Marketing Mix Model Take-Home Summary

Monthly Mocha - Bayesian MMM with Google Meridian

Prepared by: Dillon Murphy | Date: 2025-12-17

Recommendations (fixed budget, constrained reallocation)
Reallocate spend share away from Google and Newsletter (Beehiiv + LiveIntent) and into Snapchat, Meta, and Moloco based on higher modeled marginal returns.

Predicted lift
• Current modeled incremental revenue: **$84.9M**
• Optimized modeled incremental revenue: **$86.4M**
• Predicted lift: **$1.5M** (**1.73%**)

Key findings

• Baseline demand is the dominant driver (~79.7% of modeled revenue), with paid media contributing ~20.3% overall.
• Google drives the largest absolute incremental revenue (~$7.2M) but has lower ROI (0.7 mean) given it holds most spend.
• Meta and Moloco show the strongest efficiency (mean ROI ~2.0–2.1) but at smaller scale today.
• Newsletter (Beehiiv + LiveIntent merged) shows moderate ROI but higher uncertainty and very high CPM.

Action plan

• Move budget gradually (e.g., 10–15% of weekly budget per week) toward the optimized shares; monitor CPIK and volume.
• Treat results as directional where uncertainty intervals are wide; prioritize incrementality tests for Meta, Moloco, and Newsletter.
• Refresh the MMM monthly and compare ROI stability and response-curve shape over time.

Budget reallocation scenario

Scenario: fixed total budget, each channel constrained within +/-30% around the baseline allocation.
Objective: maximize modeled incremental revenue using learned response curves.

Recommended spend share shifts

Channel	Current share	Optimized share	Delta
Snapchat	22.3%	28.8%	+6.5%
Meta	12.0%	15.6%	+3.6%
Moloco	4.6%	5.9%	+1.4%
TikTok	0.0%	0.0%	+0.0%
Newsletter	13.5%	9.7%	-3.8%
Google	47.7%	40.0%	-7.7%

Predicted incremental revenue lift by channel

Channel	Current	Optimized	Lift
Snapchat	$20.1M	$22.3M	+$2.2M
Meta	$13.9M	$15.4M	+$1.6M
Moloco	$8.7M	$9.6M	+$0.8M
TikTok	$0.0M	$0.0M	+$0.0M
Newsletter	$11.1M	$10.0M	$-1.1M
Google	$31.1M	$29.1M	$-2.1M

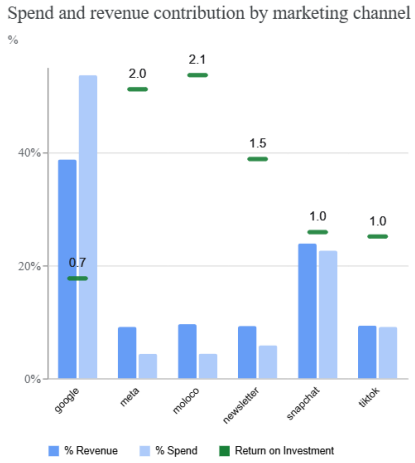
Lift shows expected model gain from baseline budget allocation of last 8 weeks to the optimized allocation, evaluated over entire model horizon.

Interpretation: gains come from shifting marginal dollars into Snapchat, Meta, and Moloco, while trimming Google and Newsletter where the model indicates lower marginal returns at current spend.

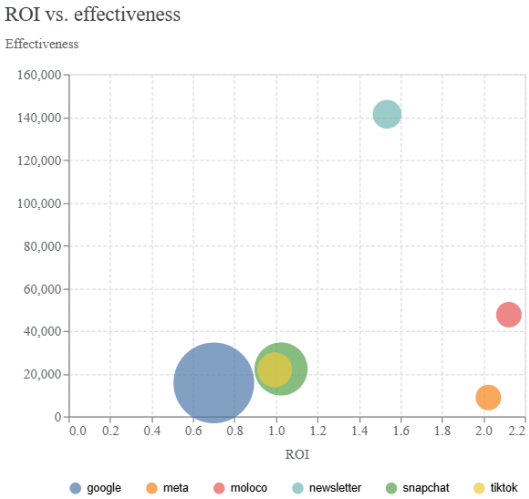
Channel performance summary

Posterior estimates reported with 90% credible intervals (CI). ROI is incremental revenue divided by spend. CPIK is cost per incremental subscription (lower is better).

Channel	Spend	Incremental revenue	ROI	CPIK	CPM
Google	$10,298,544	$7,213,184 ($1,338,402, $18,703,056)	0.7 (0.1, 1.8)	$186 ($55, $769)	$22
Meta	$840,158	$1,700,618 ($194,497, $5,345,034)	2.0 (0.2, 6.4)	$76 ($16, $432)	$4
Moloco	$842,235	$1,788,092 ($190,735, $5,447,500)	2.1 (0.2, 6.5)	$73 ($15, $442)	$22
Snapchat	$4,342,437	$4,448,082 ($711,807, $12,506,747)	1.0 (0.2, 2.9)	$137 ($35, $610)	$22
TikTok	$1,752,685	$1,741,754 ($277,840, $4,793,768)	1.0 (0.2, 2.7)	$137 ($37, $631)	$22
Newsletter	$1,126,160	$1,729,627 ($210,747, $5,370,200)	1.5 (0.2, 4.8)	$101 ($21, $534)	$92

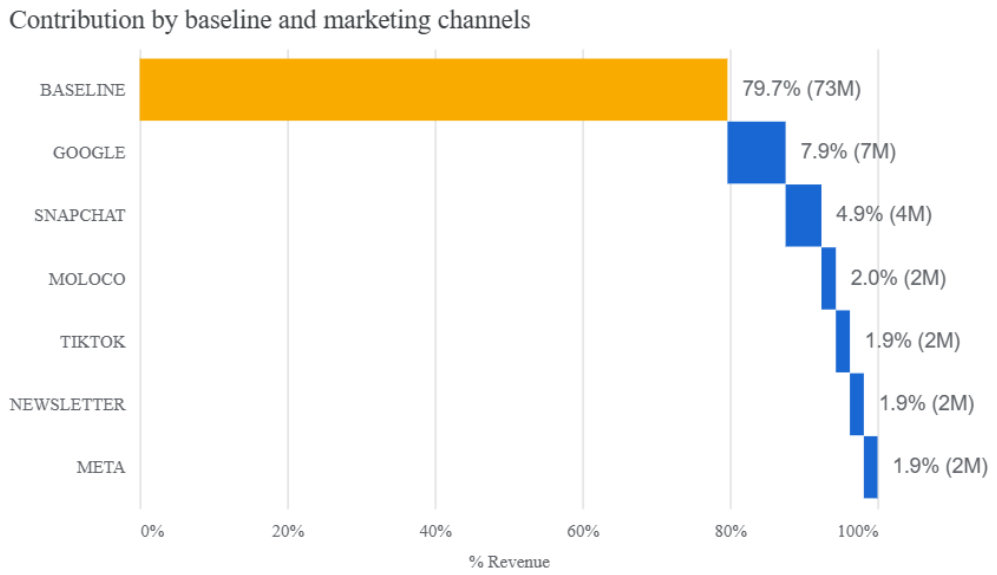


Spend share vs revenue contribution share (annotated with posterior mean ROI).



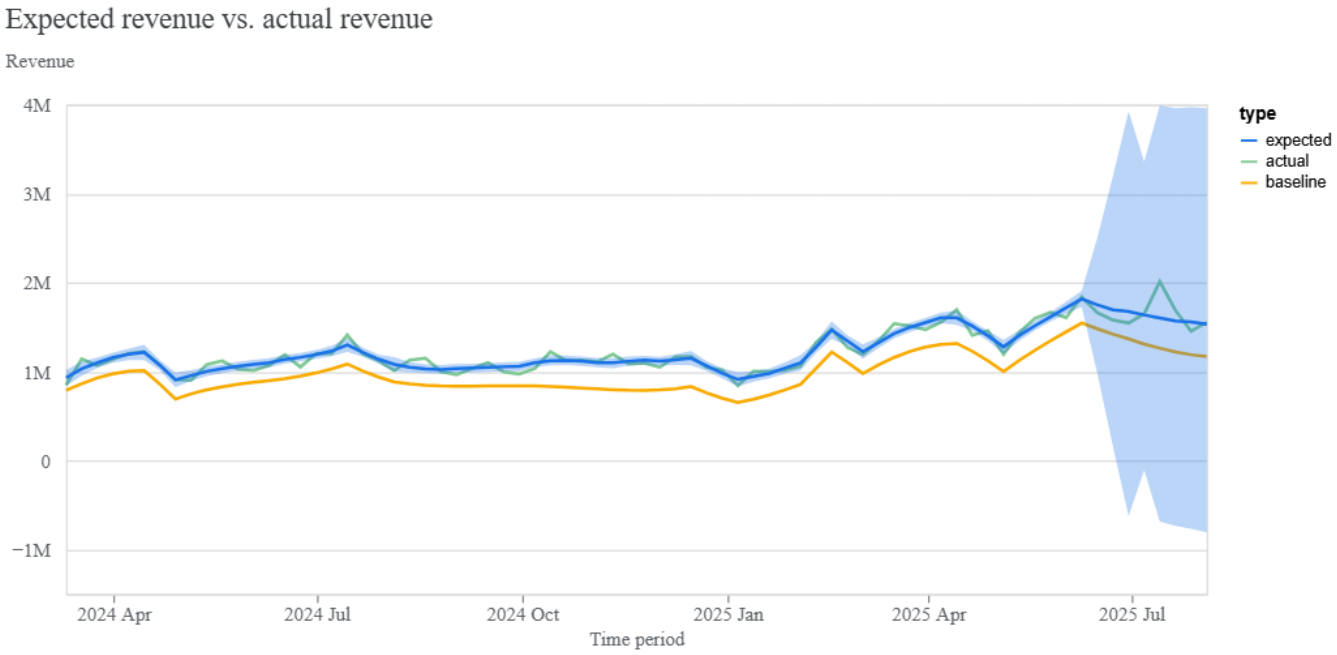
ROI vs effectiveness (bubble size reflects spend).

What is driving outcomes



Baseline dominates modeled outcomes; paid media contributes ~20.3% in aggregate.

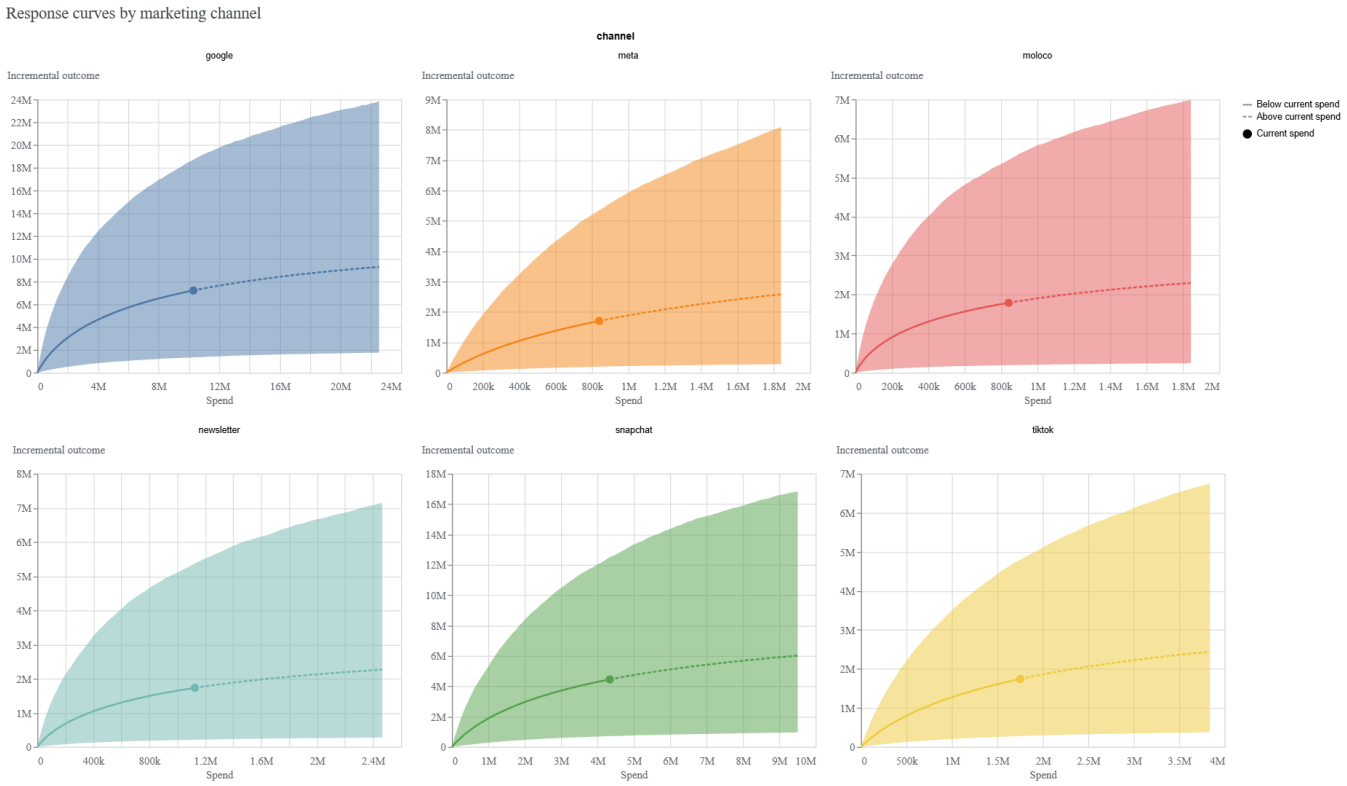
Model fit (directional validation)



Holdout (last 8 weeks) shows wider uncertainty; media levels were partially out-of-range vs training. Use results directionally and validate shifts with incrementality tests.

Why the budget shifts make sense

Response curves show diminishing returns: as spend increases, marginal incremental revenue decreases. Optimization prefers channels with higher marginal returns around the current operating point.

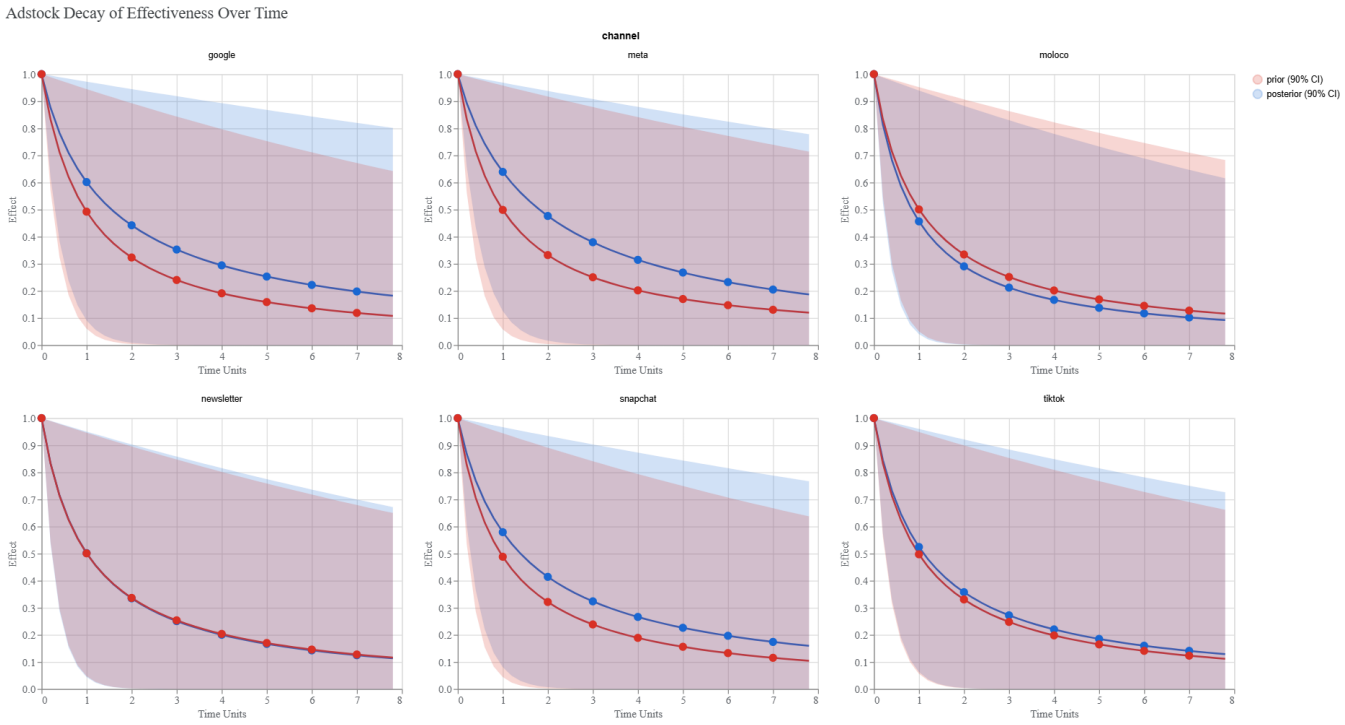


Dotted lines indicate extrapolation above historical spend.

Business interpretation: The model suggests Google is closer to saturation at current spend, while Snapchat/Meta/Moloco have more room to scale efficiently at the margin.

Timing: carryover (adstock) and measurement windows

Adstock curves describe how quickly a channel's impact decays after exposure. This informs how long to wait to evaluate changes (e.g., budget shifts) and helps separate immediate vs multi-week effects.



Posterior adstock decays indicate learned carryover by channel.

How to operationalize this:

- For channels with faster decay, evaluate changes over 1–2 weeks.
- For slower decay channels, evaluate over multi-week windows (e.g., 3–6 weeks) to capture carryover.

Method notes and limitations

Approach

• Bayesian MMM (Google Meridian) with adstock (carryover) + saturation (diminishing returns).
• Controls: trend + annual seasonality (Fourier harmonics k=1,2).
• Channel prep: removed low-signal channels (Roku, Amazon) and merged correlated newsletters (Beehiiv + LiveIntent).
• Validation: time-based holdout (last 8 weeks). Reviewer checks passed (convergence, baseline sanity, posterior predictive).

Limitations / caveats

• Short time series (74 weeks) and limited controls (pricing, promos, competition, macro) constrain causal separation.
• Channel correlation can inflate uncertainty; merging newsletters mitigated but does not eliminate this risk.
• Holdout contained out-of-range media levels, which can depress test R-squared; treat optimization results as directional.

Next steps

• Run incrementality tests (geo-holdout or matched-market) prioritizing Meta/Moloco/Newsletter where ROI is high but uncertain.
• Add business controls if available (promo calendar, pricing changes, email sends, seasonality events).
• Refit MMM on a recurring cadence and compare posterior ROI stability and response curve shifts.