

Designing Freemium and Free Trials For Digital Subscriptions

Ian N. Weaver¹, Vineet Kumar², and Sreelata Jonnalagedda³

^{1,2}Yale School of Management

³Indian Institute of Management, Bangalore

Date: Spring 2023

Summary: In digital product settings, freemium (with a permanently free plan) and free trial are among the most commonly used and effective strategies used by both start-up companies and established firms. The design of the free plan and trial is of primary importance, but there are few studies of its causal impact on metrics that businesses value. We conduct a field experiment in collaboration with a company that provides video-based learning for performing arts space to identify the impact of free content availability on both engagement and monetization outcomes. We find that the generosity of the free plan drives engagement higher, whereas conversion rates are inversely related. However, the monetization impact of the generosity demonstrates an inverted-U shaped relationship. We document the underlying mechanism for user behavior that drives these results. Finally, we undertake a content analysis, adapting recent advances in using raw unstructured video data to characterize rich content features so we can understand how content characteristics explain differential treatment effects.

We investigate the tradeoffs in designing product plans for digital platforms, specifically in the freemium business model, and examine how plan design impact consumer choices and firm outcomes. In markets with digital products and services, we commonly see firms offering both a free product and a paid premium product, which is termed a freemium business model. For example, Spotify offers a free plan as well as a premium plan with additional features for a monthly fee. Similarly, companies with digital products across a wide range of industries like the New York Times, LinkedIn, Zoom, Dropbox and Google Docs also use this model. Offering a *perpetually available free plan (freemium)* makes financial sense when the cost structure includes relatively high fixed costs for product development and perhaps more importantly, low variable costs associated

with usage. Other businesses do not offer a perpetually free plan, but rather offer a *time-limited free trial* of a paid product. Although such a strategy may on the surface appear similar, the underlying rationale is often quite different. Free trials are often used when consumers face uncertainty in terms of the value proposition, since the products are often experience goods (Nelson, 1970). Allowing users to try a sample (free trial) in such cases allows them to evaluate the product and determine fit and value before they purchase the product.

We examine some of the primary questions related to the design of the perpetual free plan and time-limited free-trial in digital product markets. Firms in such markets typically care about both user engagement as well as monetization, and aim to design their plans to improve along these measures. However, there are often tradeoffs companies face here in designing the free plan. Increasing the value of the free offering might be beneficial from an engagement viewpoint, but might cannibalize the purchase of the premium product, resulting in lower monetization effectiveness. Thus, we might expect a direct tradeoff between engagement and monetization. A free trial might seem less likely to result in such cannibalization, but its relative effectiveness compared to a perpetually free product is not well understood. Moreover, firms often distinguish between short-run and long-run outcomes, with varying emphasis depending on the goals of the company. The impact of these design choices across timeframes is therefore also important to understand in such cases.

We undertake a careful experimental study of the following questions related to design of the freemium and free-trial strategies over both the short and long run. We examine the impact of freemium plan design, or how the amount of (perpetual) free content impacts engagement and monetization outcomes. One goal is compare the relative effectiveness of freemium and free trial strategies. We also examine whether there is evidence of complementarities across freemium and free trial strategies, in the sense of whether they might be more effective when used in conjunction with each other.

Our research focus is on understanding the outcomes corresponding to different design choices for the free plan in a freemium business model. The outcomes we are interested in include short and long run measures of engagement, as well as monetization metrics of conversion, revenue and customer lifetime value. We vary the value proposition available to the free consumer in several ways, and characterize the individual-level and aggregate outcomes. First, we are interested in examining how varying the amount of content offered in the free plan impacts the above outcomes. Second, we evaluate whether a time limited (24 hours) free trial allowing access to all content impacts engagement and monetization. An important question arises whether the (permanent)

free plan and the (temporary) free-trial serve complementary roles in achieving engagement and monetization, or whether they serve as substitute strategies from the firm’s perspective. We also investigate the impact of permanently offering a full-length sample. Finally, we conduct a content-level analysis using the recently developed generic machine learning inference (Chernozhukov et al., 2020) to examine whether and how different types of content obtain *differentially higher engagement* under the experimental conditions.

Field Experiment Setting: We conduct a field experiment in collaboration with an online platform (name withheld) for dance enthusiasts with video lessons that enables learners to take dance lessons online. The platform offered 180+ classes across 30+ different dance forms from beginner to advanced level. The content on the platform comprised of live classes or library (recorded) classes. Live classes are typically lower quality and offered for free at a pre-specified time on specific days, and are aimed at a wide audience. The library classes included both higher quality studio classes and recorded versions of live classes (live-recorded). The studio classes were categorized into either moves, choreographies, or courses based on content. The firm used a freemium business model where all live classes and a part of all the library content were free for all users. To access library classes beyond the minutes allowed in the free plan, the consumers had to subscribe to one of the following three premium plans at different price levels: 7 days (¥199), 30 days (¥499) and 180 days (¥2499).¹ The studio classes available to premium users involved high quality production with significant involvement by the company, including production resources and monetary support. Users were typically acquired through digital and social media, specifically Facebook/Instagram and Google/Youtube, which served as the primary marketing channels.

We design a field experiment using classic Randomized Controlled Trial (RCT) principles to vary the design of the free plan along 4x3 aspects, and run it over the course of 15 weeks. Randomization is done at the user-level when a user first signs up to access the product, and the user is permanently allocated to a condition.

We characterize business outcomes at two distinct and unique levels of analyses: user-level and content-level. The user-level analysis informs us how the individual user journey is different across the different experimental conditions (free plan + free trial designs). In contrast, the content-level analysis looks at engagement for each content video across the conditions. In the *user-level analysis*, our focus is on metrics of engagement and monetization, aggregated across the users, corresponding to each experimental condition (cell). We evaluate 3 different metrics of

¹Currency units have been disguised to avoid identification.

engagement, including total view time, repeat views and variety of content consumed. We find that as the amount of permanently free content is increased, engagement across each of the metrics uniformly increases. However, we find that the proportion of consumers upgrading to a premium plan decreases as the free plan becomes more generous with permanent content. This is suggestive of the idea that users may be getting sufficient value from a more generous free plan, which leads to a drop in the conversion rate to premium plans. However, this is not the complete story from a monetization perspective. The company offers premium plans of varying duration, and we find that when the free plan is *somewhat more generous*, users are more likely to upgrade to a premium plan with a longer duration, which brings in greater and more predictable revenue to the company. The revenue seems to have an inverted-U shaped relationship with free plan generosity, suggesting that an intermediate amount works best from a monetization perspective. When we account for retention likelihood in computing customer lifetime value for long-run monetization, we find results similar to, and stronger than revenue, in suggesting free plans of intermediate generosity work best. In examining the engagement and conversion results for a time-limited (24 hours) free trial, we find that although the free trial drives greater engagement during the 24 hour interval where the user can access all premium content, there is no long run impact that follows this greater engagement, whether in terms of engagement or monetization metrics.

In examining whether freemium and free trial work better together, i.e. as complements, we find that the relative improvement from a free trial is actually lower when a permanently free (freemium) plan is offered. Thus, we find no evidence for complementarity between these two commonly used business strategies. Overall, we find that whereas free trial might drive short run engagement, free plan design with freemium is more impactful than free trial in driving long run outcomes in terms of both engagement and monetization.

Although there are several related studies on freemium and free trial, field experiments that causally examine how plan design leads to different business outcomes across both short and long run are relatively few. We examine this in a subscription setting rather than individual products available for purchase. Our field experimental design tests both a 24-hour (time-limited) free trial and freemium (part of each content is available for free) model. We also study the potential complementarities between the two strategies. From a user-level perspective, we examine how value on a number of metrics is impacted by plan design:- engagement (depth, variety and repeat viewing), conversion and separately monetization. We find that conversion and monetization can yield different results as plan duration varies.

References

- Chernozhukov, V., Demirer, M., Duflo, E., and Fernandez-Val, I. (2020). Generic machine learning inference on heterogeneous treatment effects in randomized experiments, with an application to immunization in india. Technical report, National Bureau of Economic Research.
- Nelson, P. (1970). Information and consumer behavior. *Journal of political economy*, 78(2):311–329.