

# A Time of Stress: SIMM Passed the Test

## ISDA SIMM™ Data Study

JULY 2020

*In February 2020, the COVID-19 pandemic began to sweep across the world, sparking a global shutdown and ushering in the beginning of a steep recession and potentially ushering in an indeterminate period of global economic uncertainty.*

Selloffs in the Equity, Bond, and Commodity markets began to produce losses ranging from 35% to 40% from their all-time highs, leading to volatility levels not seen since the recession in 2008<sup>1</sup>. The OTC derivatives market had its share of volatility as well, seeing high yield CDS indices reaching new highs in March. As the volatility picked up, so did collateral swings and movements across all markets, including the OTC derivative market, prompting Central Counterparties (CCPs) to adjust their margin models mid-stream to account for collateral shortfalls<sup>2</sup>. The impact of the COVID shutdown also prompted regulators across the globe to delay the margin rules for bilateral OTC derivatives by one year.

***“The OTC derivatives market had its share of volatility as well seeing high yield CDS indices reaching new highs in March of this year.”***

### The Recent Volatility and ISDA SIMM™

As market volatility increased, risk models in the cleared OTC markets adjusted rapidly to ensure firms were adequately covering risk, but on the bilateral OTC side, firms exchanging margin using the ISDA SIMM model<sup>3</sup> (SIMM) had experienced something entirely different. SIMM is the initial margin model used by all firms that are in scope for the non-cleared margin rules to exchange regulatory initial margin. SIMM is by design a model that is intended to avoid procyclicality<sup>4</sup>. It was conservatively built to ensure it could withstand market shocks to allow firms who use the model to cover their risk without making ad-hoc adjustments, even through a highly volatile market period of stress. During the initial volatility period of February through March 2020 many industry experts questioned whether SIMM was built to be able to withstand these shocks. By all intents and purposes, SIMM did withstand the period of stress and volatility based on the data and evidence that we will demonstrate in this study.

<sup>1</sup>We used market data captured and referenced directly through NYSE historical market data  
<https://www.nyse.com/market-data/historical>

<sup>2</sup> Data gathered through BIS to compare CCP adjustments during COVID stress period  
<https://www.bis.org/publ/bisbull13.pdf>

<sup>3</sup>ISDA SIMM™ is currently the only approved model use for the exchange of Regulatory IM for bilateral OTC trading. 99% of all Phase1-4 firms are using SIMM to calculate regulatory Initial Margin

<sup>4</sup> Procyclicality refers to the tendency of financial variables to fluctuate around a trend during the economic cycle does have a robust governance structure in place to ensure that if there are observations of exceedances produced by the model due to new periods of stress, they are identified and the model is altered accordingly to ensure risk is being appropriately captured and that the model remains conservative enough to avoid future events of procyclicality.

***"SIMM is altered accordingly... to ensure the model remains conservative enough to avoid future events of procyclicality"***

In addition, SIMM does have a robust governance structure<sup>5</sup> in place to ensure that if there are observations of exceedances produced by the model due to new periods of stress, they are identified and the model is altered accordingly to ensure risk is being appropriately captured and that the model remains conservative enough to avoid future events of procyclicality.

## The Data Study

In this data study we are going to explore exactly how SIMM performed during the period of January through mid-April 2020<sup>6</sup>. We will look to see what, if any, exceedance took place across assets classes and compile benchmark data to illustrate how SIMM performed against Value-at-Risk (VAR) models<sup>7</sup> during other periods of stress. We will also look to make recommendations based on the data observed to any changes we believe could benefit the model.

## The Data Set

Non-cleared derivative portfolio:

- The table below summarizes the study's Test portfolio, which contained over six thousand trades across all asset classes (Rates, FX, Equity, Credit and Commodity, based on a synthetic composition of real client portfolios in terms of notional, maturity, and underliers.
- Backtesting results against ISDA SIMM according to BCBS' "Traffic Light Test", as well as Benchmarking of SIMM against various flavors of Value-at-Risk and Expected Shortfall measures, took place at both the asset class-level as well as at the consolidated portfolio-level.
- Backtesting occurred over the full period from the beginning of 2008 through the approximate end of the COVID stress period at 4/15/20<sup>10</sup>.
- Analysis and commentary are presented at the asset class-level first, to identify material risk factor drivers most affected by the COVID stress, in an effort to magnify where ISDA SIMM calibrations could be lacking adequate conservatism. Results are then analyzed in aggregate to determine how SIMM's overall conservatism stood up to the COVID stress. Summary results for each asset class are highlighted in the table below.

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<sup>5</sup>ISDA and its members perform quarterly backtesting results submitted to global regulators to ensure the model is working as intended as well as address changes needed to cover p&I shortfalls.  
<https://www.isda.org/category/margin/isda-simm/>

<sup>6</sup>As of the publication of this study this time frame remains the most volatile period due to COVID-19

<sup>7</sup>Value at Risk is a measure of the risk of loss for investments. It estimates how much a set of investments or investment portfolios might lose given normal market conditions in a set time period such as one day.

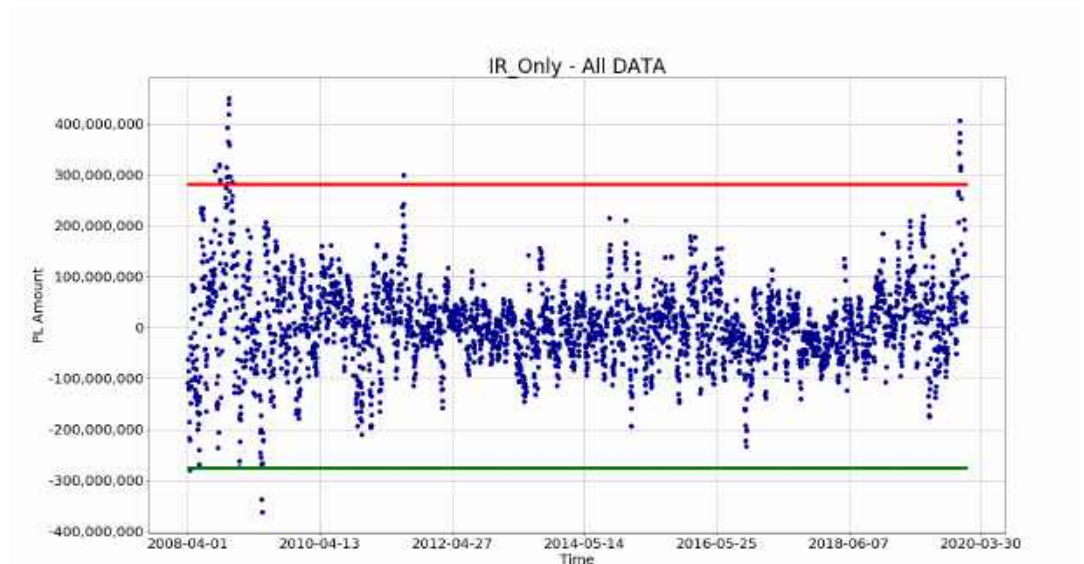
<sup>8</sup>We observed data that has shown consumer sentiment at its lowest in April, followed by several market rallies since then ref Wall Street Journal June 30th report: <https://www.wsj.com/articles/global-stock-markets-dow-update-6-30-2020-11593508397>

Asset Class	Instruments	Average Maturity	Material COVID Risk Factor Drivers	Most stressful 10-day COVID period	Backtesting Exceedances: 2008-2009 (12 months)	Backtesting Exceedances: COVID 2020
Rates	Swaps (277), Caps/Floors (224) – mostly USD-based, with minor EUR and AUD	5Y	USD-Prime-5Y, USD-LIBOR-1/3M	2/24-3/9/2020	19	8
FX	FxForwards (1,553), FxBarriers (25), FxSwaps (12) across 17 currencies	6M	vs. USD: RUB (-18% to +8%), COP (-16% to +5%), CHF (-6% to +6%), EUR (-6% to +6%)	3/5-3/19/20	22	1
Equity	EquitySwaps ( 2,359) - mostly USD with minor EUR, PLN, JPY, GBP, HKD.	3M	MSCI All Country Index, REITs, Retail	2/24-3/9/20	1	0
Commodity	CommoditySwap (736), CommodityOption (474), CommoditySwaption (4) – mostly oil and gas underlyings	1-3Y	NYMEX:NG (Henry Hub), NYMEX:CL (WTI), NYMEX:B0 (MtB Propane), ICE:B (Brent)	3/4-3/18/20	2	5
Credit	SingleNameCDS (519), IndexCDS (46)	3-5Y	Financials, Oil, Retail, Autos	3/4-3/18/20	53	3
Total	P&L is dominated by Commodity (56% median contribution to absolute 10-day P&L), followed by IR (24%) and Equity (10%)			2/24-3/9/20	0	0

## Graph Data Explained

- The backtesting charts we outline in this study show SIMM-to-Call (red line) and SIMM-to-Post (green line) calculated for the test portfolio as of 4/15/20. The blue dots represent hypothetical rolling 10-day full revaluation P&Ls for that static 4/15/20 portfolio, calculated by applying historical market data moves back through the beginning of 2008.
- Any time the hypothetical historical P&L is greater than or less than SIMM-to-Call or SIMM-to-Post, respectively, it is counted as an “exceedance” for purposes of backtesting. A strong measure of a given period’s market volatility is the number of SIMM exceedances that occur over a specific period for a given portfolio.
- The previous table compares the number of exceedances observed during the ~2 month COVID stress period (mid-Feb 2020 through mid-Apr 2020) against the ~12-month early 2008 through early 2009 stress period. When adjusted for the length of time, the number of exceedances are comparable for certain asset classes. Additionally, as shown in each of the charts below, the magnitude of the most volatile 10-day P&Ls are also comparable across the COVID and ‘08-’09 stress periods for most asset classes.
- We have broken out asset classes individually to illustrate how SIMM performed without diversification then how a mixed portfolio performed using SIMM during the COVID stress period to illustrate the benefits of a diverse portfolio using SIMM.

## IR-Only Asset Class

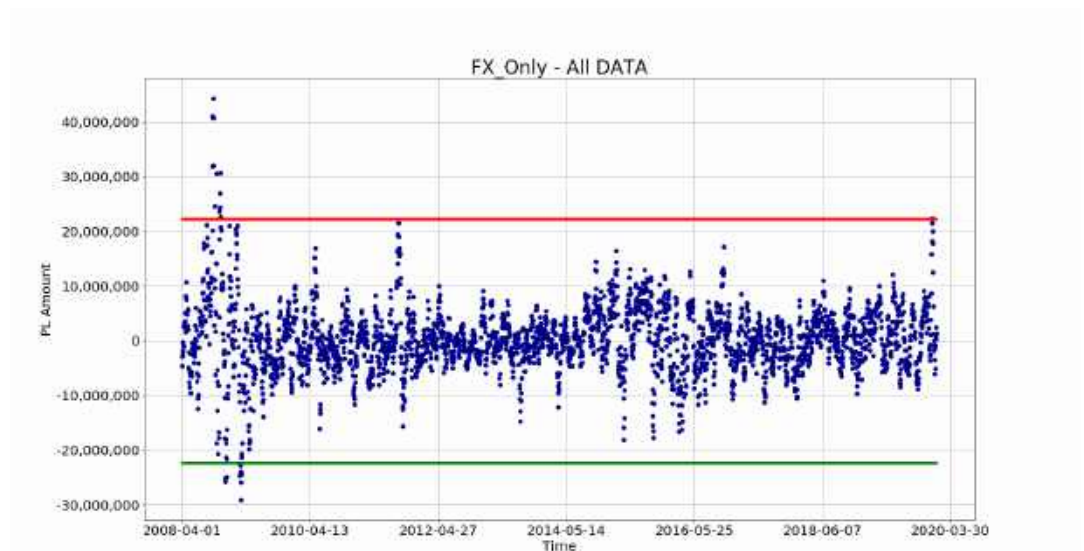


### Observations

- When adjusting for the length of time, the number of exceedances observed for IR during COVID was greater (proportionally) than observed during '08-'09.
- COVID exceedances were driven primarily by substantial negative rate shocks to USD-based rates at various tenors during mid- to late-February 2020, up to -140bps over a 10-day period. Peak negative rate shocks during '08-'09 were ultimately a bit more severe, nearing -190bps, explaining why the magnitude of historical P&Ls were ultimately a bit larger during the historical period.

***“COVID exceedances were driven primarily by substantial negative rate shocks to USD-based rates at various tenors during mid-to late-February 2020”***

## FX-Only Asset Class



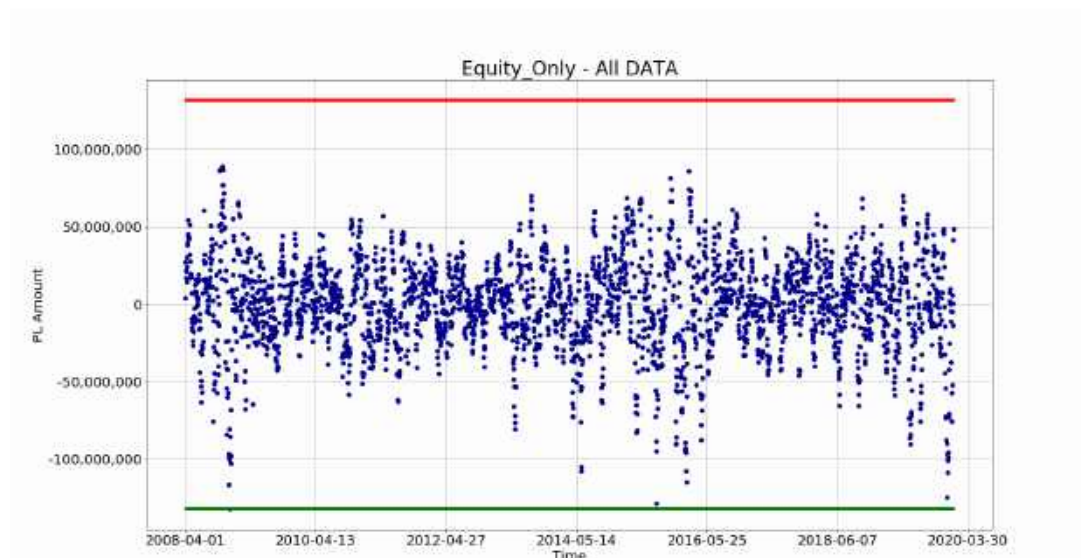
### Observations

- The COVID period was much less stressful for FX overall, as compared to '08-'09.
- The most stressful 10 days were from March 5 to March 19, resulting in the only failure outside of '08-09 period. The single failure was driven by short portfolio sensitivities to KRW, BRL, MYR, and COP currencies combined with relatively large devaluation moves across all vs. USD (i.e. positive P&L). This was counterbalanced with long portfolio sensitivity to RUB vs. USD, which also experienced devaluation.
- The most volatile currencies during 1Q20 (vs. USD) included RUB (-18% to +8%), COP (-16% to +5%), CHF (-6% to +6%), EUR (-6% to +6%). The currencies with greater max/min % changes in 1Q20 than in '08-09 (vs. USD) were CNY, COP, RUB.
- The large devaluation in RUB currency was also likely driven by the oil price collapse observed during 1Q20, due to the collapse in OPEC+ talks during late February / early March 2020, which ultimately led to negative oil prices during mid- to late-April.

***"The most stressful 10 days were from March 5 to March 19, resulting in the only failure outside of '08-09 period"***

## Equity-Only Asset Class

Currencies Captured: USD:1486, EUR:347, PLN:258, JPY:113, GBP:100, HKD:40, Other:15



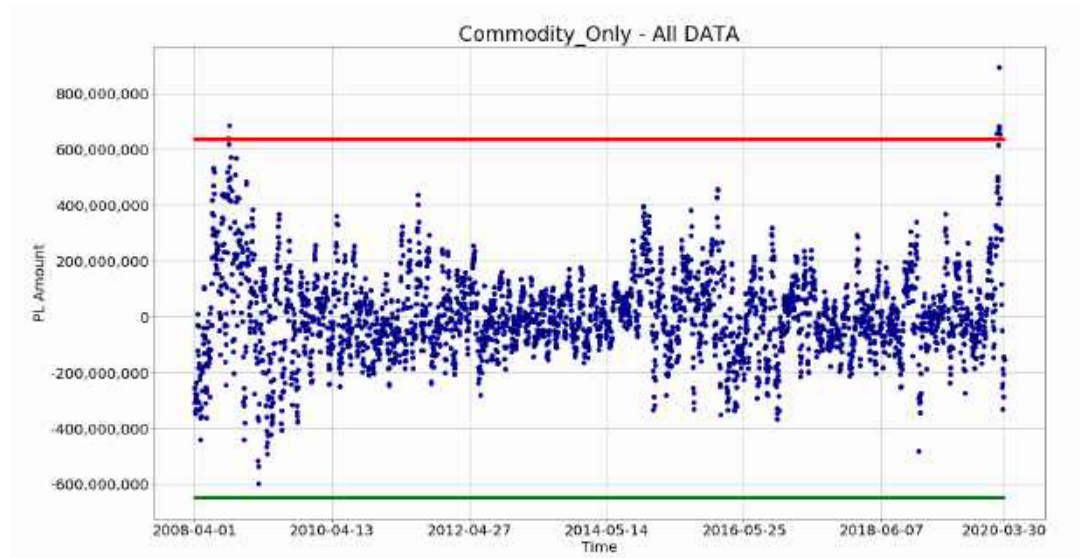
## Observations

- February 24 to March 9 were the most stressful 10-days during 1Q20, though resulted in no exceedances.
- REITs and Retail stocks experiences large declines, though the SIMM model was more than adequately calibrated.
- Peak volatility during COVID stress period was on the same order as '08-'09, though there are several other equity stresses over the historical 12-year period that are also of similar magnitude.
- Generally the 2015–2016 stock market selloff was driven by several global forces: the Chinese stock market bubble burst in mid-2015 and led to CNY devaluation, the Greek sovereign debt default in June 2015, and the UK Brexit vote in mid-2016. All of these led to additional Equity market volatility and pressures that were not generally recorded as strongly in other asset classes.



## Commodity-Only Asset Class

Commodity Underliers Used: NYMEX:NG (Henry Hub); NYMEX:CL (WTI); NYMEX:B0 (MtB Propane); ICE:B (Brent); NYMEX:RB (RBOB Gas); NYMEX:A7Q (MtB Gas); NYMEX:WJ (LLS)

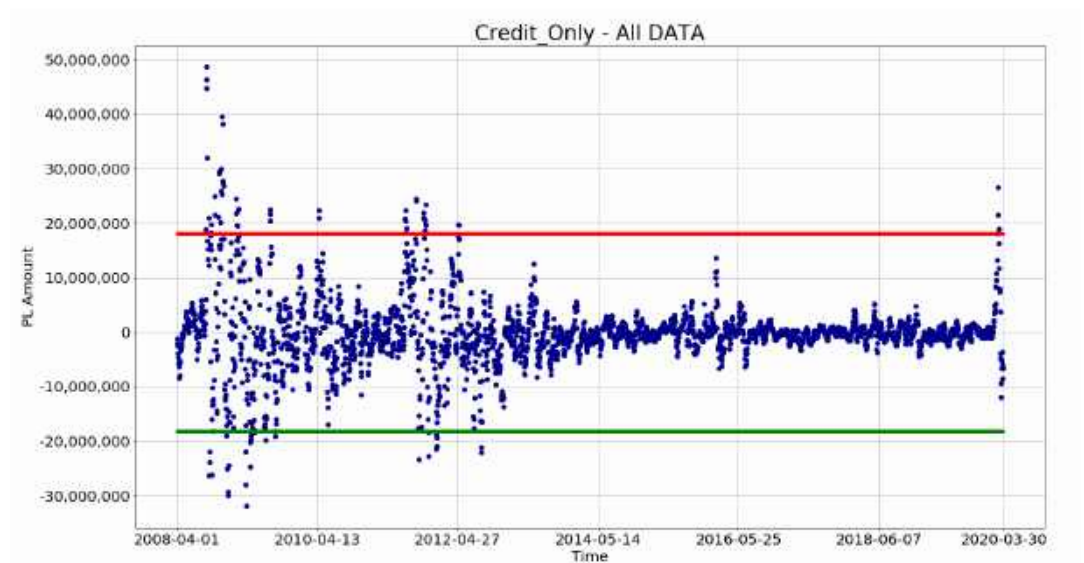


## Observations

- Large positive P&L swings were driven by short portfolio sensitivity combined with the oil price collapse observed during 1Q20 due to the collapse in OPEC+ talks during late February / early March 2020, which ultimately led to negative oil prices during mid- to late-April. Most commodity positions in the synthetic Test portfolio were US-based oil underliers, which were most heavily devalued during the 2020 global price collapse.

## Credit-Only Asset Class

Trade Types and Volumes Captured: Single Name CDS (519 trades), Index CDS (46 trades)

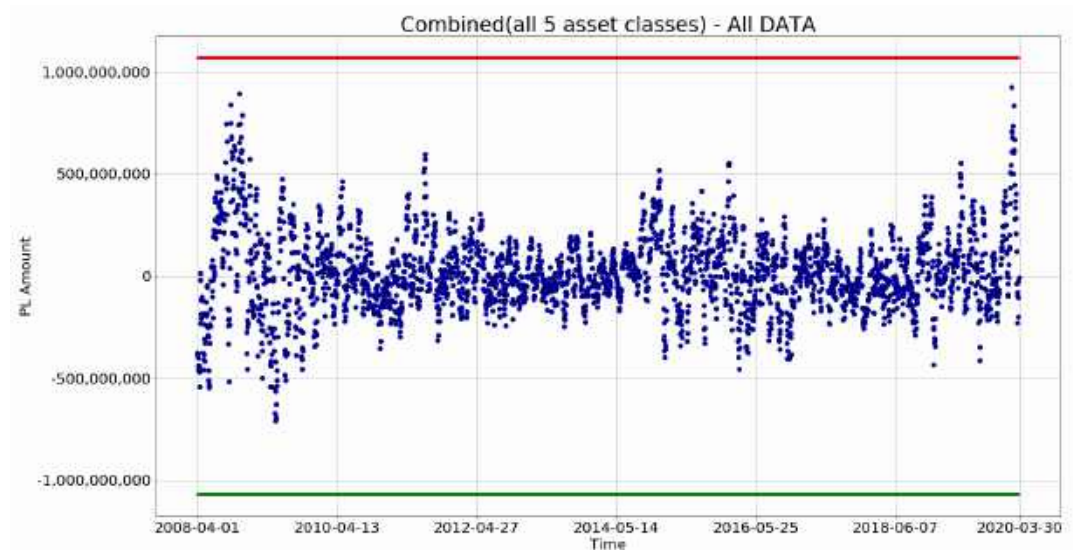


## Observations

- The most volatile underlying sectors observed are Financials, Oil, Retail and Autos .
- For credit, March 4 through March 18 were the most stressful 10-days during 1Q20.
- Overall, Credit was much more volatile, both in magnitude and over a more prolonged/sustained period of time, during '08-'09 as compared to the recent COVID period.



## Combined Portfolio of Rates/FX/Equity/Commodity/Credit



### Observations

- Based on a blended portfolio of asset classes, SIMM is still overall quite conservative with no observed exceedances.
- The benefits from diversification across all asset classes in a single netting set align with SIMM's design features.
- Overall, across the 2020 COVID volatility period, the magnitude of portfolio P&Ls is dominated by Commodity risk (56% median contribution to absolute 10-day P&L), followed by IR (24%) and Equity (10%).

### SIMM Benchmarking Summary

- All benchmarks were calibrated over "3+1" historical period, similar to SIMM<sup>9</sup>.
- Given that our backtesting approach relies on a "constant" portfolio with historical market moves applied as if that same portfolio had existed at that time "hypothetically," we used identical portfolios at 4/15/20 and 12/31/19 (with the maturities rolled forward). Thus, a 3-month swap at 12/31/19 position date was still maintained as a 3-month swap at 4/15/20.

***"The benefits from diversification across all asset classes in a single netting set align with SIMM's design features.."***

<sup>9</sup>SIMM calibration standard of 1 year of stress data and 3 years of data from the most recent continuous period from the calibration date ("1+3 standard") which satisfies requirements across regulator jurisdictions <https://www.isda.org/a/7FiDE/isda-simm-governance-framework-19-september-2017-public.pdf>

- Benchmark VaRs increase 2-15% from 12/31/19 compared to 4/15/20 due to the impact from COVID stress period. These increases are driven by the inclusion of the ~1Q+ P&Ls and market risk factors at more elevated levels of volatility in early 2020, therefore raising the amount of measured 99% tail volatility over the historical VaR period.
- LCH Expected Shortfall increases 33-105% due to the COVID stress period.
  - LCH ES methodology shows greater impact due to a) more emphasis placed on recent periods (EWMA volatility scaling), b) ES averages tail P&Ls, and c) more conservative tail percentile (99.7% vs. 99% for SIMM).
- Overall, the lack of change to SIMM risk weighted to accommodate the most recent COVID stress period is well balanced by its overall conservatism.
  - i.e. even though VaR and ES benchmarks are increasing due to COVID, they are inherently less conservative and only “catching up” to the more conservative SIMM

## Conclusion

In this data study, we set out to look at how SIMM performed under the new period of stress driven by COVID-19 and evaluate whether the model was sufficient in covering risk and/or if any changes to SIMM were observable. We concluded that the SIMM model remains conservative enough to cover 99th-percentile market volatility without the need for procyclical model adjustments in light of the recent coronavirus pandemic. Due to the benefits of diversification, we observed no exceedances for a diverse, multi-asset class portfolio during the recent COVID stress period and believe the SIMM model to be appropriately calibrated from its reliance on the '08-'09 stress period in its calibrations. Even at the individual asset class-level, the observed exceedances from the recent COVID stress period are not enough to change the “Green” traffic light rating for the Test portfolio subjected to historical SIMM backtesting.

## About the Study:

This study is compiled by AcadiaSoft, the leading industry provider of risk and collateral management services for the non-cleared derivatives community in collaboration with Quaternion Risk Management<sup>10</sup>, a capital markets software and consulting practice with a focus on the quantitative aspects of risk management, trading and finance. AcadiaSoft and Quaternion partner to deliver AcadiaSoft’s Risk Services Suite<sup>11</sup> to support firms that need to comply with the Uncleared Margin Rules.



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## About the Authors:

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John Pucciarelli is Head of Industry & Regulatory Strategy at AcadiaSoft. John is leading AcadiaSoft's outreach to IM phase 5 & 6 firms building on his knowledge and experience as well as overseeing AcadiaSoft's interactions with global regulators and industry associations. John was previously with The International Swaps and Derivatives Association (ISDA) as Director of Market Infrastructure and Technology. John led margin and collateral Initiatives for the ISDA membership overseeing the implementation of the initial phases of the non-cleared margin rules from an operations and business perspective.



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Scott is a finance and risk professional specializing in capital planning, stress testing, and model development at large US banks. He advises financial institutions on risk management and regulatory compliance matters, helping clients accelerate model development and achieve high-value institutional objectives.

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<sup>10</sup>Quaternion is a partner of Acdiasoft INC which provides risk services and SIMM model calculation and market data services

<sup>11</sup>Acdiasoft provides collateral and Risk services for the bilateral OTC market - <https://acdiasoft.com/solutions/risk-suite/#imbacktestingbenchmarking>