On the Overcapitalization for Market Risk Under the U.S. Regulatory Framework

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BANK POLICY INSTITUTE

Katie Collard

202.589.2533

Katie.Collard@BPI.com

Francisco Covas

202.589.2413

Francisco.Covas@BPI.com

Brett Waxman

646.736.3961

Brett.Waxman@BPI.com

The Basel Committee's revisions to the market risk capital framework, known as the Fundamental Review of the Trading Book (or FRTB), are aptly named, as they represent a fundamental change to the minimum capital requirements for market risk.[1] FRTB better captures tail risk under stressed conditions and places more stringent guardrails on the use of banks' own internal models for measuring market risk than the current market risk capital rules.

As with all elements of the Basel framework, each jurisdiction must issue its own regulations to implement FRTB. However, implementation in the United States presents unique and difficult challenges because U.S. regulators have already adopted a separate capital charge explicitly designed to capture tail risk: the global market shock (GMS), a component of the Dodd-Frank Act Stress Tests. Under the Federal Reserve's capital regime for bank holding companies, capital to cover projected losses under the stress tests, known as the stress capital buffer (SCB), takes the place of the static 2.5 percent capital conservation buffer and is added on top of the other capital required by the Basel standards. Trading losses incurred because of the GMS can make up a significant portion of banks' required stress capital buffers. Other jurisdictions also use the results of stress tests to determine capital buffers, but the U.S. is unique as breaching the SCB in the U.S. results in automatic restrictions on capital distributions, which effectively makes the SCB a minimum capital requirement.[2]

In this blog post, we note that the FRTB improves the current market risk framework that it replaces by better capturing tail risk but show that the GMS effectively did the same thing. Specifically, some of the market risk capital changes contained in the FRTB are intended to better capture market risk under stressed conditions—exactly what the GMS in the stress tests is intended to capture. As a result, we propose some adjustments to the FRTB and the GMS frameworks that would result in their combined capital charges more accurately reflecting a firm's true market risk.

The consequences of double counting here are significant. Under the current U.S. capital framework, the GMS already results in market risk capital requirements for the largest U.S. banks that are more than double those of the current Basel framework. The FRTB would further increase those requirements. Although we will not attempt to assess the impact of such a step, it seems clear that requiring U.S. bank-affiliated broker-dealers to further overcapitalize for market risk would make these banks less willing to engage in essential market making activities. This would exacerbate the lack of liquidity in markets that has been evident during recent stress periods and increase the chances of the Federal Reserve having to again intervene.[3]

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[1] As we've previously written, in 2017, the Basel Committee on Banking Supervision finalized its overhaul of bank capital standards known as "Basel III." Given the significance of the 2017 changes compared with the initial Basel III standards, we refer to them in this post as the "Basel III endgame," but many refer to the changes as "Basel IV." For further discussion, see previous BPI blog posts here and here.

[2] In the European Union (EU) and in the United Kingdom (U.K.), stress tests are mandated and used to set so-called Pillar 2B buffers in the U.K. and Pillar 2G buffers in the EU. However, only the first 2.5 percentage points of the buffer have payout restrictions (i.e., the capital conservation buffer), as per the Basel standard. For evidence that the SCB acts like a minimum requirement see Berrospide, Gupta and Seay (2021).

[3] *See*, e.g., Bao, O'Hara and Zhou (2018), Liang and Parkinson (2020), and Freedman and Covas (2018).

What Is Market Risk?

Market risk is the risk of losses in on- and off-balance-sheet positions arising from movements in market prices. In January 2013, the U.S. banking agencies implemented a rule that currently sets regulatory capital requirements for market risk in the United States as part of the capital framework commonly known as the "Basel 2.5" capital rule. That rule primarily affects banks that engage in significant market making and other trading activities by requiring capital to be held against positions in the trading book that meet defined specifications (covered positions). In addition to being subject to Basel 2.5's market risk requirements, as part of the supervisory stress tests, the largest banks are also subject to the GMS, in which banks must write down large instantaneous trading losses. Effectively, the GMS forces the largest banks to capitalize for potential losses stemming from market risk under stressed conditions.

How Much Capital Is Currently Held for Market Risk by the Largest Banks?

For the largest banks, the general capital requirement for risk-weighted assets (including risk-weighted assets determined under Basel 2.5) is defined by the sum of the 4.5-percent minimum CET1 requirement under Basel III, the SCB, the global systemically important bank (GSIB) capital surcharge, and any countercyclical capital buffer (currently set at zero).

The GMS is a component of the stress capital buffer, and banks subject to the stress tests that have significant trading activity are required to stress their trading portfolios using that year's GMS scenario. Application of the GMS significantly increases the losses of these firms under the supervisory stress tests. Those losses increase the peak-to-trough decline in a bank's capital ratios under the stress test, thereby increasing a firm's capital requirement through raising the firm's SCB. As we show below, trading losses incurred because of the GMS can make up a significant portion of banks' SCBs.

Overall, the current CET1 capital requirement for market risk can be expressed as the sum of these two components: (1) Basel 2.5 capital requirement in the absence of the GMS; and (2) the GMS add-on,

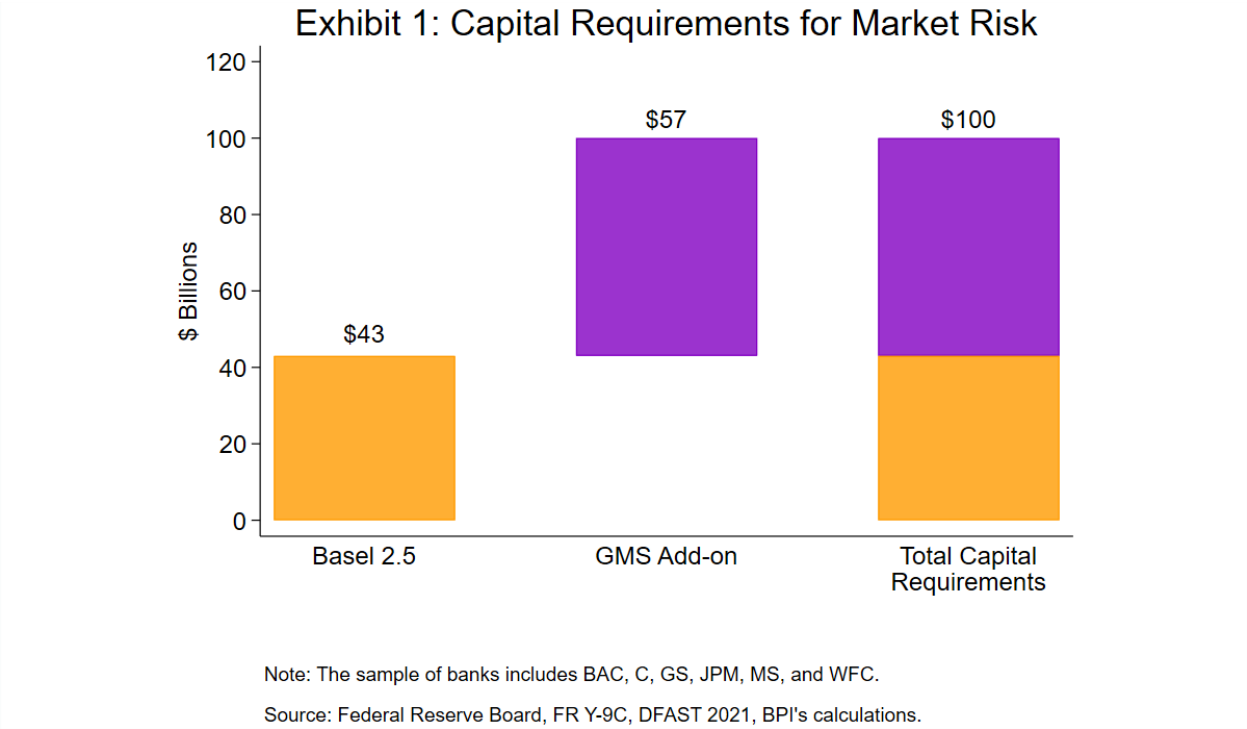
$$\text{CET1 Capital Req. for Market Risk} = \underbrace{(4.5\% + 2.5\% + GSIB) \times \text{Market Risk RWA}}_{Basel\ 2.5\ capital\ requirement} + \underbrace{(SCB - SCB_{No\ GMS}) \times Total\ \text{RWA}}_{GMS\ add-on} \quad (1)$$

where $SCB_{\text{No GMS}}$ is the stress capital buffer of each firm when losses associated with the GMS are set to zero. Total risk-weighted assets (RWA) are defined as the sum of RWA for market and credit risk. Although the Federal Reserve as well as each bank subject to the stress tests are required to disclose certain summary information regarding the results of the stress tests, these disclosures do not directly report the effect of the GMS on the stress capital buffer.[4] For that reason, we estimate the peak-to-trough decline in each bank's CET1 ratio with and without trading losses.[5]

[4] DFAST disclosures combine both trading and counterparty losses. Ideally, we would exclude counterparty losses from the calculation. But we know those are relatively small compared with trading losses, so the overstatement of capital requirements for market risk is likely not material.

[5] We use BPI's top-down model, which is based on the CLASS model developed by Hirtle, Kovner, Vickery, and Bhanot (2015). See this post for details.

The SCB is floored by the Fed at 2.5 percent in order to maintain consistency with the Basel framework and the 2.5 percent capital conservation buffer. For banks subject to the 2.5-percent SCB floor, the GMS add-on is zero, because changes in projected losses do not change the SCB.[6] It is also worth noting that the GMS add-on depends on credit risk RWA in addition to market risk RWA.



Note: The sample of banks includes BAC, C, GS, JPM, MS, and WFC.

Source: Federal Reserve Board, FR Y-9C, DFAST 2021, BPI's calculations.

Exhibit 1 decomposes the capital requirements for market risk for the six U.S. banks subject to the GMS across the two components. The Basel 2.5 component of the capital requirement for market risk, defined in the first half of equation (1), is approximately $43 billion. The GMS component of the capital requirement for market risk is approximately $57 billion based on the 2021 stress test results (the latest available). As a result, the aggregate capital requirement for market risk is about $100 billion, 2.3 times higher than the capital charge based solely on the Basel 2.5 market risk rule.

Note that, because the Basel 2.5 market risk capital requirement is generated based on Basel 2.5's assessment of the levels of market risk associated with trading book assets, and the GMS add-on effectively requires firms to capitalize against hypothetical realization of market risk (i.e., hypothetical trading losses), there is already an inherent duplication of capital requirements for market risk. However, it is difficult to quantify the magnitude of duplication, because the methodologies underlying Basel 2.5 market risk capital charges and the GMS add-on are not the same.

[6] However, this assumption understates the impact of the GMS. Trading losses caused by the GMS result in capital depletion at banks operating at the SCB floor, which would be factored into their own capital planning decisions. This problem can be resolved by unflooring the SCB calculation in equation (1).

Other Ways to Derive the GMS Add-on

There are other ways of calculating the GMS add-on that rely on information provided in the Fed's DFAST disclosures. One is to split the difference between the SCB and the 2.5-percent floor across the three different risk stripes: market risk, credit risk and operational risk. The DFAST disclosures provide GMS losses, total credit risk losses and operational risk losses cumulatively over the nine quarters of the stress planning horizon. Using these data, we can calculate the share of each risk stripe in total losses and set the GMS add-on to equal the share of trading losses times the portion of the SCB that is above 2.5 percent. However, this approach assumes losses across all risk stripes are equally important in determining a bank's SCB. In practice, this is not correct. GMS losses are booked in the first quarter of the planning horizon, and GMS banks tend to reach the trough in CET1 capital ratios early in the stress planning horizon. As a result, GMS losses tend to explain most of the difference between a bank's SCB and the 2.5-percent floor. This approach would therefore understate the size of the GMS add-on.[7]

What Is the Fundamental Review of the Trading Book?

As noted above, FRTB represents a wholesale rewrite of the current market risk capital framework. It is designed to better capture tail risks under stressed conditions (a perceived weakness of the current Basel standard) and place more stringent guardrails on the use of internal models to measure market risk.[8]

Two particularly important changes were made:

- Replacing value at risk (VaR) with liquidity adjusted expected shortfall (ES), to better capture product liquidity and the fat tails of loss distributions; and
- Introducing explicit penalties on risk factors (e.g., asset prices, bond spreads, etc.) that do not meet the criteria for modeling, referred to as non-modellable risk factors.

The ES is derived using the most severe 12-month period over a history dating back to at least 2007. The Standardized Approach (SA) is also more risk-sensitive and behaves more like a model, relative to the current standardized market risk framework in Basel 2.5.

Under FRTB, model approvals will occur at the trading-desk level rather than at the product level, where such approvals occur under Basel 2.5. Trading desks that receive model approval will be able to use the Internal Model Approach (IMA) to calculate capital requirements for market risk. By contrast, trading desks that do not receive model approvals, or later fall out of compliance with the FRTB backtesting requirements, will be subject to the SA. This approach is calibrated to generally require higher capital charges than the IMA. Total RWAs associated with market risk are the sum of market risk exposures calculated using the IMA and the SA.

Estimated Impact of FRTB on Capital Requirements

The Basel Committee runs a quantitative impact study every six months to monitor the impact of the Basel III framework on banks and to determine the effect of the proposed revisions to the framework on capital

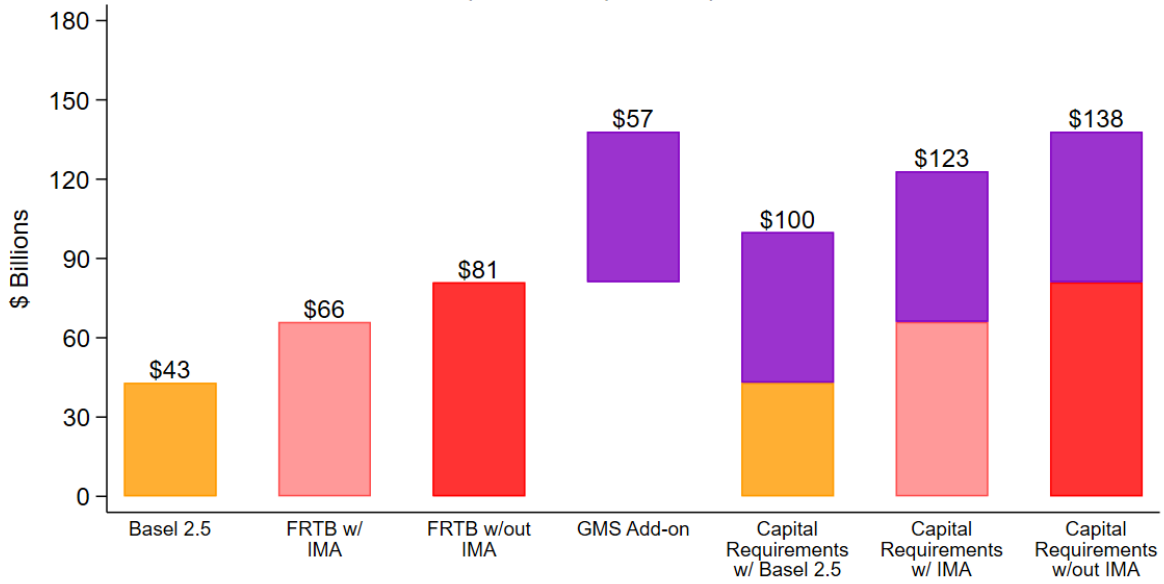
[7] Yet another approach would be to let the GMS add-on equal GMS losses net of taxes.

[8] *See* Basel Committee on Banking Supervision, Consultative Document: Fundamental review of the trading book, May 2012. In proposing the FRTB framework, the Basel Committee stated, "The Committee recognises the importance of ensuring that regulatory capital is sufficient in periods of significant market stress. As the crisis showed, it is precisely during stress periods that capital is most critical to absorb losses. Furthermore, a reduction in the cyclicality of market risk capital charges remains a key objective of the Committee. Consistent with the direction taken in Basel 2.5, the Committee intends to address both issues by moving to a capital framework that is calibrated to a period of significant financial stress in both the internal models-based and standardised approaches."

requirements. The most recent report was published in February 2022, based on 2Q21 data. The results show that in the aggregate, the 21 GSIBs included in the Basel Committee's sample would experience a 55-percent increase in market risk capital requirements versus Basel 2.5 with the adoption of FRTB. This estimate assumes banks will receive approval to use the internal model approach for all the trading desks or portfolios that already have such approval. Supervisory approvals to use internal models would probably be restricted relative to the Basel 2.5 model approval. Therefore, the 55-percent increase in capital requirements is a lower-bound estimate of the effect of the proposed revisions to market risk.

The extent to which U.S. regulators will make IMA available in the implementation of FRTB is uncertain. To estimate the effect of FRTB adoption assuming IMA will not be available under the U.S. market risk framework, we used the estimated effect of the revised market risk standards for the GSIB that is in the 75th percentile of the distribution of the revised market risk framework's overall effect. According to "Graph 70" of the Basel Committee's most recent report (page 77 of the report), market risk RWA would increase approximately 90 percent relative to current market risk requirements.

Exhibit 2: FRTB Impact on Capital Requirements for Market Risk



Note: The sample of banks includes BAC, C, GS, JPM, MS, and WFC.

Source: Federal Reserve Board, FR Y-9C, DFAST 2021, BPI's calculations.

Exhibit 2 shows the increase in capital requirements under these two scenarios: full approval to use IMA for FRTB (column 2), and no ability to use IMA for FRTB (column 3). The aggregate capital requirements for market risk for the six trading banks would increase from $100 billion to $123 billion with IMA and to $138 billion without IMA.

The existing framework already requires overcapitalization for market risk. The current U.S. framework requires banks to book massive trading losses during stress events, when they in fact earn profits due to heightened volatility and increased trading activity. For example, while a senior Fed official noted that the severity of the actual market shock in the first quarter of 2020 was similar in magnitude to the first quarter of the 2020 global

market shock, the largest six trading banks booked $7 billion in trading *revenues* in that quarter, instead of the $74 billion in trading *losses* projected in DFAST 2020.[9]

The remainder of the note describes how the U.S. agencies, in implementing FRTB, could improve the accuracy of the U.S. market risk capital framework by decreasing the severity level of the GMS, or simultaneously change the GMS and FRTB to prevent a material and further unnecessary increase in capital requirements for trading, including market making activities.

Potential Solutions

Adjustments to the GMS and FRTB could offset the drastic increase in the capital requirement for market risk and enable Basel III finalization in the United States to be capital neutral. Moreover, because the increase in capital requirements for market risk under FRTB is so large, relying on changes to the GMS alone might be insufficient to offset the increase in capital requirements. Because of this, it may be necessary to adjust both the GMS and FRTB.

Table 1: Priorities to Refine GMS and FRTB Frameworks

GMS Modifications	FRTB Modifications
Align liquidity horizon assumptions in the GMS with those of FRTB.	Allow the continued use of the internal model approach in the U.S. standardized approach/SCB, consistent with Basel 2.5.
Review the historical correlation assumptions in the GMS.	Lower the calibration of the multiplication factor range to 1.0 to 1.5 (current range is 1.5 to 2.0).
Allow for hedging of highly liquid assets under stress.	Increase the benefits of diversification by recalibrating the weight assigned to the firm's modellable risk factors and the "rho" parameter in the calculation of capital requirements for non-modellable risk factors.

GMS Modifications. The first potential modification would align the liquidity horizons in the GMS with those in the FRTB framework. A liquidity horizon is the time required to exit or hedge a risk position without materially affecting market prices in stressed market conditions. Currently, the liquidity horizons used to calibrate the shocks to risk factors in the GMS exceed those in FRTB. For example, in FRTB, the liquidity horizon is 10 trading days for interest rates and 40 trading days for corporate IG spreads. The FRTB also lists the liquidity horizons used for the various types of trading desks at a granular level.

By contrast, the GMS includes longer calibration horizons with shocks to risk factors (i.e., large and sudden changes in asset prices, interest rates and spreads) in more liquid markets using a period of about three months (60 trading days). In comparison, shocks to risk factors in less liquid markets have calibration horizons up to 12 months (250 trading days). The longest liquidity horizon in FRTB is about six months (120 trading days), roughly half the longest liquidity horizon in the GMS. Intuitively, longer liquidity horizons possibly allow for more severe shocks to the risk

[9] The trading revenue series available in the regulatory reports (specifically, the FR Y-9C trading revenue line item) includes both mark-to-market gains and losses and trading-activity-based revenue. The GMS is a set of instantaneous, hypothetical shocks to a large set of risk factors, intended to capture mark-to-market losses that banks with large trading operations could experience during a sudden market stress; therefore the comparison is not perfect but supports the view that the calibration of the GMS is overly conservative.

factors, due to the longer holding period under stressed conditions. The FRTB and GMS liquidity horizons are designed to capture the same practical difficulties with exiting or hedging positions under stress. The U.S. agencies agreed to the shorter FRTB liquidity horizons at the Basel Committee and therefore there is no principled basis to require longer horizons in the GMS.

Another potential improvement would be to revisit some of the calibrations in the GMS and assess whether the correlation of the shocks to the risk factors seems plausible. For example, the GMS assumes that most asset classes would experience their worst performance simultaneously, which is logically implausible and unsupported by historical experience.[10] Therefore, the size of GMS shocks should be modified to be more consistent with historical experience.

In addition, the Federal Reserve should also allow banks to assume they would hedge some possible losses on high-quality liquid assets under stress. In 2018, the Federal Reserve objected to firms' assumptions of purchases of trading positions to offset losses associated with the instantaneous market shock. This was because there was no guarantee of the counterparties' willingness to make such positions available during stress conditions. Although that is a reasonable concern for positions subject to substantial credit risk, it is significantly less so for other high-quality liquid assets.

FRTB Implementation. First, in adopting FRTB, the U.S. agencies should in general continue to allow U.S. banks to use the IMA when calculating RWA under the standardized approach and when calculating the stress capital buffer. So long as backtesting continues to demonstrate that the models are sound (or at least more predictive than the standardized approach), there is no principled basis to abandon the Basel regime and disqualify or reduce the availability of internal models.

Next, the backtesting dependent multiplier for trading desks approved to use the IMA starts at 1.5 for desks that report less than five backtesting violations over the prior year. However, because there is no empirical evidence to justify calibration of the 1.5 multiplier, our second recommendation is for the U.S. agencies to start the backtesting dependent multiplier at 1. The backtesting add-on would still range between 0 and 0.5 (i.e., the ultimate multiplier would range between 1 and 1.5), depending on the outcomes of the backtesting of the bank's daily VaR at the 99th percentile.

Third, the agencies should also recognize greater diversification benefits (i.e., by increasing the "rho" parameter) in the calculation of capital requirements for modellable and non-modellable risk factors in FRTB. In practice, banks can reduce portfolio risk by holding risk positions across broad regulatory risk classes (interest rate risk, equity risk, foreign exchange risk, commodity risk, and credit spread risk) not perfectly correlated with one another.

Final Thoughts

Capital requirements for market risk in the U.S. are set both by the Basel 2.5 framework and the GMS in the stress tests. Our analysis estimates that the GMS currently more than doubles capital requirements for market risk for the largest six banks in aggregate. Additionally, the Basel Committee's own quantitative studies suggest that adopting FRTB will further increase market risk capital requirements. This will lead to excessive capitalization for trading, including market making activities, which will discourage such activities and thereby exacerbate reduced liquidity in markets under stress.

[10] *See* SIFMA, "Global Market Shock and Large Counterparty Default Study: Recommendations for Reforms Based on a Statistical Analysis of Stress Testing Scenarios," August 2019.

Although more work could be done to quantify the overlaps and more precisely identify the changes that would address them, we have offered some adjustments to the frameworks that would at least mitigate the overcapitalization effect in the absence of this precision.