Sales Promotions

Marketing Analytics

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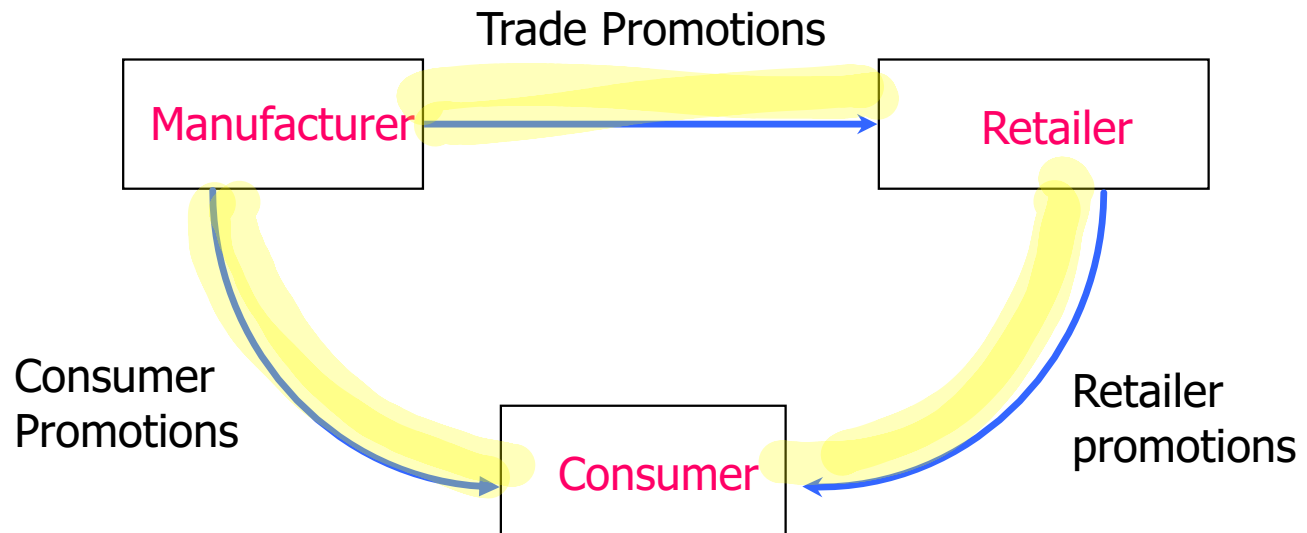
Agenda

- Introduction
- Assessing Promotion Effectiveness
- Conclusions

Definition

Sales promotions are short term inducements designed to have a direct impact on the buying behavior of end-users and trade

Types of Sales Promotions

Trade Promotions

Manufacturer → Retailer

Consumer Promotions

Retailer promotions

Consumer

Daily Deals: Prediction, Social Diffusion, and Reputational Ramifications (2011, by Beyers, Mitzenmacher, and Zervas)
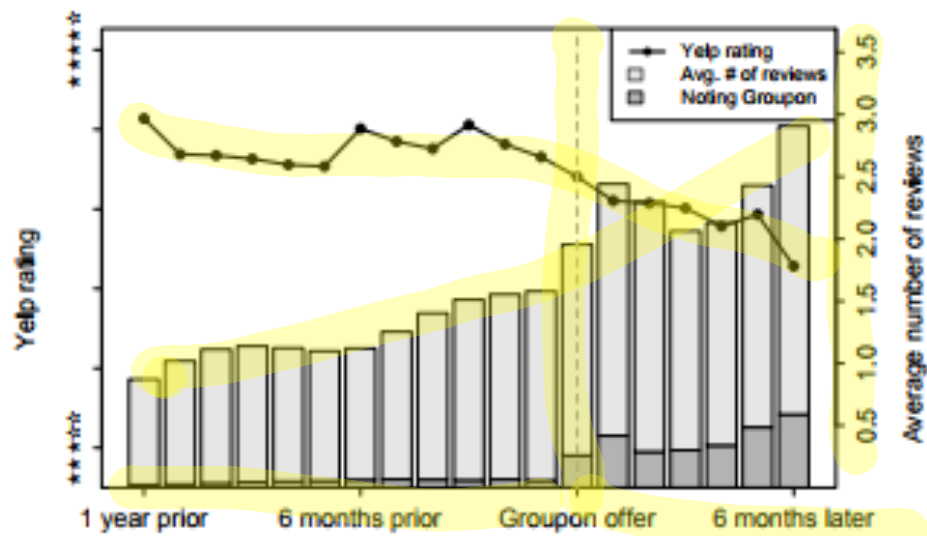

Figure 11: The average Yelp star-rating for merchants before and after their Groupon offers (line-chart), and the average number of reviews per merchant per month (bar-chart).

Short Run Impact of Sales Promotions: A Simple Example

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Company XYZ ran a promotion in quarter Q3, 2017. XYZ did not promote in 2015 and 2016.

- What's your estimate of (baseline) sales in 2017 w/o promotion? *(w/o Sales)*
- What's the impact of 2017 (Q3) promotion on sales?

Baseline 2017

	2015	2016	2017 (2017)	2017
Quarter 1	100	110	121	120 −1
Quarter 2	125	138	152	110 −42
Quarter 3	140	154	169	250 81
Quarter 4	80	88	97	90 −7

Estimating Baseline Sales

- Historical data

- Experiments
  - Run a promotion in a "test" store
  - No promotion in a comparable control store
  - Incremental sales = Test store sales - Control store sales

Mini-Case: Céréale

- ## A leading brand of ready-to-eat breakfast cereal
  - Céréale makes $2.20 gross margin per 18oz package

- ## For years 2014-2017, has monthly data on:
  - Sales volume in thousand (18oz) packages
  - Spending on consumer promotions (number of redeemed $1 coupons in a month)
  - Spending on trade promotions (monthly $ amount spent on co-op advertising + display and slotting fees)

- ## Wants to assess the impact of promotions on sales volume

Céréale's Historical Sales Data

Monthly spending on coupons in thousand $

| Month | Sales(in 1000s) | Promotion (in $000s) | | Month | Sales(in 1000s) | Promotion (in $000s) | |
		Consumer	Trade			Consumer	Trade
Jan-14	10,201	$360	$686	Jan-16	15,737	$2,615	$996
Feb-14	7,567	$73	$383	Feb-16	6,492	$211	$804
Mar-14	8,815	$647	$389	Mar-16	8,762	$27	$825
Apr-14	10,306	$574	$402	Apr-16	7,515	$48	$226
May-14	8,347	$652	$237	May-16	12,678	$0	$870
Jun-14	10,453	$911	$643	Jun-16	9,117	$67	$652
Jul-14	7,186	$43	$582	Jul-16	11,330	$484	$540
Aug-14	7,116	$197	$337	Aug-16	6,108	$385	$147
Sep-14	10,240	$45	$1,562	Sep-16	13,233	$1,613	$47
Oct-14	7,914	$0	$1,459	Oct-16	8,061	$441	$222
Nov-14	6,762	$0	$451	Nov-16	7,690	$48	$441
Dec-14	3,994	$0	$115	Dec-16	6,645	$516	$244
Jan-15	15,106	$2,634	$0	Jan-17	10,922	$1,438	$52
Feb-15	6,323	$254	$472	Feb-17	5,942	$101	$35
Mar-15	9,344	$0	$1,055	Mar-17	14,934	$0	$6,754
Apr-15	9,036	$133	$300	Apr-17	10,303	$63	$752
May-15	10,667	$106	$718	May-17	10,876	$1,601	$0
Jun-15	9,287	$0	$685	Jun-17	7,682	$854	$0
Jul-15	9,943	$0	$1,064	Jul-17	10,843	$1,514	$68
Aug-15	6,083	$0	$68	Aug-17	5,986	$385	$137
Sep-15	11,626	$1,806	$39	Sep-17	17,869	$29	$7,305
Oct-15	7,346	$589	$166	Oct-17	10,108	$174	$565
Nov-15	7,569	$73	$401	Nov-17	9,539	$1,125	$566
Dec-15	4,387	$28	$532	Dec-17	6,456	$344	$829

Monthly spending on trade support in thousand $.

How Promotions Affect Sales
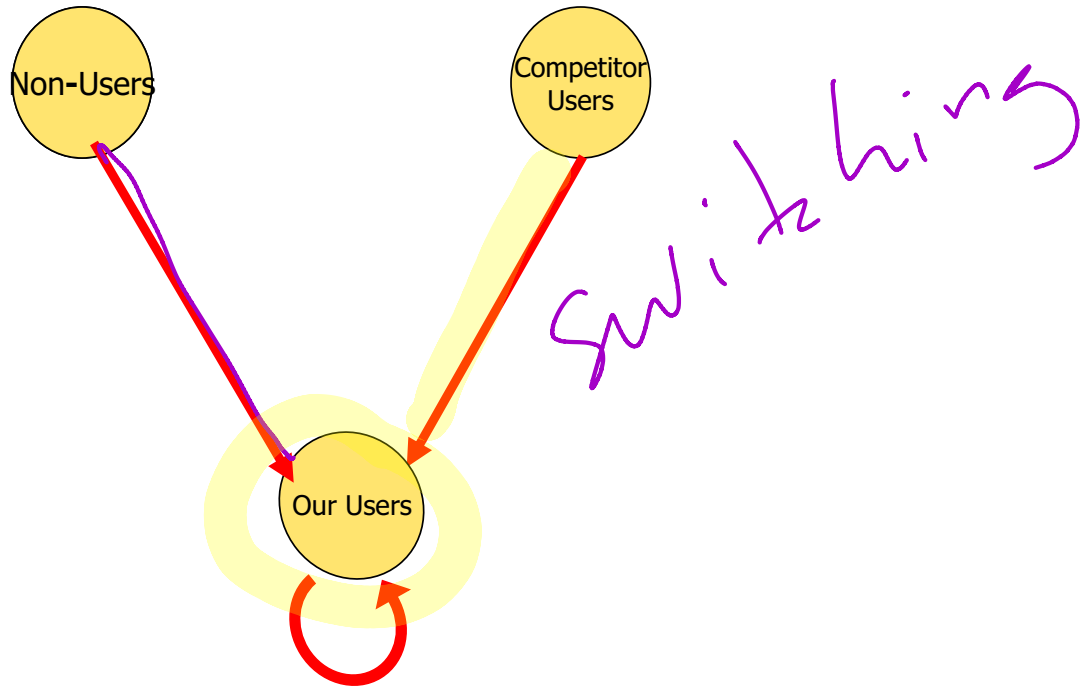
Sales Volume over Time

Sales over Time

Seasonality
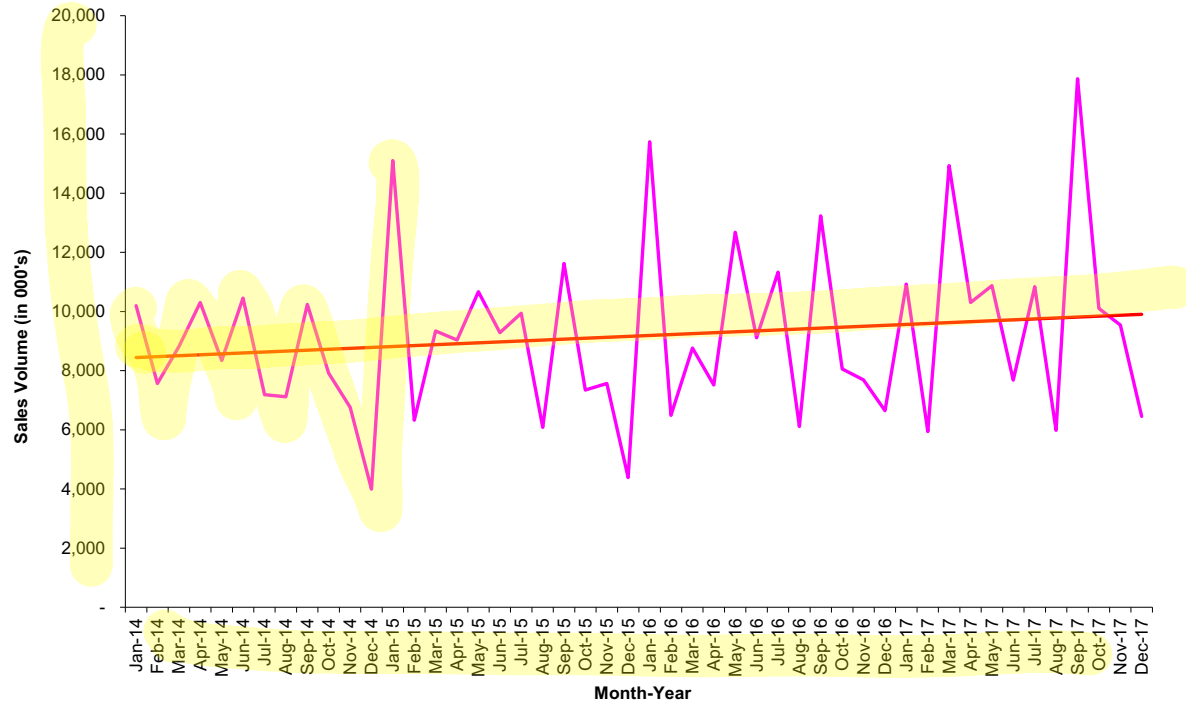
Seasonality of Sales (monthly)
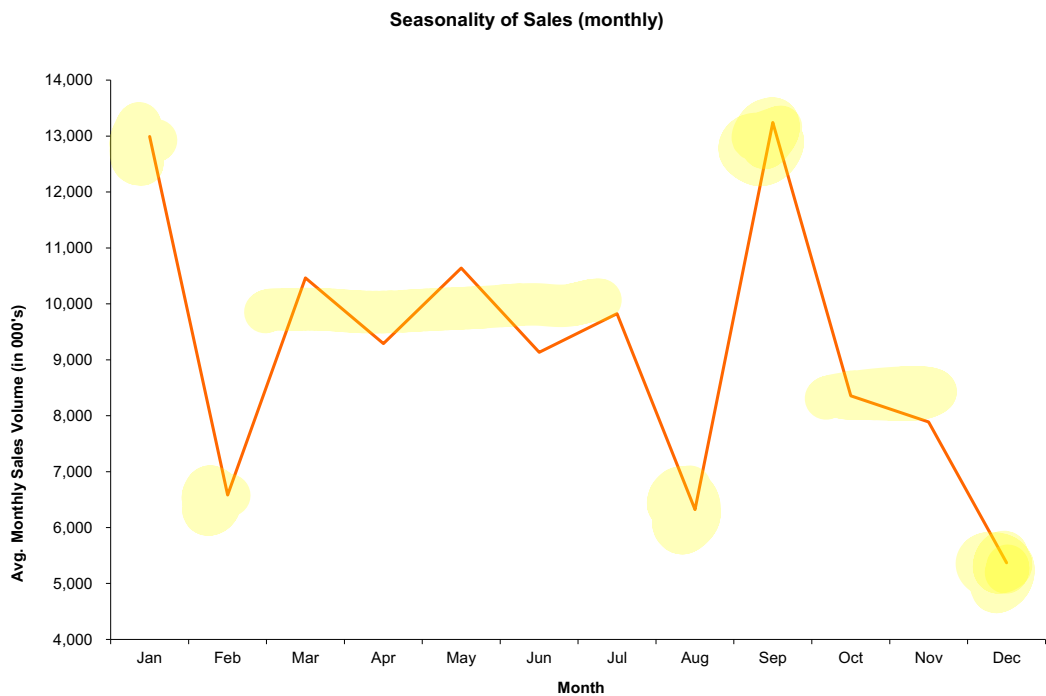
Month	Avg. Monthly Sales
Jan	12991.71
Feb	6581.00
Mar	10464.02
Apr	9290.27
May	10642.01
Jun	9134.88
Jul	9825.14
Aug	6323.37
Sep	13242.12
Oct	8357.05
Nov	7890.06
Dec	5370.72

Sales Volume and Consumer Promotion over Time

Sales and Consumer Promotion over Time
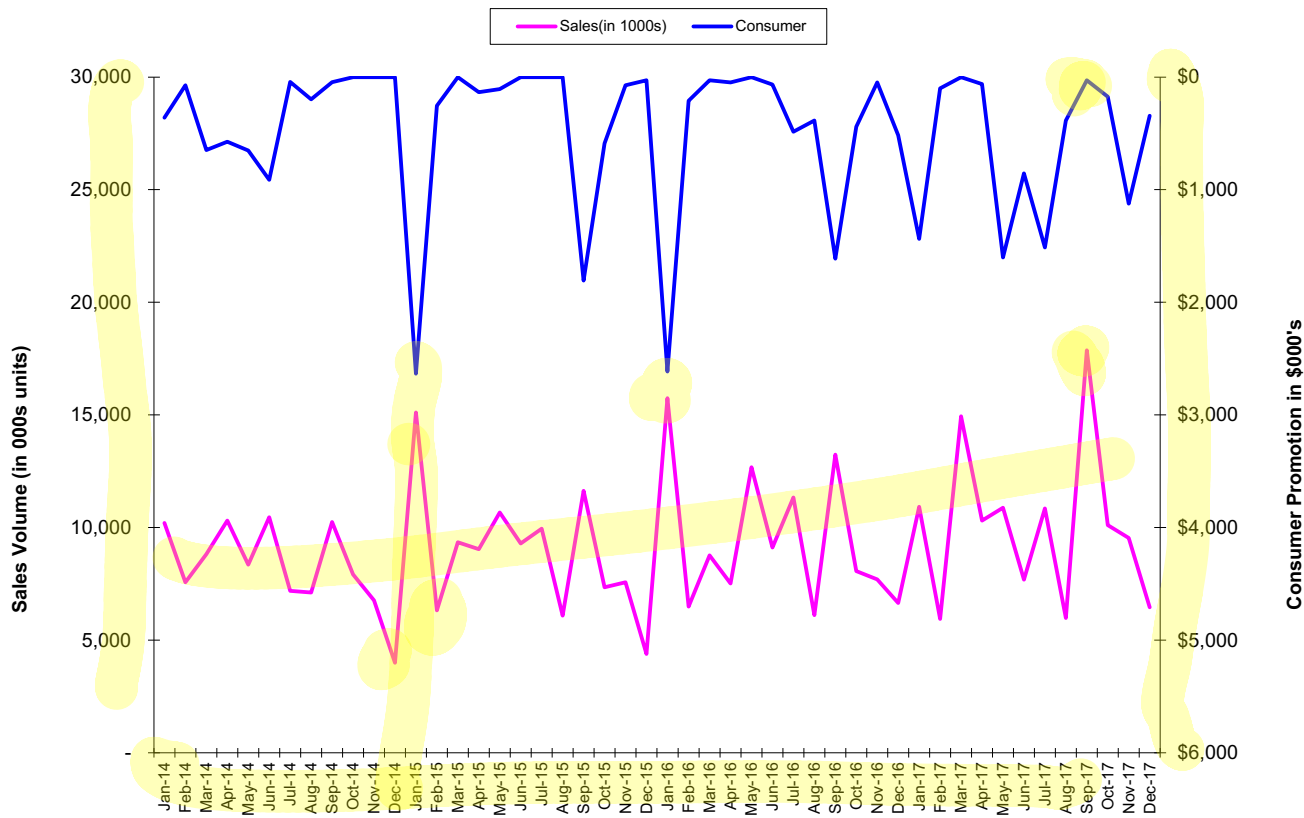
Sales Volume and Trade Promotion over Time

Sales and Trade Promotion over Time
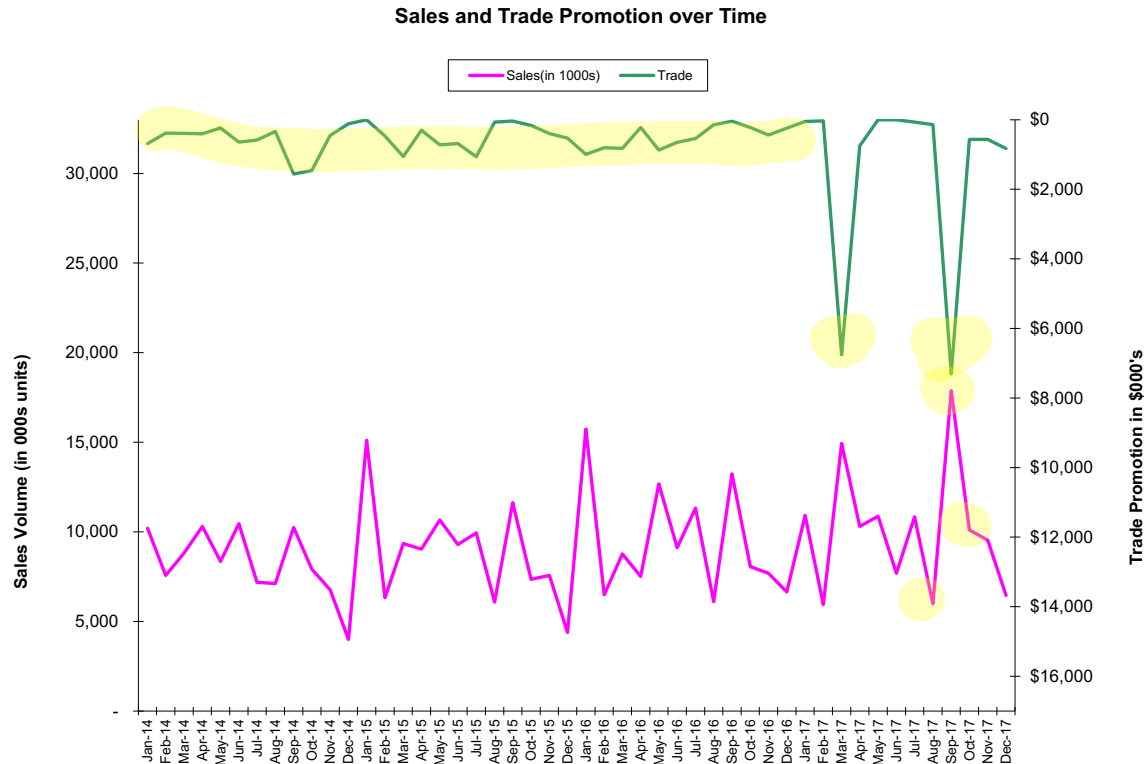
Key Insights from the Plots

- There's an upward sales trend, albeit mild
- There's monthly seasonality in sales
- Consumer and trade promotions affect sales positively in the same month
- However, there's a negative carryover in the following month

Preparing the Data for Regression: Capturing (Monthly) Trend Effect

Month	Sales	Monthly Trend
Jan-14	10,201	1
Feb-14	7,567	2
Mar-14	8,815	3
Apr-14	10,306	4
May-14	8,347	5
Jun-14	10,453	6
Jul-14	7,186	7
Aug-14	7,116	8
Sep-14	10,240	9
Oct-14	7,914	10
Nov-14	6,762	11
Dec-14	3,994	12
…	…	..
Jan-17	10,922	37
Feb-17	5,942	38
Mar-17	14,934	39
Apr-17	10,303	40
May-17	10,876	41
Jun-17	7,682	42
Jul-17	10,843	43
Aug-17	5,986	44
Sep-17	17,869	45
Oct-17	10,108	46
Nov-17	9,539	47
Dec-17	6,456	48

Preparing the Data for Regression: Capturing (Monthly) Seasonality

Month	Sales	Monthly Trend	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jan-14	10,201	1	1	0	0	0	0	0	0	0	0	0	0	0
Feb-14	7,567	2	0	1	0	0	0	0	0	0	0	0	0	0
Mar-14	8,815	3	0	0	1	0	0	0	0	0	0	0	0	0
Apr-14	10,306	4	0	0	0	1	0	0	0	0	0	0	0	0
May-14	8,347	5	0	0	0	0	1	0	0	0	0	0	0	0
Jun-14	10,453	6	0	0	0	0	0	1	0	0	0	0	0	0
Jul-14	7,186	7	0	0	0	0	0	0	1	0	0	0	0	0
Aug-14	7,116	8	0	0	0	0	0	0	0	1	0	0	0	0
Sep-14	10,240	9	0	0	0	0	0	0	0	0	1	0	0	0
Oct-14	7,914	10	0	0	0	0	0	0	0	0	0	1	0	0
Nov-14	6,762	11	0	0	0	0	0	0	0	0	0	0	1	0
Dec-14	3,994	12	0	0	0	0	0	0	0	0	0	0	0	1
...	...	..	..	..	..	..	..	..	..	..	..	..	..	..
Jan-17	10,922	37	1	0	0	0	0	0	0	0	0	0	0	0
Feb-17	5,942	38	0	1	0	0	0	0	0	0	0	0	0	0
Mar-17	14,934	39	0	0	1	0	0	0	0	0	0	0	0	0
Apr-17	10,303	40	0	0	0	1	0	0	0	0	0	0	0	0
May-17	10,876	41	0	0	0	0	1	0	0	0	0	0	0	0
Jun-17	7,682	42	0	0	0	0	0	1	0	0	0	0	0	0
Jul-17	10,843	43	0	0	0	0	0	0	1	0	0	0	0	0
Aug-17	5,986	44	0	0	0	0	0	0	0	1	0	0	0	0
Sep-17	17,869	45	0	0	0	0	0	0	0	0	1	0	0	0
Oct-17	10,108	46	0	0	0	0	0	0	0	0	0	1	0	0
Nov-17	9,539	47	0	0	0	0	0	0	0	0	0	0	1	0
Dec-17	6,456	48	0	0	0	0	0	0	0	0	0	0	0	1

Preparing the Data for Regression:
Capturing the Short Term Effects of Promotions

Month	Sales	Monthly Trend	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Consumer	Trade
Jan-14	10,201	1	1	0	0	0	0	0	0	0	0	0	0	$360	$686
Feb-14	7,567	2	0	1	0	0	0	0	0	0	0	0	0	$73	$383
Mar-14	8,815	3	0	0	1	0	0	0	0	0	0	0	0	$647	$389
Apr-14	10,306	4	0	0	0	1	0	0	0	0	0	0	0	$574	$402
May-14	8,347	5	0	0	0	0	1	0	0	0	0	0	0	$652	$237
Jun-14	10,453	6	0	0	0	0	0	1	0	0	0	0	0	$911	$643
Jul-14	7,186	7	0	0	0	0	0	0	1	0	0	0	0	$43	$582
Aug-14	7,116	8	0	0	0	0	0	0	0	1	0	0	0	$197	$337
Sep-14	10,240	9	0	0	0	0	0	0	0	0	1	0	0	$45	$1,562
Oct-14	7,914	10	0	0	0	0	0	0	0	0	0	1	0	$0	$1,459
Nov-14	6,762	11	0	0	0	0	0	0	0	0	0	0	1	$0	$451
Dec-14	3,994	12	0	0	0	0	0	0	0	0	0	0	0	$0	$115
...	...	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Jan-17	10,922	37	1	0	0	0	0	0	0	0	0	0	0	$1,438	$52
Feb-17	5,942	38	0	1	0	0	0	0	0	0	0	0	0	$101	$35
Mar-17	14,934	39	0	0	1	0	0	0	0	0	0	0	0	$0	$6,754
Apr-17	10,303	40	0	0	0	1	0	0	0	0	0	0	0	$63	$752
May-17	10,876	41	0	0	0	0	1	0	0	0	0	0	0	$1,601	$0
Jun-17	7,682	42	0	0	0	0	0	1	0	0	0	0	0	$854	$0
Jul-17	10,843	43	0	0	0	0	0	0	1	0	0	0	0	$1,514	$68
Aug-17	5,986	44	0	0	0	0	0	0	0	1	0	0	0	$385	$137
Sep-17	17,869	45	0	0	0	0	0	0	0	0	1	0	0	$29	$7,305
Oct-17	10,108	46	0	0	0	0	0	0	0	0	0	1	0	$174	$565
Nov-17	9,539	47	0	0	0	0	0	0	0	0	0	0	1	$1,125	$566
Dec-17	6,456	48	0	0	0	0	0	0	0	0	0	0	0	$344	$829

Preparing the Data for Regression:
Capturing the Carryover Effects of Promotions

Month	Sales	Monthly Trend	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Consumer	Lag Consumer	Trade	Lag Trade
Jan-14	10,201	1	1	0	0	0	0	0	0	0	0	0	0	$360		$686	
Feb-14	7,567	2	0	1	0	0	0	0	0	0	0	0	0	$73	$360	$383	$686
Mar-14	8,815	3	0	0	1	0	0	0	0	0	0	0	0	$647	$73	$389	$383
Apr-14	10,306	4	0	0	0	1	0	0	0	0	0	0	0	$574	$647	$402	$389
May-14	8,347	5	0	0	0	0	1	0	0	0	0	0	0	$652	$574	$237	$402
Jun-14	10,453	6	0	0	0	0	0	1	0	0	0	0	0	$911	$652	$643	$237
Jul-14	7,186	7	0	0	0	0	0	0	1	0	0	0	0	$43	$911	$582	$643
Aug-14	7,116	8	0	0	0	0	0	0	0	1	0	0	0	$197	$43	$337	$582
Sep-14	10,240	9	0	0	0	0	0	0	0	0	1	0	0	$45	$197	$1,562	$337
Oct-14	7,914	10	0	0	0	0	0	0	0	0	0	1	0	$0	$45	$1,459	$1,562
Nov-14	6,762	11	0	0	0	0	0	0	0	0	0	0	1	$0	$0	$451	$1,459
Dec-14	3,994	12	0	0	0	0	0	0	0	0	0	0	0	$0	$0	$115	$451
…	…	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Jan-17	10,922	37	1	0	0	0	0	0	0	0	0	0	0	$1,438	$516	$52	$244
Feb-17	5,942	38	0	1	0	0	0	0	0	0	0	0	0	$101	$1,438	$35	$52
Mar-17	14,934	39	0	0	1	0	0	0	0	0	0	0	0	$0	$101	$6,754	$35
Apr-17	10,303	40	0	0	0	1	0	0	0	0	0	0	0	$63	$0	$752	$6,754
May-17	10,876	41	0	0	0	0	1	0	0	0	0	0	0	$1,601	$63	$0	$752
Jun-17	7,682	42	0	0	0	0	0	1	0	0	0	0	0	$854	$1,601	$0	$0
Jul-17	10,843	43	0	0	0	0	0	0	1	0	0	0	0	$1,514	$854	$68	$0
Aug-17	5,986	44	0	0	0	0	0	0	0	1	0	0	0	$385	$1,514	$137	$68
Sep-17	17,869	45	0	0	0	0	0	0	0	0	1	0	0	$29	$385	$7,305	$137
Oct-17	10,108	46	0	0	0	0	0	0	0	0	0	1	0	$174	$29	$565	$7,305
Nov-17	9,539	47	0	0	0	0	0	0	0	0	0	0	1	$1,125	$174	$566	$565
Dec-17	6,456	48	0	0	0	0	0	0	0	0	0	0	0	$344	$1,125	$829	$566

Regression Output

P < 0.0001

R-square=0.92   F-value=22.29   p-value=2.23532E-12

	Coefficients	Standard Error	t Stat	P-value
Intercept	4213.39	608.32	6.926	0.000
Trend	16.50	13.57	1.216	0.233
Jan	5155.99	1110.98	4.641	0.000
Feb	2679.86	907.64	2.953	0.006
Mar	3161.96	783.27	4.037	0.000
Apr	3785.90	776.30	4.877	0.000
May	4636.33	741.62	6.252	0.000
Jun	3608.89	740.16	4.876	0.000
Jul	4003.48	737.24	5.430	0.000
Aug	1425.78	723.60	1.970	0.058
Sep	4732.65	850.37	5.565	0.000
Oct	2958.51	827.09	3.577	0.001
Nov	2318.56	717.79	3.230	0.003
Consumer	1.734	0.390	4.445	0.000
Lag(con)	-0.818	0.343	-2.383	0.024
Trade	1.124	0.148	7.603	0.000
Lag(trade)	0.106	0.147	0.720	0.477

P > 0.05

P > 0.05

Output Interpretation

	Coefficients
Intercept	4213.39
Trend	16.50
Jan	5155.99
Feb	2679.86
Mar	3161.96
Apr	3785.90
May	4636.33
Jun	3608.89
Jul	4003.48
Aug	1425.78
Sep	4732.65
Oct	2958.51
Nov	2318.56
Consumer	1.73
Lag(con)	-0.82
Trade	1.12
Lag(trade)	0.11

Sales volume increases by 16.5 thousand units each month

Sales volume in Apr is 3785.90 thousand units higher than Dec

An extra $1000 spent on consumer promotion increases sales by 1.73 thousand units in same month and reduces sales by 0.82 thousand units in the next month

ROI Calculation

- Volume impact of an extra $1 spent on consumer promotion=1.73-0.82=0.91package

- Céréale makes $2.20 per 18oz package

- Incremental contribution=0.91*$2.20=$2

- ROI=($2 - $1)/$1=100%
    - An incremental $1 coupon generates an incremental contribution (net of the coupon cost) of $1

Conclusion

- Sales promotions are short terms instruments
- Profitability depends upon incremental sales and costs of promotion
  - Make sure to control for trend and seasonality
- Beware of their long term impact!