Review of PJM Mark To Auction FTR Designs

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December 12, 2018

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TOPICS

- Summary of Bottom Line
- Why Mark to Market
- Mark to Auction Price
- Mark to Market Related Concerns with Historic PJM FTR Collateral Design
- Description of Mark to Auction Alternatives
- Review of Mark to Auction Alternatives
- Empirical Analysis
- Conclusions

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SUMMARY

The three mark to auction designs being considered are all sound, with no critical flaws.

- All three mark to auction designs would significantly improve the coverage provided by the current PJM FTR collateral design.
- They would all achieve these improvements while retaining most features of the current design, avoiding the need to develop, analyze the performance of, and implement a substantially different collateral structure.
- Retaining most features of the current design would enable all three designs to be implemented relatively quickly, but also means that all three designs would have elements that would not be part of an ideal long-term FTR collateral design.

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WHY MARK TO MARKET

The core benefit of mark to market collateral designs in forward markets is that they generally provide much better coverage of payments due on a forward market position for a given initial collateral margin than would be the case if the initial collateral margin had to cover the totality of the changes in market value that could occur over the term of the forward contract.

- The essence of a mark to market design is that the collateral margin only needs to be large enough to cover the change in market value of the contract between the date the contract was last valued and the next date the contract will be valued and can be closed out if any required additional collateral is not provided.

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WHY MARK TO MARKET

If the posted collateral plus the value of the FTR portfolio at current auction prices exceeds the purchase price of the FTR portfolio due to PJM, the FTR holder is better off meeting a collateral call than defaulting and walking away from the FTR portfolio.

- It is essential that the initial collateral margin be large enough to cover most declines in portfolio value between auctions. Mark to market will not have the intended effect if collateral calls are made when the portfolio is underwater relative to the posted collateral.

- The longer the term of the FTR portfolio, the more burdensome it would be to post collateral covering the potential change in value of the FTR portfolio over its entire term.

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MARK TO AUCTION

PJM's proposed designs are termed "mark to auction," rather than "mark to market," but an auction is a market.

- An FTR auction provides a better valuation than the valuation of a thinly traded contract on a futures exchange.

- Mark to market can in practice be mark to "assessment," mark to "model" or some other measure of market price that is equally or more opaque.

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MARK TO AUCTION

It is important to understand that FTR auction prices are not determined by the bids and offers for particular source sink pairs in that auction.

- FTR auction prices are determined by the constraint shadow prices in the auction which are generally be impacted by hundreds of bids and offers even if there is only one bid or offer for each FTR source sink pair.

  Price FTR ij = Sum over all constraint k [Shift factor FTR ij on constraint k] * Shadow Price constraint k

- Every FTR source sink combination is priced in every auction, even if no market participant bids to buy or sell that FTR source sink pair.

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MARK TO AUCTION

The limitations of “mark to auction” collateral designs in FTR markets do not relate to the quality of FTR auction prices but rather relate to the relative infrequency of FTR auctions.

- FTR auctions have historically been relatively infrequent compared to near daily trading in liquid exchange traded futures markets.
- Less frequent auctions mean that larger price changes can occur between valuations and between the time an FTR holder fails to meet a collateral call and the time the portfolio can be resold or settled.
- Less frequent auctions also make it difficult to use historical pricing data to accurately measure FTR price variability.

The introduction of balance of period auctions provides much more frequent FTR market valuation than has been possible in the past.

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CONCERNS WITH CURRENT DESIGN

There are three core concerns with the lack of a mark to market element in the historic PJM FTR collateral design:

- The historic design did not require additional collateral to be posted when the value of an FTR portfolio declined relative to the original purchase price, increasing the net payments expected to be due in the delivery month.
- The historic design enabled the creation of negative credit requirements (historic payout greater than current FTR value), which in turn could and did allow FTR holders to assemble large FTR portfolios while posting little or no actual collateral and could also allow FTR holders to add FTRs to portfolios that had already declined in value relative to the purchase price without posting any additional collateral.

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CONCERNS WITH CURRENT DESIGN

- The historic design could in some circumstances allow market participants to draw down collateral or withdraw cash from FTR holdings that had declined in value relative to the purchase price before defaulting.

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CONCERNS WITH CURRENT DESIGN

The second concern has been largely addressed by the addition of a minimum collateral requirement per FTR megawatt hour.

- The first and third concerns remain to be addressed.
- The first and third concerns could both be addressed by a mark to auction collateral design.
- A mark to auction collateral design element could also further reduce the potential for a FTR holder to use negative credit requirements to increase its FTR holdings without posting additional collateral.

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DESCRIPTION OF OPTIONS

Option G:

Collateral = Current Collateral Requirement

+ Max (0, Mark to Auction Adjustment)

Mark to Auction Adjustment =

Sum over all FTRs ij (Purchase price ij – Current Auction price ij)

The mark to auction adjustment would be applied to a market participants FTR portfolio as a whole.

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DESCRIPTION OF OPTIONS

Option G:

- The option G mark to auction adjustment would never decrease the collateral requirement below the current collateral requirement, it could only increase it.

- The current collateral requirement would in effect become a minimum margin.

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DESCRIPTION OF OPTIONS

Option H:

Collateral = Max (Current Collateral Requirement, Mark to Auction Adjustment + Mark to Auction Adder)

Mark to Auction Adjustment =

Sum over all FTRs ij (Purchase price ij – Current Auction price ij)

The mark to auction adjustment would be applied to a market participant's FTR portfolio as a whole.

If the Market to Auction Adjustment ≤ 0, then the Mark to Auction Adder = 0

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DESCRIPTION OF OPTIONS

Option H:

If Market to Auction Adjustment > 0, then Mark to Auction Adder =

Min [.2 * Market to Auction Adjustment), Max (0, .2 * Sum over all current year FTRs ij (Purchase price ij – Current Auction price ij)] +

Min [.5 * Market to Auction Adjustment), Max (0, .5 Sum over all future year FTRs ij (Purchase price ij – Current Auction price ij)]

The mark to auction adder could only increase the collateral requirement above the mark to auction adjustment, and it cannot be greater than .5 the market to auction adjustment.

Neither of the two components of the mark to auction adder could ever be negative.

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DESCRIPTION OF OPTIONS

Option I:

Option I would require collateral equal to the higher of the collateral calculated under option G or H for each FTR holders overall portfolio.

- The collateral requirement could never be lower than the current collateral requirement.

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REVIEW OF OPTIONS

This review of Options G, H and I evaluates the collateral coverage they provide for payments due on future period FTRs.

- The review does not consider bidding collateral or intra-auction collateral calls.
- The review does not evaluate collateral coverage of payments due during the delivery month.

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REVIEW OF OPTIONS

- Options G, H and I would all maintain the current collateral requirement as a minimum. Hence, all three options could only increase the collateral requirement.

- Options G, H and I would all prevent any kind of negative credit requirement being used to allow additional FTRs to be added to a portfolio that does not have sufficient collateral to cover expected net payments due to PJM.
- Options G, H and I would further reduce the potential for collateral or cash to be withdrawn from a portfolio that does not have sufficient collateral to cover expected net payments due to PJM.

All three options would be a significant improvement over the current design in terms of covering payments due to PJM.

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REVIEW OF OPTIONS

The fundamental difference between options G and H is in the collateral margin above the mark to auction value that would be required.

- Option G would maintain a margin at least equal to the current collateral requirement. Any decline in mark to auction value relative to the original purchase price would require the posting of additional collateral.

- Option H would not necessarily maintain the current collateral requirement as a margin. Mark to auction value could decline until the collateral margin was 1/3 of the current margin for future year FTRs and 1/6 of the current margin for current year FTRs without triggering a collateral call.

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REVIEW OF OPTIONS

Option G would adjust the collateral requirement after every auction based on the change in portfolio value. These changes could both require the posting of additional collateral, or allow the drawdown of posted collateral, but always restore at least the initial margin.

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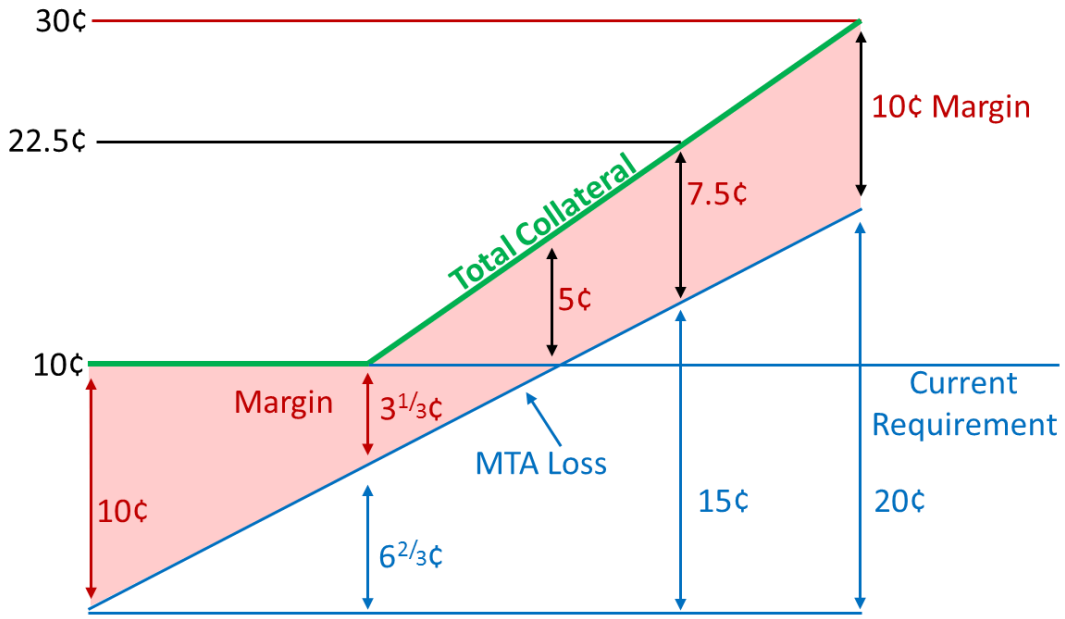
REVIEW OF OPTIONS

Under option H the collateral margin on future year FTR payments due would decline with decline in mark to auction value until the collateral margin was 1/3 of the current collateral margin. The margin would then rise with further declines in market to auction value.

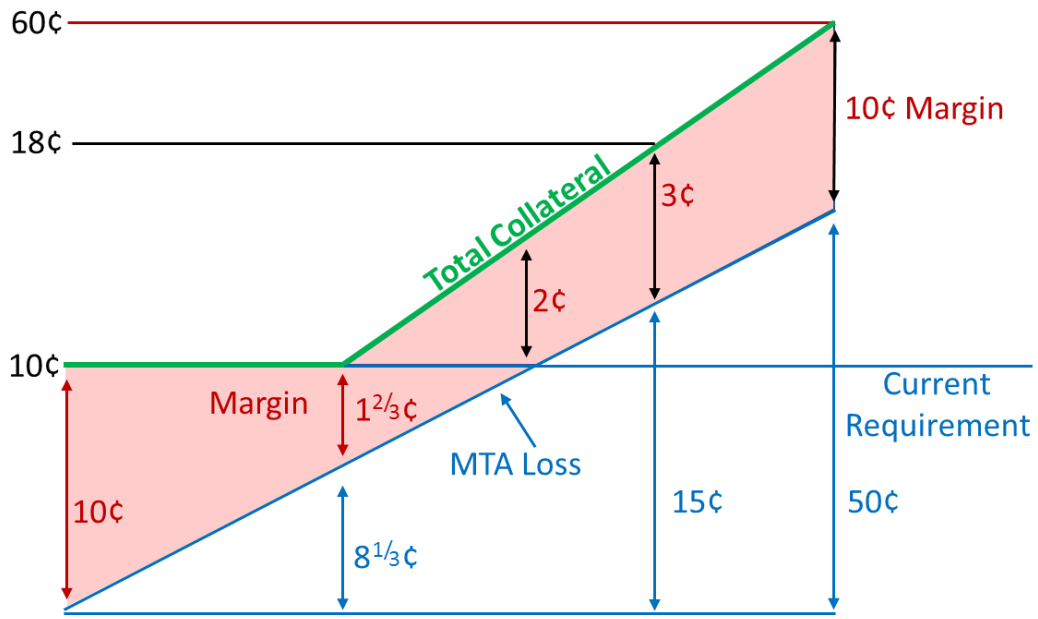


0 MTA Loss

Option H Future Year FTR Collateral

REVIEW OF OPTIONS

Under option H the collateral margin on current year FTRs would decline with decline in mark to auction value until the collateral margin was 1/6 of the current collateral margin. The margin would then rise with further declines in market to auction value.



0 MTA Loss

Option H Current Year FTR Collateral

REVIEW OF OPTIONS

The option H design in which the collateral margin first declines with declines in FTR value, then rises with additional declines in FTR value cannot be reconciled with any plausible theory of potential future changes in individual FTR value.

- The probability of an additional large loss does not decrease as losses are incurred up to 2/3 the collateral and then rise.

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REVIEW OF OPTIONS

Another way of looking at the option H design, however, would be to step back from looking at the way the collateral requirement changes for an individual FTR and consider the overall effect at the portfolio level.

- The essence of option H is that it will continue to require a collateral margin above the mark to market value of the portfolio but the margin will be less than the current collateral requirement, and less than the margin under option G.

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REVIEW OF OPTIONS

This overall effect of Option H makes sense from the view point that the implementation of a mark to auction design should reduce the size of collateral margin required to cover declines in value (relative to the size of the margin required under the current design), because collateral would be adjusted on an ongoing basis if the mark to auction value declines.

- However, the key parameters of the option H design are ad hoc choices that are not derived from fundamentals relating to FTR price variability, so a comparison of Options G and H needs to assess how the two options perform in practice.

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EMPIRICAL ANALYSIS

PJM compiled data on the hypothetical application of options G, H and I to 2018-2019 FTRs over the period since the 2016-2019 auction through the November 2018 auction. This analysis provides informative comparative statistics but the results need to be interpreted with caution in assessing the potential future performance of the alternative designs:

- Although the analysis covers several auctions of 2018-2019 FTRs, it is only one period with one set of outcomes.
- The balance of period auction analysis does not account for coverage of delivery month payments due.
- The coverage analysis has been carried out only at the portfolio level.

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EMPIRICAL ANALYSIS

In addition to analyzing the impact of the alternative collateral designs on total collateral requirements we analyze the extent to which the collateral (and ARR value not accounted for in collateral) would cover changes in FTR portfolio value.

Mark to Auction Losses are covered if:

$$\text{Collateral}_{\text{auction } t} + \text{ARR Value} - \text{Mark to Auction Value}_{\text{auction } t+1} > 0$$

Or:

$$\text{Collateral}_{\text{auction } t} + \text{ARR Value} - (\text{Purchase Price} - \text{Auction Value}_{\text{auction } t+1}) > 0$$

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EMPIRICAL ANALYSIS

Data compiled over 19 auctions

- # Positions is # MP * # Auctions
- # positions not covered is # positions with
  - MTA Loss > Collateral prior auction
- Total MTA Loss = sum MTA Loss 1st 18 auctions
  - (no MTA Loss for November-December 2018)
- Total Collateral = total collateral summed over auctions and
  - FTR holders
- Excess Collateral = Total Collateral – Covered MTA Losses

Figures reported are average per auction values over the 19 auctions.

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EMPIRICAL ANALYSIS

$ values in millions – Averages over all 19 2018/2019 auctions

Excluding GreenHat and GreenHat 2 Portfolios

	Current	G	H	I
# Positions	172	172	172	172
# Positions MTA not Covered	3.8	1.5	2.6	1.5
MTA Losses	13.6	13.6	13.6	13.6
MTA Losses not Covered	.64	.07	.21	.07
Average Total Collateral	332	344	333	344
Excess Collateral	319	330	320	330

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EMPIRICAL ANALYSIS

$ values in millions - Averages over all 19 2018/2019 auctions

Portfolios including GreenHat

	Current	G	H	I
# Positions	173	173	173	173
# Positions MTA not Covered	4.4	1.5	2.7	1.5
Total MTA Losses	55.5	55.5	55.5	55.5
MTA Losses not Covered	11.4	.07	1.29	.07
Total Collateral	372	426	391	426
Excess Collateral	328	370	337	370

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EMPIRICAL ANALYSIS

The MTA loss calculations in the prior tables may somewhat overstate the proportion of losses that would be covered by the alternative collateral designs because the loss calculation does not account for payments due to PJM for FTR settlements in the day-ahead market over the delivery month.

- We have therefore also compiled these same statistics just for the 13 forward auctions with complete MTA calculations.
- These statistics are portrayed in the following tables.
- The general pattern is the same as in the prior tables but the proportion of MTA losses that are covered is somewhat lower.

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EMPIRICAL ANALYSIS

$ values in millions –averages for 10 non-BOP 2018/2019 auctions

Excluding GreenHat and GreenHat 2 Portfolios

	Current	G	H	I
# Positions	133	133	133	133
# Positions MTA not Covered	3.2	1.7	2.5	1.7
Total MTA Losses	11.7	11.7	11.7	11.7
MTA Losses not Covered	.27	.08	.24	.08
Total Collateral	252.3	260.8	252.5	260.8
Excess Collateral	240.9	249.3	241.1	249.3

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EMPIRICAL ANALYSIS

$ values in millions –averages for 10 non-BOP 2018/2019 auctions

Portfolios including GreenHat

	Current	G	H	I
# Positions	134	134	134	134
# Positions MTA not Covered	3.5	1.7	2.6	1.7
Total MTA Losses	43	43	43	43
MTA Losses not Covered	6.5	.08	1.6	.08
Total Collateral	285.3	320.1	294.1	320.1
Excess Collateral	248.8	277	252.6	277

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EMPIRICAL ANALYSIS

Observations:

- Options G, H and I all provide much better coverage of MTA losses than the current collateral requirement.
- Options G, H and I not only improve coverage of payments due to PJM, they greatly reduce the frequency that portfolios would be substantially under collateralized.
- With Option G, only one portfolio in a single auction would have been under collateralized by more than $250,000, with a total exposure of $741,000.
- With Option H, only six portfolios over all 19 auctions would have been under collateralized by more than $250,000, with a total exposure of $22.5 million.
- Under the current design 29 portfolios over 19 auctions would have been under collateralized by more than $250,000, with a total exposure of $214 million.

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EMPIRICAL ANALYSIS

- Option G covers more MTA losses than option H but requires an average of about $32 million more collateral per auction to cover an average of an incremental $1 million of MTA losses (per auction).

- Option H does well on average in terms of the coverage/collateral tradeoff because it combines a mark to auction design with a lower margin.

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CONCLUSIONS

The three mark to auction designs under consideration are all sound, with no critical flaws.

- All three mark to auction designs significantly improve the coverage provided by the current PJM FTR collateral design.
- They would all achieve these improvements while retaining most features of the current design, avoiding the need to develop, analyze the performance of, and implement a substantially different collateral structure.
- Retaining most features of the current design would enable all three designs to be implemented relatively quickly, but also means that all three designs would have elements that would not be part of an ideal long-term FTR collateral design.

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CONCLUSIONS

Over all 19 auctions, Option G would have increased the coverage of MTA losses to almost 99.9% but would have increased total collateral by 14.5% and excess collateral by 13%.

- Option H would have increased the coverage of MTA losses to 97.5% from around 80% under the current design, while only increasing total collateral by 5.3% and excess collateral by 2.9%.
- The performance of Option I is essentially identical to option G over the period examined.
- While option H would have performed relatively well in this period, option H is based on an ad hoc set of parameters and this empirical assessment only covers price changes for one vintage of FTRs over 2.5 years.

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CONCLUSIONS

Option I will generally result in the same outcomes as Option G and this was the case over the 19 auctions for 2018-2019 FTRs.

- In the situations in which Option I would lead to a materially different outcome than Option G, requiring more collateral than Option G, it is difficult to envision circumstances in which this would be appropriate.

- There does not appear to be a sound rationale for selecting Option I in place of Option G.

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CONCLUSIONS

Option H requires less collateral overall than option G and has the potential to work well most of the time.

- However, the ad hoc margin adjustments on which Option H is based have the potential to perform very badly in particular situations.
- It is noteworthy that while Option H only would have resulted in 6 portfolios over the 19 auctions that were under collateralized by $250,000 or more, two of those portfolios were GreenHat portfolios that would have been under collateralized by more than $20 million.
- These outcomes occurred because Option H initially reduces the collateral margin it requires as a portfolio incurs losses.

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CONCLUSIONS

Option G	Option H	Option I
Materially better coverage of payments due than current design.		
Requires more collateral than H	Requires less collateral than G	Requires more collateral than G or H
Somewhat better average coverage than H	Potential for poor coverage of particular portfolios	Doubtful that higher collateral is appropriate
Much more consistent coverage than H		

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