PROCYCLICALITY OF CCP MARGIN MODELS: SYSTEMIC PROBLEMS NEED SYSTEMIC APPROACHES

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AGENDA*

- Introduction: why the focus on IM models is misplaced
- An empirical case study
- Worst-case scenario analysis
- Complexity
- Conclusions

*The full report is available at:
https://www.world-exchanges.org/storage/app/media/Procyclicality_cut7.pdf

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INTRODUCTION

- After the 2007-08 crisis, there were concerns that, in a stress, margin calls would put further pressure on clearing members, creating a feedback loop that could deteriorate the situation.
- Since then, CCPs have implemented different procyclicality mitigation measures, including monitoring procyclicality levels, recalibrating their margin models, and increasing transparency and reporting.
- Despite these measures, after the March 2020 events, there have been renewed claims regarding the procyclicality of initial margin (IM) models.
- The debate ignores the trade-offs and constraints involved, including any assessment of the costs and financial stability implications.

THE FOCUS ON IM IS LARGELY MISPLACED

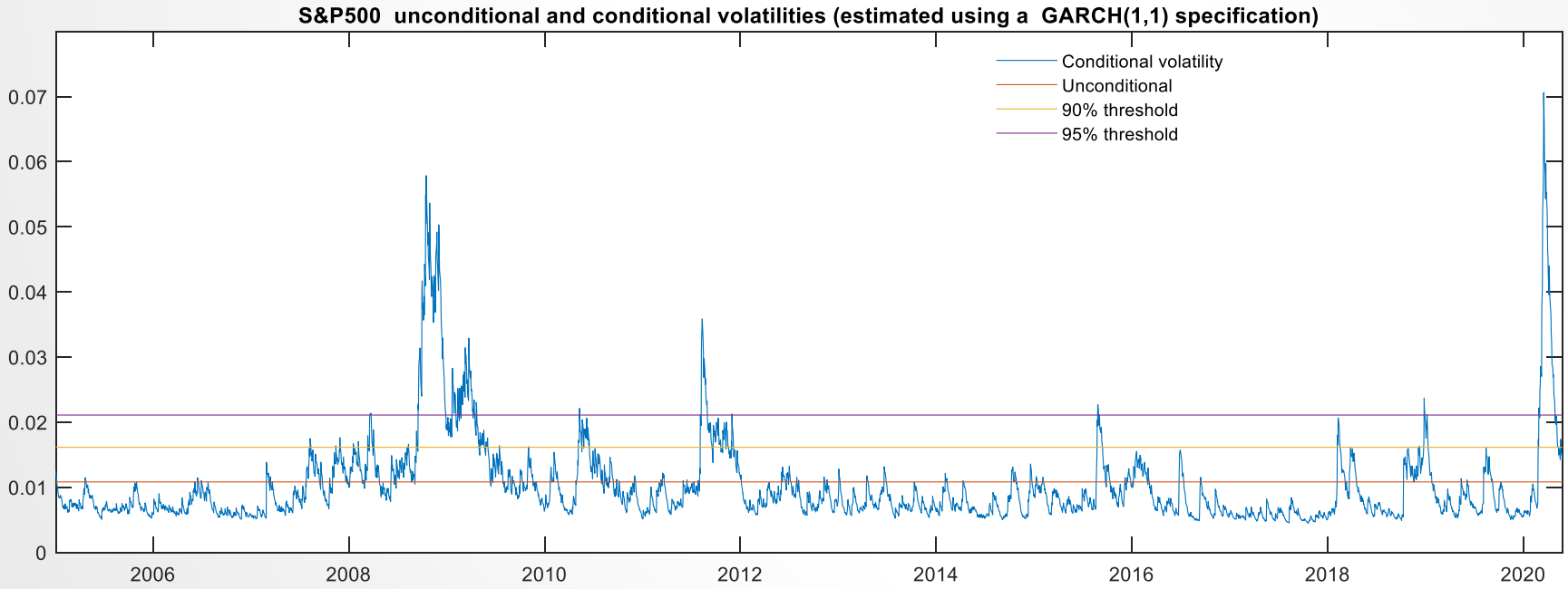
- Margin calls are mainly about variation margin (VM), not IM. They can also be driven by changes in the portfolio.
- **Unavoidable trade-offs and constraints**: Since market risk models need to be risk sensitive and central clearing needs to be economically efficient, there is a limit to what can be achieved.
- **Randomness:** The same calibration may produce different outcomes under different initial conditions. Prescribing calibrations does not make the unpredictable any more predictable.
- **Volatility clustering**: It is critical to distinguish between long-term properties (for which, for example, extending the lookback period may be useful) from those that reflect market conditions at a given point in time (e.g., conditional volatilities)
- **Complexity:** The problem is that feedback loops are amplified through system interactions; therefore, we should look for solutions that address system-wide robustness.

CASE STUDY: THE MARCH 2020 EVENTS

To illustrate the points above, we will consider an empirical example:

- **Data**: S&P500 daily prices (15 years, from January 2005 to May 2020)
- **Models**: Historical simulation VaR (HS VaR) and filtered historical simulation (FHS VaR)
  - Single-tailed 99% confidence level
  - Lookback periods of 1-, 10- and 12-years.
  - One-day MPOR
  - Decay factor (for FHS models)=0.985
- We are working with a constant portfolio, therefore the volatility observed is only caused by changes in market prices.

WHY CONDITIONAL VOLATILITY MATTERS



- The spike in (conditional) volatility observed in March 2020 reaches a maximum which is 6.5 times larger than the long-term (unconditional) volatility.
- Conditional volatilities vary through time.
- Crucially, the resilience of the CCP (and of the system) does not depend on long-term properties but on getting the numbers right under the prevailing market conditions at a specific point in time.

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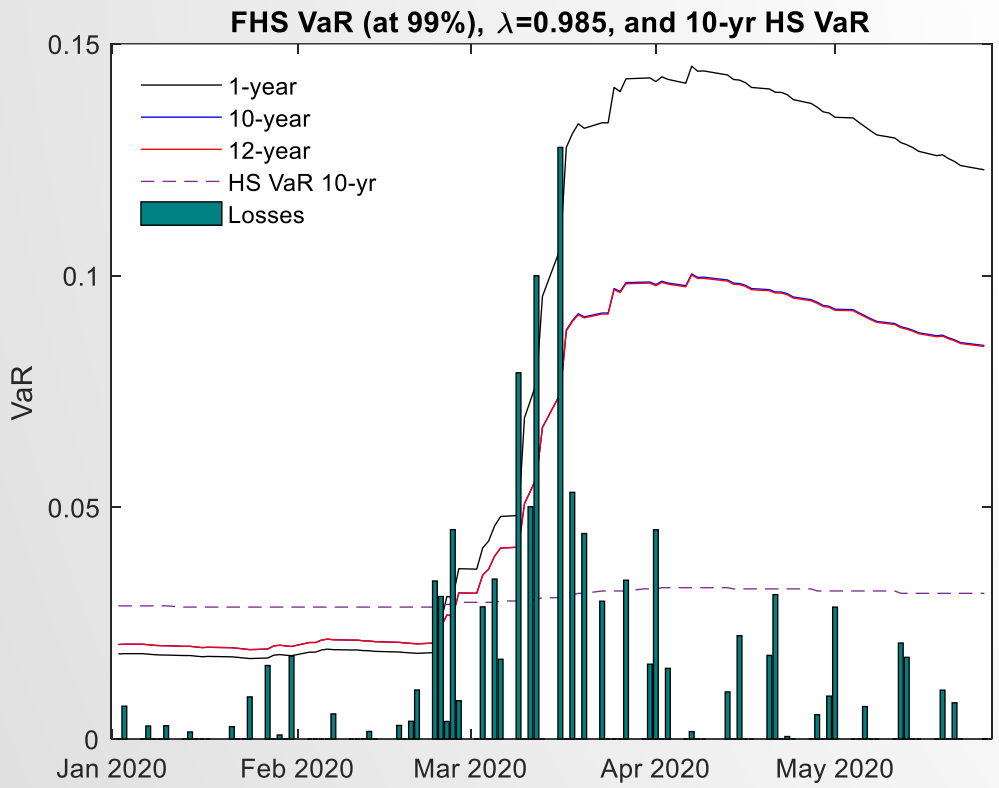
MODEL PERFORMANCE MEASURES

- **Coverage**: Number and size of backtesting breaches.
- **Procyclicality**:
  - **Peak-to-trough (PT) ratio**: the ratio of the maximum initial margin required to the minimum margin required during the period.
  - **n-day measure**: the largest increase in margin over an n-day period assuming a constant portfolio. It is a relative measure of the speed of change. We will consider n=1 and n=5.
- **Cost of over-margining**: measured as the average excess margin C(M) (it is not an estimate of the real costs of posting collateral to the CCP, but only a way of comparing two models in terms of how much they over-margin)

LESS PROCYCLICALITY vs ADEQUATE COVERAGE



	FHS VaR			HSVaR
	1 year	10 years	12 years	10 year
Breaches				
Number	6	6	6	12
Agg. Size	0.1112	0.1730	0.1730	0.3153
Max	0.0308	0.0532	0.0532	0.0972
Procyclicality				
PT ratio	6.61	4.21	4.20	1.35
5-day max	74%	45%	45%	15%
1-day max	31%	21%	21%	9%

- No significant difference between 10- and 12 -years FHS (even though the 12-year captures the 2008 stress)
- The 1-year is more procyclical but produces significantly smaller breaches
- This illustrates the contradiction in simultaneously asking for low procyclicality and smaller/less breaches.
- Similar issues if we instead vary the decay factor λ

Given the magnitude of the shock, would adding/increasing a floor make a significant difference?
At what cost?

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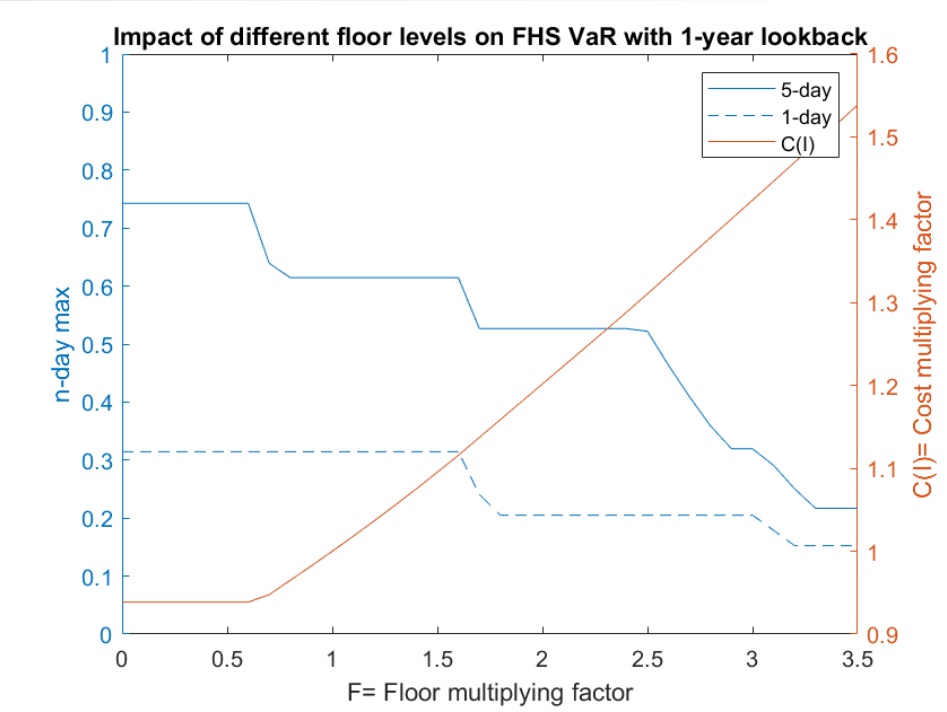
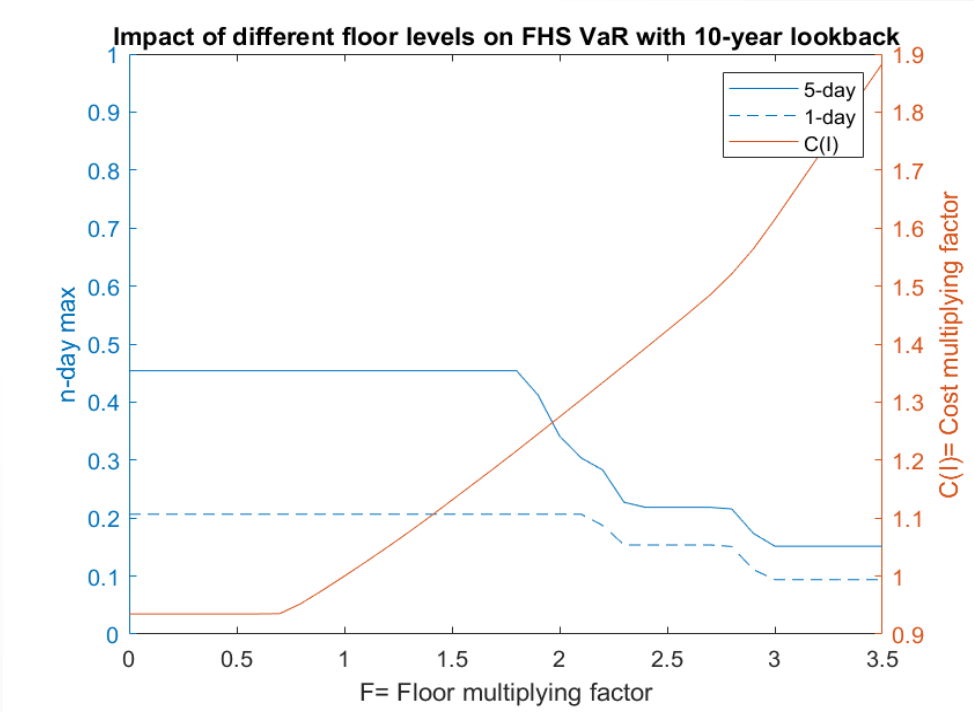
LESS PROCYCLICALITY vs VIABLE CLEARING COSTS

Baseline: We assume a 10-year HS VaR floor





We would need to increase the floor by a factor of around 2 before we see any significant reduction in procyclicality

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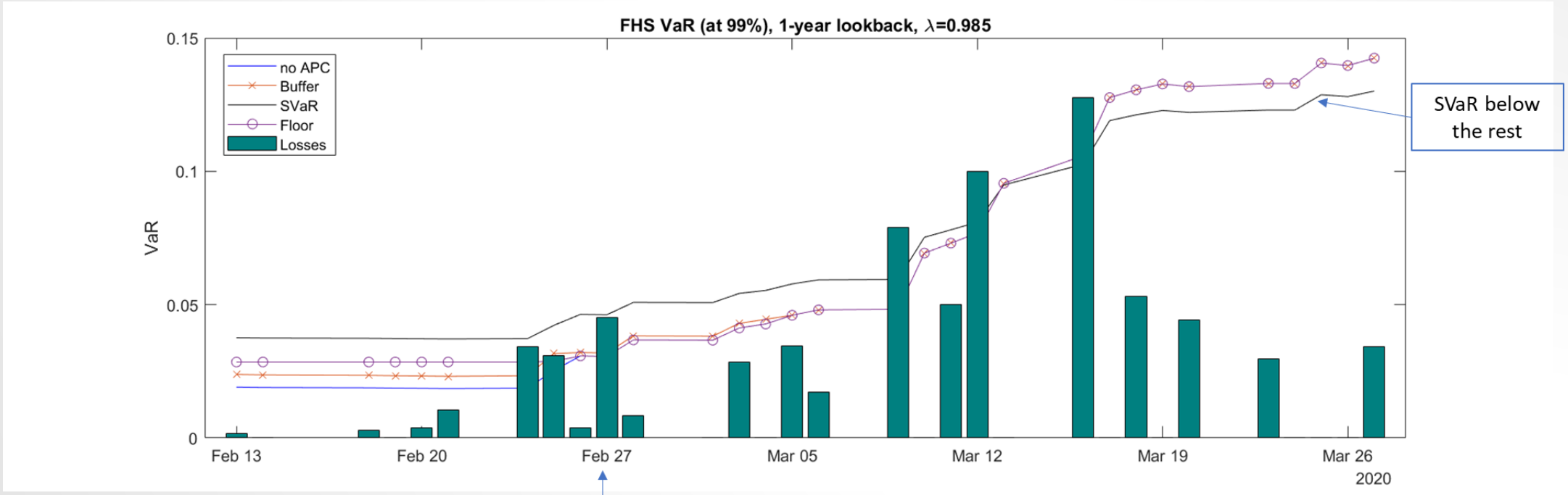
WORST-CASE SCENARIO

- We consider the potential losses had the member defaulted on any day during March 2020.
- We will consider the FHS models together with three standard anti-procyclicality (APC) tools:
  - **Buffer**: 25% additional IM.
  - **Stress**: We estimate VaR in a stressed period ($VaR^{stressed}$), and we consider the weighted average

$$SVaR=0.25 \times VaR^{stressed} + 0.75 \times FHSVaR$$

  - **Floor**: We use the 10-year HS VaR as a floor.

MODEL PERFORMANCE (1-YEAR LOOKBACK):



None of the APC tools can prevent having large margin increases

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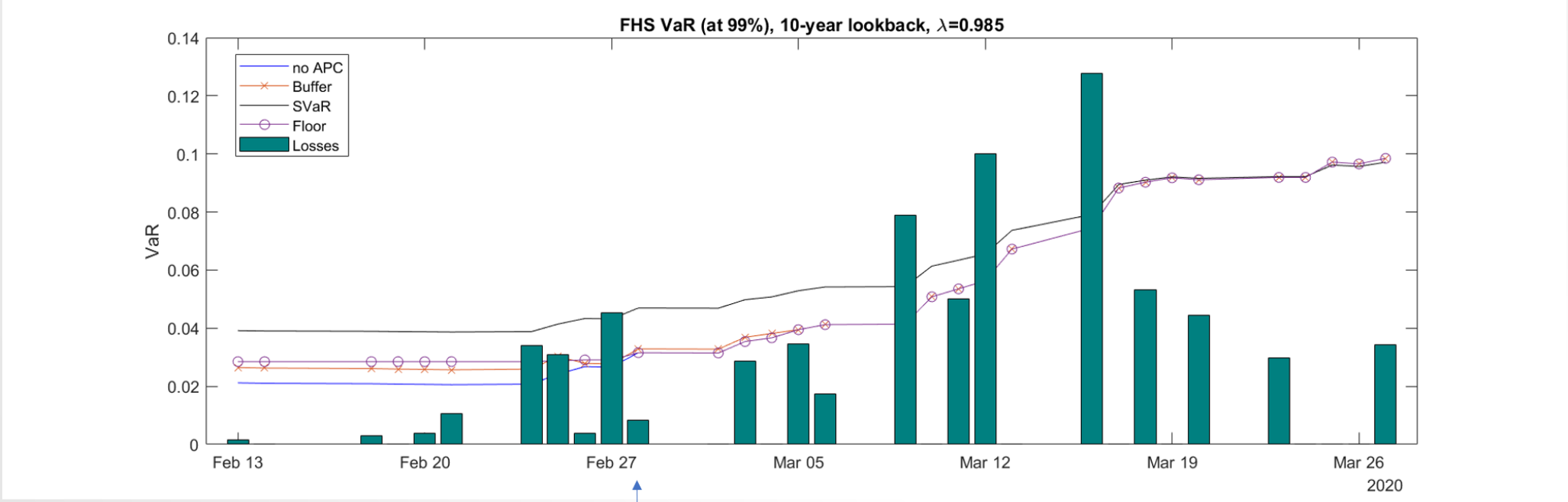
...AND SIMILARLY FOR THE 10-YEAR LOOKBACK



``*In the March market turmoil, IM increased sharply after a few days, which suggests that APC tools were able to dampen or slow down the IM increase only for a short time period*" (FSB, 2020)

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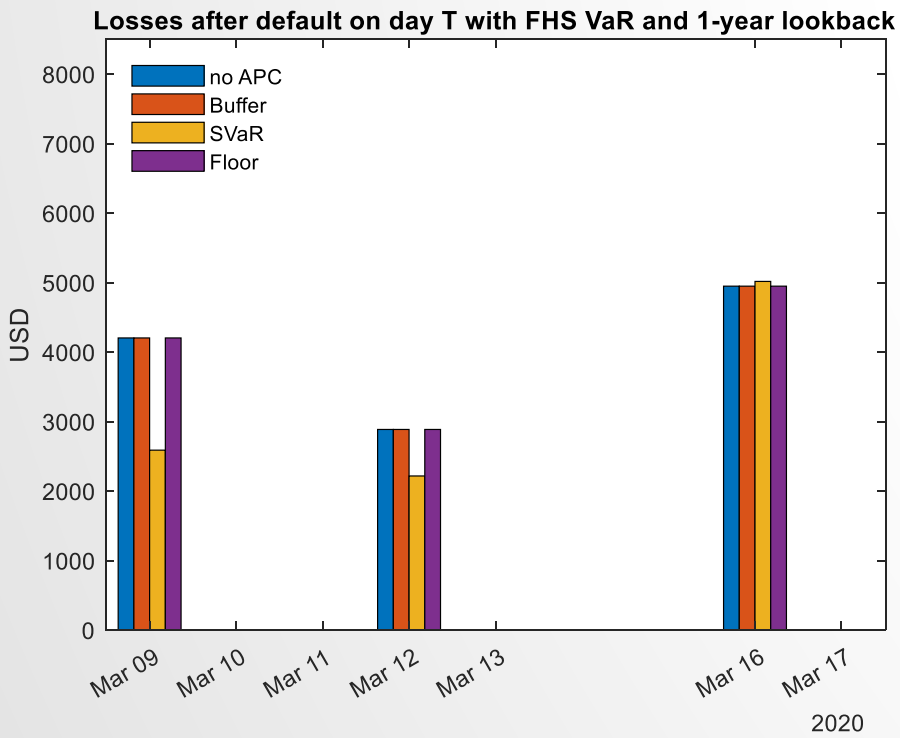
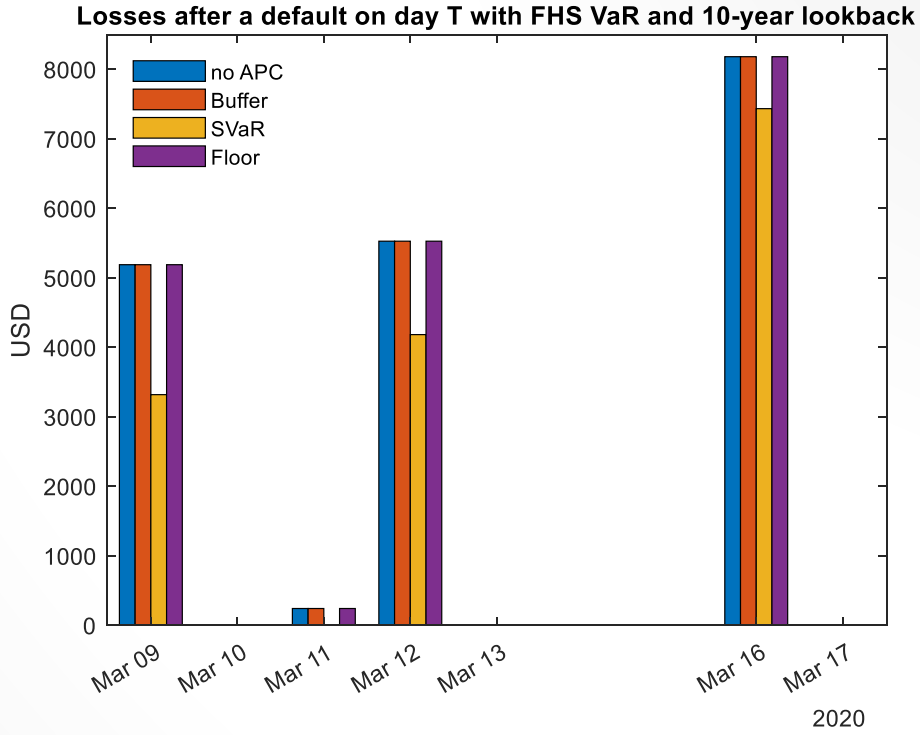
LOSSES ASSUMING A DEFAULT ON DAY T*





- 10-year FHS model produces losses that can be 64% larger compared to the 1-year one
- SVaR tends to perform better but not always.

*Losses estimated assuming one S&P500 E-mini futures contract long position.

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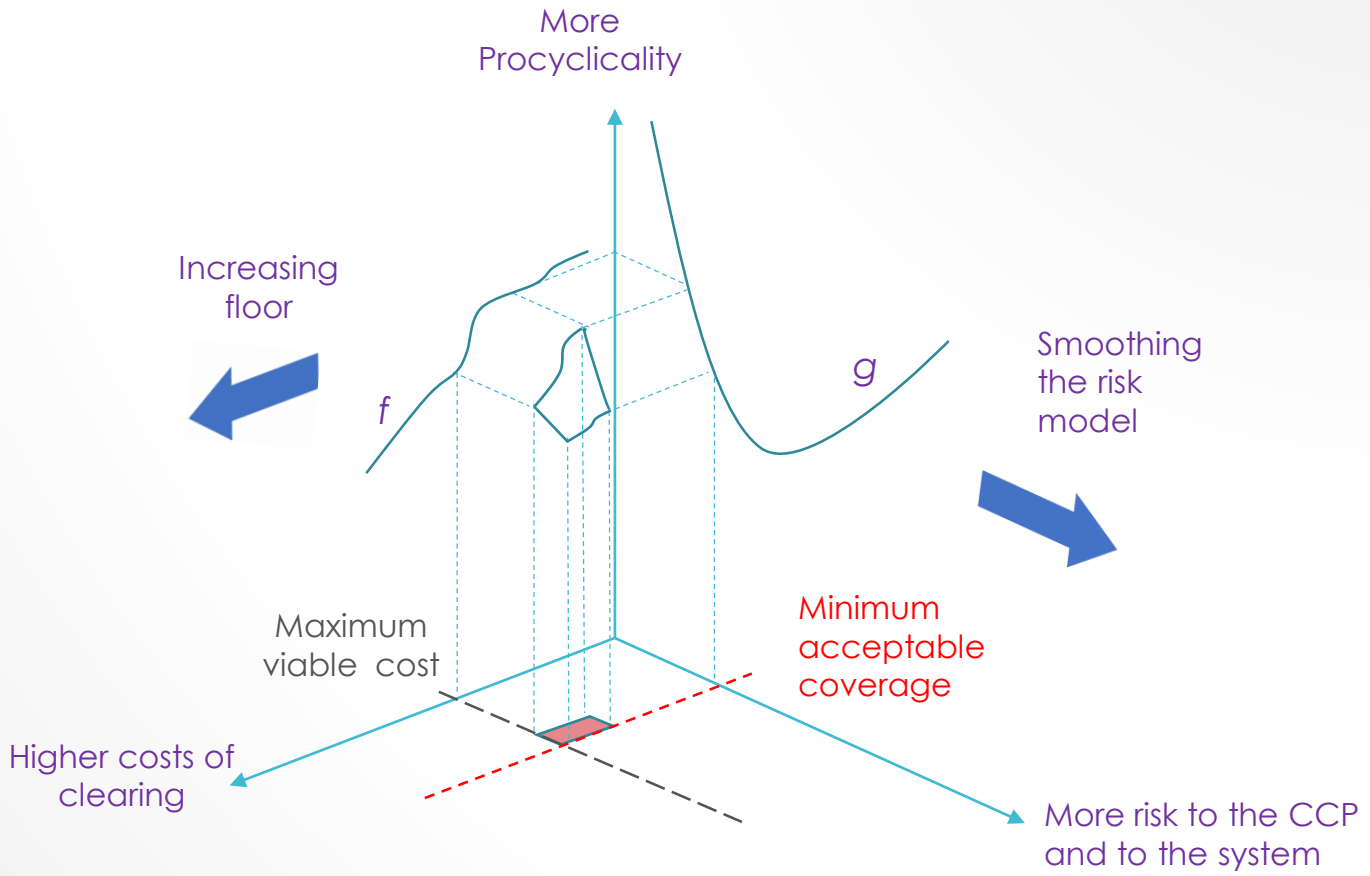
IN SUMMARY:

- We face a three-way set of trade-offs
- We have constraints on costs and coverage
- + Relations *f* and *g* are non-linear
- + Randomness: Different scenarios will produce different relations *f* and *g*, and different solution sets
- + Different risk factors will have different dynamics



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COMPLEXITY

- In a complex system, procyclicality is only one among the possible mechanisms that may contribute to the propensity to generate adverse feedback loops.
- Reductive approaches do not work because the safety of the system is a consequence of the interactions and interdependencies.
- It is important to also consider the incentives and behaviours: artificially "smoothing" the IM requirements may induce moral hazard in CCP members and lead to additional risk taking.
- Procyclicality mitigation is one layer of defence but others are needed, including market participants ensuring their liquidity management strategies take account of the possibility that margin requirements may rise significantly during periods of market stress, or liquidity-focused macroprudential stress tests.

CONCLUSIONS

- We all agree IM models should be calibrated to address procyclicality to the extent that it is prudent and practical.
- But, if at the end of the day, fragilities in the system remain that contribute to adverse liquidity feedback loops, what else we need to do?
- Given the limitations discussed, the answer cannot simply be to impose further constraints into the IM models.
- Constraining the ability of the CCP to set prudent but adequate margins has the double negative effect of incentivizing risk-taking while curtailing the ability of the CCP to correctly collateralize its exposures. Due weight should be given to the role of CCPs in ensuring the right resources are in the right place at the right time, holding risk takers to account.
- While the tensions and trade-offs we have discussed will not go away, they would be better addressed by acknowledging that adverse feedback loops are a consequence of interactions across the system and, as such, that the problem requires system-wide solutions.