Peak Market Activity Proposal

Risk Management Committee
Yong Hu, Manager - Trade Risk & Analytics
June 21, 2023

Discussion Items

1. Selected Back-tested Solutions

2. Proposed Solution

3. Key Takeaways

Selected Back Test Results

	RMSE Under	RMSE Over	RMSE Total	Failure Rate	Expected Shortfall	Collateral Reduction
Status Quo	1,685,799	11,759,081	11,879,306	7.6%	(116,767)	
Option 1: 3-Month Reset	1,772,402	11,222,516	11,361,614	7.8%	(128,251)	-4.2%
Option 2: Rolling 3-week Invoice	1,910,641	9,754,472	9,939,832	11.5%	(169,088)	-17.8%
Option 3: Rolling 4-week Invoice	1,567,750	10,480,514	10,597,123	6.4%	(95,547)	-6.5%
Option 4: Rolling 4-week Invoice + Minimum Transfer Amount [1]	1,543,174	10,516,319	10,629,045	4.9%	(90,462)	-6.1%

- *RMSE Under* is the PMA under collection measured by Root Mean Square Error[2]
  - Option 1 & 2 are worse than the Status Quo.
- *RMSE Over* is the PMA over collection measured by Root Mean Square Error
  - All options alleviate PMA over collection.
- *RMSE Total* is the PMA for both under and over collection measured by Root Mean Square Error
  - All options alleviate PMA over collection.
- *Failure Rate* is the percentage of failure over Total Samples[3]. A failure is recorded every time *the collateral requirement - target period[4] invoices < - Minimum Exposure[5]*.
  - Option 1 & 2 have higher failure rate than the Status Quo.
  - Option 3 & 4 have lower failure rate than the status quo, with Option 4 failure rate reduction almost by half.
- Expected Shortfall is the average shortfall over all samples.
  - Option 1 & 2 have higher expected shortfall than the Status Quo.
  - Option 3 & 4 have lower shortfall than the Status Quo.
- Collateral Reduction measures how much collateral can be reduced comparing to the Status Quo.
  - All options have collateral reduction.

[1] Minimum Transfer Amount: the minimum amount that will be transferred for any PMA call or return.
[2] Root Mean Square Error measures the differences between collateral requirements and the target period invoices.
[3] Total Samples are weekly from Q1-2020 to Q2-2023, for all members with 2022 PMA > $1,000.
[4] Target Period: week -1 to week+1 (last week, current week, and next week).
[5] Minimum Exposure: the minimum threshold a PMA call is made. No PMA call is made if the PMA deficiency is below this threshold.

Proposed Solution (Option 4)

Proposed (Option 4): Rolling 4-week Invoices + Minimum Transfer Amount

- There is a PMA collateral shortfall if current 4-week PMA requirement is greater than collateral held last week.
  - If PMA shortfall is greater than the *Minimum Exposure*, a PMA call is made, which equals to *n* Minimum Transfer Amount*, where the integer *n* is optimized to bring the collateral to just at or above the current 4-week PMA requirement.
  - Otherwise, no PMA call is necessary.

- There is a PMA surplus if current 4-week PMA requirement is less than collateral held last week.
  - If the surplus is greater than *Minimum Transfer Amount*, then collateral is returned, which equals to *n* Minimum Transfer Amount*, where the integer *n* is optimized to bring the collateral to just at or above the current 4-week PMA requirement.
  - Otherwise, no collateral is returned.

- *Minimum Exposure* is the maximum of a) 3,000, and b) 1% of the greatest amount invoiced in any rolling one, two or three week period in the prior 52 weeks, capped at $100,000.

- *Minimum Transfer Amount* is the maximum of a) $20,000, and b) 5% of the greatest amount invoiced in any rolling one, two or three week period in the prior 52 weeks, capped at $1,000,000.

Proposed Solution (Example)

	Rolling 4-week	Shortfall / (Over Collection)	Integer Multiple for Returnable	Returned Amount	Integer Multiple for Callable	Called Amount	Collateral Requirement	Over / (Under Collection)
week 0							**12,150,000**	
week 1	**12,200,000**	50,000	0	0	0	0	**12,150,000**	(50,000)
week 2	**12,300,000**	150,000	0	0	1	1,000,000	**13,150,000**	850,000
week 3	**13,000,000**	(150,000)	0	0	0	0	**13,150,000**	150,000
week 4	**11,000,000**	(2,150,000)	(2)	(2,000,000)	0	0	**11,150,000**	150,000

Minimum Exposure $100,000; Minimum Transfer Amount $1,000,000.
Shortfall = current week Option 3 PMA requirement less previous week Option 4 PMA amount.

Week 1: Shortfall $50,000. No action, as the amount is less than Minimum Exposure.
Week 2: Shortfall $150,000. PJM calls for $1,000,000. New collateral held is now $13,150,000.
Week 3: No action, as the collateral held is $150,000 more than the required amount.
Week 4: The collateral held is $2,150,000 over the required. $2,000,000 is returned.

The expectation is that under this proposed solution, Option 4, a member's collateral requirement deficit would remain under their Minimum Exposure, while excess collateral requirement would remain under the Minimum Transfer Amount.

Key Takeaways

- PMA using rolling 4-week invoices provides extra week of cover during stressed period.
- Minimum Exposure sets up a threshold, below which small PMA deficiencies are allowed.
- Minimum Transfer Amount reduces frequent PMA calls or returns, and provides extra cushion.

- Back-test results show the proposed solution is better than Current PMA calculation
  - Reduced RMSE
  - Reduced failure rate
  - Reduced expected shortfall
  - Reduced total collateral requirement
  - Shorter period of holding high collateral after peak