EDGE DAIRY FARMER COOPERATIVE

TESTIMONY ON TOPIC 4 – base

Class I milk formula

ASSERTIONS MADE IN SUPPORT OF PROPOSAL #13

1. "Average-of" pricing regime is not necessary to facilitate hedging because Class I can be hedged under "higher-of" pricing approach using swaps.

2. U.S. Generally Accepted Accounting Principles (GAAP) require correlation coefficient to be between 0.8 and 1.25 for risk management activities to be recognized as hedging for accounting purposes.

3. "Higher-of" pricing regime would not 'detract' from risk management vs "average-of" pricing regime.

4. "Average-of" pricing regime caused depooling in recent years.

In this rebuttal testimony, I am presenting my preliminary analysis of these arguments.

CORRELATION COEFFICIENT

Correlation coefficient is defined as follows:

$$\rho = \frac{cov(x,y)}{\sigma(x)\sigma(y)}$$

where x and y are some stochastic variables, such as prices. If x and y tend to "move together", then covariance between them, $cov(x,y)$, will be positive and high, and correlation coefficient will be positive and high. In the extreme case, if x and y are exactly the same, then $cov(x,y) = \sigma^2(x)$, in that case, the correlation coefficient is equal to:

$$\rho = \frac{\sigma^2(x)}{\sigma(x)\sigma(x)} = 1$$

It is not mathematically possible for correlation be higher than 1, or lower than -1.

CORRELATION COEFFICIENT

- As for the GAAP, the numbers cited, 80% to 125% do not refer to the correlation coefficient.

- Accounting standards are focused on the extent to which changes in cash flows of the hedging instrument offset changes in the cash flows of the hedged item.

- For example, if Class I skim price is projected to be $18.00/cwt based on current futures prices, and the actual value turns out to be $21.00/cwt, then the change in the hedged item is $3.00/cwt.

- Using a 'dollar-offset method', an evaluation would be made to assess if the hedging instrument would result in hedging gains equal to 80% to 125% of $3.00/cwt, i.e. $2.40/cwt to $3.75/cwt.
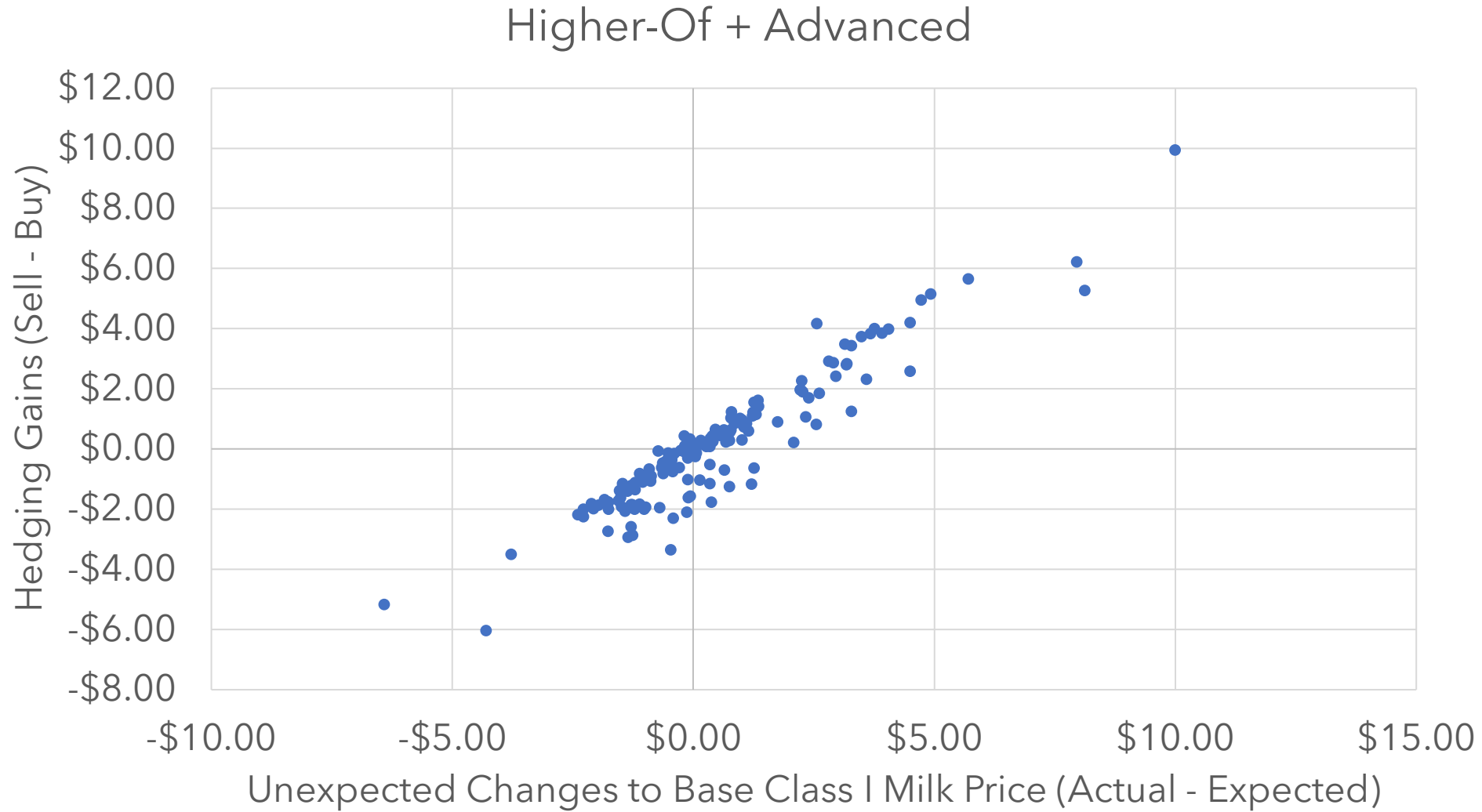
WHY HEDGING IS NOT PERFECT

- **"Mover" Risk:** If hedging with Class III or Class IV futures, and Class I Skim Milk Price is based on the higher-of Class III Skim Milk Price and Class IV Skim Milk Price (whether Advanced or final), there is a "mover" risk, i.e. the risk that the hedge will be based on the 'wrong' contract.
- **"Advanced Prices" Risk:** If Class I Milk Price is based on Advanced prices calculated using surveys of commodity prices during the middle two weeks of the prior month, then it is likely that the full-month average skim milk prices (for the month during which two-week averages are calculated) will not be equal to the two-week average prices.

- **Bid-Ask Spread / Risk Premium**: Even if advanced prices are not used in pricing, and a Base Class I Milk futures contract is introduced by the Chicago Mercantile Exchange Group, the transacted price may be higher than the expected price, and the hedging gains will be lower than the unexpected change to the Base Class I Milk Price, thus reducing hedge effectiveness.
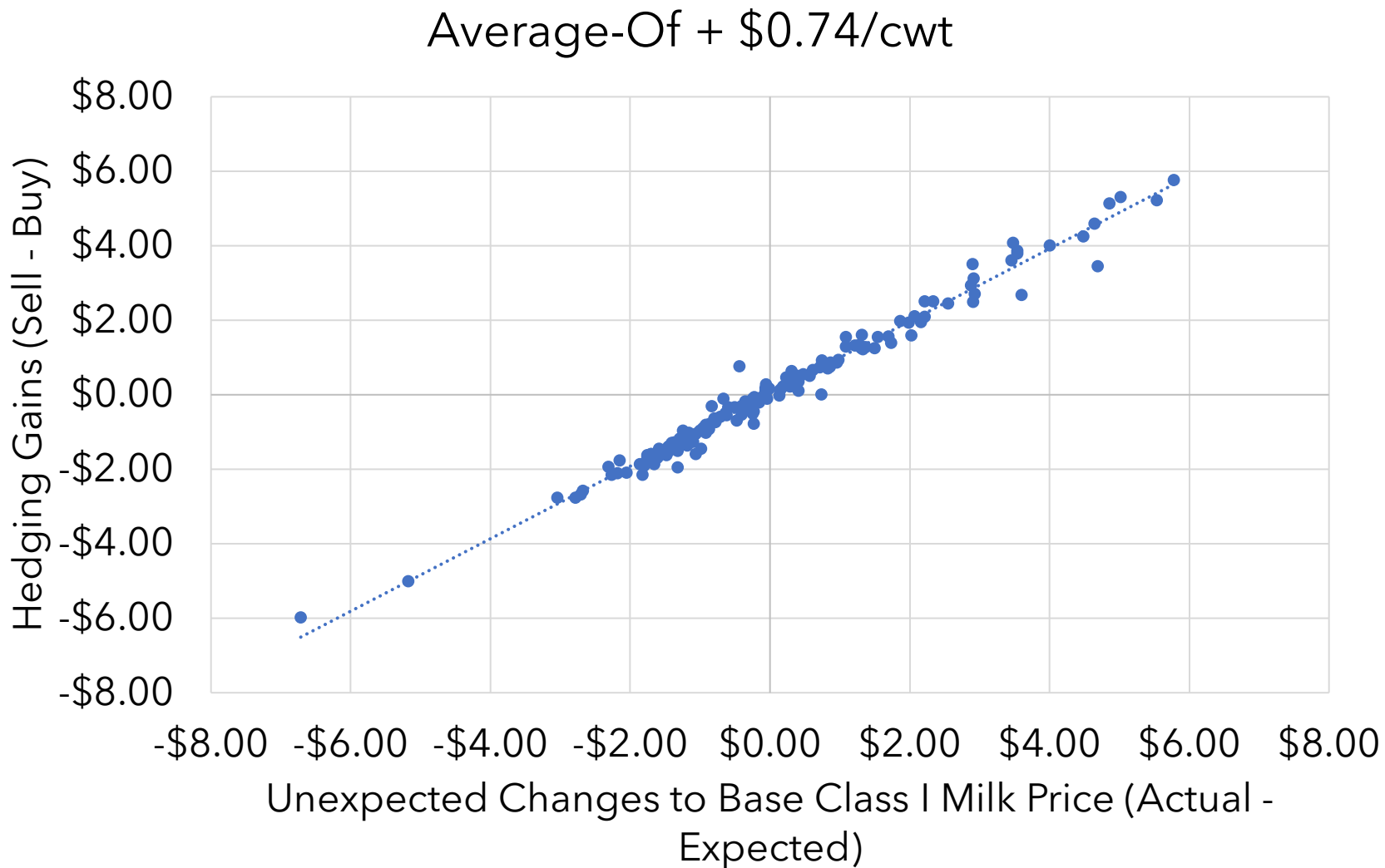
WHY HEDGING IS NOT PERFECT

Proposal #No	Eliminates Mover Risk?	Eliminates Advanced Prices Risk?	Eliminates Bias / Risk Premium?
Proposal #13 by NMPF	No	No	Yes
Proposal #14 by IDFA	Yes	No	Yes
Proposal #15 by MIG	Yes	No	Yes
Proposal #16 by Edge	Yes	Yes	Yes
Proposal #17 by Edge	Depends on CME	Yes	No
Proposal #18 by AFBF	Depends on CME	Yes	No

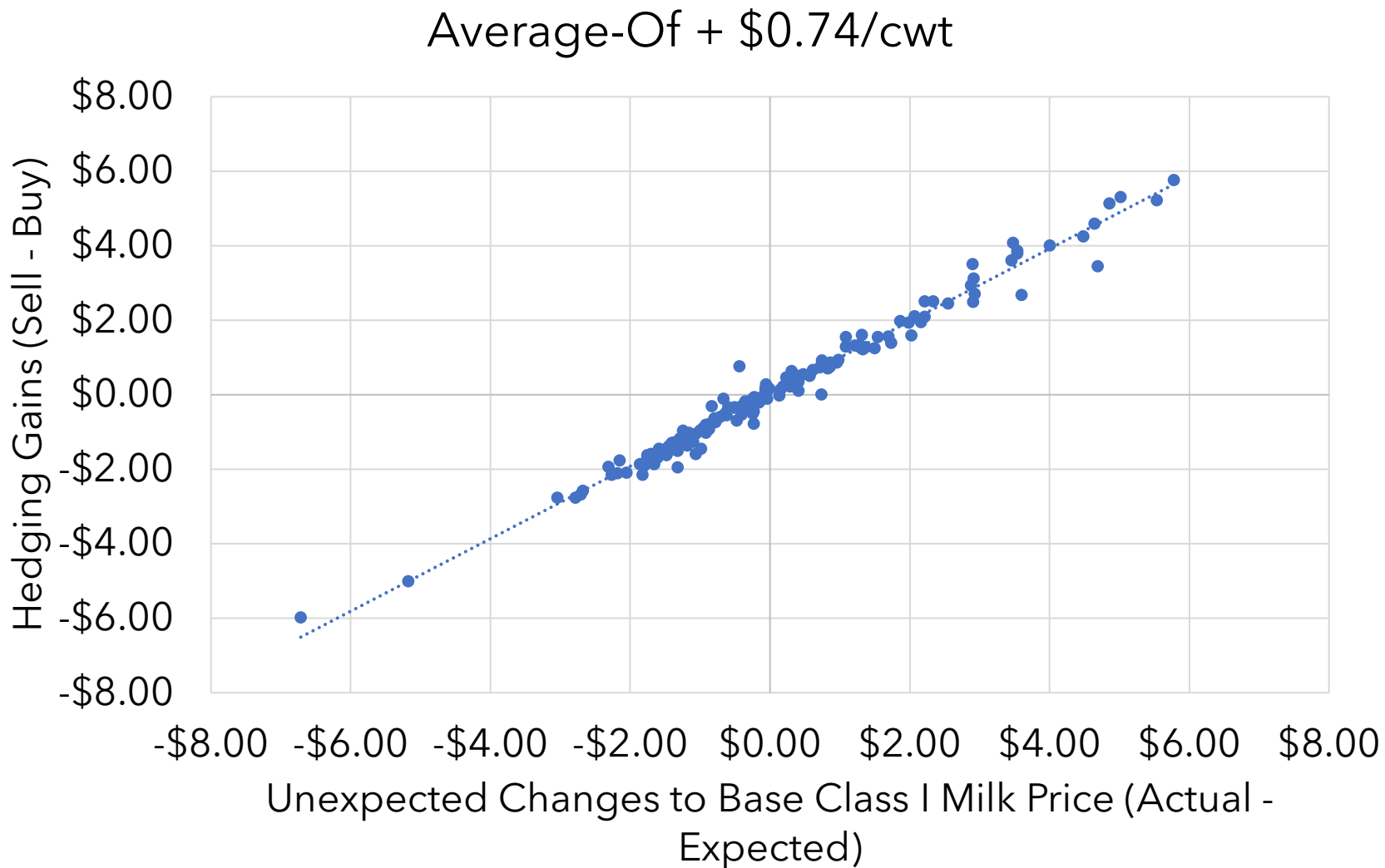# EVALUATION OF HEDGING EFFECTIVENESS – PROPOSAL #13

Higher-Of + Advanced

Average-Of + $0.74/cwt

Average-Of + $0.74/cwt

EVALUATING HEDGING EFFECTIVENESS

- Residual basis risk (measured as a standard deviation of the sum of unexpected changes in Base Class I Milk Price and hedging gains) under "higher-of" is $0.75/cwt, vs. only $0.27/cwt under "average of". In other words, basis risk is nearly three times as large under the higher-of than under the average-of regime.

- "Mover" risk is substantial under "higher-of" regime. From January 2011 through June 2023, over 150 months, the actual mover class was different than the expected mover class in 49 months, or 32.6% of the time. To illustrate the "mover" effect consider the scattergrams that relate the unexpected changes to the Base Class I Milk Price to hedging gains under a program designed to offset such unexpected changes.

# EVALUATING HEDGING EFFECTIVENESS

- Hedging under the average-of method would clearly meet effectiveness standards required for hedge accounting status. A hedging program with futures contracts, under higher-of pricing regime, would have major difficulties achieving such status.

- "Advanced Prices" risk remains substantial under the "average-of" regime. The number of months in which hedging gains do not fall in the range of 80% to 125% of changes in Class I Milk Price is reduced by 25% under "average-of" vs. "higher-of" regime, due to the elimination of the "Mover" risk. Nevertheless, it is still the case that in 42 out of 150 months, the hedging gains fall outside that range. It is important to note however that the "dollar-offset" method produces uninformative measurements when the change in the hedged item is very small. If we restrict the sample to months in which the change (either positive or negative) in the Base Class I Price was higher than $0.375/cwt, then under average-of regime, hedges fall in the 80% to 125% range in 102 out of 123 months, or 83% of the time.

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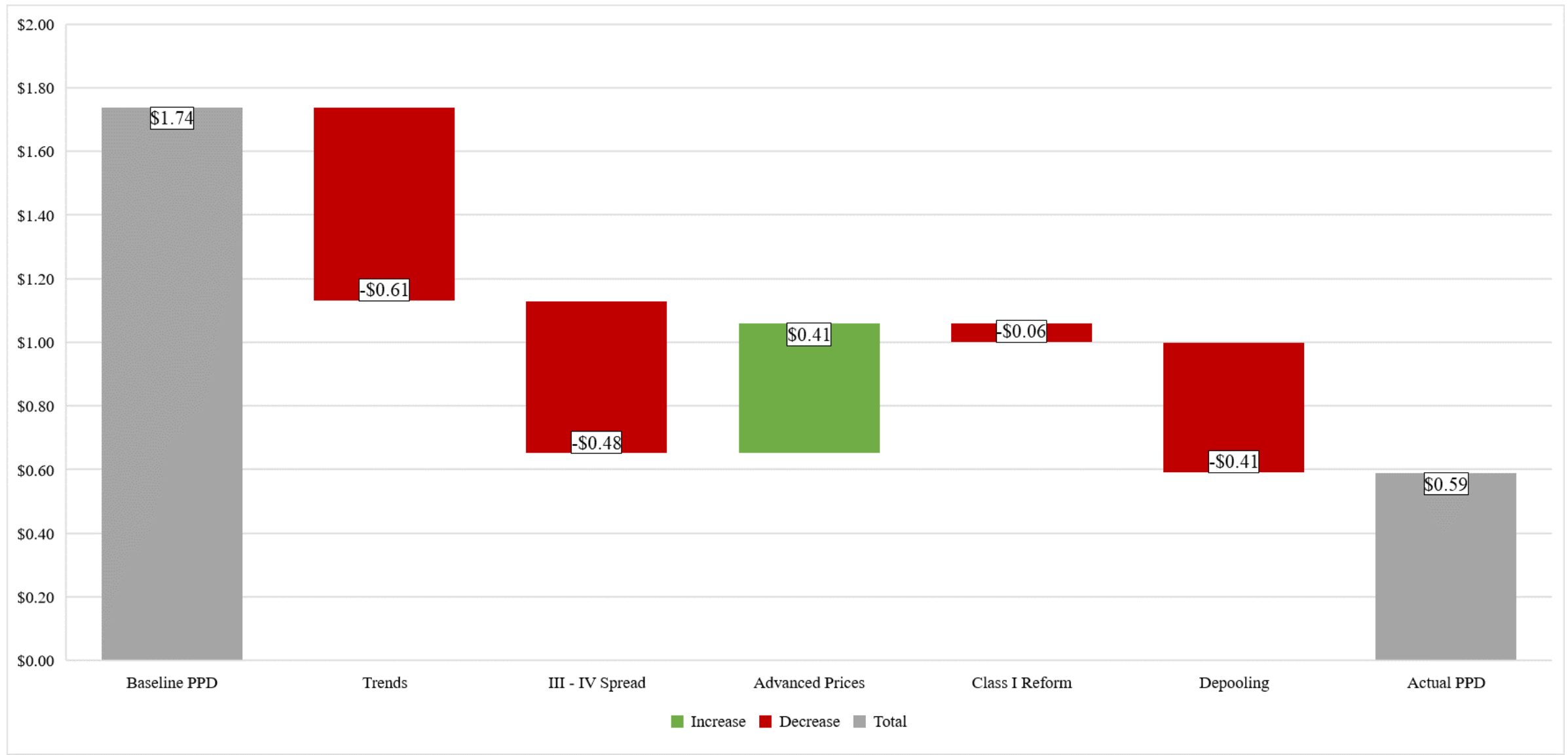
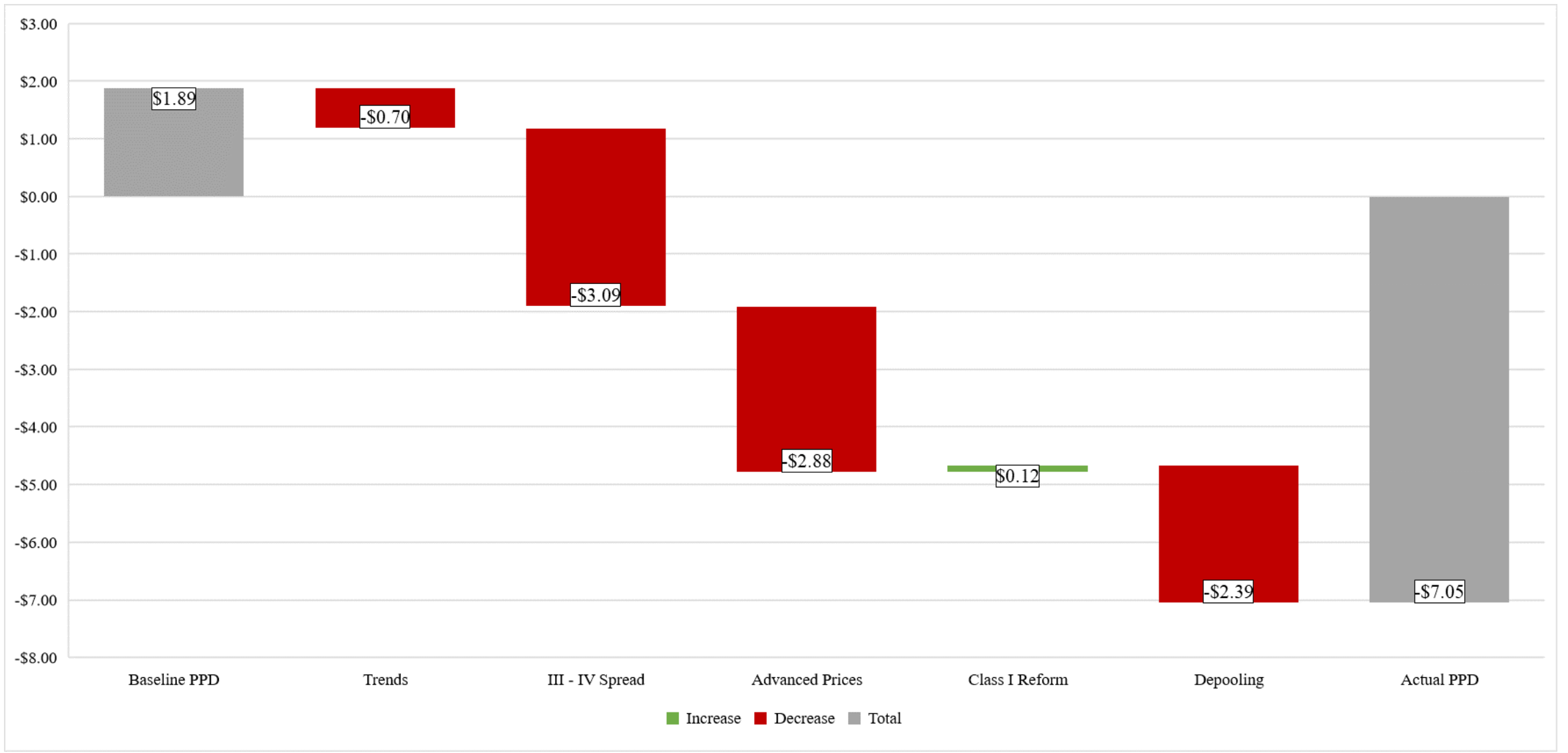# PPD DECOMPOSITION – FMMO 33 (MIDEAST), MARCH 2020
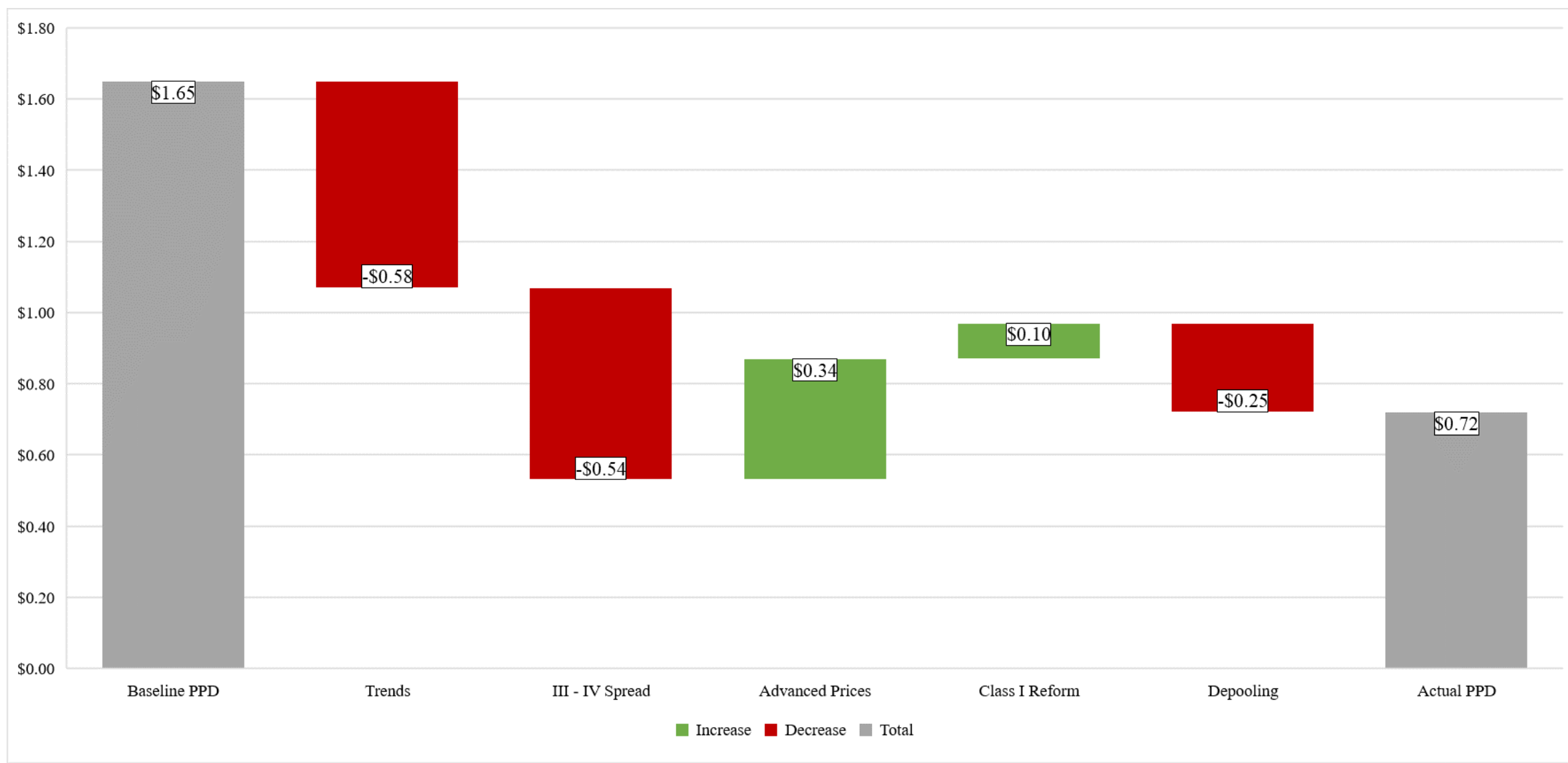
PPD DECOMPOSITION – FMMO 33 (MIDEAST), APRIL 2020
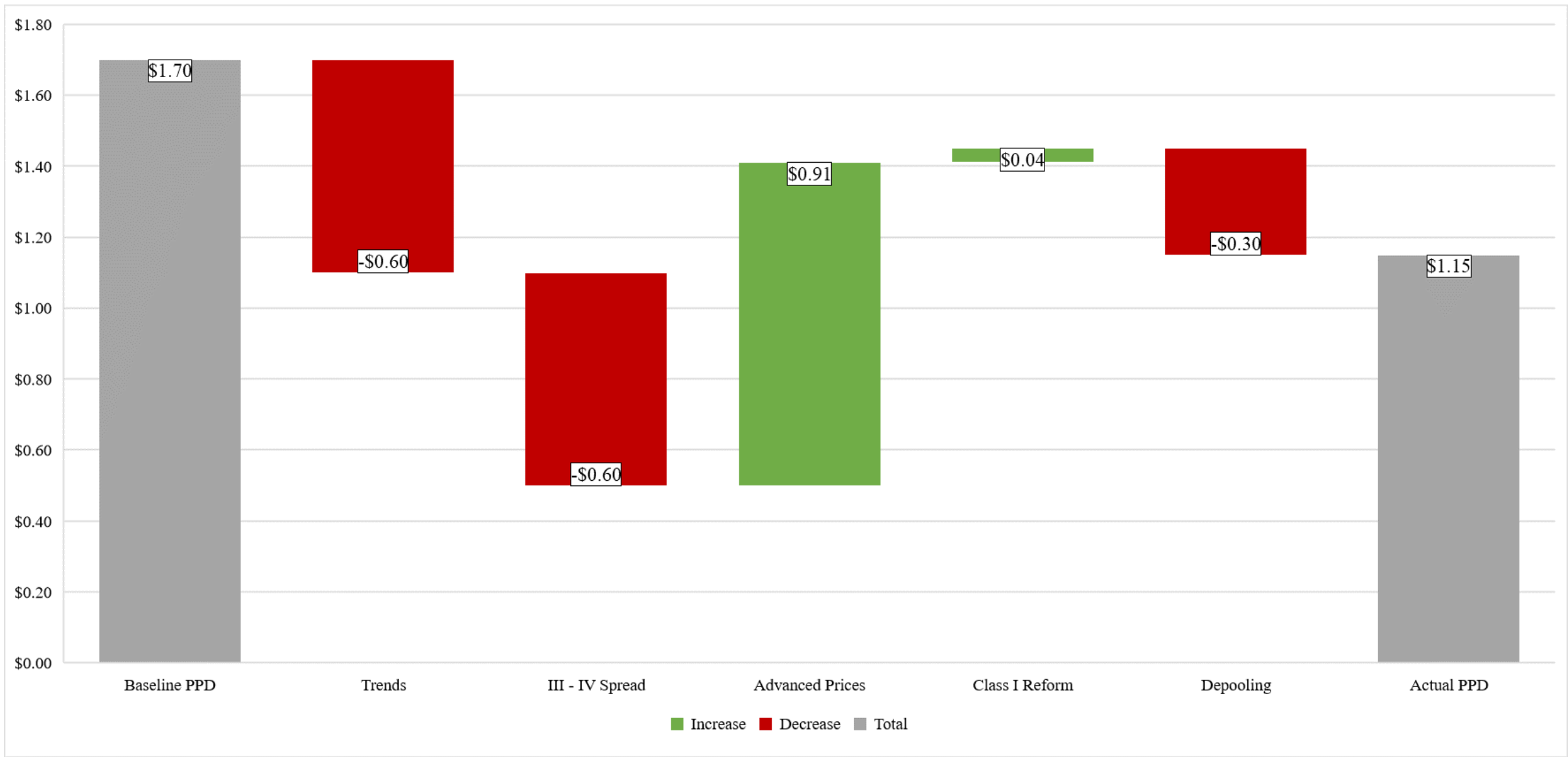
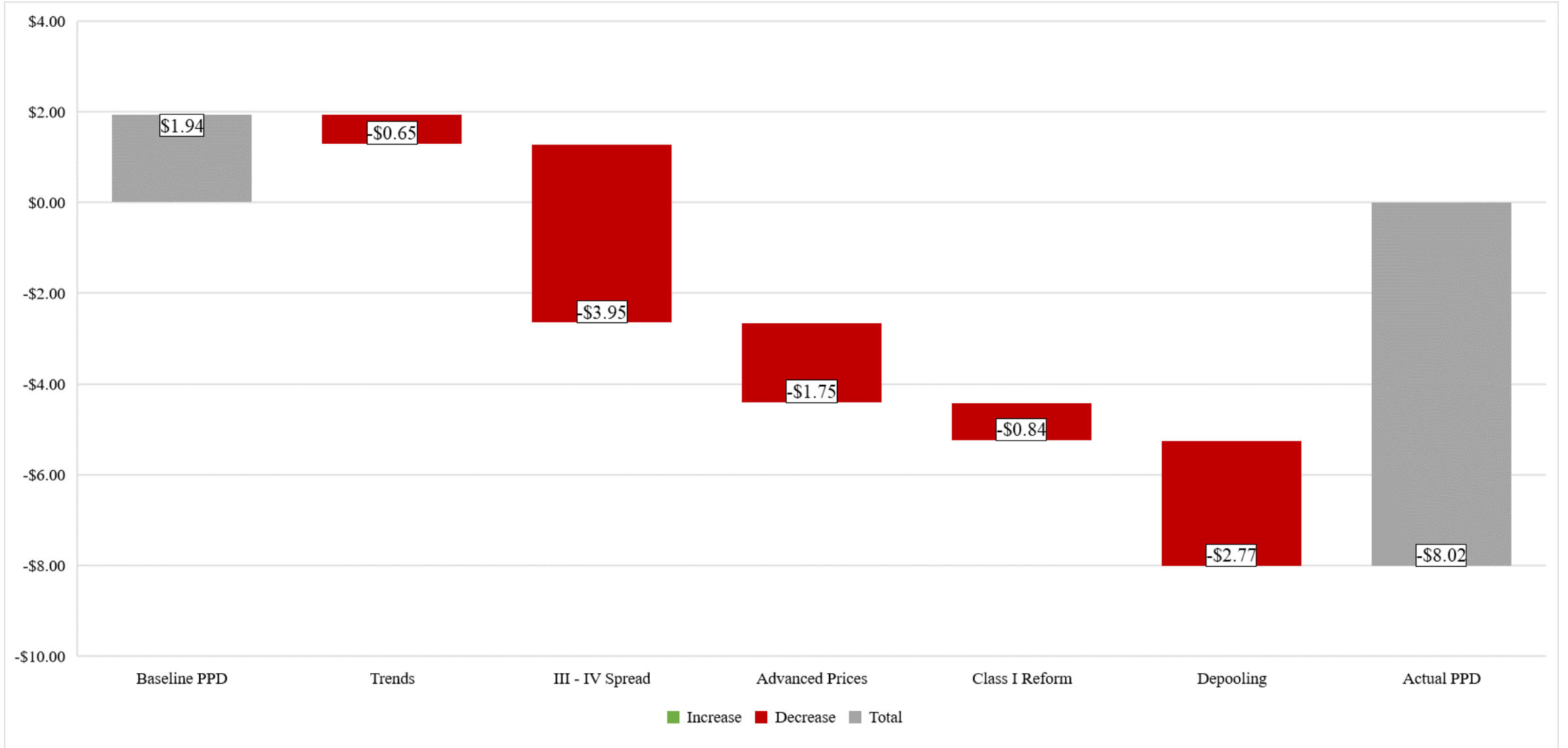# PPD DECOMPOSITION – FMMO 33 (MIDEAST), MAY 2020

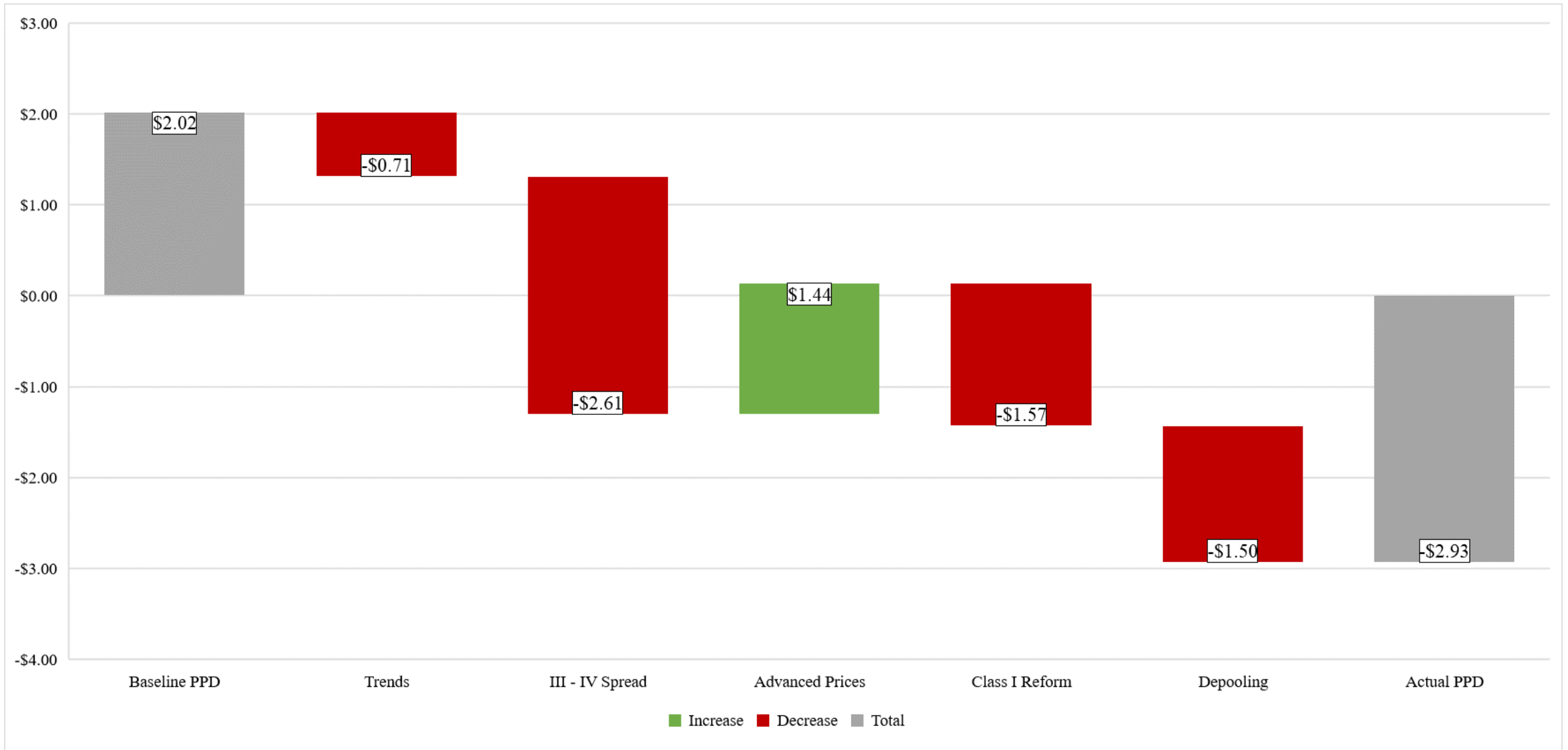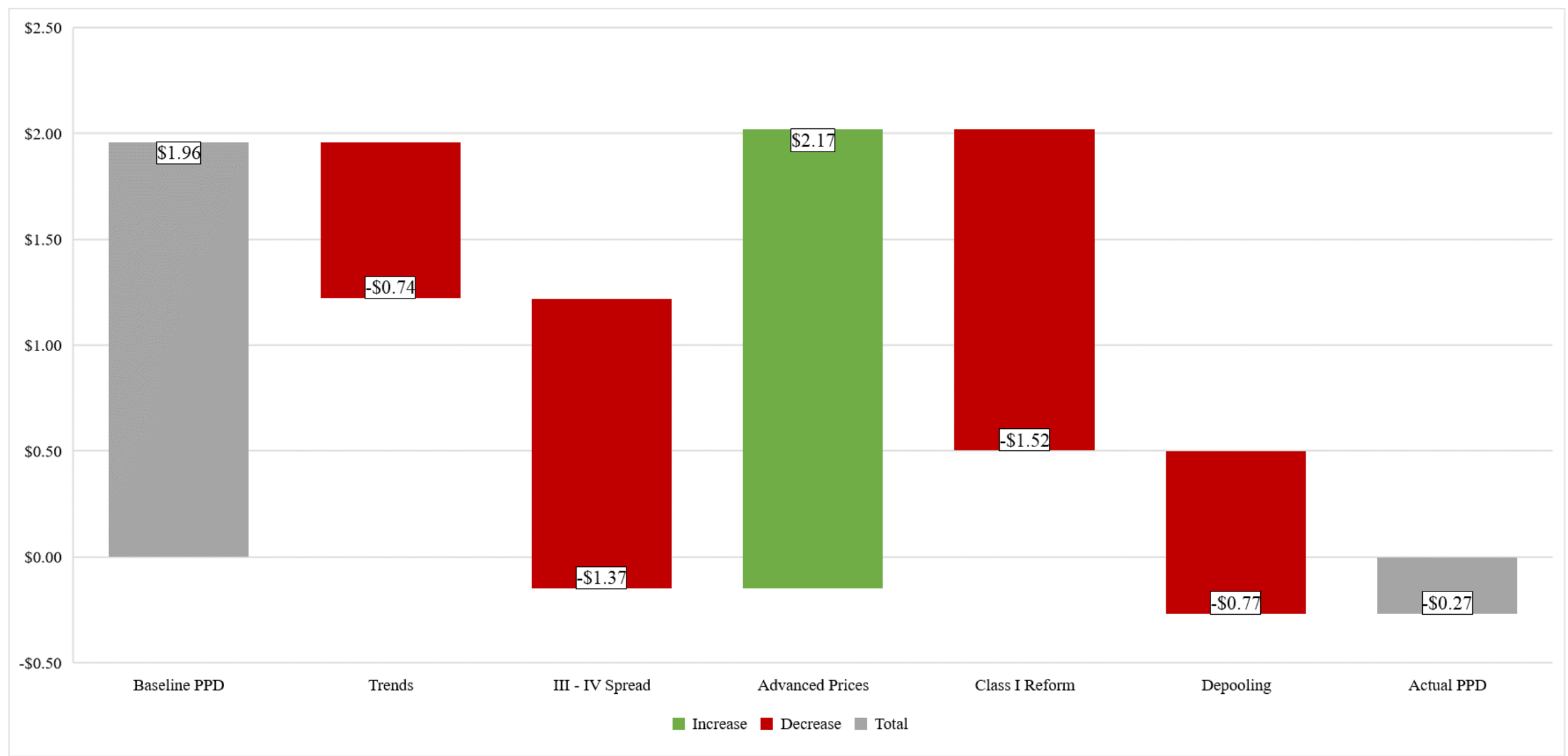# PPD DECOMPOSITION – FMMO 33 (MIDEAST), JUNE 2020

PPD DECOMPOSITION – FMMO 33 (MIDEAST), JULY 2020

Waterfall chart showing PPD decomposition:
- Baseline PPD: $1.94
- Trends: -$0.65
- III - IV Spread: -$3.95
- Advanced Prices: -$1.75
- Class I Reform: -$0.84
- Depooling: -$2.77
- Actual PPD: -$8.02

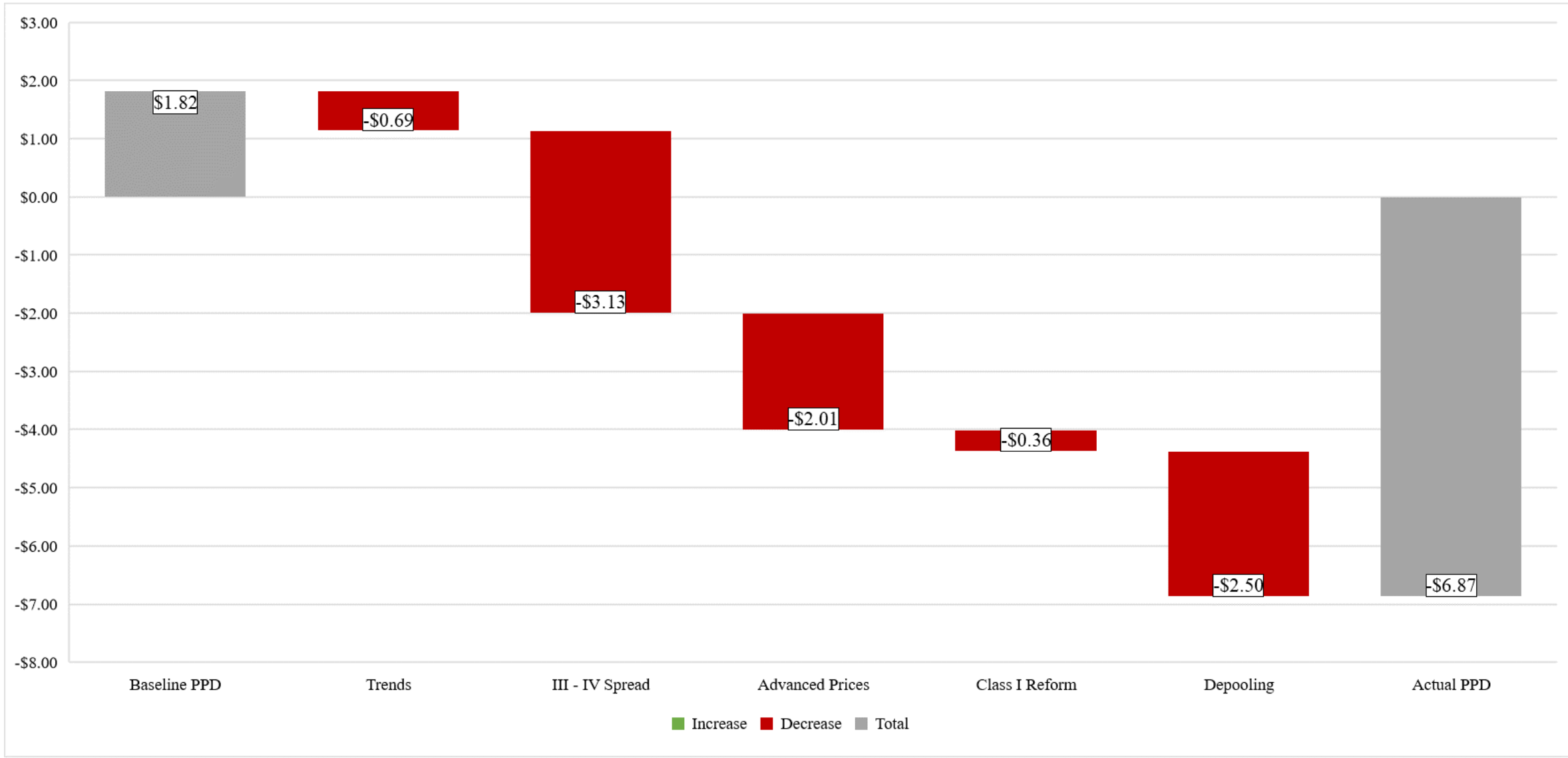Legend: Increase | Decrease | Total
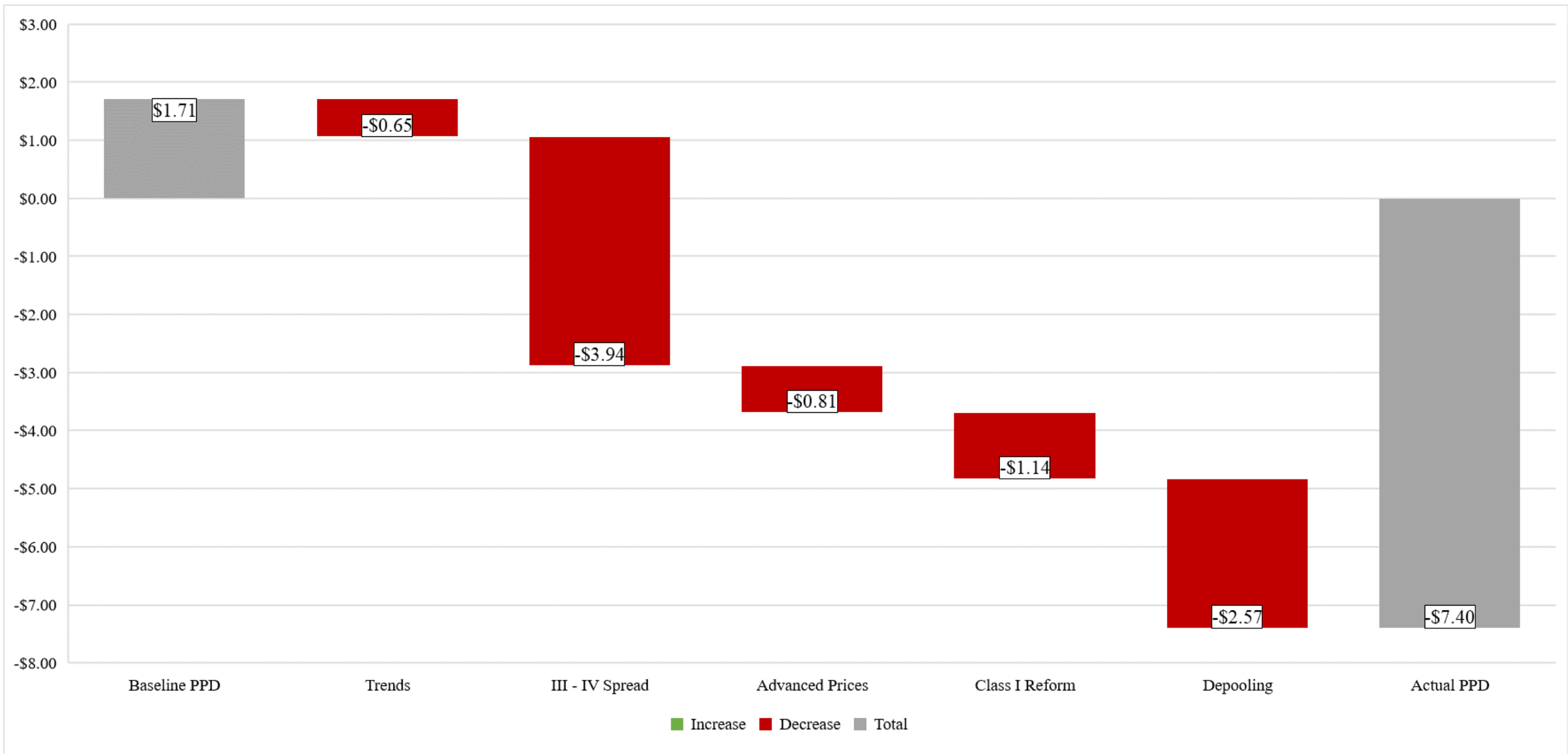
PPD DECOMPOSITION – FMMO 33 (MIDEAST), AUGUST 2020

PPD DECOMPOSITION – FMMO 33 (MIDEAST), SEPTEMBER 2020

PPD DECOMPOSITION – FMMO 33 (MIDEAST), OCTOBER 2020

PPD DECOMPOSITION – FMMO 33 (MIDEAST), NOVEMBER 2020

PPD DECOMPOSITION – FMMO 33 (MIDEAST), DECEMBER 2020