

The Sensitivity of Retention to In-Game Advertisements: An Exploratory Analysis

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Introduction

- ▶ In-app advertisements are an increasingly important part of the freemium gaming ecosystem.
- ▶ Their effect is not understood:
 - ▶ Developers generally dislike advertisements and believe that they negatively and significantly effect a users experience.
 - ▶ Advertiser claims are different.

Literature

- ▶ In-game advertisements have not been studied for their effect on consumption (to the best of our ability to google).
- ▶ Literature from other fields:
 - ▶ (McCoy et al. 2004) – Pop-up ads on web pages. **Ads decrease “perceived” enjoyment, but do not effect information retention.**
 - ▶ (Goldstein, McAfee, and Suri 2013; Goldstein et al. 2014) – Work on a paid task in the presence of annoying advertisements. **Ads decrease use.**
 - ▶ (Nelson, Meyvis, and Galak 2009) – **TV advertisements can increase enjoyment by providing a break.**

In-game advertising

- ▶ Difficulties in studying the effect of advertising:
 - ▶ There are a number of different formats (banner, interstitials, videos, etc.).
 - ▶ The decision to show an advertisement is the joint decision of the ad network and developer.

Our Purpose

- ▶ Let's do the simplest thing in the world:
 - ▶ Regress a user's advertising consumption against a user's behavior.
- ▶ Caveats:
 - ▶ Not an experiment.
 - ▶ Subject to how advertisements are displayed.
- ▶ If Developer's are correct then we would expect negative behavioral responses to users seeing advertisements.

Specifics

- ▶ Define Advertisement density as the numbers of advertisements shown per-minute in the first session. Literature indicates that first impressions matter.
- ▶ Regression:

$$\text{Retention} = \beta_0 + \beta_1 \cdot \text{Ad. Density} + \beta_i \cdot \text{Game Fixed Effects}$$

- ▶ We define three different retention metrics:
 - ▶ Time to 2nd session (We subset the dataset to those users who have a second session).
 - ▶ Total Session Time
 - ▶ Total Number of Sessions

Data

- ▶ DeltaDNA
- ▶ Games with more than 100 new users and 3,000 DAU.
- ▶ Each game must also show more than 1,000 advertisements a day.
- ▶ Data from users who install between June 29th and July 7th, analysis includes all information up to July 21st.
- ▶ Sample 1/16th of the data (first digit MD5 hash) for performance purposes.
- ▶ Total users in the same is: 99,620.

Game Data

Statistic	Value
Installs Per Day, Per Game	338.84
Sessions Per User	9.50
Total Ads Shown	1,522,263
Average Users Per Game	4,743.81
Total Users	99,620

Data

Statistic	With Ads	Without Ads
Number of Users	31,784	67,836
Lifetime Sessions	14.42	7.29
Total Minutes Played	131.01	41.42
Average Session Length	10.87	7.89
Ads Per Session	3.37	–

Results

	log(Time to 2 nd Session)	log(Total Session Time)		log(Number Sessions)	
	(1)	(2)	(3)	(4)	(5)
Ad Density	0.333 (0.818)	-0.200 (0.690)	-0.865 (0.584)	0.236 (0.314)	-0.314 (0.295)
Constant	8.368*** (0.132)	2.172*** (0.087)	3.976*** (0.094)	0.676*** (0.040)	1.391*** (0.048)
<i>Game specific effects in next table</i>					
Observations	65,422	99,620	65,422	99,620	65,422
R ²	0.142	0.216	0.279	0.073	0.094
Adjusted R ²	0.142	0.216	0.279	0.072	0.094
Residual Std. Error	2.592	2.456	1.851	1.119	0.936
F Statistic	515.144***	1,309.938***	1,207.096***	371.498***	324.692***
Def. of freedom	21, 65400	21, 99598	21, 65400	21, 99598	21, 65400

Note:

* p<0.1; ** p<0.05; *** p<0.01

Game Specific Effects and Robustness Checks

- ▶ Most Game Specific Effects were significant (high variation).
- ▶ Robustness Checks:
 - ▶ Added variables for platform, country and device type.
 - ▶ Logistic Model attempting to predict if there would be a second session.
 - ▶ Indicator flag for ads, rather than ad density.

Conclusions

- ▶ First session advertisement density not statistically significant
- ▶ Game specific effects much more important
- ▶ Caveats:
 - ▶ Exploratory, not experimental.
 - ▶ Only within bounds of how ads are currently shown.