Roadmap of experiments : how many times and on which media?

Robyn calibration strategy for better estimating ROI

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MMM is designed to guide optimal advertising investment decisions.

but MMM has its duality...

Duality of MMM

Convincing explanation to customers

Problem: The results from MMM are often controversial and not intuitive.

Demand: Optimization for convincing explanation [1]

Solution : Decomp.RSSD

Better understanding of ROI

Problem: MMM produce correlational, not causal results. [2]

Demand: System for accurately estimating (incremental) ROI

Solution : Calibration from RCT or quasi-experiments

[1] Decomp RSSD: Optimizing for Politics, RECAST

[2] Challenges and Opportunities in Media Mix Modeling

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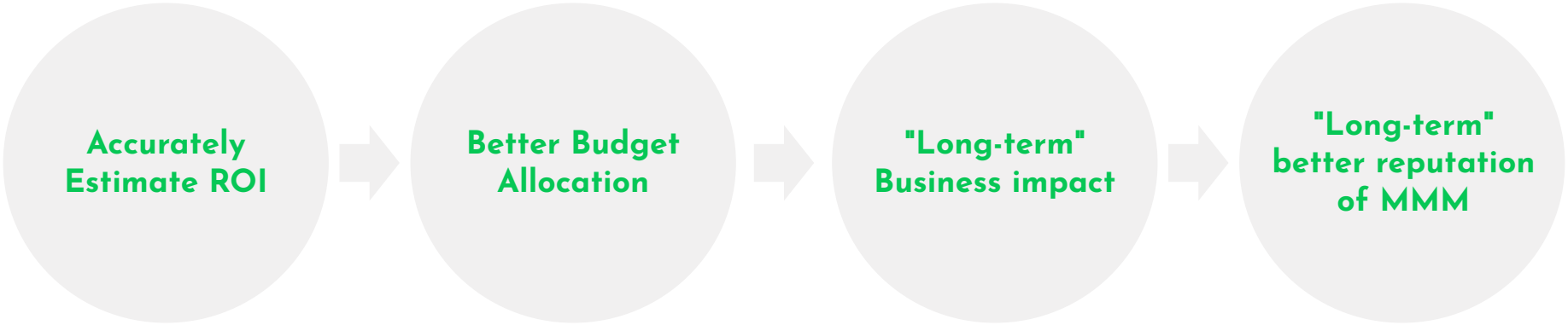
Why should we accurately estimate ROI?



what we need is

Calibration strategy for accurately estimating ROI

Questions of calibration strategy

Variety of experiments

"Which media should we conduct experiments on?"

"We do a lot of experiments on facebook. Is it enough?"

Number of experiments

"How many experiments should we conduct on Instagram?"

"Conducting experiments is expensive. Can we reduce the cost?"

Contribution

We show...

① Experiments on multiple media make Robyn's ROI estimation much better

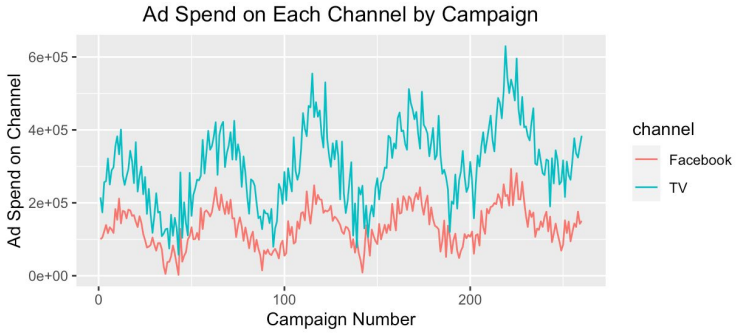
② Multi-time experiment on each media make Robyn's ROI estimation accurate

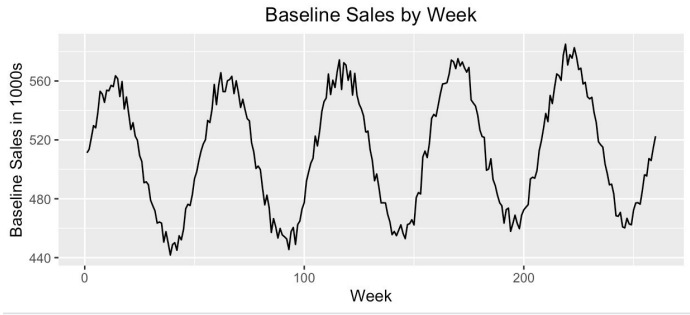
by conducting analysis with synthetic data.

Setting

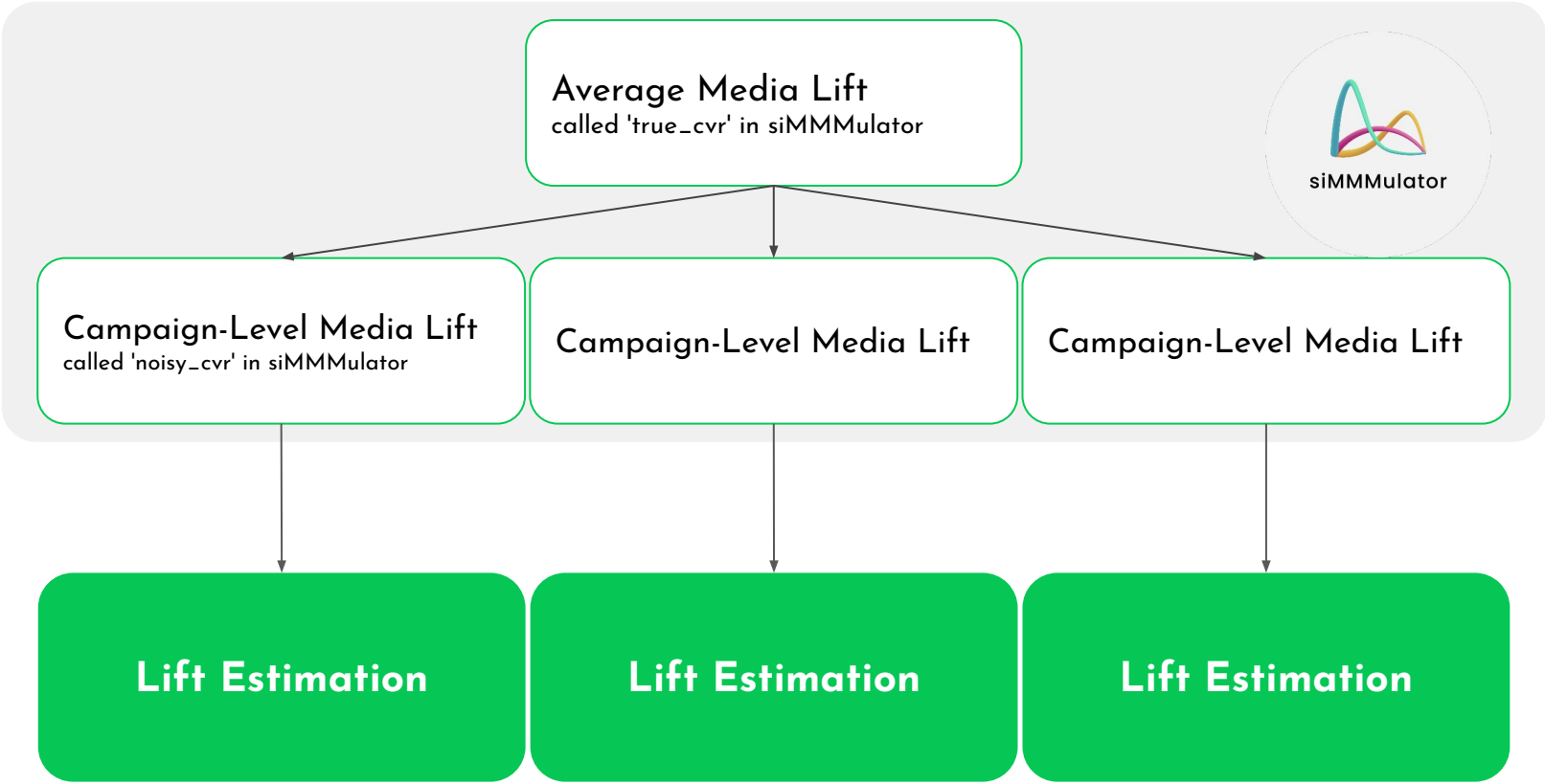
Data Generation Process : spend and sales history

- Key Points
  - **Media Spend is correlating with organic sales.**
    - We add implementations to **siMMMulator** to achieve this.
- Important Assumption
  - 2 (FB/TV) channels
  - Causal effect of each media is time-invariant
  - Not considering post-click conversion for simplicity
  - CPM is time-invariant





Data Generation Process : RCT results



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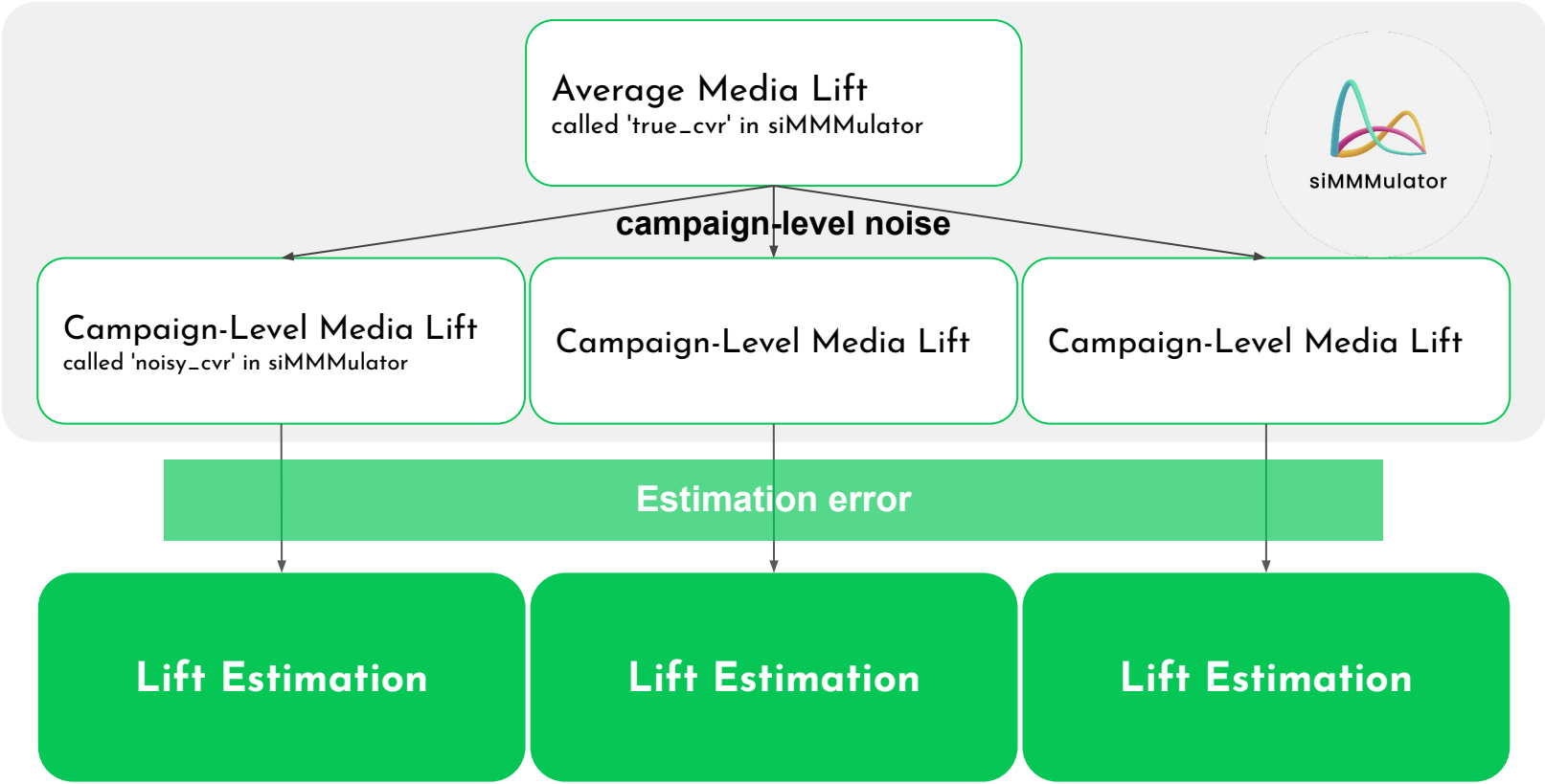


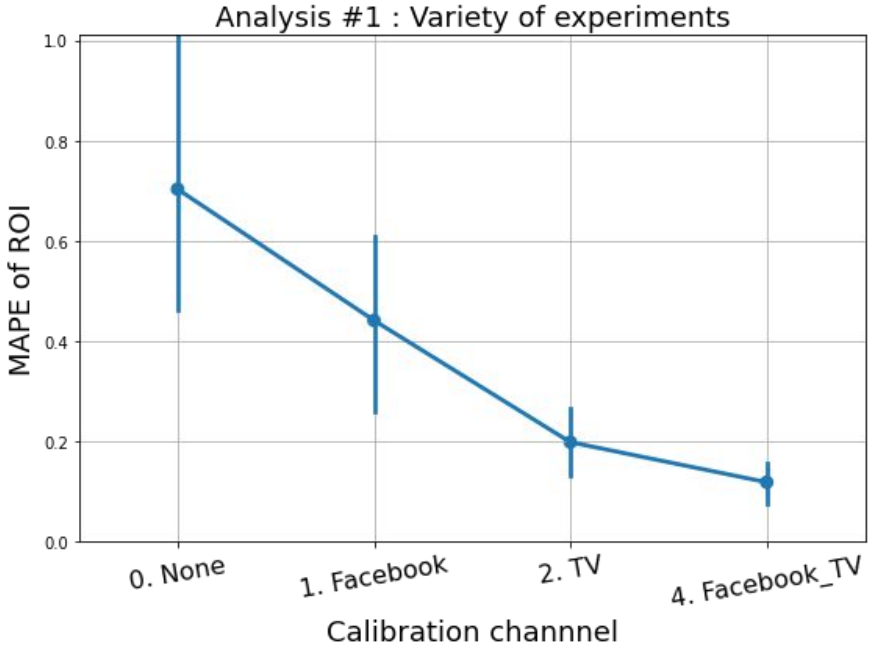
Analysis #1 : Variety of experiments

Experimental Setting

- Goal
  - Prove that calibration improves the accuracy of causal effect estimation
- Comparison
  - No calibration
  - Calibration with single media
  - Calibration with All media
- Evaluation metrics
  - Mean of absolute percentage error (MAPE) of ROI
- Assumption: no estimating error exists

see document for detail.

Results



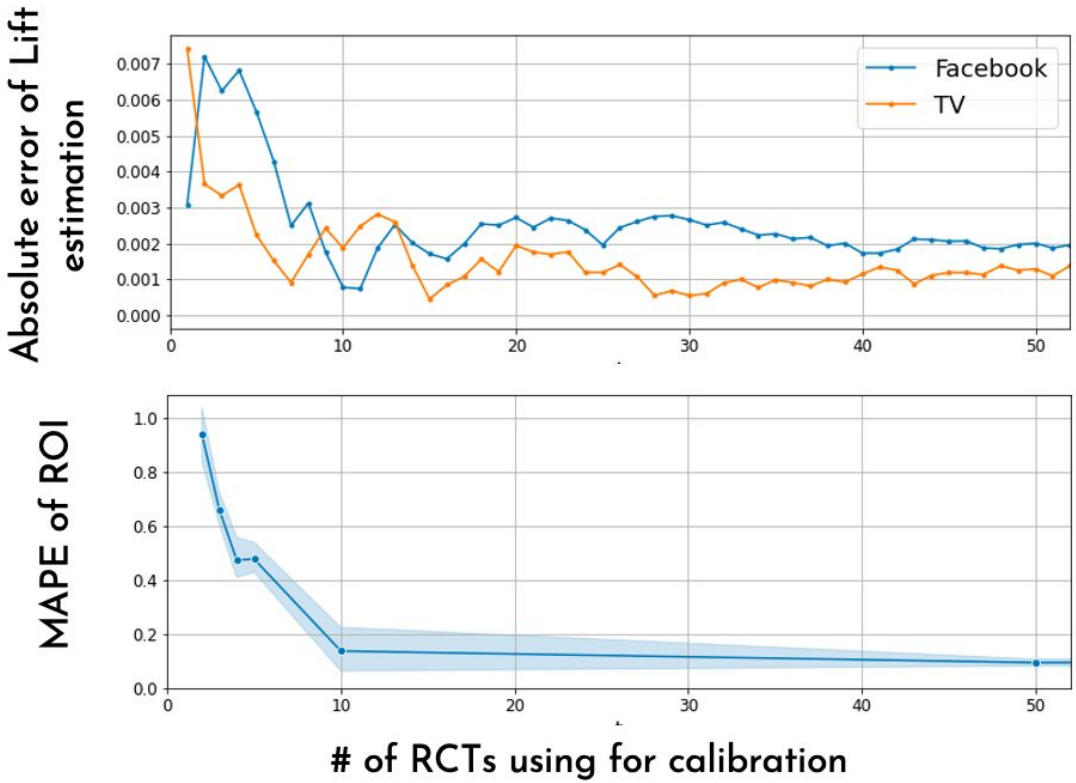
- Calibrating two media achieve smallest MAPE of ROI.
- Even though calibration doesn't cover all of media, MAPE of ROI decrease
- it is better that conduct experiments on as much media as possibl

Analysis #2 : Number of experiments

Experimental Setting

- Goal
  - Prove that the calibration with numerous RCTs improves the accuracy of causal effect estimation
- Comparison
  - Number of RCT results used for calibration (1, 5, 10, 50, 260)
- Evaluation metrics
  - MAPE of ROI

Results



- Using the more RCTs for calibration, the error of average Lift is decreasing (above)
- Using the more RCTs for calibration, the error of ROI is decreasing (bellow)

Results and Discussion

- Analysis #1 showed experiments on multiple media make Robyn's ROI estimation much better
  - RCT on all media estimated ROI the most accurately
  - RCT on some media improved the ROI estimation
- Analysis #2 showed multi-time experiment on each media make Robyn's ROI estimation accurate

What should we do from tomorrow?

- **In the planning phase of marketing, you just plan the experiment roadmap.**
- If you can conduct experiments on all media, it's the best.
- If cannot, it is better that cover as much media as possible.
- If you can conduct experiments as many as possible on each media, that makes your MMM results more accurate.

take home message

Make experiments roadmap. Do experiments more.