EUREX Architects of trusted markets

Eurex Clearing margin performance during 2020 and reflection on the industry discussion

17 December 2020

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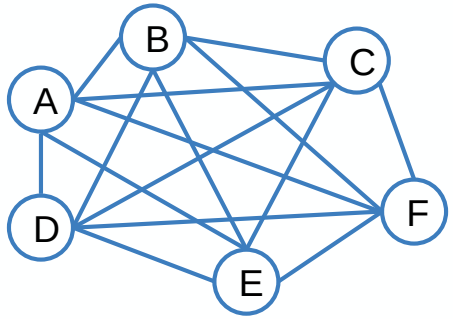
1 Summary

Summary

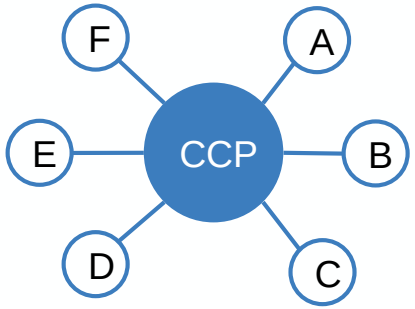
- Year 2020 provided an important dataset to review the behavior of new financial market architecture introduced since 2009.
- Recently, FIA, ESRB and ECB published papers and studies outlining the effect of market volatility and CCP margin behavior on liquidity demand for Clearing Members and Clients: the two main topics emerging are the dynamics of the margin models and the intra day margin calls.
- This presentation aims to contribute Eurex Clearing perspective, facts and figures and also ideas on potential next steps.

Benefits of central counterparty clearing

Bilateral market structure



CCP market structure



Key logic of central clearing

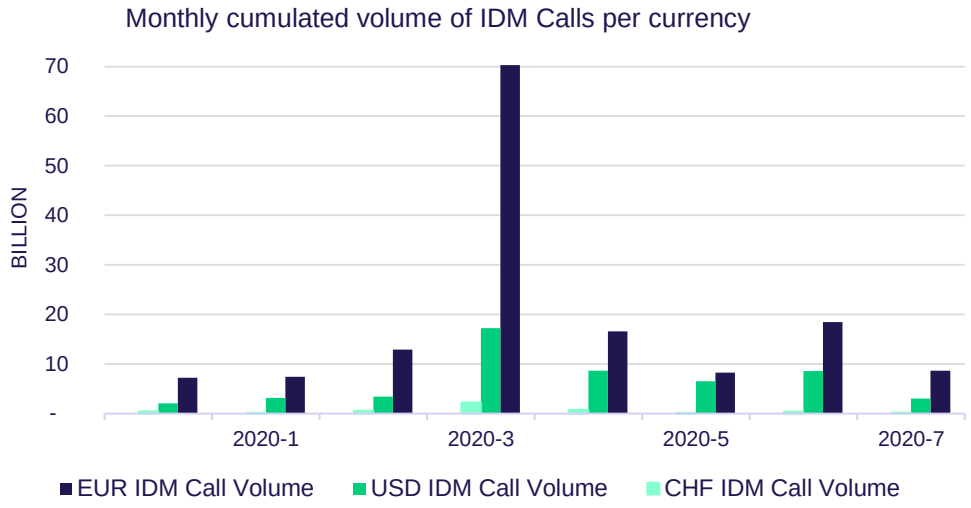
Reduce systemic risk by:

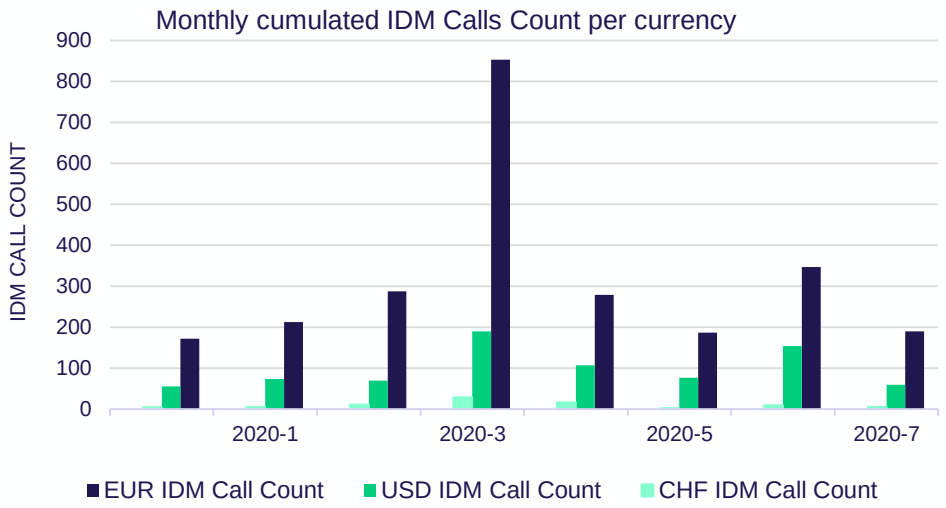
- Reducing interconnectedness
- Counterparty risk reduction
  - by collateralization of exposures stemming from cleared portfolios
    - changes over time due to
      - Portfolio recomposition
      - Market regime changes
      - Margin parameters changes

2020 events generated an important dataset on the behavior of financial market architecture with central clearing playing a greater role since 2009

2 Covid 2020 lookback

Intraday Margin Calls





IDM Calls (in bn)	2019-12	2020-01	2029-02	2020-03	2020-04	2020-05	2020-06	2020-07	2019 average
EUR	7.21	7.42	12.93	70.31	16.58	8.26	18.44	8.64	**6.99**
USD	2.07	3.18	3.43	17.26	8.67	6.51	8.60	3.01	**3.08**
CHF	0.49	0.16	0.58	2.29	0.76	0.01	0.41	0.18	**0.16**

IDM Calls Count	2019-12	2020-01	2020-02	2020-03	2020-04	2020-05	2020-06	2020-07	2019 average
EUR	172	213	288	853	279	187	347	190	**266**
USD	56	74	70	190	107	77	154	60	**90**
CHF	5	6	11	29	17	3	10	6	**4**

Margin Performance Summary

Intraday margin calls

- extreme market moves necessitated extraordinary number and volume of intraday margin calls in March 2020; currently intraday calls are back to normal levels.

Margin requirements and margin collateral

- as the market volatility picked up and market participants increased their exposures, margin collateral increased from EUR 60bn to 110bn; currently it stands at EUR 71.2 bn.

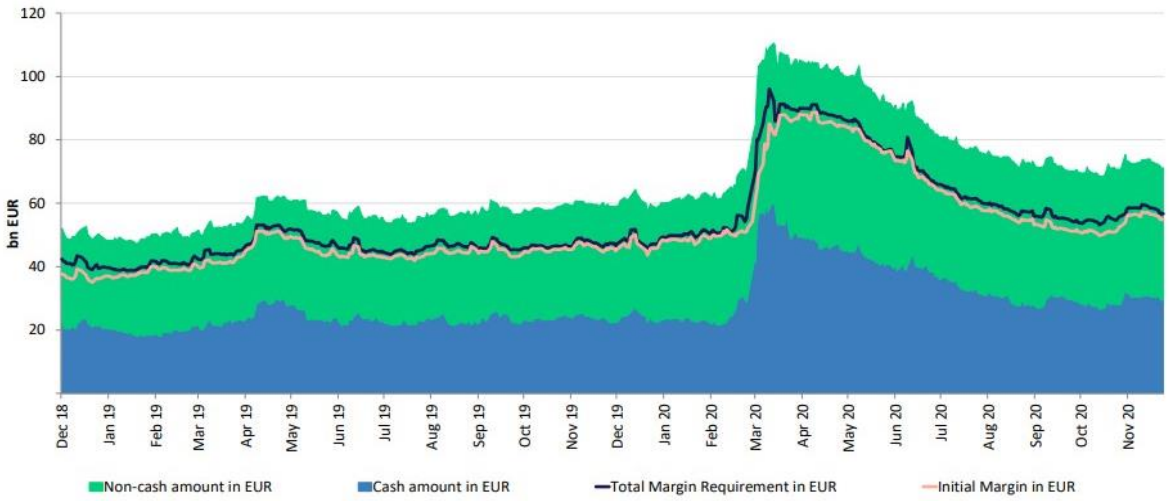
Dynamics of margin parameters

- Prisma Margin parameters adapted to new level of volatility adequately and gradually, without manual interventions. Margins for different markets reacted differently, reflecting different volatility patterns.
- Margin parameters decline slowly. For most products, the indication is that it will take 3-6 months to revert to pre-crisis levels if market volatility is at pre-crisis levels during that time.

Margin Requirements and Margin Collateral

Eurex Clearing has a sufficient coverage of margin requirements by margin collateral with a stable split between cash and securities

Margin Requirement and Collateral Development (last 720 days)



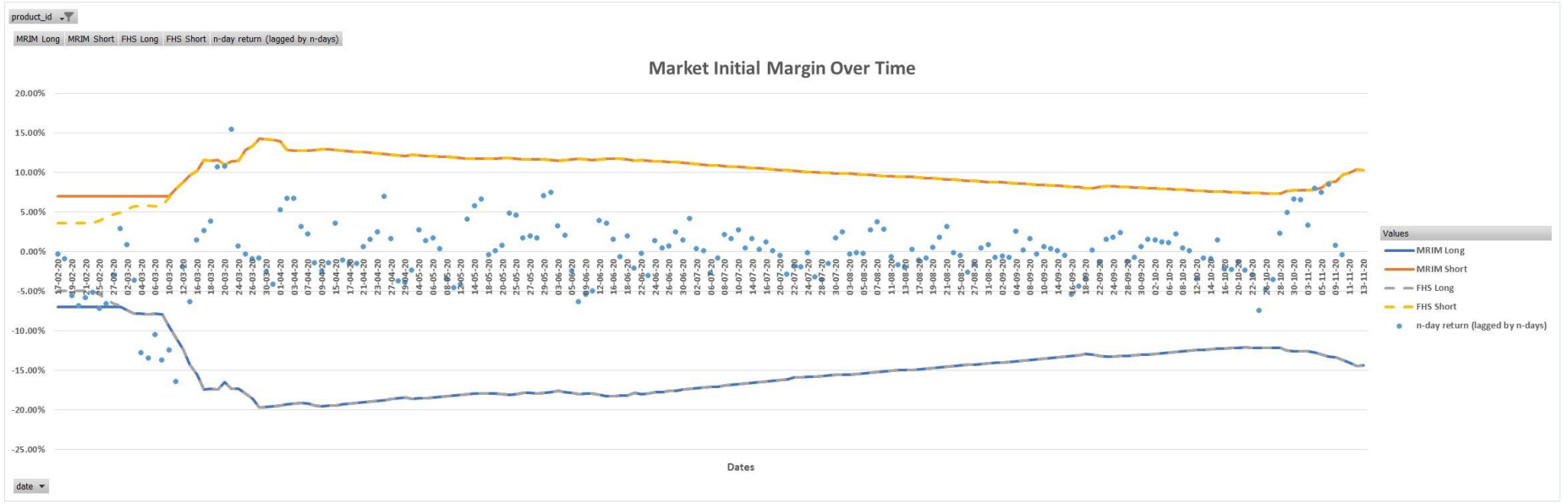
	TODAY	LAST WEEK		LAST 180 DAYS		LAST 360 DAYS		LAST 720 DAYS	
CATEGORY	DAY T (04/12/2020)	DAY T - 7 (27/11/2020)	CHANGE (in % pts)	DAY T - 180 (05/06/2020)	CHANGE (in % pts)	DAY T - 360 (10/12/2019)	CHANGE (in % pts)	DAY T - 720 (14/12/2018)	CHANGE (in % pts)
TOTAL MARGIN REQUIREMENT (in bn EUR)	56.7	58.5	-3.0%	76.7	-26.0%	46.4	22.1%	41.0	38.2%
INITIAL MARGIN (in bn EUR)	54.9	56.5	-2.8%	76.2	-28.0%	44.9	22.2%	36.6	49.9%
MARGIN COLLATERAL (in bn EUR)	71.2	73.0	-2.4%	92.0	-22.6%	59.2	20.4%	49.0	45.5%
NON-CASH AMOUNT (in bn EUR)	41.7	42.6	-2.2%	51.1	-18.4%	36.6	14.0%	28.7	45.3%
CASH AMOUNT (in bn EUR)	29.5	30.4	-2.7%	40.9	-27.8%	22.6	30.7%	20.3	45.7%
CASH RATIO ON TMR (in %)	52.1%	51.9%	0.2%	53.4%	-1.3%	48.6%	3.4%	49.4%	2.7%
OVERCOLLATERALIZATION (in %)	25.6%	24.9%	0.7%	20.0%	5.6%	27.4%	-1.8%	19.3%	6.3%

Key insights

- Following the peak in March, margin requirements started to decline at a slow pace
- Initial Margin and Total Margin Requirement are a function of both margin model (which in turn is a function of market volatility) as well as risk exposures of cleared portfolios
- Cash ratio remained stable throughout 2020; overcollateralization remained well above 10% at all times.
- Stable collateral composition with dominant role of cash

Product-level margin performance for EURO STOXX® 50

- EuroSTOXX 50 futures represents the most actively traded equity derivative contract at Eurex Clearing
- The chart depicts margin levels (3-day MPOR) with and without floors, for long and short positions, over time and compares to 3-day PnLs
- The contract displayed increase in levels of volatility since second half of February. There were several exceedances of 3-day PnL against the margin levels. When comparing to 1-day PnL, number of margin exceedances is lower.
- Margins reacted gradually and adequately first exhausting the pro-cyclicality buffers thus smoothening the pace of the increase
- Slow-paced normalisation of margin levels since March, still significantly above pre-crisis levels.
- Observed a 7.99% 3-day move in November due to vaccine related announcement.



3 Eurex Clearing reflection on the industry discussion

Derivatives clearing performance through the crisis

Worked as designed?

Learn from the new developments and continuously improve?

Good to have this discussion today

Discussion landscape

Area	Topic	ECAG approach	More discussion points / design choices / trade-offs
Intraday Margin Call	Driver	• Market movements (leading to trading losses), position changes. No manual adhoc changes	• Possible drivers for IDMC are 1) market movements 2) position changes and 3) margin features. During the Covid 2020 distress, 1) was identified as the biggest driver.
	Timing	• Event-driven (see drivers), operational thresholds	• Scheduled batch vs. Event-driven. Tradeoff: operational facilitation vs. uncovered risk if strong market move between batches.
	Trading Losses & Gains	• Can be covered by non-cash	• 1) Adverse MtM changes can be covered by non-cash 2) Intraday pay-in/pay-out of trading losses/gains in respective currency. Tradeoff: combination of allowing non-cash collaterals and passing through pay-in/pay-out automatically is not feasible.
	Netting Level	• Segregated pool level • (new) Excess collateral pool helps reduce number of calls	• 1) net across client pools – tradeoff with segregation 2) "eat" into IM – tradeoff with MPOR
	Predictability	• Intraday margin reports	• 1) timing predictability 2) amount predictability – reports are possible, markets remain unpredictable
IM model	Flooring	• Stress Period Floor targets 10y+ 99-99.5% MPOR-day move	• Stakeholders to agree on the right level of floors
	Reactiveness	• Formula-based, gradual changes reflect volatility regime. No manual adhoc changes.	• 1) Formula-based approach with predictable and transparent model – agree how quick/slow margins should react and calm down by setting parameters (e.g. decay/half-life) vs. 2) static modelling with discretionary adjustments. Mind the tradeoff with margin breaches backtesting.
	MPOR	• Aligned with DMP: Fixed Income derivatives 2d, Equity derivatives 3d, OTC 5d	• Any additional information on MPOR adequacy from analysing granular dataset 2020?
	Back Testing	• Portfolio and product-level backtest	• Backtest on portfolio or product level? Against 1-day or MPOR-day PnL? With or without addons?
	Concentration & Liquidity	• Addons are built into IM model	• Addons within or outside margin model?
General		• n/a	• Lack of consistency across CCPs is criticised

Some tradeoffs (Operational, Risk and Regulatory)

Strong fit with FIA WP

Zoom in: IM model - example for transparency on product-level margin procyclicality and backtesting

Product ID	Product Name	MPOR	Target C.L.	*Long*			*Short*		
				Breaches	LTMR	IM MRC	Breaches	LTMR	IM MRC
FESX	EURO STOXX 50 Index Futures	3	99.00%	2	103%	16%	1	105%	18%
FGBL	Euro-Bund Futures	2	99.00%	1	103%	24%	0	-	11%
FBTP	Long-Term Euro-BTP Futures	2	99.00%	2	154%	20%	1	187%	26%

Granular dataset of product-level margins and PnLs (here for the last 2 years) can be used to generate KPIs for 1) procyclicality and 2) backtesting. Some of these KPIs may also help to understand potential liquidity needs.

1) Procyclicality KPIs:
   - **IM MRC**: IM Maximum Rate of Change over 1 day
     - MRC can also be used as an estimate for liquidity needs – increase of IM due to increase in market volatility, position unchanged
     - Other KPIs are possible e.g. rate of IM change over 1 week, 6 months, …

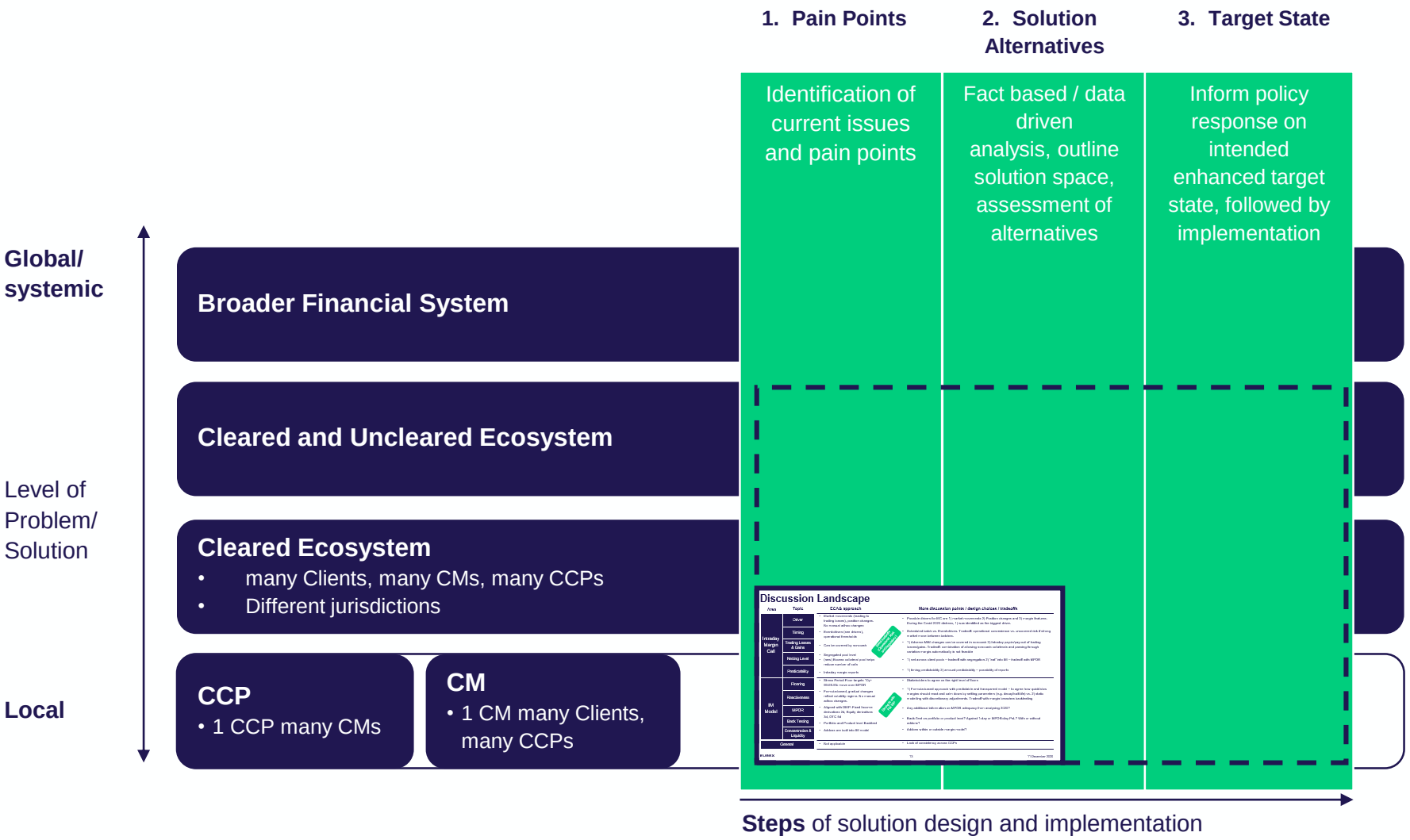
2) Backtesting KPIs (product level, without addons)
   - Exceptions: number of observed Margin Breaches
   - Effective Confidence Level
   - **LTMR**: Loss to Margin Ratio (worst 1-day Loss/IM)
     - Consistent usage of 1-day Loss (instead of MPOR-day loss) makes the results more comparable across CCPs
     - LTMR Can also be used as an estimate for liquidity needs - potential size of intraday margin call (in relation to IM) due to market move

Zoom in: Intra Day Margin Call

Topic	CM perspective	Eurex Clearing perspective
Ad-hoc vs. scheduled intraday margin calls	▪ No harmonization between CCPs ▪ Possible liquidity squeeze under stressed market circumstances ▪ Difficulties to pass on ad-hoc intraday margin calls to clients ▪ Hard deadlines of ad-hoc intraday margin calls ▪ Operational thresholds limiting number of intraday margin calls favorable ▪ Ad-hoc intraday margin calls only times of extreme market dislocation ▪ Interest in resilient CCPs	▪ CCPs shall not be left with significant uncovered exposures ▪ Application of operational thresholds only intervene in case of significant uncovered exposures ▪ Transparency and intraday margin reports shall enable clearers to predict intraday margin calls ▪ Compliance with EMIR requirement to assess exposures on a near to real-time basis
Passing through of trading gains/losses intraday vs. netting of requirements	▪ Asymmetry of handling: intraday profits should be passed through ▪ Netting of requirements and credits ▪ Provision of non-cash collaterals ▪ Intraday provision of possibly illiquid product currencies shall be avoided	▪ Excess collateral can be withdrawn when adhering to cut-off times or on request ▪ Intraday all requirements can be covered by non-cash collaterals ▪ Netting of variation margin and initial margin allows higher capital efficiency ▪ (new) excess collateral pool allows more efficient cash management and lower liquidity needs ▪ Combination of allowing non-cash collaterals, netting and passing through variation margin automatically is not feasible

Opportunity to engage in discussion to understand pain points, needs, constraints, develop solution alternatives and approach enhanced target state

Zoom out: Levels of pain points and solutions



In search of enhancements to prevent potential systemic issues, it is worth to elaborate also higher level solutions (Cleared & Uncleared) in addition to more “local” solutions at CCPs/CMs or Cleared Ecosystem level

Key takeaways / potential next steps

- Shorter term Quick Wins:
  - Collect granular Dataset 2020 (product level margins, PnLs) across CCPs and perform quantitative study
  - Create transparency and evaluate tradeoffs between:
    - Procyclicality KPIs (e.g.: maximum 1-day change of IM)
    - Backtesting KPIs (product level, against 1day PnL, without addons)
  - Derive ideal margin performance “trajectory” to inform progression towards enhanced target state with harmonization (MPOR, Floors, reactivity, …)

Preview on p 14.

- Mid term goals
  - Evaluate further pain points in necessary granularity and structure, derive solution alternatives and inform potential regulatory policy response to achieve intended enhanced target state

Thank You!

4 Appendix

Dynamics of margin parameters over time

Prisma margin model has two main components determining how margin reacts to changes in market volatility

Margin Floor by means of Stress Period VAR

determines how low margin can go during calm times

- Stress Period VaR acts as an anti-procyclicality margin floor in Eurex Clearing Prisma IM model
  - As an example, thanks to SP VaR component, the pre-crisis IM for EuroSTOXX 50 futures was 7% of notional; substantially higher than peers‘ margins for their benchmark equity products
- Eurex Clearing has performed annual recalibration of its Stress Period VaR component in May 2020 reflecting Covid-19:
  - Recalibration is based on a long history of data reaching back to Lehman crisis and now also including Covid-19 crisis
  - The impact of recalibration on productive portfolios was minimal as vast majority of portfolios were above this margin floor

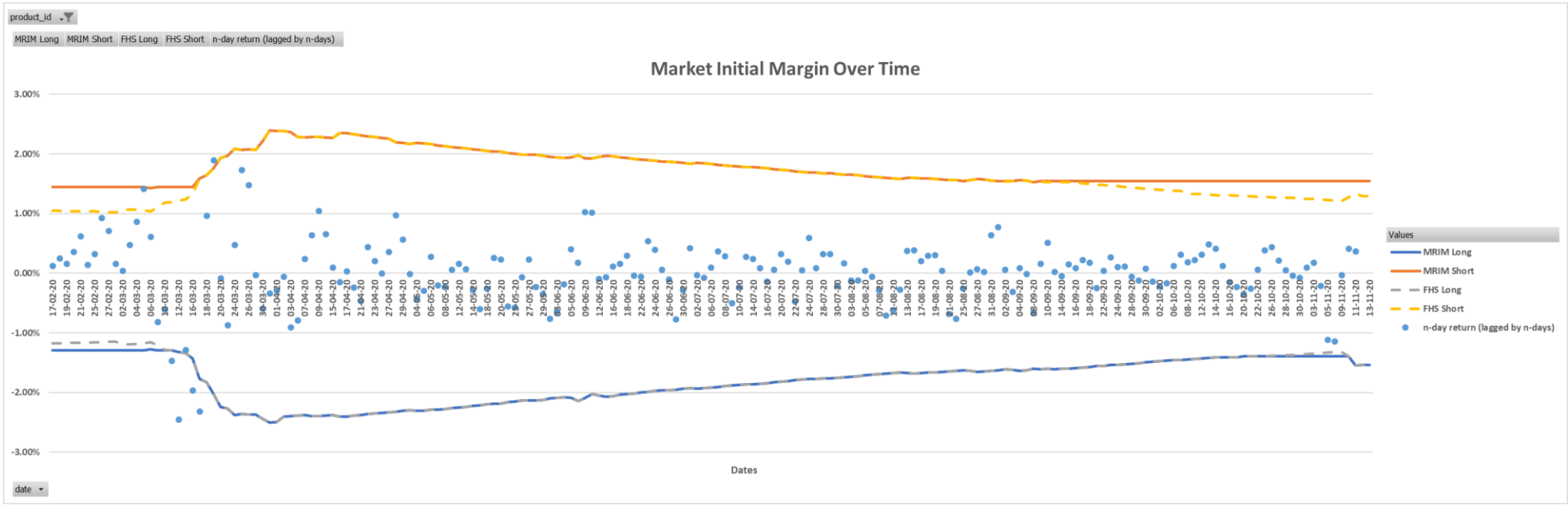
Filtered Historical Simulation VAR

determines how quickly margin reacts to changes in volatility

- The reactivity of Eurex Clearing Prisma model is driven by Filtered Historical Simulation component
  - The parameter governing reaction speed is lambda in an exponentially weighted moving average (EWMA) estimator
  - Currently, lambda parameter is calibrated to achieve half-life of a single shock of approx. 50 working days
  - Margin adequacy remains above 99% target (99.5% for OTC)
- Another effect is the expected time it takes for margins to revert to pre-crisis levels. Eurex Clearing risk team performed forward-looking scenario simulations for several market volatility levels.
  - Current volatility is above pre-crisis levels
  - For equity products products, the indication is that it will take another 3-6 months to revert to pre-crisis levels if market volatility is normalised during that time.

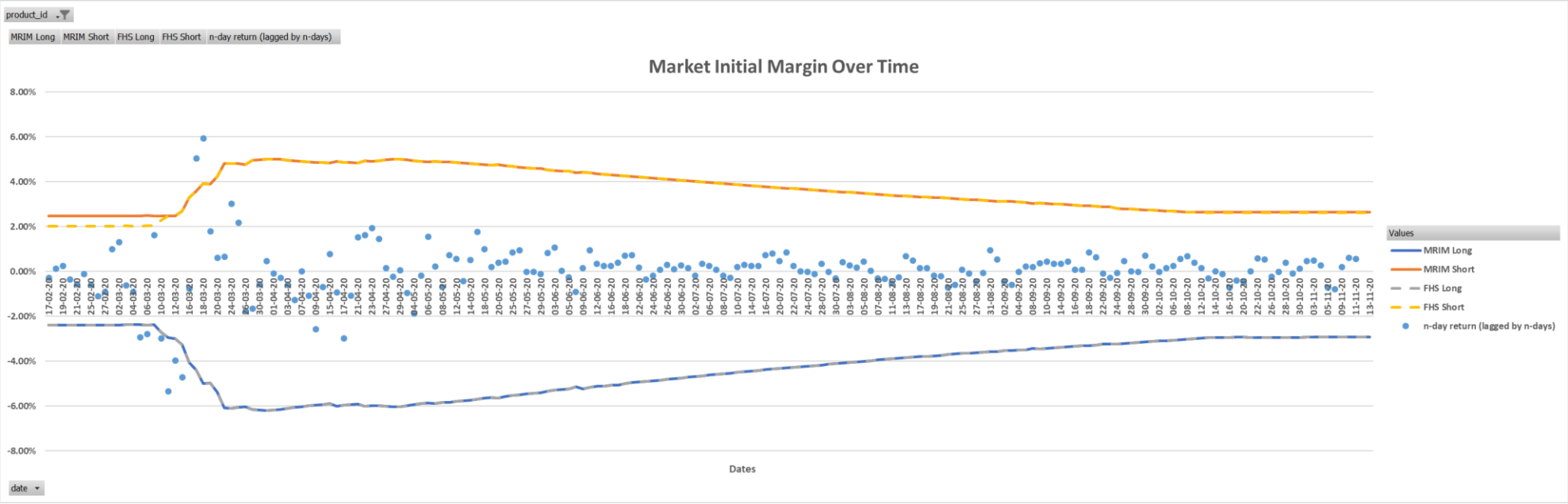
Product-level margin performance for Euro-Bund Futures (FGBL)

- Euro-bund Futures is the most traded fixed income future contract on Eurex
- The chart depicts margin levels (2-day MPOR) with and without floors, for long and short positions, over time and compares to 2-day PnLs
- While initially less volatile than equity contract, it picked up steam in March leading to a few margin exceedances. When comparing to 1-day PnL, number of margin exceedances is lower.
- Pro-cyclicality buffer was larger for short position than long positions as most of stress periods historically characterised by price moves up in a crisis.
- The new returns resulted in IM adapting to new, higher volatility regime, e.g. IM for short positions going up from 1.5% of notional to 2% notional as of 20 March.



Product-level margin performance for Euro-BTP Futures (FBTP)

- The chart depicts margin levels (2-day MPOR) with and without floors, for long and short positions, over time and compares to 2-day PnLs
- The situation with Covid-19 in Italy led to several margin exceedances when measured against 2-day backtesting PnL. When comparing to 1-day PnL, number of margin exceedances is lower.
- Margins gradually increased even further in second half of March further as ECB actions resulted in a price spike in the opposite direction



EURO STOXX® 50 Simulation of future margin development

Several paths have been simulated under different scenarios on future levels of (annualised) market volatility

- MRIM: Market Risk Initial Margin (i.e. without concentration Addons)
- Stress Floor is shown as a black dashed line
- Simulation assumes the productive setting of half-life equal to 50 days.
- Simulation date: 22 October 2020