

# Optimizing Advertising Spend with Media Mix Modeling

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Companies have long invested in advertising to promote brand awareness and ultimately drive sales, but marketers have more options than ever before when it comes to allocating marketing budgets. Technological advances and societal shifts have led to the widespread adoption of programmatic advertising and social media marketing channels, which has culminated in highly targeted digital advertising dominated by major tech companies. For many firms, these digital channels have been added to the more traditional drivers of television, radio, out of home, and direct mail. As such, companies are increasingly relying on data analytics to help efficiently allocate advertising funds. At Mather, our media mix modeling approach leverages econometric techniques to measure the efficacy of advertising channels on sales. Below we will detail this approach for a project recently completed for a large U.S. publisher.

## *Objective*

The purpose of this engagement was to assist a U.S. publisher in completing an analysis of advertising spend effectiveness with the ultimate goal of informing more efficient allocation of their marketing budget. Weekly data on impressions delivered and total spend for various marketing channels was analyzed, including: social media (Facebook, LinkedIn, YouTube, Twitter), television, out of home, digital display, and search. Data was also obtained from other sources that were thought to influence sales. These factors include payroll settings, online promotional subscription offers, direct mail volume, and macroeconomic indicators. The two primary objectives were to leverage the analysis to optimize channel mix at current aggregate spend levels and to measure the overall relationship between advertising spend and sales.



## *Optimizing Channel Mix*

An econometric model measuring the relationship between impressions delivered by channel and total sales was developed leveraging the data noted above. The model enabled us to measure the marginal impact of an additional impression from each channel on subscription sales while controlling for other relevant factors. Two important factors considered when building these models were (a) the lag time between when impressions were delivered and the effect on sales, and (b) the diminishing effectiveness of impressions delivered by channel. To incorporate the timing effect, we tested various lag periods for each channel, ranging from in-week effects to several week lags. For digital channels, we found that the relationships between impressions delivered and sales were strongest in-week, meaning spend in those channels had immediate impacts. For direct mail, we found that impacts were most significant with one to two weeks of lag time, reflecting the period of time between the sending and arrival of those pieces.

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This approach also allows for an evaluation of the effect of diminishing returns to scale for each of these channels. For example, this analysis revealed that social impressions exhibited stronger effects from diminishing returns than search impressions, indicating that the effectiveness of social impressions on sales was reduced more significantly as the number of social impressions delivered increased.

Once these models estimating the relationship between impressions and sales were developed, a scenario planning tool was built to project the impact on sales as a product of varying the mix of spend by channel. The output of this tool allowed us to estimate the channel mix at the current overall level of spend that would maximize sales. Figure 1 shows the current and optimal levels of spend by channel. As a product of moving to the optimal mix, we estimated that sales could increase by 19%.

## *Measuring the Relationship between Aggregate Spend and Sales*

In addition to identifying efficiencies in channel mix, a secondary goal of the project was to measure the relationship between overall marketing spend and sales. To do this, a similar econometric approach was taken, but instead of

using individual variables to control for impressions by channel, a single aggregate spend variable was substituted, which included the combined weekly spend across all channels. This model specification allowed us to estimate the relationship between aggregate spend and sales, and it provided the framework to project baseline sales without any marketing spend. That is, what would sales be if advertising spend was eliminated altogether?

This framework is helpful in estimating the amount of “organic” sales, or sales in the absence of paid acquisition and brand spending. To do this, we plotted weekly observed sales in 2019 and generated a prediction from the econometric model of weekly sales under zero aggregate spend. The plot of the sales with observed spend and predicted sales without spend is in Figure 2. In all, our analysis indicated that, on average over 2019, 65% of orders were attributable to advertising spend.

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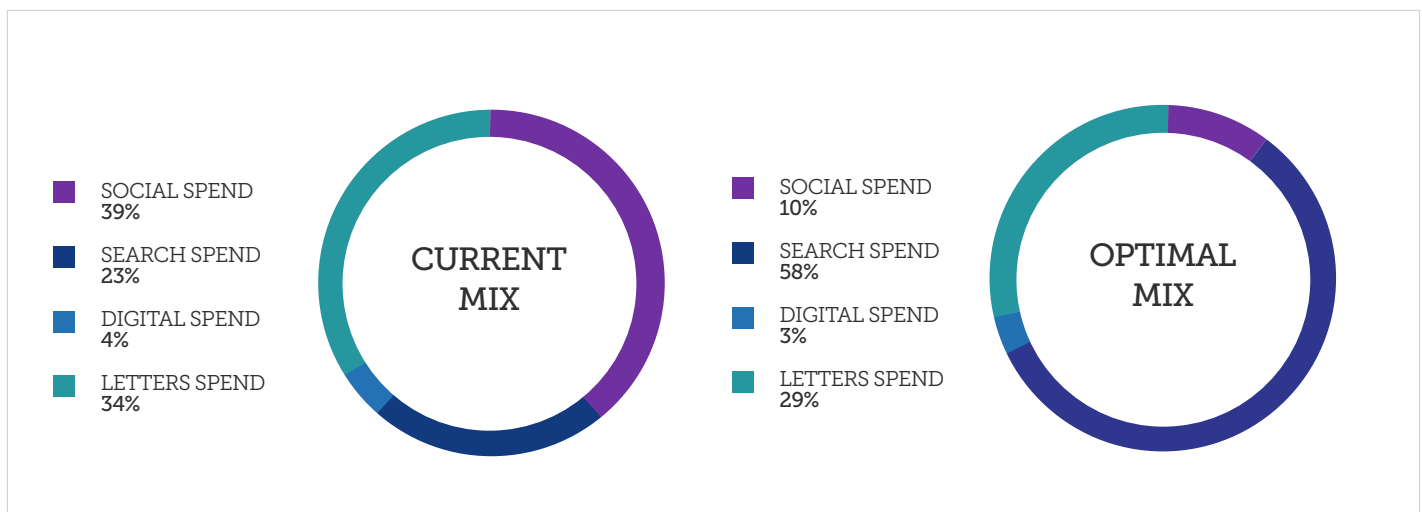


Figure 1: Current vs. Optimal Spend Mix

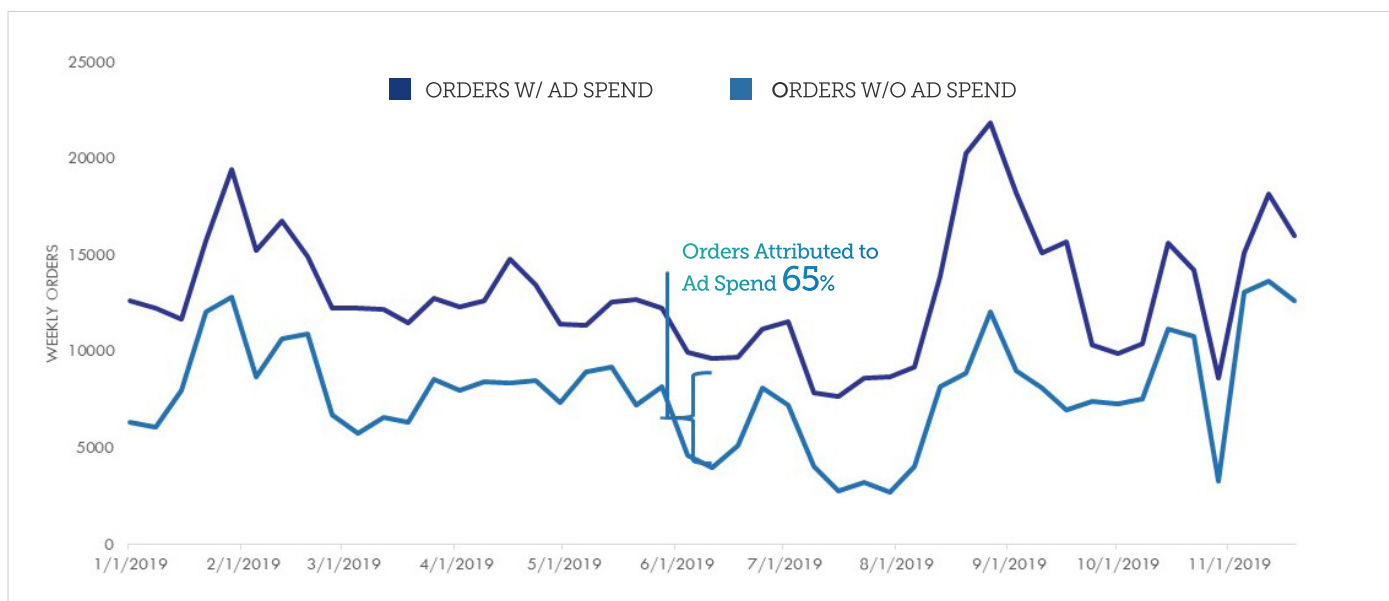


Figure 2: Order Lift from Advertising Spend

## Conclusion

With so many options in how to spend advertising dollars and budgets coming under increased scrutiny due to changing economic conditions, it is important for companies to have the insight needed to efficiently allocate marketing spend. At Mather, our approach to media mix modeling allows stakeholders to measure the sales lift from individual marketing channels and estimate the return on overall spend, ultimately giving them the ability to make more informed decisions on advertising spend.

## About the Author



Matthew Lulay, Managing Director

Since joining Mather Economics in 2012, Matthew has served in a variety of consulting and leadership positions at the firm. In his current role as managing director, his responsibilities include complex project delivery and management, product development, organizational strategy, and business development. He is a subject matter expert in subscription analytics, having worked with hundreds of publishers and other direct to consumer firms to provide data driven insights on price sensitivity, churn mitigation, and customer lifetime value. Matthew has applied his expertise in several industries and focus areas including environmental service valuation, lottery and gaming, and mixed media modeling, but his recent focus has been on developing a suite of analytical tools to support DtC operations in the wine industry.

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