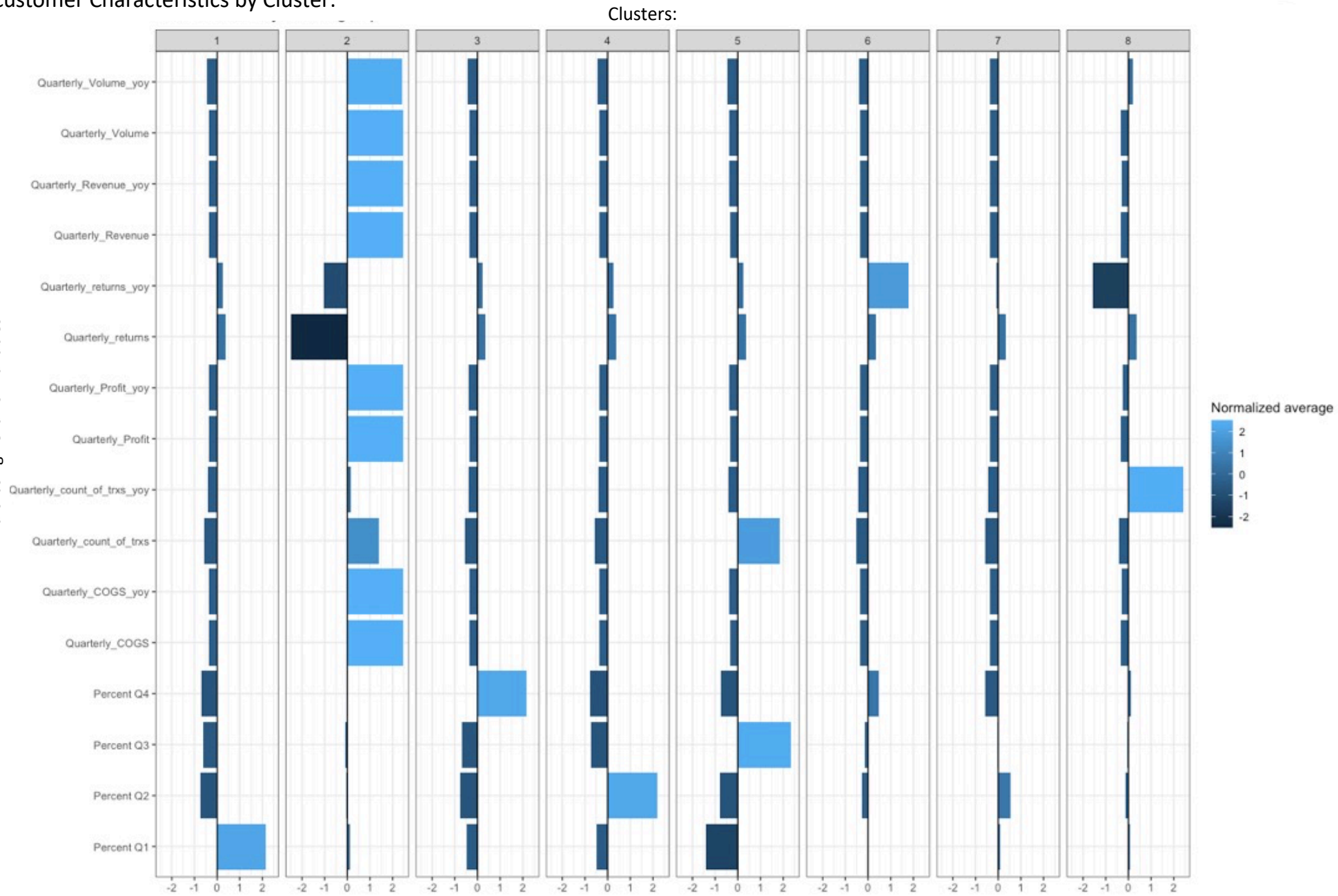
Summary

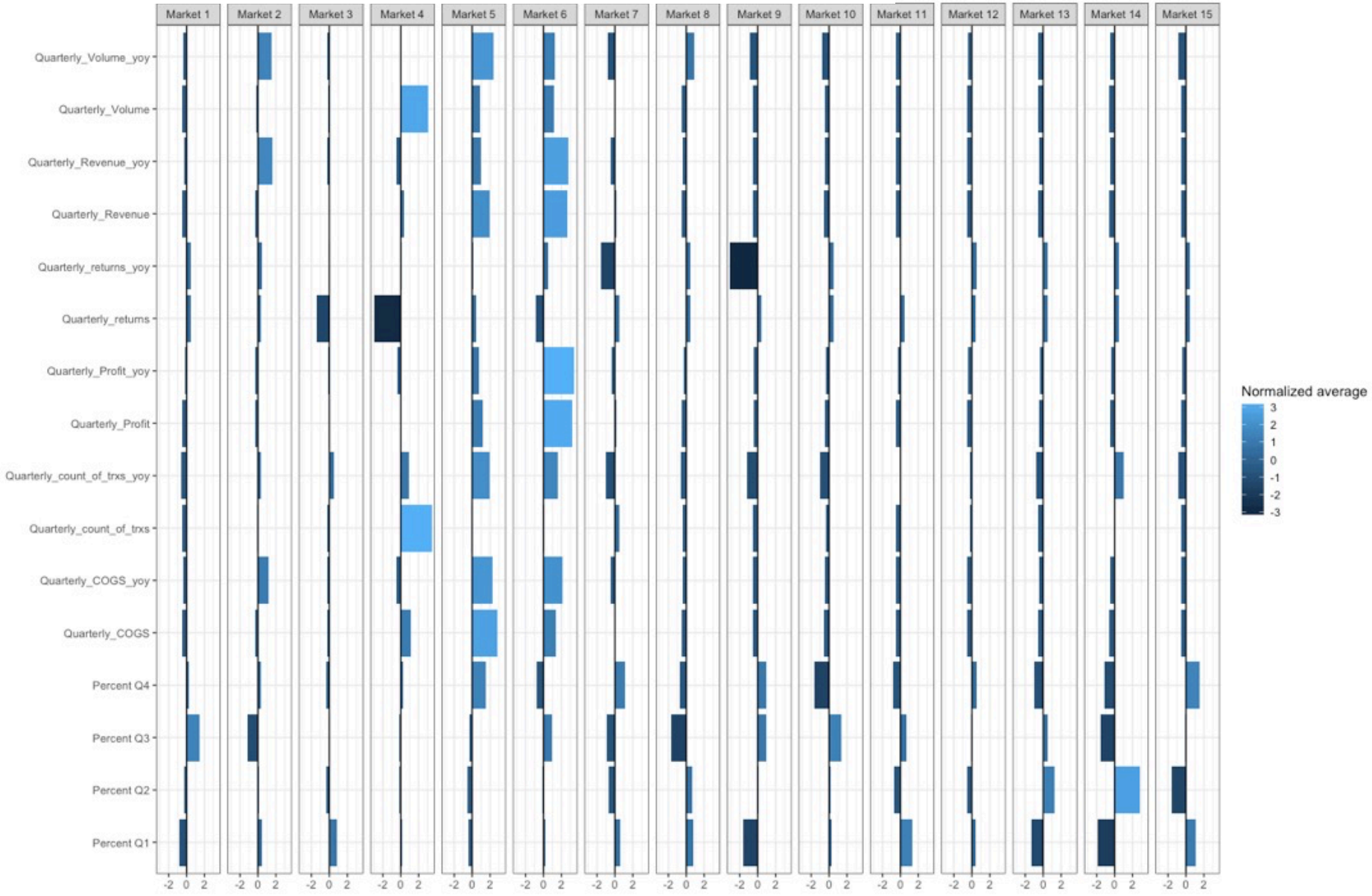
1. The current practice of “End Market” classification fails because “Market 1” makes up >98% of all customers
2. By segmenting customers based on purchasing behavior (e.g., how much, how often, when, where) we can identify like-groupings of customers
3. Underperforming customers (compared to their segment) can be targeted for incremental revenue and cost improvement
4. Back-of-the-envelope analysis suggests:
    - $2.4B in potential revenue headroom at 10% under-performer lift rate
    - $3.5B in potential COGS reduction at 10% under-performer lift rate
5. Additional areas for exploration:
    - Plant optimization / redundancy
    - Seasonality of purchasing (consolidation, targeting)
    - Implementing a targeted sales-service (as opposed to engineering staff being solely responsible)
    - How sensitive are customers to price increases?
    - Which customers/markets are most influenced by regulations?
    - Target customers based on likelihood of incremental gain

Customer Characteristics by Cluster:



Number of Customers:	34,10	92	4,848	3,162	5,203	5,117	2,486	2009
Characterizations:	Buys in Q1	Buys the most, growing the fastest	Buys in Q4, some returns/discounts	Buys in Q2. Some returns/discounts	Buys in Q23. High volume but low profit	Highest returns/discounts. Buys in Q4	Some returns/discounts	Highest YoY Volume Growth with little discounts/returns

“End Market” Segmentation Fails because all customers are in “Market 1”



Number of Customers:	26,023	47	36	125	33	38	7	8	8	36	125	33	38	7	8
Characterizations:	Entire Portfolio, mostly unremarkable	…?	…?	…?											

Targeting Customers for Interventions

Process:

- Assign cluster to each customer along with information about common cluster behavior (e.g., average profit)
- Identify customers that are under-performing relative to their cluster
- Target customers in order of potential upside (delta from group mean)
- For future exploration: Target customers based on *likelihood of incremental gain*

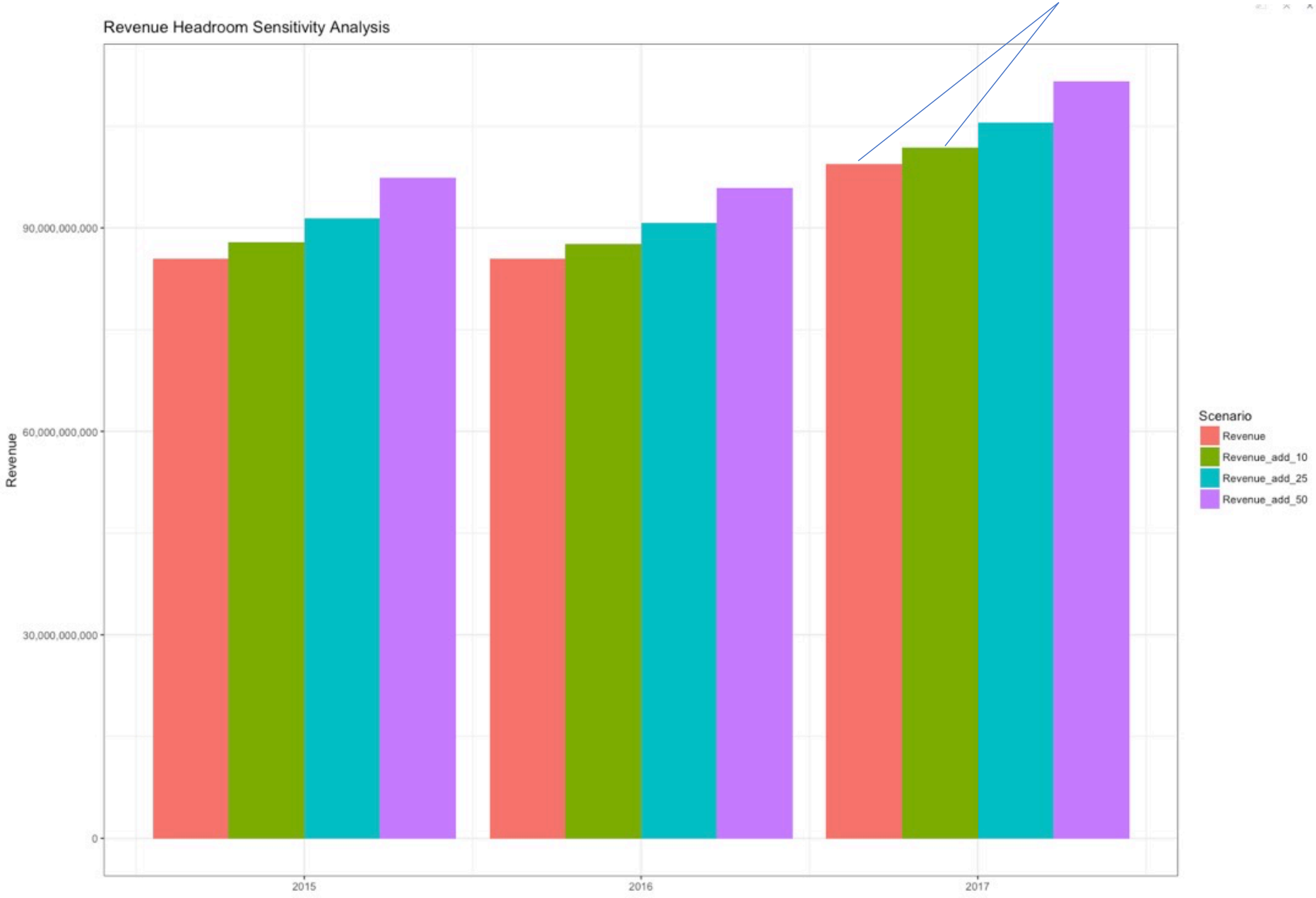
Example: Top 10 Customers by difference from cluster mean:

Customer	Average Quarterly Profit	Quarterly_Profit_cluster_mean	Quarterly_Profit_delta
Customer 2243	$ 3,346,865	$ 147,017,951	$ (143,671,087)
Customer 2424	$ 12,763,173	$ 147,017,951	$ (134,254,778)
Customer 2578	$ 7,186,739	$ 147,017,951	$ (139,831,212)
Customer 3939	$ 14,007,406	$ 147,017,951	$ (133,010,546)
Customer 4077	$ 1,736,164	$ 147,017,951	$ (145,281,787)
Customer 4865	$ 16,478,070	$ 147,017,951	$ (130,539,882)
Customer 518	$ 14,749,410	$ 147,017,951	$ (132,268,541)
Customer 573	$ 4,847,317	$ 147,017,951	$ (142,170,634)
Customer 577	$ 12,863,103	$ 147,017,951	$ (134,154,849)
Customer 734	$ 9,650,885	$ 147,017,951	$ (137,367,066)

Potential Upside: Increasing Revenues

If 10%-50% of underperformers could be moved to the mean, how much would that be worth?

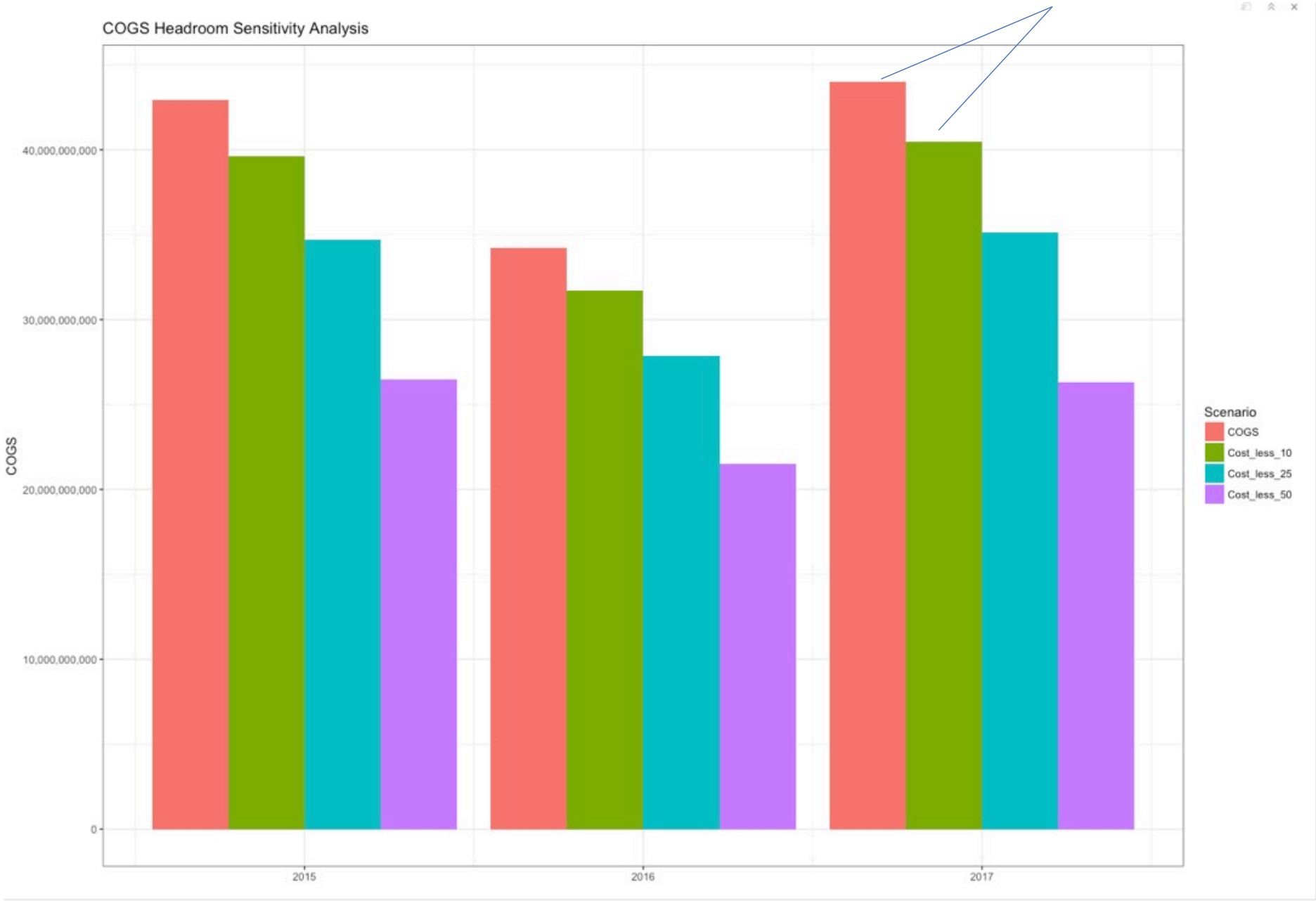
$2.4B in potential cost savings at 10% increase



Potential Upside: Decreasing COGS

If 10%-50% of underperformers could be moved to the mean, how much would that be worth?

$3.5B in potential cost savings at 10% reduction



Appendix

Future Topics:

- Employ predictive modeling to target customers based on things like:
  - Predicted sensitivity to increased prices
  - Likelihood of attrition
  - Likelihood to consolidate plants/products
  - Additional data needed: Price of eventual goods sold by customers using our parts
- Non-linear optimization of product mix / manufacturing output
  - What is the exact right mix of products to produce so as to:
    - Maximize revenue
    - Minimize cost
    - Maximize LTV of customer
- Plant optimization
  - Redundancy in plants
  - Consolidation
  - Logistics optimization

Appendix

Why choose 8 clusters?

- ”Elbow” method reveals 8 clusters is optimal
- Few enough to be understandable, and increasing group size incrementally decreases the Sum of Squared Errors within clusters