Mape Budget Forecasting & Optimization Report
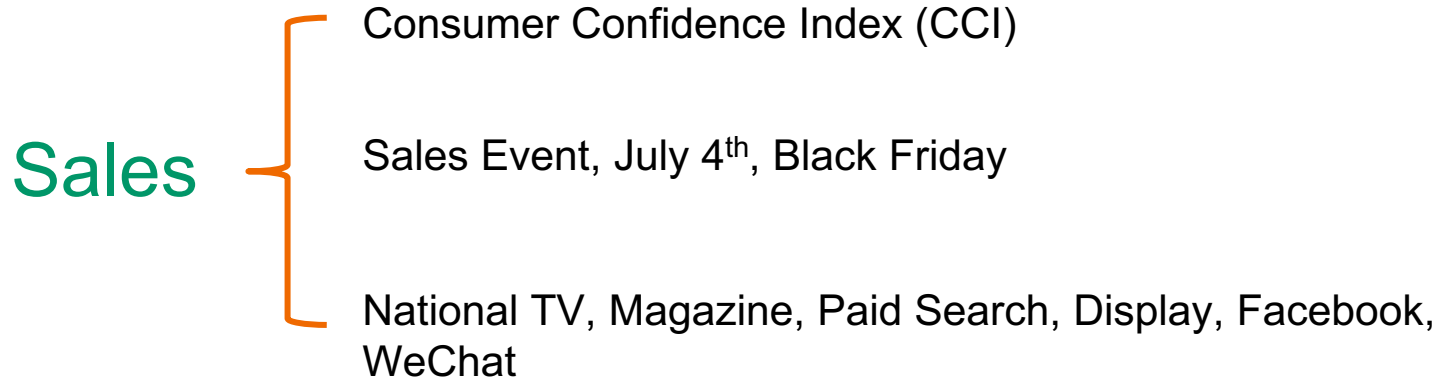
Xiaoxi Qi

To Answer These Questions:

- What will be the impact from different media channels on our sales?

- Which channels have the highest/lowest effectiveness and ROI?

- What will be the optimal spend and mix of marketing investments?

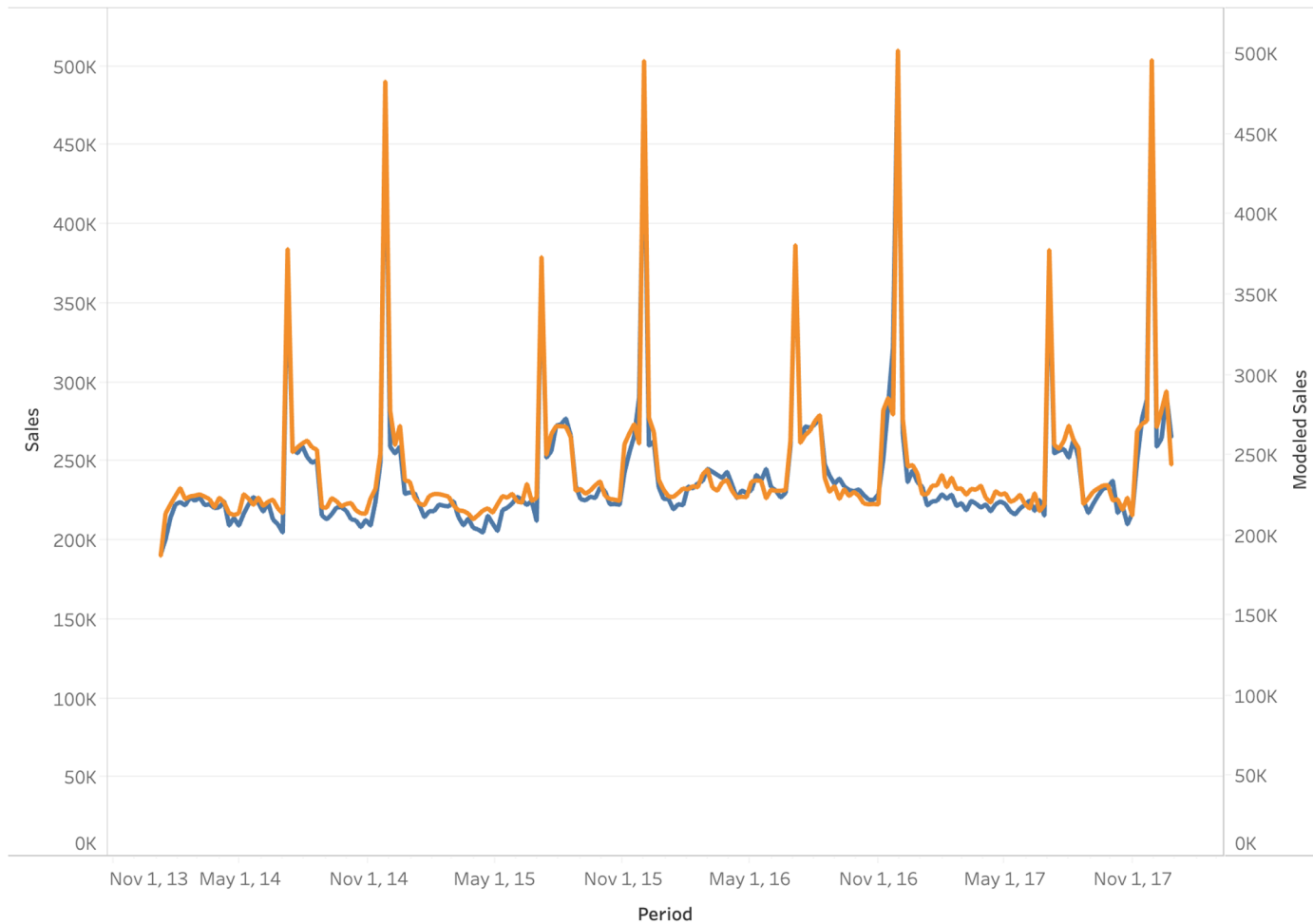- What will be the predicted sales in the future?

Sales Forecasting Model Variables

Sales

Consumer Confidence Index (CCI)

Sales Event, July 4th, Black Friday

National TV, Magazine, Paid Search, Display, Facebook, WeChat

Note:

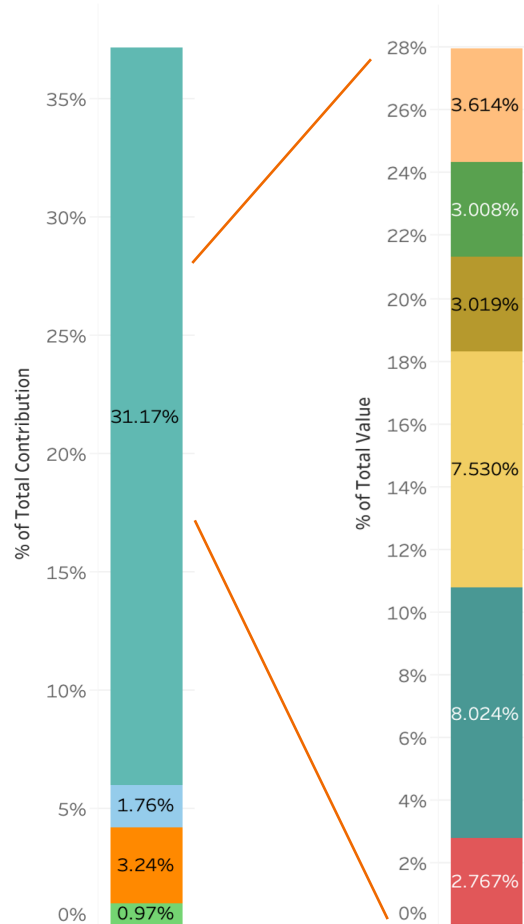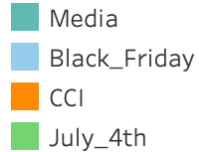- Data range is from 01/2014 to 12/2017 and is by week

AVM

- **MAPE:** 2.4%
- **R-Squared:** 0.9678
- The model performed well during large-spike sales events but overperformed during normal weeks.

Contribution

% of Total Contribution

- Media
- Black_Friday
- CCI
- July_4th

31.17%
1.76%
3.24%
0.97%

Media Contribution

% of Total Value

- Display2
- Facebook1
- Magazine1
- NationalTV2
- PaidSearch1
- Wechat2

3.614%
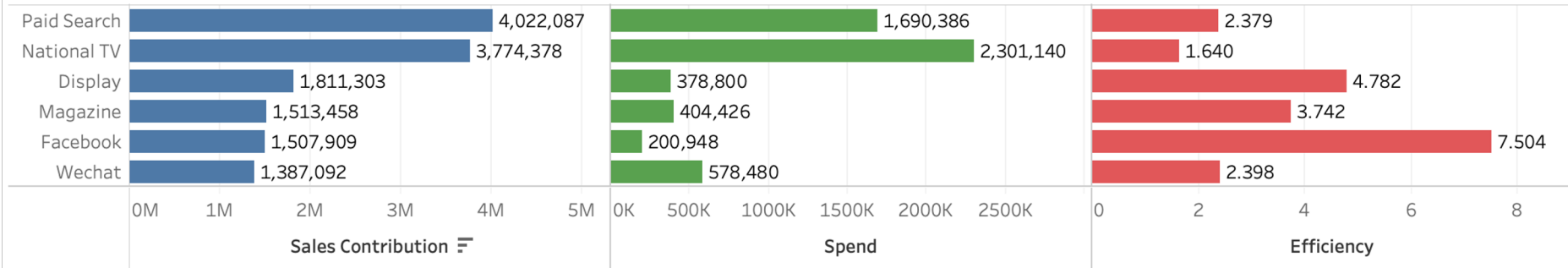3.008%
3.019%
7.530%
8.024%
2.767%

- 31.17% of contribution comes from media marketing
- National TV and Paid Search made the highest contribution to sales
- Wechat made the smallest part of contribution among all of the media marketing channels

Media Efficiency Comparison

Efficiency = Contribution / Spend

Efficiency

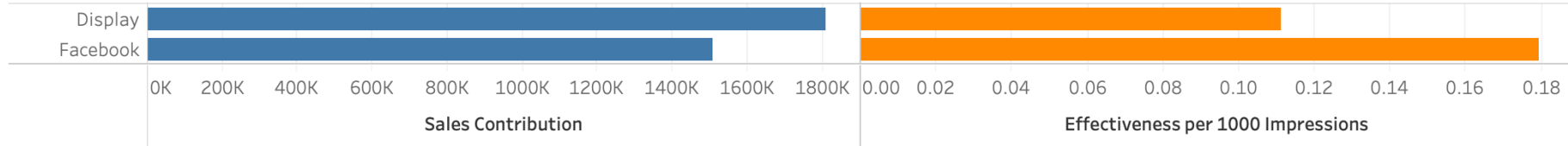| Variab..	Sales Contribution	Spend	Efficiency
Paid Search	4,022,087	1,690,386	2.379
National TV	3,774,378	2,301,140	1.640
Display	1,811,303	378,800	4.782
Magazine	1,513,458	404,426	3.742
Facebook	1,507,909	200,948	7.504
Wechat	1,387,092	578,480	2.398

- National TV and Paid Search have the highest sales but have the lowest efficiency
- Facebook has the highest efficiency among marketing channels

Digital Media Effectiveness Comparison

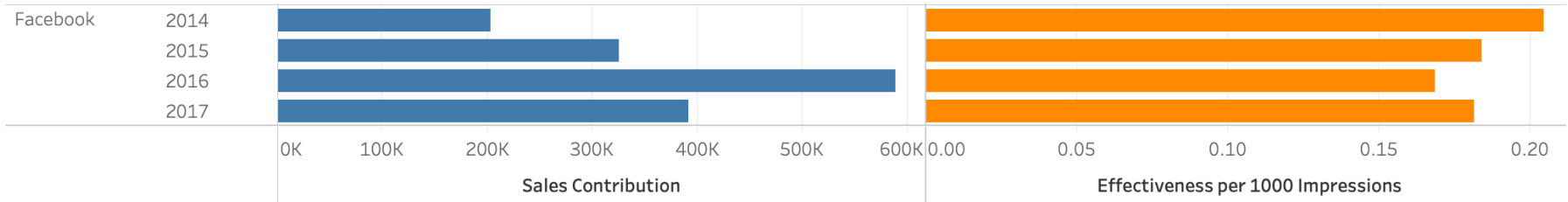Effectiveness = Contribution / Activity

Digital Effectiveness

Variable ..

	Sales Contribution	Effectiveness per 1000 Impressions
Display	(to ~1850K)	(to ~0.11)
Facebook	(to ~1450K)	(to ~0.18)

Sales Contribution axis: 0K, 200K, 400K, 600K, 800K, 1000K, 1200K, 1400K, 1600K, 1800K

Effectiveness per 1000 Impressions axis: 0.00, 0.02, 0.04, 0.06, 0.08, 0.10, 0.12, 0.14, 0.16, 0.18

Facebook Effectiveness

Variable ..   Year of Peri..

Facebook	Year	Sales Contribution	Effectiveness per 1000 Impressions
	2014	(~200K)	(~0.21)
	2015	(~330K)	(~0.185)
	2016	(~580K)	(~0.17)
	2017	(~400K)	(~0.18)

Sales Contribution axis: 0K, 100K, 200K, 300K, 400K, 500K, 600K

Effectiveness per 1000 Impressions axis: 0.00, 0.05, 0.10, 0.15, 0.20

Facebook Campaign Comparison

Facebook Sub-Category Campaign Effectiveness

Category	Value
Facebook Branding	15.85
Facebook Holiday	12.02
Facebook Other	12.06
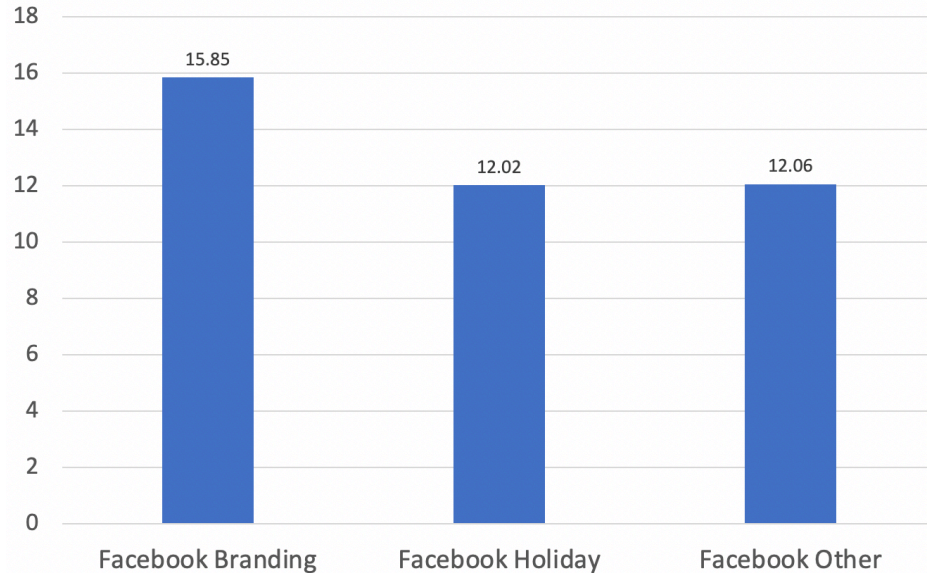
Facebook Sub-Category Campaign Efficiency per 1000 Impressions

Category	Value
Facebook Branding	0.36
Facebook Holiday	0.31
Facebook Other	0.31

Forecasting Optimization
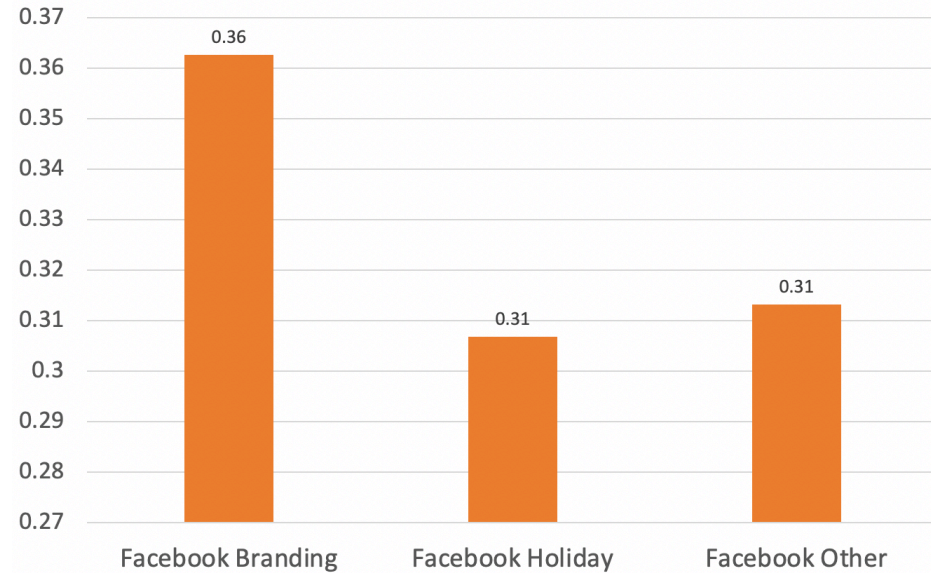
	Original Budget	Optimized Budget	Changes
National TV	$274,552.35	$192,186.65	-30%
Magazine	$57,546.76	$52,541.11	-8.7%
Paid Search	$209,566.26	$272,436.14	+30%
Display	$46,368.03	$60,278.44	+30%
Facebook	$25,770.72	$33,501.94	+30%
Wechat	$9,532.82	$12,392.67	+30%

	Original	Optimized
Sales	3,518,628.87	3,987,434.93
ROI	5.64	6.40

Executive Summary

- National TV and Paid Search have the highest sales contribution. Wechat has the lowest sales contribution

- Facebook has the highest efficiency and effectiveness

- We should cut the budget on offline media and increase the online media budget by 30%

- The predicted sales is $3,987,434.93 and the optimized ROI increases by 13.46%

Appendix

Models:

Sales = 85.3 * CCI + 30942.8 * Sales.Event + 121693.9 * July_4th + 220273.4 * Black_Friday + 1623.7 * NationalTV2 + 0.06 * PaidSearch1 + 4.8 * Wechat2 + 1828.8 * Magazine1 + 0.0002 * Display2 + 0.01 * Facebook1

Facebook Side Model:

Regression Statistics								
Multiple R	0.99535872							
R Square	0.99073898							
Adjusted R Sc	0.98577058							
Standard Erro	850.530679							
Observations	208							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	3	15864787821	5288262607	7310.26376	2.76E-207			
Residual	205	148297499.2	723402.4351					
Total	208	16013085320						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
FacebookBran	0.00036269	3.70924E-06	97.78067693	5.736E-174	0.00035538	0.00037	0.00035538	0.00037
FacebookHoli	0.00030674	3.1489E-06	97.41097869	1.227E-173	0.00030053	0.00031295	0.00030053	0.00031295
FacebookOth	0.00031313	1.72769E-05	18.12428484	1.8788E-44	0.00027907	0.00034719	0.00027907	0.00034719

	FacebookBrandingImpressions	FacebookHolidayImpressions	FacebookOtherImpressions					
Contribution	934273.694	430233.1822	69259.22498					
Activity	2575945041	1402609330	221182838					
Spend	$58,942.00	$35,789.00	$5,743.00					
Efficiency	0.00036269	0.000306738	0.000313131					
Effectiveness	15.8507294	12.02138037	12.05976406					