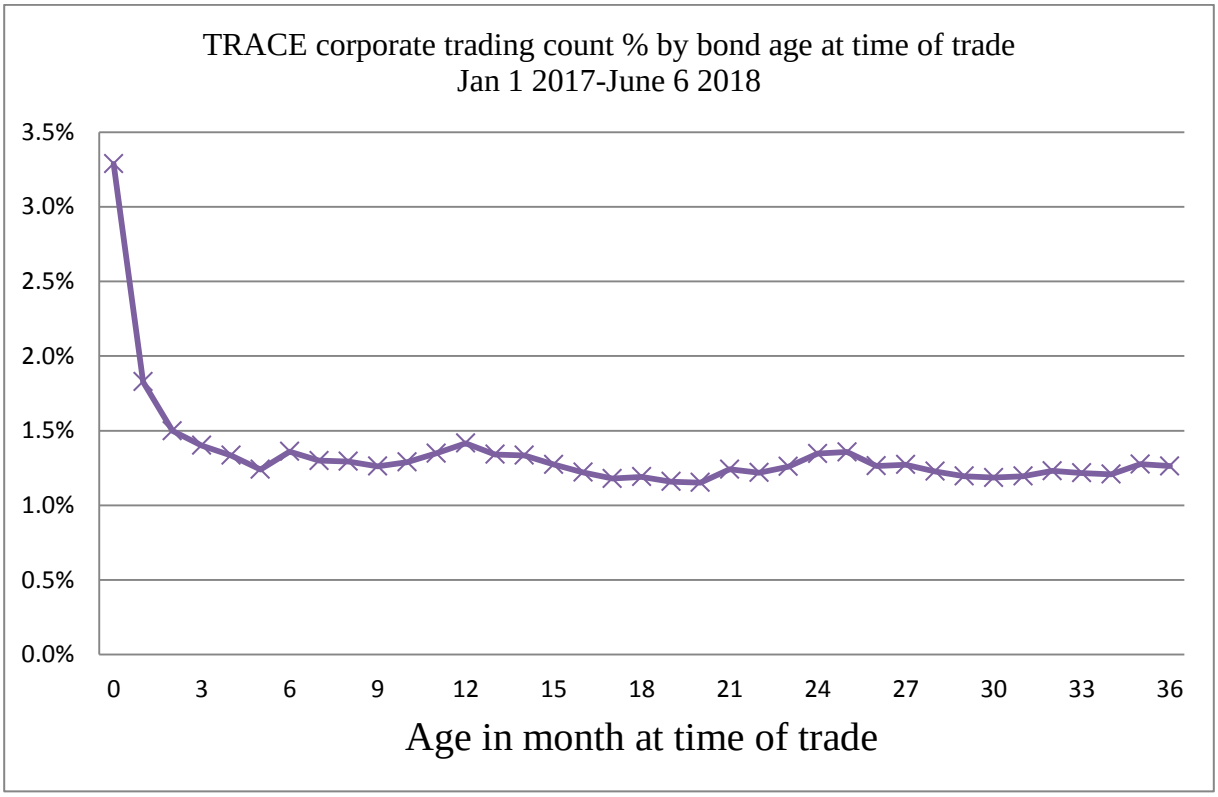
Yours sincerely,



Patrick Howard
Chief Market Risk Officer

Annex 1: U.S. corporate bond trading volumes

Source: Financial Industry Regulation Authority (FINRA) data made available through the Trade Reporting and Compliance Engine (TRACE).



Annex 2: Alternative 2 NMRF Bucketing by Asset Class (indicative)

1. Corporate Credit and Munis

    A. Credit spread risk factors

    Maturity buckets: 0 month up to 15 months; longer than 15 months up to 39 months; longer than 39 months up to 63 months; longer than 63 months up to 123 months; longer than 123 months

    B. Implied volatility risk factors

    Strike buckets: high strike; ATM; low strike.

    Bank can determine product specific ATM corridor with regulatory guidance

2. Agency mortgages

    A. OAS risk factors

    Maturity buckets: 0 month up to 42 months; longer than 42 months up to 90 months; longer than 90 months up to 180 months; longer than 180 months

3. Rates

    A. G4 (USD, EUR, GBP and JPY)

        i. Yield curve risk factors
        Maturity buckets: 0 month up to 12 months; longer than 12 months up to 60 months; longer than 60 months up to 120 months; longer than 120 months

        ii. Implied volatility risk factors
        Expiry buckets: 0 month up to 12 months; longer than 12 months up to 24 months; longer than 24 months up to 60 months; longer than 60 months up to 120 months; longer than 120 months
        Tenor buckets:
        - for expiry up to 12 months: 0 month up to 60 months; longer than 60 months up to 120 months; longer than 120 months
        - for expiry up longer than 12 months up to 24 months: 0 month up to 60 months; longer than 60 months
        - for expiry longer than 24 months up to 60 months: 0 month up to 60 months; longer than 60 months up to 120 months; longer than 120 months
        - for expiry longer than 60 months: 0 month up to 120 months; longer than 120 months

Strike buckets: ATM (as above); low strike and high strike expected to have fewer buckets (≤ 3)

B. CAD

i. Yield curve risk factors
Maturity buckets: 0 month up to 12 months; longer than 12 months up to 60 months; longer than 60 months up to 120 months; longer than 120 months

ii. Implied volatility risk factors
Expiry buckets: 0 month up to 24 months; longer than 24 months up to 60 months; longer than 60 months
Tenor buckets:
- for expiry up to 60 months: 0 month up to 60 months; longer than 60 months
- for expiry longer than 60 months: A single bucket should apply to all implied volatility risk factors

Strike buckets: ATM (as above); low strike and high strike expected to have fewer buckets (1)

C. Other currencies

i. Yield curve risk factors
Maturity buckets: 0 month up to 24 months; longer than 24 months

iii. Implied volatility risk factors
A single bucket should apply to all implied volatility risk factors irrespective of expiry or strike

D. Inflation

i. Inflation curve risk factors
Maturity buckets: 0 month up to 60 months; longer than 60 months

ii. Inflation implied volatility risk factors
Expiry buckets:
- Major economies: 0 month up to 60 months; longer than 60 months
- Other economies: a single bucket irrespective of expiry

Strike buckets: a single bucket irrespective of strike

4. FX

A. Type 1 currency pairs:

i. Spot/Forward risk factors
Maturity buckets: 0 month up to 3 months; longer than 3 months up to 12 months; longer than 12 months up to 24

months; longer than 24 months up to 60 months; longer than 60 months

ii. Implied volatility risk factors
Expiry buckets: 0 month up to 3 months; longer than 3 months up to 12 months; longer than 12 months up to 24 months; longer than 24 months up to 60 months; longer than 60 months
Strike buckets: High strike; ATM; low strike

B. Type 2 currency pairs:

i. Spot/Forward risk factors
Maturity buckets: 0 month up to 3 months; longer than 3 months up to 12 months; longer than 12 months

ii. Implied volatility risk factors
Expiry buckets: 0 month up to 3 months; longer than 3 months up to 12 months; longer than 12 months
Strike buckets: High strike; ATM; low strike

C. Type 3 and other currency pairs:

i. Implied volatility risk factors
A single bucket should apply to all implied volatility risk factors irrespective of expiry or strike

Currency pair by type

	USD	EUR	GBP	CAD	JPY	SEK	NOK	CHF	AUS	NZD
USD										
EUR	1									
GBP	1	1								
CAD	1	1	3							
JPY	1	1	1	1						
SEK	1	1	3	3	2					
NOK	1	1	3	2	2	1				
CHF	1	1	1	2	2	3	3			
AUS	1	1	1	1	1	3	3	1		
NZD	1	1	2	2	1	3	3	3	1	

5. Equity

A. Maturity dimension

Maturity buckets: 0 month up to 7 months; longer than 7 months up to 25 months; longer than 25 months up to 66 months; longer than 66 months up to 132 months; longer than 132 months

B. Strike dimension

Strike buckets: high strike; ATM; low strike.

Bank can determine product specific ATM corridor with regulatory guidance

6. Commodities

A. Maturity dimension (for North America Power and Gas risk factors)

Maturity buckets: 0 month up to 6 months; longer than 6 months up to 12 months; longer than 12 months up to 24 months; longer than 24 months up to 36 months; longer than 36 months

B. Strike dimension

Strike buckets: high strike; ATM; low strike.

i. Bank can determine product specific ATM corridor with regulatory guidance

Annex 3: Comments on Annex D Principles

Principle 1. *The data used may include combinations of modellable risk factors*. Banks often price instruments as a combination of risk factors that have been deemed modellable. This practice allows for sound pricing interpolations/extrapolations, as well as other transformations of historical observations. As a general principle, interpolation based on combinations of modellable risk factors should be consistent with mappings used for P&L attribution (to determine the RTPL) and should not be based on alternative, and potentially broader, bucketing approaches. Likewise, banks may compress risk factors into a smaller dimension of orthogonal risk factors (eg principal components) and/or derive parameters from observations of modellable risk factors, such as in models of stochastic implied volatility, without the parameters being directly observable in the market.

Subject to the approval of the supervisor, banks may extrapolate up to a reasonable distance from the closest modellable risk factor. ~~The extrapolation should not rely solely on the closest modellable risk factor but on more than one modellable risk factor.~~ In the event that a bank uses extrapolation, the extrapolation must be considered in the determination of the RTPL.

Rationale: We recommend removing the statement that extrapolations "should not rely solely on the closest modellable risk factor but on more than one modellable risk factor." Different extrapolation approaches are appropriate for different risk factors based on data availability and dynamics of particular markets. Banks should be permitted to adopt extrapolation approaches consistent with their internal risk management frameworks, subject to supervisory review and approval.

Principle 2. *The data used must allow the model to pick up both idiosyncratic and general market risk.* General market risk is the tendency of an instrument's value to change with the change in the value of the broader market, as represented by an appropriate index or indices. Idiosyncratic risk is the risk associated with a particular issuer or issuance~~, including default provisions, maturity and seniority~~. The data must allow both components of market risk to be captured in any market risk model used to determine capital requirements. If the data used in the model do not reflect either idiosyncratic or general market risk, the bank must apply an NMRF charge for those aspects that are not adequately captured in its model.

Rationale: Banks should be permitted to define idiosyncratic risk to the appropriate level of granularity, which may cut across multiple issuances. To the extent that banks are unable to fully capture idiosyncratic risks by considering multiple issuances, NMRF charges will apply, eliminating the need for Principle 2 to require issuance-specific data.

Principle 3. *The data used must allow the model to reflect volatility and correlation of the risk positions*. Banks must ensure that they do not understate the volatility of an asset (eg by using inappropriate averaging of data or proxies). Further, banks must ensure that they accurately reflect the correlation of asset prices, rates across yield curves and/or volatilities within volatility surfaces. Different data sources can provide dramatically different volatility and correlation estimates for asset prices. The bank should choose data sources so as to ensure that ~~(i) the data are representative of real price observations (RPOs); (ii)~~ price volatility is not understated by the choice of data~~; and (iii)~~

~~correlations are reasonable approximations of correlations among RPOs.~~ Furthermore, any transformations must not understate the volatility arising from risk factors and must accurately reflect the correlations arising from risk factors used in the bank's ES model.

Rationale: We believe that the requirement, in the Proposal, for RPOs to be representative creates tensions with the 2016 FRTB final standard, which provides that "the data used for calibration does not need to be the same data used to prove that the risk factor is modellable." We recommend that the Basel Committee clarify Principle 3 to focus solely on expectations that data used for calibration accurately reflect volatilities and correlations in the market, without any reference to RPOs. The levels of RPOs are impacted by a number of factors not relevant for market risk RWA calculations, such as timing differences and CVA, that should not be reflected in the volatility or correlations of appropriate data used for model calibration.

Principle 4. *The data used must be reflective of prices observed and/or quoted in the market*. Where data used are not derived from RPOs, the bank must demonstrate that the data used are reasonably representative of RPOs. To that end, the bank must ~~periodically~~, at least quarterly, reconcile price data used in a risk model with front office and back office prices. Just as the back office serves to check the validity of the front office price, risk model prices should be included in the comparison. ~~The comparison of front or back office prices with risk prices should consist of comparisons of risk prices with RPOs, but front office and back office prices can be used where RPOs are not widely available.~~ Banks must document their approaches to deriving risk factors from market prices.

Rationale: This principle would require that, where data used are not derived from RPOs, the bank must periodically reconcile price data used in a risk model with front office and back office prices and that the comparison of front or back office prices with risk prices should consist of comparisons of risk prices with RPOs, where widely available. We recommend that the periodic reconciliation of price data be required on a quarterly basis and that there be no mandatory comparison of risk prices with RPOs. Setting a quarterly, rather than "periodic," reconciliation requirement would help to establish consistency across jurisdictions. Reconciliation with RPOs should not be mandatory because RPOs contain noise from valuation adjustments and timing basis and RPOs from external vendors will not contain pricing information.

Principle 5. The d*ata used must be updated at a sufficient frequency*. A market risk model may require large amounts of data, and it can be challenging to update such large data sets frequently. Banks should strive to update their model data as often as possible to account for frequent turnover of positions in the trading portfolio and changing market conditions. Banks should update data at a minimum on a monthly basis, but preferably daily. Lags in updating can lead to erroneous outcomes and a poor reflection of current risks. Additionally, banks should have a workflow process for updating the sources of data. Furthermore, where the bank uses regressions to estimate risk factor parameters, these must be re-estimated ~~on a regular basis, generally no less frequently than every two weeks~~ at least quarterly. Calibration of pricing models to current market prices must also be sufficiently frequent, ideally no less frequent than the calibration of front office pricing models. Where appropriate, banks should have clear policies for backfilling and/or gap-filling missing data.

Rationale: The Proposal would require that banks re-estimate regressions used to estimate risk parameters on a regular basis, but no less frequently than every two weeks. We recommend updates to regressions be required on a quarterly basis. The operational burdens associated with biweekly regression updates are significant, with little clear benefit. Additionally, any significant underestimation of risk due to the frequency of regression parameter re-estimation would be penalized by backtesting failures, leading to loss of model approval at trading desk level or increase in backtest multiplier at Firm-level.

Principle 6. *The data used to determine stressed expected shortfall (ES) must be reflective of market prices observed and/or quoted in the period of stress.* The data for the stressed ES model should be sourced directly from the historical period whenever possible. There are cases where the characteristics of current instruments in the market differ from those in the stress period. Nevertheless, banks must empirically justify any instances where the market prices used for the stress period are different from the market prices actually observed during that period. Further, in cases where instruments that are currently traded did not exist during a period of significant financial stress, banks must demonstrate that the prices used match changes in prices or spreads of similar instruments during the stress period.

In cases where banks do not sufficiently justify the use of current market data for products whose characteristics have changed since the stress period, the bank must omit the risk factor for the stressed period and meet the requirement of paragraph 181 (d) that the reduced set of risk factors explain 75% of the fully specified ES model. Moreover, if name-specific risk factors are used to calculate the ES in the actual period and these names were not available in the stressed period (eg an initial public offering occurred two years ago, while the stress period is five years ago), ~~there is a presumption that these risk factors are not in the reduced set of risk factors~~ such risk factors may be included in the reduced set of risk factors if the bank demonstrates the use of fit-for-purpose modelling techniques to backfill data for the risk factor during the stress period. One such technique would be to express the risk factor as a combination of an appropriate proxy and a basis factor with the proxied part included in the reduced risk factor set. Exposures for risk factors which are included in the current set but not in the reduced set need to be mapped to the most suitable risk factor of the reduced set for the purposes of calculating ES measures in the stressed period.

Rationale: We believe the above restriction on the inclusion of risk factors in the reduced risk factor set is overly punitive as it precludes well-accepted approaches to time-series modelling from being utilized to capture the behavior of such risk factors during the stress period.

Principle 7. ~~*The use of proxies must be limited, and proxies*~~ *Proxies must have sufficiently similar characteristics to the transactions they represent*. Supervisors will assess whether methods for combining risk factors are conceptually and empirically sound. ~~Combinations of modellable risk factors are to be considered as proxies and, in constructing modellable risk factors, proxy use must be limited and proxies themselves must be sufficiently similar to characteristics of the transactions they represent.~~ ~~Proxies~~ Any proxies used must be appropriate for the region, quality and type of instrument they are intended to represent. For example, the use of indices in a multi-factor model must capture the correlated risk of the assets represented by the indices, and the remaining idiosyncratic risk must be demonstrably uncorrelated across different issuers. A multi-factor model needs to have significant

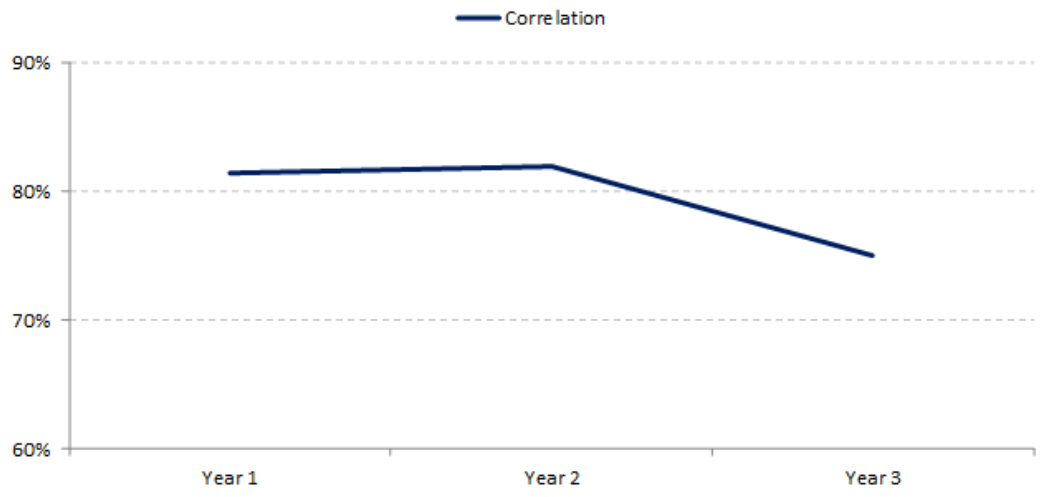
explanatory power for the price movements of assets and must provide an assessment of the uncertainty in the final outcome due to the use of a proxy. The coefficients (betas) of a multi-factor model need to be empirically based and not determined based on judgment. Instances where coefficients need to be set by judgment generally should be considered as NMRFs. If risk factors are represented by proxy data in the ES model, the proxy data representation of the risk factor – not the risk factor itself – must be used in the RTPL unless the bank has identified the basis between the proxy and the actual risk factor and properly capitalised the basis as an NMRF. If the basis is properly capitalised as an NMRF then the bank can choose to include in the RTPL either (i) the proxy risk factor and the basis or (ii) the actual risk factor itself.

Rationale: The Proposal includes a statement that combinations of modellable risk factors are proxies and proxy use must be limited. We recommend the removal of this sentence as defining all combinations as proxies will greatly increase the scope of proxies from generally accepted definitions since the majority of risk factors can be considered combinations of other risk factors. Combining risk factors to imply forwards from spot, yield curves from futures and swap rates and volatility surface parameters from implied volatility quotes are well accepted techniques and should not considered as resulting in proxies. Furthermore, the Proposal will make it very challenging to differentiate proxies meeting the expanded definition above from traditionally accepted proxies.

Annex 4: North America electricity and natural gas correlation evidence

Source: Morgan Stanley internal analysis.

Correlation between PJMW Peak and NYMEX natural gas for the front three years



**Based on log returns of daily samples*