"How to Realize the Full Potential of Single Source data by understanding the impact of advertising on individual brand choice"

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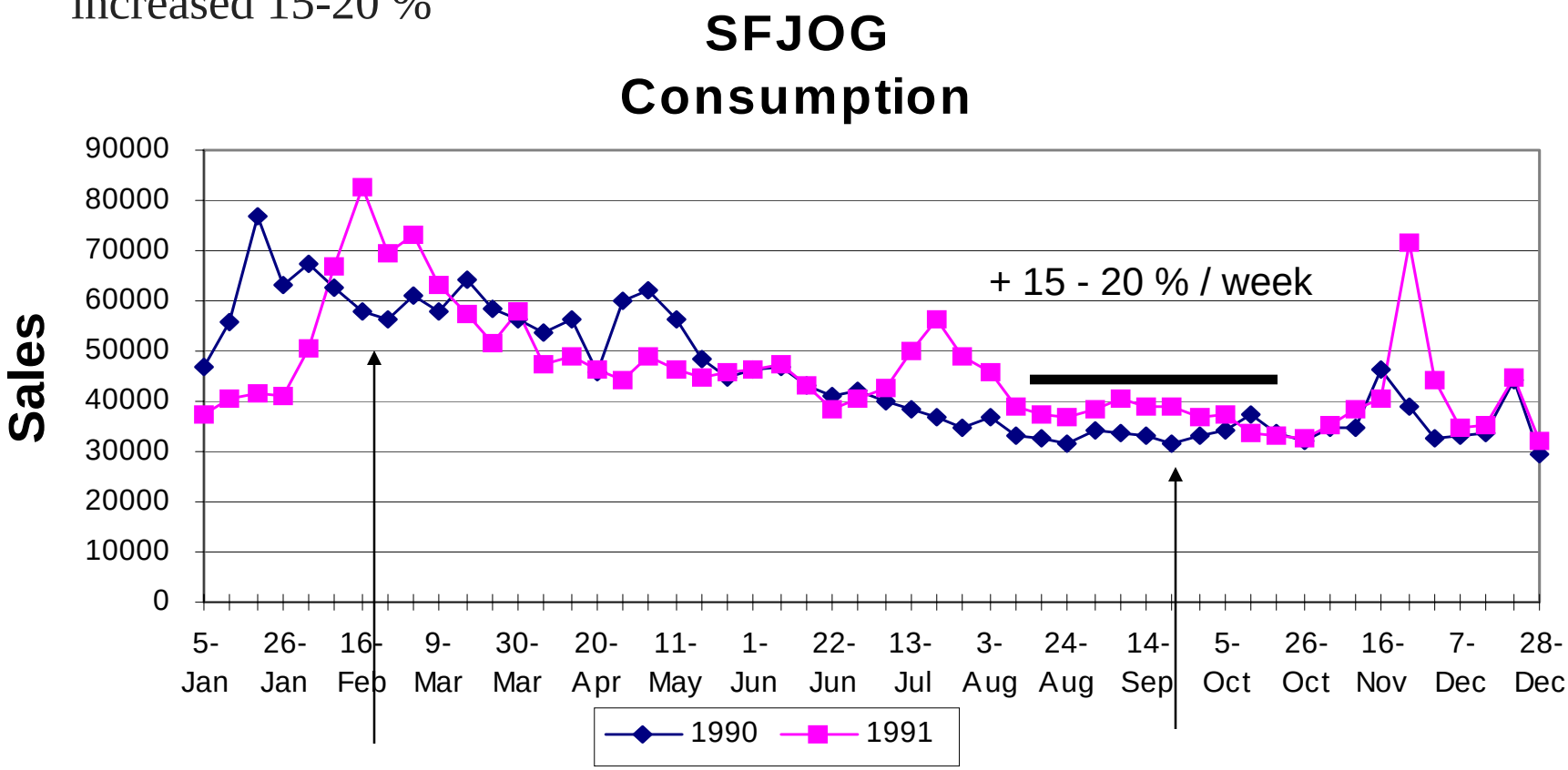
Advertising response comes into aggregate level models regularly

- Aggregate level Marketing Mix Models have become a staple in the industry
  - Used frequently for Return on Advertising Investment (ROAI)
  - Measure's most media effects for such as:
    - Copy type
    - Length (15, 30)
    - Halo's
  - Aggregate models rarely measure reach versus frequency
    - When they do they come up with very high frequency required for a change in sales

Advertising Analysis	Aggregate Models

In aggregate data the effects of advertising show up regularly and significantly

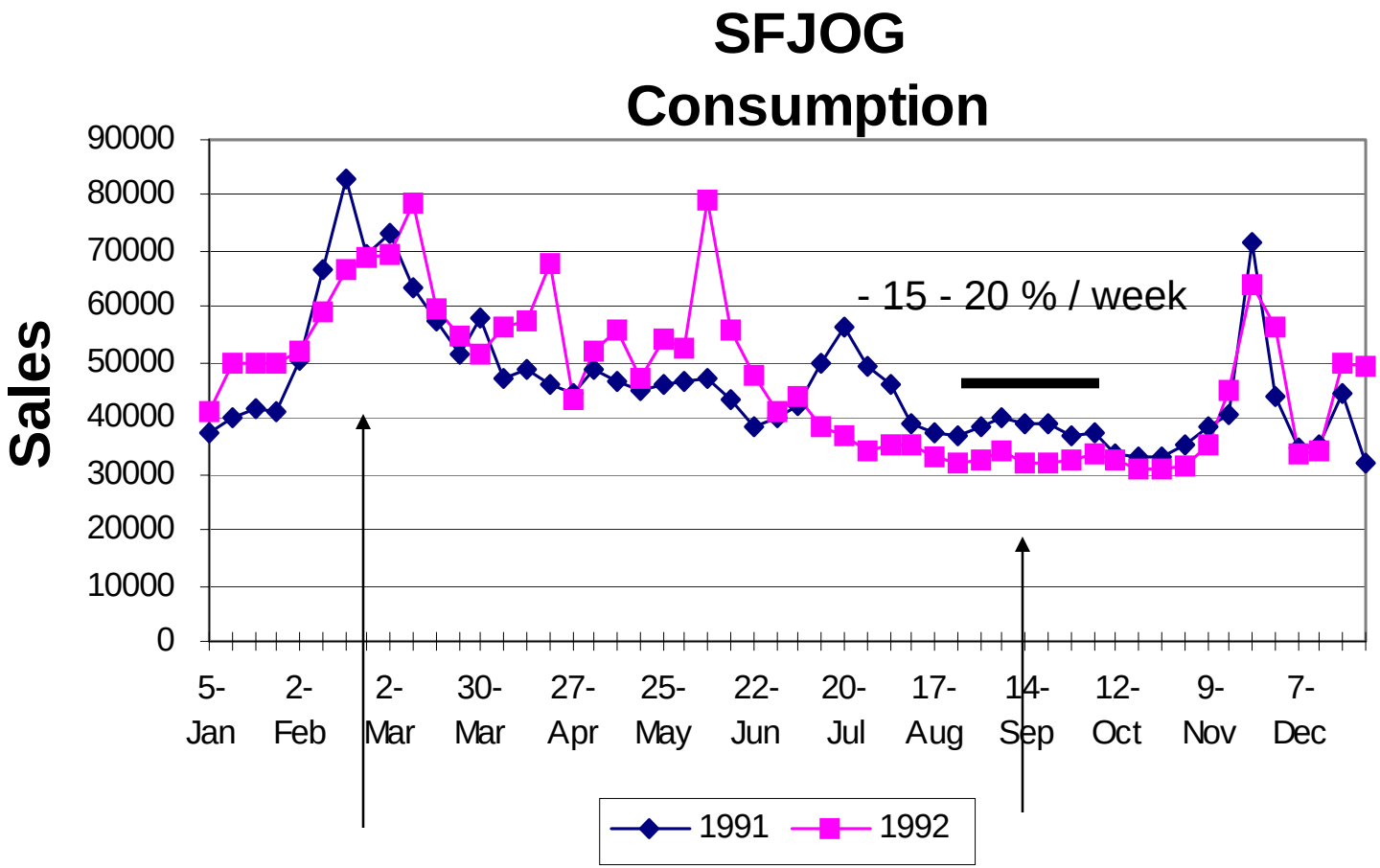
The period where only advertising was added versus year ago, volume increased 15-20 %



Advtg., Promotion, Price, FSI

Advtg. Only

When advertising was eliminated the next year, volume declined predictably by the same amount



Advtg., Promotion, Price, FSI Advtg. Only

Advertising Analysis	Disaggregate Models

There have been many attempts historically to measure the impact of advertising on brand choice at the disaggregate level

- Professor Gerald Tellis and Neslin conducted the most extensive research using single source data
- There has also been numerous other papers published that also have attempted multinomial choice modeling

Advertising Analysis	Disaggregate Models

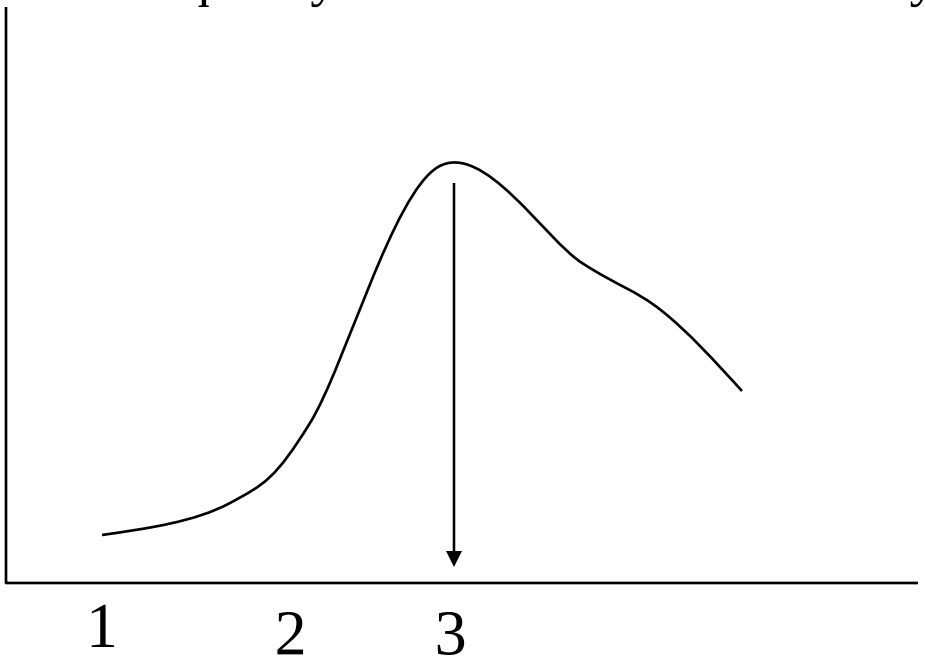
Professor Jones work revived interest in single source data analysis by attempting to measure the impact of advertising frequency on purchase

- When Professor Jones from Syracuse conducted his analysis, using cross-tab data across many categories, he concluded that the ARF Effective Frequency model was not validated
  - Jones found the first exposure having the largest impact
  - The ARF model suggested a frequency threshold at around 3 exposures before a change in purchase behavior occurred

Advertising Analysis	Effective Frequency Model

The original ARF effective frequency model suggested that there was a threshold of 3 ad exposures before there was a significant behavioral change

- The original effective frequency model was based on survey research



Advertising Analysis	Disaggregate Models

There has been much research but results are inconsistent, and the statistical robustness varies significantly and therefore reliability is questionable

	Research	**Statistical robustness**
•	Jones - JAR M/J 95 Nielsen single-source data	Cross-tab, share index of exposed vs. non-exposed HH's No statistical controls for price/promotion during estimation Analysis limited to 7 day viewing window Broad based sample (multiple category's / markets)
•	Reichel, Wood - A to S link Nielsen single-source data	Cross-tab, share index of exposed vs. non-exposed HH's Analysis limited to 28 day viewing window, limited stat controls Broad based sample (multiple category's)
•	Deighton, Henderson, Neslin JMR 2/94	Multi Nomial choice model with extensive statistical control variables including brand loyalty, size loyalty, price, promotion, previous advertising exposures Limited sample (several hundred households), & stable category's
•	Pedrick, Zufryden, USC Nielsen Sioux Falls data	Multi Nomial choice model with extensive statistical controls including short & long term brand loyalty, avg. purchase rates Limited sample (Yogurt category only)

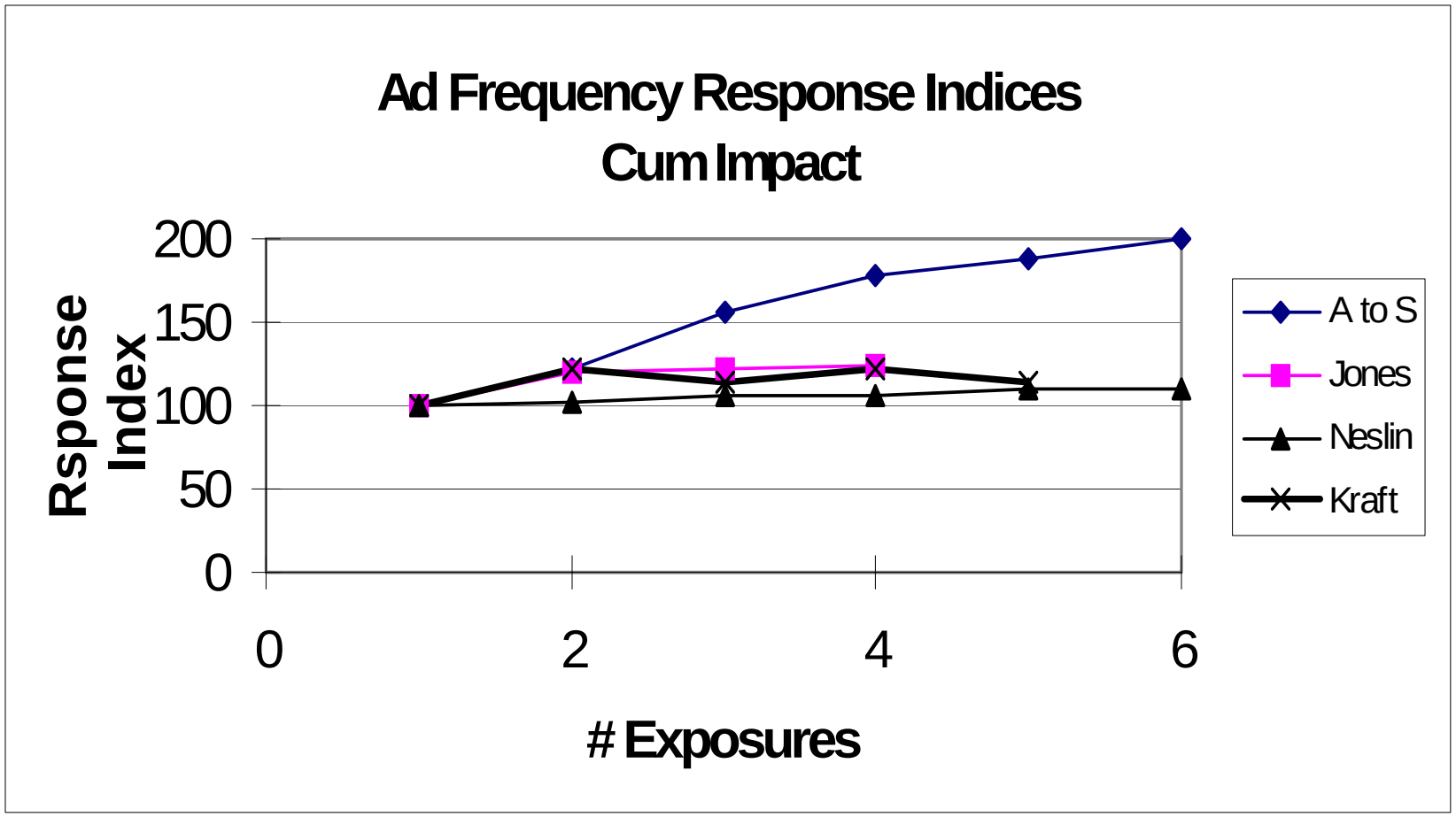
Advertising Analysis	Disaggregate Models

Observations of prior research results were inconsistent and inconclusive and varied in their statistical rigor

- Outside research was simple cross-tab's of the data with minimal statistical controls for other variables such as price, promotions, and brand loyalty
- The overall advertising contribution from one study is significantly over-stated, while others are understated, raising issues with the validity of the frequency findings
- Outside research looked at very short time-frames of 7 to 28 day impacts
- Outside research did not report brand / category specific results

Advertising Analysis	Single source frequency analysis

Most of the published Advertising frequency modeling indicates the first exposure has the greatest impact, while A to S indicates high response for subsequent exposures, with minimal diminishing returns



Advertising Analysis	Disaggregate Models

The most advanced academic attempt to reconcile why advertising enters market level models with statistical significance but not household choice models was performed by Professor Tellis

- Gerald Tellis finds in his extensive research that **“the estimated effects of advertising on households’ brand choices are weak and rarely significant.”**

- His article attempts to reconcile the differences in statistical significance due to differences in measures, models, and aggregation levels used by different researchers

- His analysis suggests that **aggregating data over time and households may create a false impression of advertising having a statistically significant effect on sales**

Advertising Analysis	Disaggregate Models

Tellis emphasizes the power of household level data compared to market level data in understanding consumer response to marketing

- "Comparing choice models with sales response models in econometric research is analogous to comparing the electron microscope with the optical telescope in biological research or the laser with the scapel in surgery"

- While he is correct in stating that the new data and models promise the greatest insights into consumer behavior and the potential elimination of aggregation bias in estimating the consumer response to advertising and promotion, he is incorrect in his conclusion that:

"Advertising plays a non detectable role in the choice of brands by households in discrete time".

Tellis goes on to conclude that if advertising does not impact brand choice then why are marketers spending such large amounts of dollars

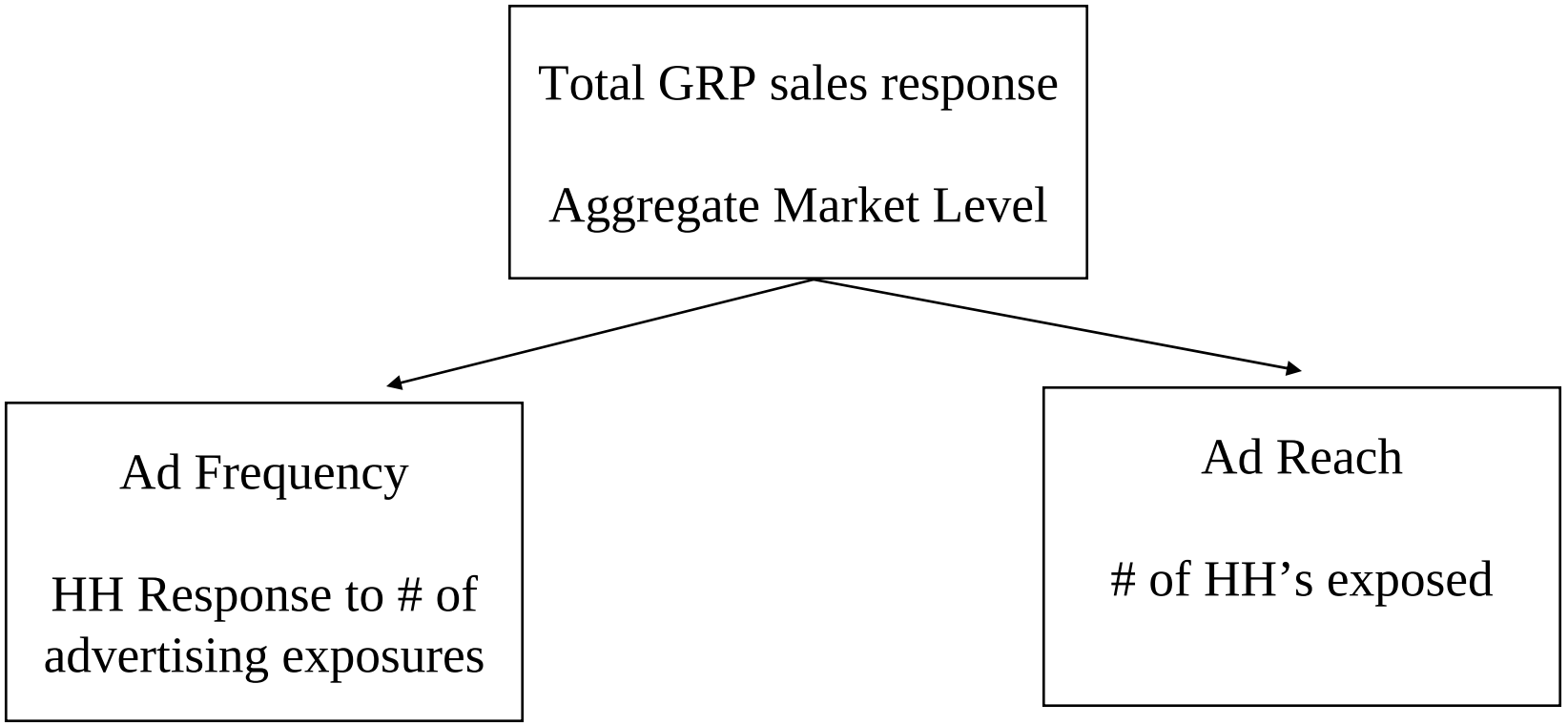
- He refers to a large detergent manufacturer that spends close to $250 million dollars on advertising, and questions its ROI since it has no detectable impact on brand choice

- My research was difficult but perseverance paid off

Advertising Analysis	Disaggregate Models

My research provided brand specific findings, with broad based sample (multiple brands & markets), and expanded scope

- Separate advertising aggregate market response into its components



Advertising Analysis	Disaggregate Models

Our initial attempts also failed significantly when we try and modeled the effects of advertising on brand choice, but perseverance paid off

- Not until a solid understanding of consumer behavior was incorporated into the model, the ad effects were also elusive and non-significant
- Other models were still biased towards very short time periods and current purchases
- Our inclusion of consumer effects and how they respond to advertising made the effects....

“Highly Statistically Significant” in the impact on consumer choice similar to price and promotion

Advertising Analysis	Statistical Reliability

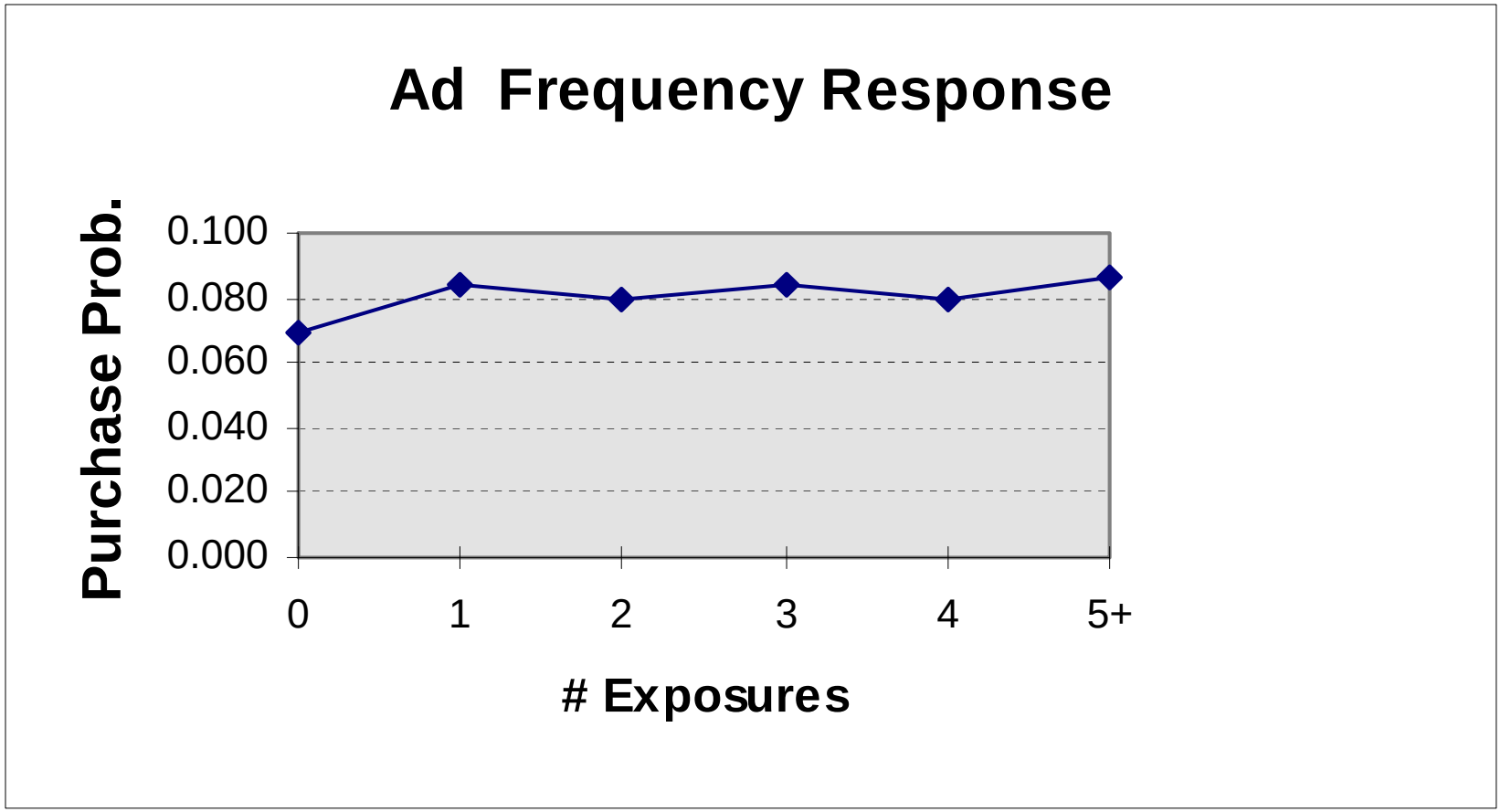
All variables are significant at the 99.9 % confidence levels including advertising

Disaggregate Brand Choice model of advertising exposure

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Pr >	Standardize Chi-Square	calc'd t-Stat
Price	-1.4	0.2	74.6	0.0001	-0.1023	-8.6
Promo1	2.0	0.2	70.4	0.0001	-0.0993	8.4
AdExpg1	24.0	3.1	61.6	0.0001	0.1228	7.9
lagAdExp1	14.9	2.7	32.3	0.0001	0.0802	5.6

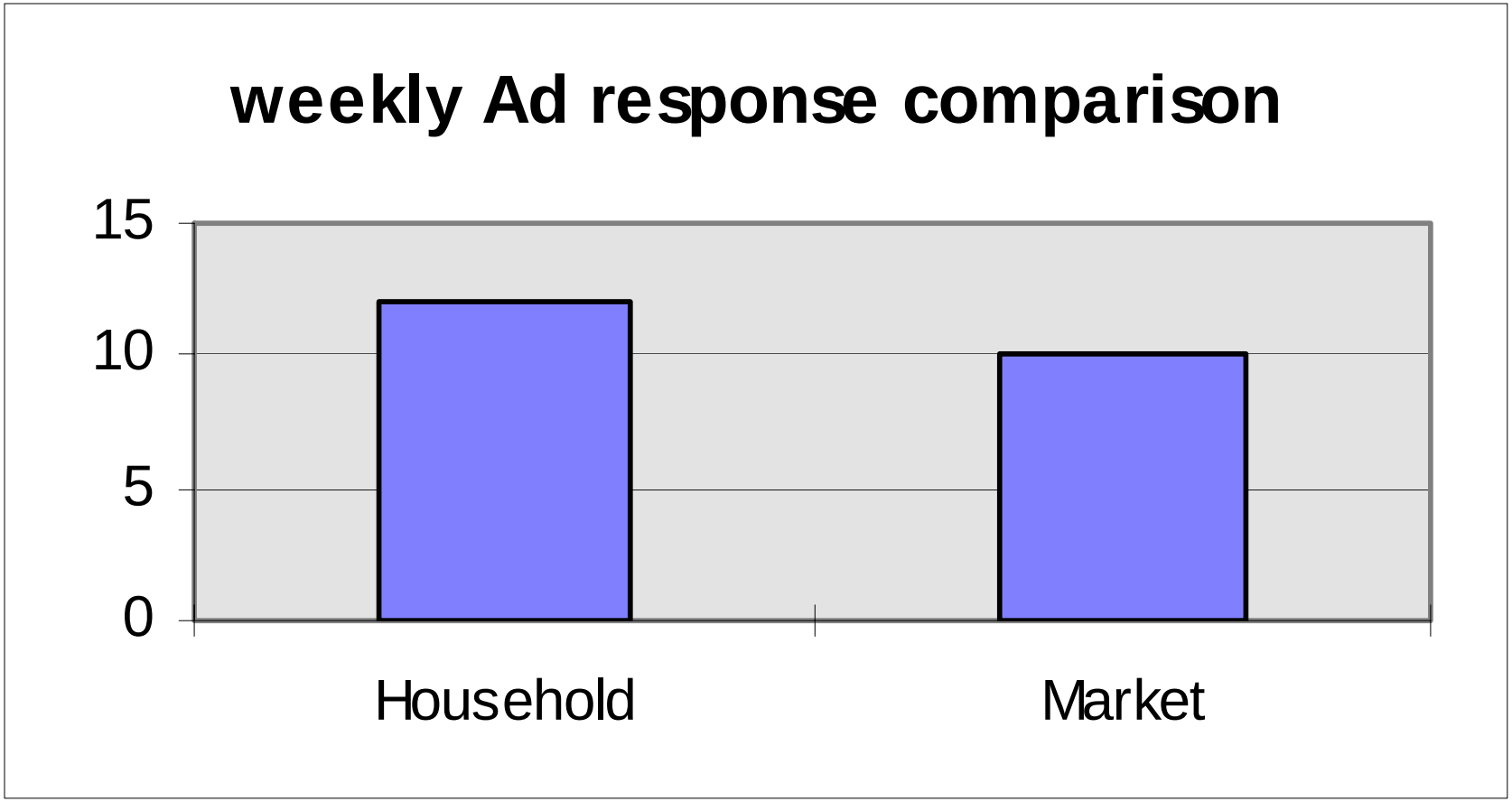
Advertising Analysis	Findings

The first exposure has the greatest impact, with no leverage from increased frequency, indicated by the flat response from 2 to 5+



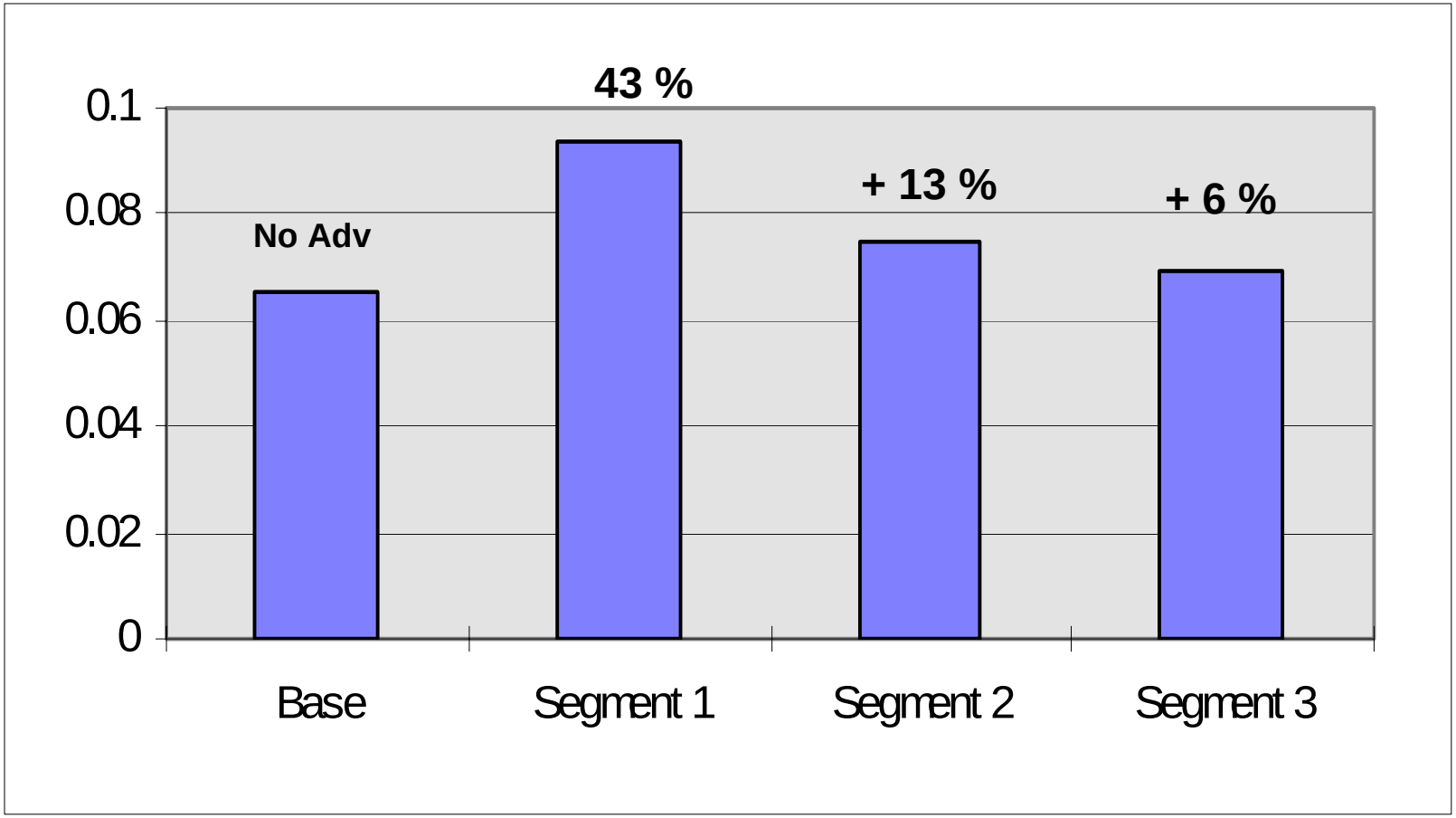
Advertising Analysis	Findings

Advertising response results were compared to market level response models and yielded very similar results, and higher for the household level model



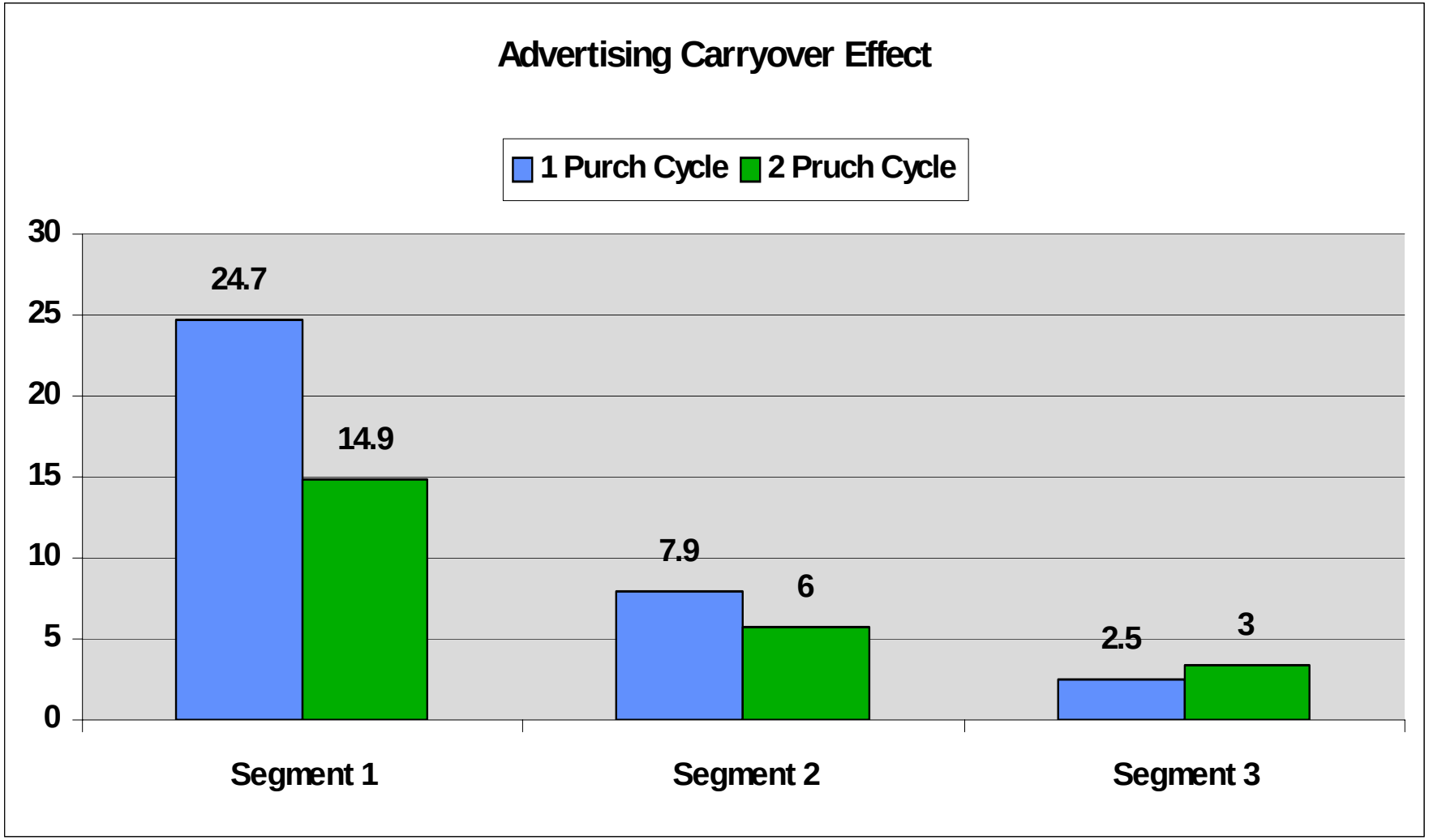
Advertising Analysis	Findings

Advertising response is dramatically different by consumer by a factor of 7 to 1, **indicating a significant targeting opportunity**



Advertising Analysis	Findings

Advertising effects carry over from one purchase to the next with some decline in impact but still highly significant



Advertising Analysis	Findings

Advertising response also varies significantly by day part

Day part	**Reach%**	**Freq.**	**Significant**	**Response Index**
1.M-F 7 - 10 am	13 %	1.8	Yes	**149**
2. M-F 10 - 1	5	1.3	No	
3. M-F 1 - 4:30	5	1.2	Yes	**63**
4. M-F 4 - 7:30	5	1.1	No	
5. M-S 7:30 - 8p	1	1.0	NS	
6. M-S 8 - 11p	4	1.1	Yes	106
8. M-S 11:30-1a	6	1.2	No	
12.S-S 1 - 7 p			Yes	86
Total	**23.4**	**1.8**		**100**

Advertising Analysis	Implications

Re-planning from flighting to continuity results in a + 60 % increase in Ad Driven volume, due-to the low frequency and high reach elasticity

Weekly GRP's	# of Weeks Advertising	Total GRP's		---------- Weekly ---------- Reach	Frequency	Volume	Total Ad Volume
Current							
150	21	3150		60	2.5	100	2100
Revised							
75	42	3150		50	1.5	80	3360
Change							
	+ 21 weeks			- 17 %	- 40%	- 21 %	**+ 60 %**
			Elasticity:	**1.0**	**.1**		
	+ 100 %			**- 17 %**	**+ - 4 %**	**= -21 %**	

Advertising Analysis	Statistical Reliability

Advertising modeling of single source household level data delivers more robust modeling results, leading to higher statistical significance!!!

	Market level	**Household level**
Sample Size	156 weeks	27,086 HH purchases
Breath	-Aggregate Market - GRP's / Sales	-Integrated by HH - Ad exposures & purchases - Ad delivery by: HH, day part, origin, 15 v30 POD sequence etc. -Price, promotion, purchase cycle
Technique	Mkt level sales models	HH level brand choice models
Robustness	Indirect 2 stage models	-Direct approach, single stage models, w/ explicit variables

Highly Statistically Significant Results !!!

Advertising Analysis	Knowledge

This research represents a significant step up in our understanding of how advertising and marketing impacts household brand choice

- For the first time ever advertising exposures enters a household choice model with high statistical significance
- The ability to understand and capture the impact of advertising on brand choice represents a significant increase in our understanding on how advertising works
- This will allow us to measure the finer attributes of advertising effects now that we understand how the aggregate works
- This also allows for improved media targeting based on Ad Response and not demo's or purchase behavior only

Advertising Analysis	Implications

Understanding and measuring the effects of advertising on brand choice has significant implications and opportunities

- The ability to identify advertising response at the individual household level will allow us to improve one to one marketing:
  - Targeting media based on response
  - Customize messaging depending on response differences
  - Leverage the increasing capabilities of targeting from mediums such as:
    - Cable companies ability to deliver different messages to different groups of households
    - In-store advertising such as Target – to target branded advertising based on individual store level response
    - Target direct mail to households based on advertising response
    - Targeted coupons such as Catalina

Advertising Analysis	Implications

Current Apollo results indicate that the majority of advertising exposures are being viewed by non-brand buyers, and does not determine who is the most responsive

- Current media targeting tools rely heavily on demographics
- Without the integration of consumer brand behavior, and accurate response models we are still left with critical questions such as:
  - Which consumers are the most profitable target?
  - Which consumers are the most responsive?

- Even with good single source data, such as Apollo, we still need to measure advertising response at the disaggregate level
  - Simple reports and cross-tabs of purchase and media exposure is very descriptive and interesting but does not give us the knowledge and insights required to improve our ROAI

Advertising Analysis	Next Steps

- Thank you for your attention and this opportunity to share these insights
- If you have single source data available I am willing to work with you on modeling advertising effects and publishing the results