

When Viewers Control The Schedule: Measuring the Impact of Digital Video Recording on TV Viewership

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Abstract

Google and DISH Network have been accumulating anonymous second-by-second records of live tuning behavior for millions of set-top boxes, covering millions of US households, for nearly two years. We have recently added measurement of digital video recording (DVR) to this dataset and have found several patterns in the impact of DVR on TV viewership. First, viewers use DVR very differently, with many viewers using DVR features only a few times per week. Second, when viewers can control their own schedule, they consume TV content very differently: the most popular live networks and programs are not necessarily the most popular content to record. Third, as has been noted elsewhere, viewers are much more likely to skip ads in recorded content than they are to tune away from ads in live content. However, we find this effect to be highly variable, with some ad airings retaining nearly their entire DVR audience, and others almost universally skipped through DVR. Finally, given that most DVR users continue to watch a lot of live TV, DVR-based ad avoidance seems to be responsible for only a modest loss in total ad impressions today.

1 Basic DVR Usage Patterns

Together with DISH Network, Google has accumulated precise second-by-second tuning behavior for millions of set-top boxes, covering millions of US households, since it launched Google TV Ads in 2007¹. Although it is not a constructed sample, this represents a broad cross-section of the general population that can be reweighted to adjust for geographic and demographic biases. We believe it is among the largest collections of current TV viewing data in the world.

In 2008, we also began receiving data on digital video recording (DVR) for several million of these set-top boxes. In this paper, we propose to analyze the ways in which DVR appears to impact TV viewing behavior, with particular emphasis on its impact on advertising.

We have found that there is wide variation in the usage of DVR. Approximately 16% of DVR users watch and record a program only once a month, while only 4% watch and record more than four times per week. The vast majority (80%) of set-top boxes belonged to casual users, who recorded and watched programming between 1 and 3 times per week. When programs are recorded, they are usually (80%) watched within 5 days, and very often (46%) watched within the same day. Figure 1a shows the distribution of DVR play backs as a function of the number of days from the recording.

Somewhat surprisingly, even in a population with above average rates of DVR ownership, DVR usage accounts for only a small fraction of total TV viewing. Among set-top boxes with at least some DVR usage, well over 90% of viewing time is still live.

2 Changes to TV Viewing

Live television viewership follows well-established patterns. Figure 1b shows the relative hour-by-hour viewership of the 250 most popular channels on the DISH satellite television service, ranked by average viewership, for a two month period in October-November, 2008. (The chart is in logarithmic scale to emphasize differences across a wide range of audience sizes.) A few channels at the top dominate the viewing, and prime time almost always has the highest audience for any given channel. If a channel is popular one day, it is most likely popular on all days, and vice versa. It is very unusual for a channel lower in the rankings to ever achieve an hourly viewership of the top channels. (The one clear exception – a lone red bar on Thursday evening – is a major sports network, when a popular football game was aired.)

When viewers are given control of their viewing schedule through DVR, all these patterns begin to breakdown. Figure 2a shows the same 250 channels in the same order, but their time the relative amount of DVR recording activity

¹The set-top box data is stripped by DISH of all personally identifiable information prior to transferring to Google.

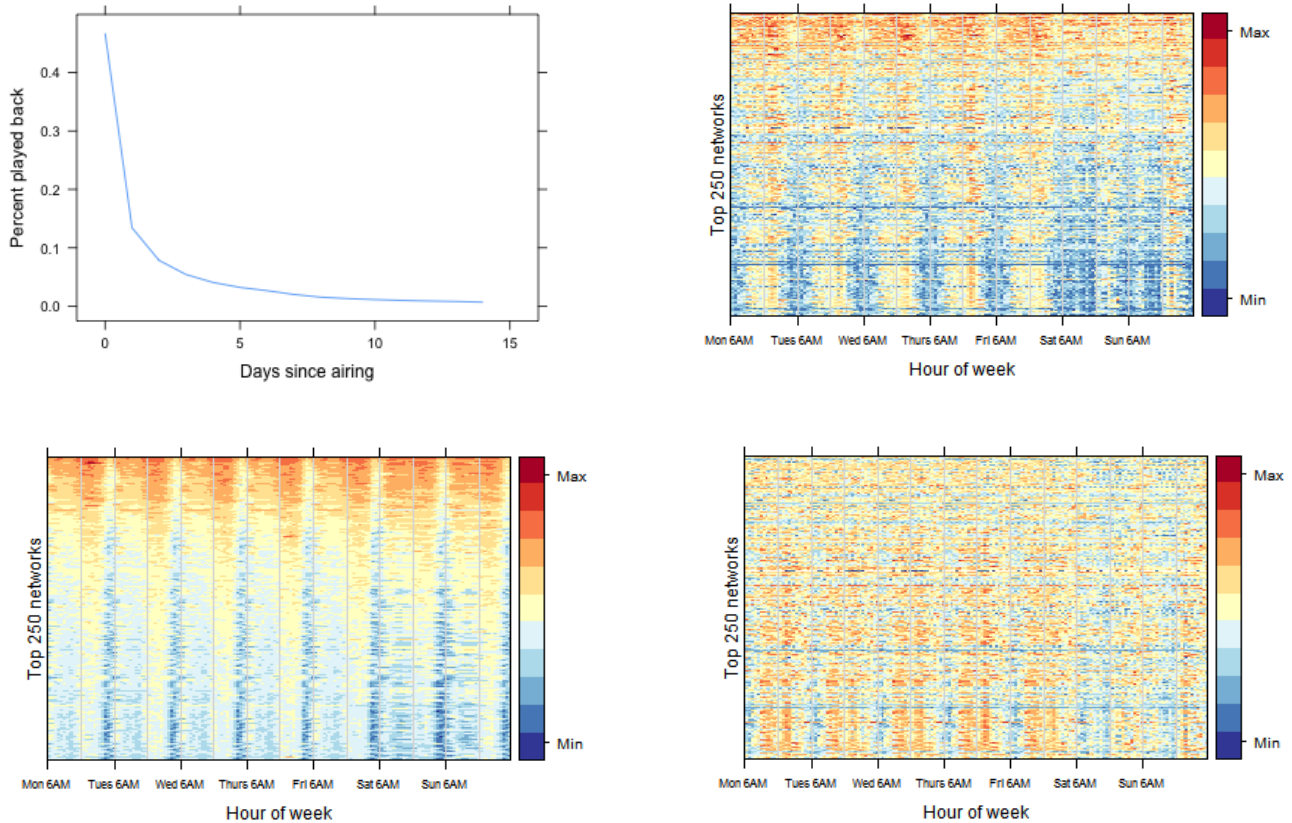


Figure 1: (a) Distribution of days since the airing. (b) Distribution of Live television viewership
 Figure 2: (a) Distribution of DVR recordings (b) Distribution of Live/recorded ratio

is shown instead. In this chart, we see that many channels that are less popular in terms of live viewership have levels of DVR recording that match their more popular counterparts. The dominance of prime time is also much reduced, with late-night and daytime TV often being recorded at similar rates.

Figure 2b shows the ratio between these two quantities, demonstrating the full extent to which the original patterns have been broken. Channels near the bottom of this ranking have a higher proportion of their viewership from DVR than channels near the top. Taken together, these figures show the extent to which viewers take advantage of the control offered by DVR to shape their viewing.

3 Expanding the Long Tail

We believe DVR exerts a subtle but important effect on what has been called the “long tail of TV.” Figure 3a shows a typical view of the long tail, with the top 500 networks on DISH plotted in descending order of their total viewership. Live viewing is in red and DVR viewing is in blue, but on first glance there appears to be little difference between the two.

A closer look, however, reveals important differences on both ends of this curve. Figure 3b shows a magnification of the top 50 networks. Here, the most popular networks to record (specifically, the top 3) are even more dominant than the most popular live networks, but beyond this top tier, most networks in top 50 for DVR are less dominant than their live counterparts. In other words, the long tail of DVR shows a steeper decline than the long tail of live TV, with a smaller percentage of total viewership going to the top 50 networks.

Figure 4a shows that this situation is reversed for networks below the top 50. These lower-rated networks account for a higher percentage of total viewership than their live counterparts. DVR has a “fatter” tail, as viewers use it to expand their viewing of niche content.

4 Ad Viewership under DVR

When viewers play back DVR content, they seem to react very differently to ads. Our prior analysis has shown that most viewers watch live TV quite passively, with usually less than 15% tuning away during a commercial break. Under

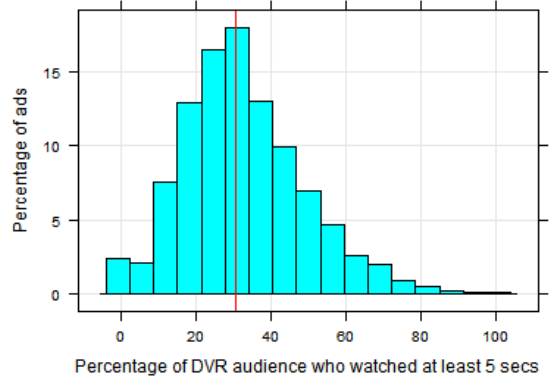
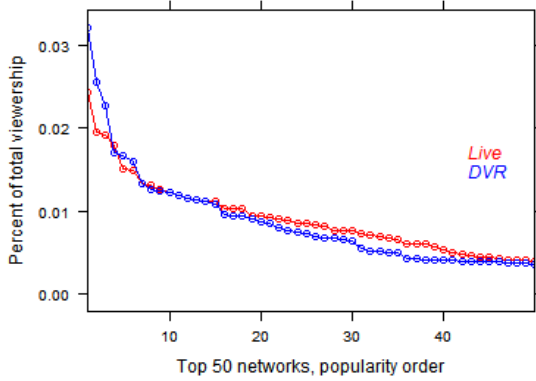
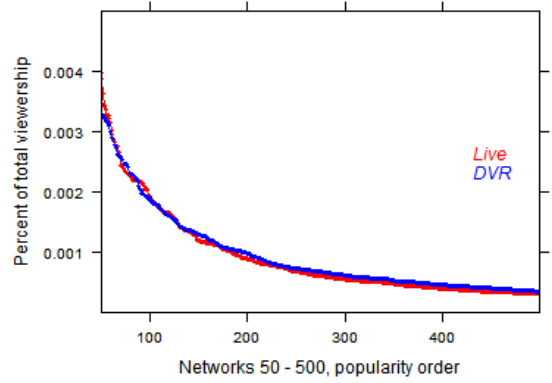
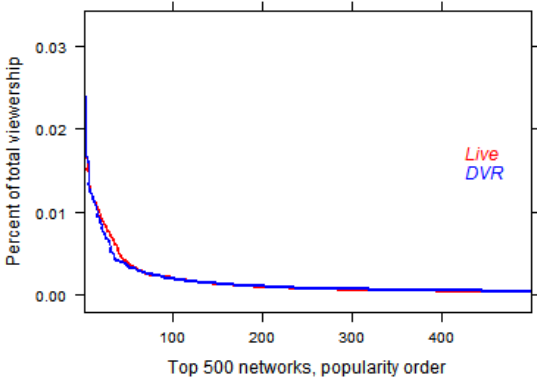


Figure 3: DVR versus LIVE viewership (a) Top 500 networks Figure 4: (a) Distribution of DVR versus Live viewership, top 50 -500 networks (b) Ad viewership under DVR playback

DVR playback, the situation is very different. As figure 4b shows, an average ad is watched at normal speed for at least 5 seconds by only about 30% of the potential DVR audience (where the potential audience is defined as all viewers who "passed" the ad in some fashion during playback, whether at normal plays speed, fast-forward, skip, etc.). But the results vary considerably across ad airings, with some ads being almost universally skipped, and others retaining a majority of their viewers. Given that the average DVR user still spends over 90% of their viewing time watching live TV, DVR-based ad avoidance would seem to account for at most a 7% reduction in total ad impressions within this population.

5 Conclusions and Future Work

When viewers are given control of their schedules through DVR, they use it. DVR users break many of the long-established patterns of TV viewing. DVR seems a particular boon to niche programming, as viewers use their control to watch less popular programming. They are also much more selective in their consumption of advertising. Although as many as 70% of ads appear to be skipped, some particular ads can have much higher (or even much lower) audience retention. Given how much TV is still viewed live, even in DVR households, and that it is still possible for ads to attract DVR viewers, the recent proliferation of DVR boxes need not spell the end of advertising.

Our analysis of DVR usage is just beginning. We plan to study the way DVR usage differs across the various genres of television programming. We also plan to look in greater depth at which ads are skipped by DVR viewers, and the extent to which the reaction of live TV viewers to a given ad predicts the response of DVR viewers.

We believe understanding the impact of DVR on TV viewership is vital for advertisers. Although DVR is not yet – and may never be – ubiquitous, we believe patterns of content consumption using DVR are an important indicator of future audience behavior. One way or the other – either through the further proliferation of DVR boxes or through the migration of TV content to on-demand services online – ordinary people will continue to exert more control over their viewing schedules. Our analysis of DVR usage among DISH subscribers suggests that they will use this control to make profound changes in what and how they watch TV.