

## Optimal Frequency—The Impact of Frequency on Conversion Rates

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### Introduction

Though marketers in all media are interested in the concept of optimal frequency, few know how to actually measure it. Common sense tells us that too few impressions won't generate significant impact, while too many impressions delivered to a given user results in over-saturation and a waste of media dollars.

If you're buying online media on a CPM<sup>1</sup> basis, the cost of additional impressions to users who have long passed the optimal frequency level can be significant. To put this potential waste into perspective with an example, a typical online marketing campaign with an average frequency of five delivers one-third of its impressions to users who have already received ten ads. If you determine your optimal frequency and impose a sensible cap, you stand to decrease your cost-per-acquisition by 10 to 30 percent.

This study focuses on optimal frequency from a direct response standpoint; namely, how to increase the efficiencies of a campaign to deliver leads and sales. After analyzing campaign data from 38 different advertisers, we have identified macro trends that reveal the industry's first look into the impact of frequency on conversion rates. We also have shown how to isolate two different strategic frequency levels: the frequency that garners the highest conversion rate and the frequency level to maximize your overall profit.

### The Wrong Path to Optimal Frequency

It is illustrative to understand how marketers have attempted to answer the optimal frequency question in the past. The typical mistake is to segment users by their frequency levels at the end of a campaign, then compare conversion rates across those segments. This creates a skewed view because users continue to receive impressions after they have converted.

Figure 1 illustrates this effect by showing a user who converts on the third ad impression, but subsequently receives three more ads. Attributing the conversion to the total impressions the user received (six) would grossly overestimate the level at which users convert.

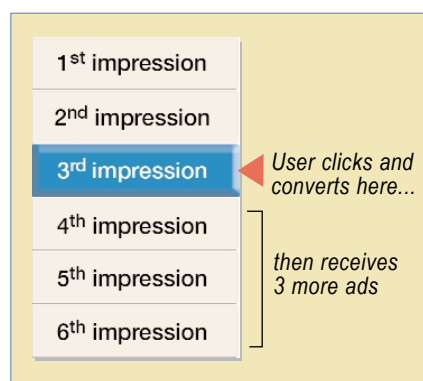


Figure 1: User who receives 6 banner impressions

Another common error isolates the analysis to users who have converted, in order to identify the most common frequency level prior to conversion. Since the vast majority of impressions from users who never convert are ignored, realistic conversion rates are impossible to estimate.

### First Impressions Really Count

For most advertisers, conversion rates are highest on the first impression.

<sup>1</sup> CPM is price of the media inventory based on a cost per 1000 impressions.

## The Right Path to Optimal Frequency

The proper way to analyze conversion rates by frequency is to segment impressions by the order they were delivered to users. By doing so, you are comparing each user’s first impression, each user’s second impression, and so on.

■ Impressions resulting in conversions

User 1	User 2	User 3	User 4	User 5	Cumulative Impressions	Cumulative Conversions	Cumulative Conversion Rate
1st Impression	1st Impression	1st Impression	1st Impression	1st Impression	5	1	20%
		2nd Impression	2nd Impression	2nd Impression	8	2	25%
			3rd Impression	3rd Impression	10	3	30%
			4th Impression	4th Impression	12	3	25%
				5th Impression	13	3	23%
				6th Impression	14	3	21%

Figure 2: Cumulative conversion rates reveal true optimal frequency

Figure 2 is a simplified example that shows how cumulative conversion rates reveal the true optimal frequency level. By looking at cumulative impressions and conversions, a model is created of how conversions are “harvested” with each incremental impression. In effect, this methodology simulates what would have happened had the campaign been frequency capped at different levels.

## What We Have Learned from 38 Advertisers

We applied the methodology to data from 38 different advertisers whose campaigns ran in the second half of 2003. For each advertiser, we calculated click-based conversion rates at each frequency level. These were indexed by advertiser (thus, advertisers with higher conversion rates did not dominate the group average) and combined.

As you can see, the conversion rate on the first impression was the highest, though the first three impressions all had at least 100% lift on average. More than half of the advertisers in this study had their highest conversion rate on the first impression.

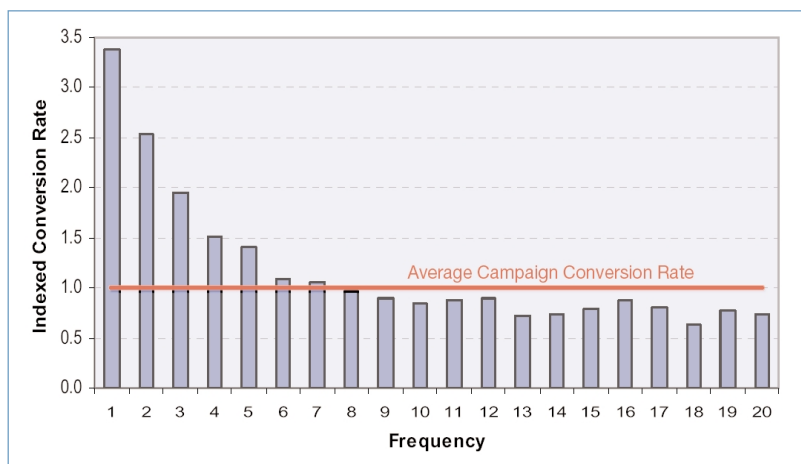
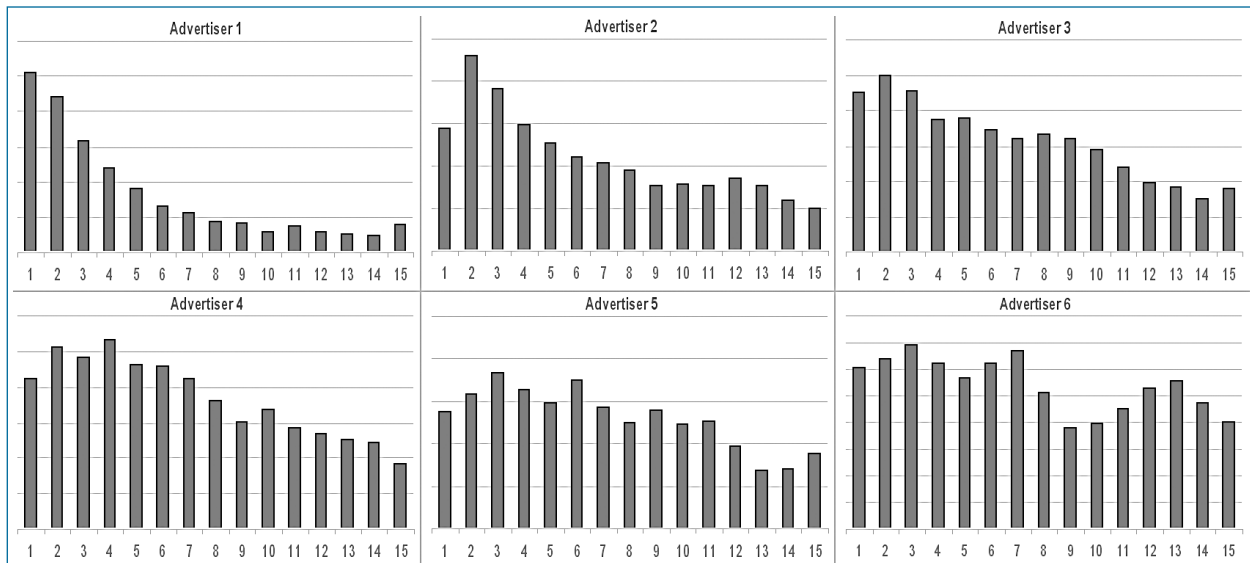


Figure 3: Indexed conversion rates by frequency

These findings may come as a surprise to many, but they make intuitive sense. At any given moment there are only a fraction of users who will immediately respond to your ads. Thus, a direct marketing campaign’s performance will depend on its ability to maximize reach at the optimal frequency level and boost the frequency of users that have only seen a few ads.

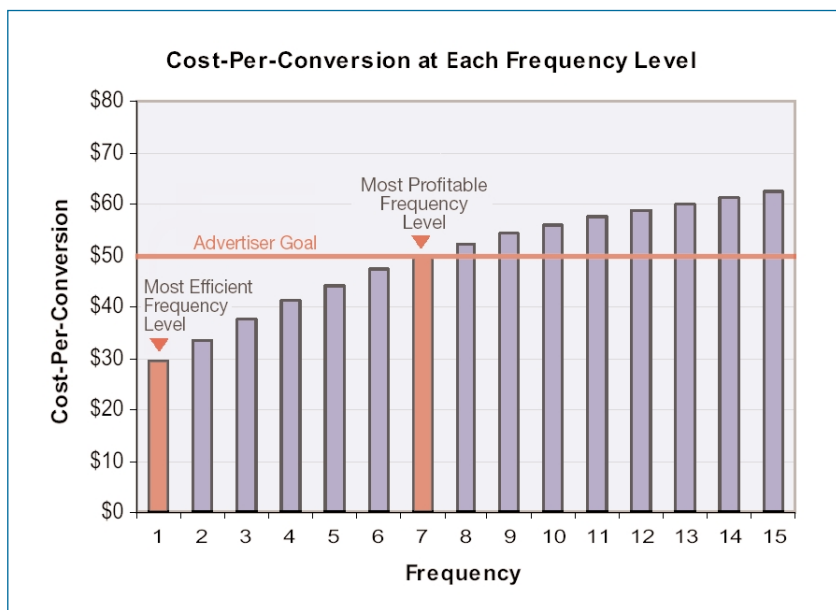
Though the macro result highlights a clear trend in which conversion rates are higher at lower frequency levels, micro-analysis of individual advertisers reveals more meaningful insights. Let’s look at how conversion rates vary by frequency for six travel and vacation advertisers depicted in the following charts.



Even within the same industry category, optimal frequency levels can vary greatly. Diverse media strategies, different demographic targets, and even seasonal variables all affect the results, making it difficult to estimate or apply results across advertisers. Only by analyzing your data and campaign strategies can you determine your optimal frequency.

### The Most Efficient Frequency vs. The Most Profitable Frequency

The frequency level with the highest conversion rate may not necessarily be the same frequency level to maximize your profits. There will always be a trade-off marketers have to manage between efficiency and volume. Restricting frequency to only one ad per user might achieve a lowest possible cost-per-conversion, but you may end up with a very low total number of conversions. The question then becomes, “at what level of frequency am I still meeting my profitability targets on my conversions?” The answer depends on three variables: the rate of diminishing return for conversions, the CPM of the media, and the cost per conversion goal. By applying a CPM to the optimal frequency analysis, you can calculate CPAs for each frequency level and overlay the advertiser’s goal.



Freq.	Cumulative Conversion	CPA
1	25%	\$29.58
2	40%	\$33.56
3	52%	\$37.40
4	60%	\$41.22
5	67%	\$44.21
6	71%	\$47.34
7	75%	\$49.89
8	79%	\$52.19
9	81%	\$54.24
10	84%	\$56.06
11	86%	\$57.56
12	88%	\$58.83
13	90%	\$60.17
14	91%	\$61.31
15	92%	\$62.26

The example on the previous page illustrates an advertiser who would achieve the lowest CPA on the first impression. However, capping frequency at seven would triple the conversion volume (75% vs. 25%) and still meet the advertiser's goal. Thus, optimal frequency levels are often much higher than frequency levels that maximize conversion rates.

As long as the conversions garnered at the higher frequency levels hit their profitability targets, marketers should be willing to pay for those impressions.

### What This Means for Marketers

**First:** It is important for marketers to recognize and react to the amount of money being wasted on excessive high frequency users. The culprits are not the users who consume four, five, or six impressions, but rather the thousands of users who receive hundreds of impressions without any response. We suggest basic frequency caps. Imagine what a frequency cap could mean when a user receives 1000 impressions—a cap at 10 impressions would drive reach to at least 100 additional potential customers.

**Second:** Marketers should utilize frequency distribution reporting from third party systems to more accurately estimate and manage the amount of waste that might be occurring on their campaigns. In most cases, the amount of waste will vary dramatically across sites and will increase over the life of campaigns. If the amount of gross waste is significant, knowing how various caps will impact campaign performance and monitoring whether negotiated caps are truly in effect will help in planning and buying media more intelligently.

**Finally:** Marketers should consider performing their own statistically valid optimal frequency analysis. Through this, they will be able to:

- Quantify the trade-offs between frequency levels and conversion rates.
- Quantify how much pricing premiums for capped inventory are actually worth.
- Strategically pick frequency levels that maximize total conversion yields, while still meeting your cost-per-conversion goals.

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