Revenue models, in-app purchase, and the app performance: Evidence from Apple's App Store and Google Play

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ABSTRACT

In this paper, we empirically examine how the revenue model (paid, free, or freemium) adopted for a given app affects the app revenue performance as measured by the app daily revenue rank. We also study the impact of in-app purchase on this measure of performance. Moreover, we study how such relationships are contingent upon the distribution platform where the app is marketed as well as the type of category to which the app belongs. We test our hypotheses relying on a large sample of top grossing apps from the two major app stores, namely Apple's App Store and Google Play. Our findings reveal that in the Apple's App Store, paid and freemium models are equivalent and both are more effective than the free model in terms of app revenue performance. On the other hand, in Google Play no significant differences between paid and free revenue models emerge, whereas the freemium model is shown to be less effective even than the free model. Moreover, while in-app purchase is shown to positively influence the app revenue performance in Apple's App Store, this effect is reversed in Google Play. Finally, the type of category is also shown to influence the effects of the revenue model and in-app purchase (the latter to a lesser extent) on the app performance.

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1. Introduction

Software developed for mobile phones has been around for well over a decade. Indeed, in the early 2000s, before the term 'application store' was popularized, the distribution of mobile content was dominated by the Mobile Portal business model. Mobile Portals were mostly managed by Mobile Network Operators (MNOs), which constructed a highly centralized model (Kuo and Yu 2006). However, the mobile content ecosystem was at first unclear and did not attract enough developers and users to really soar, possibly due to the fact that the technology was not mature. This relatively stable context was dramatically shaken in 2008 by Apple, which, by launching the app store, introduced a new distribution paradigm in mobile commerce: the application store. An application store is essentially an online distribution platform from which users can download software applications for mobile devices to increase the utility associated to their usage.

Mobile applications (apps, hereafter) are typically developed by third parties, which can be either software houses or individuals. App stores operate as online two-sided markets, generating mutual advantages to all involved actors (Hagiu 2007). By means of developers, the platform owner, e.g., Apple, can exploit indirect network externalities that increase the value of its own devices and/or operating systems (OS). In fact, the higher the number of apps running on a device, the higher the potential functionalities of such device. On the other hand, developers are interested in distributing their apps via app stores, because this allows them to reach a multitude of consumers worldwide that they might not be able to reach on their own. Finally, consumers derive higher utility from the presence of a higher number of developers in the app stores as they have larger product variety available for purchase. The revenue-sharing rule adopted by Apple (and also by all major stores) implies that, for each transaction, 70% of the revenue goes to the developer, while the platform owner retains 30% of it.[1]

Nowadays a multitude of applications have become everyday "tools" in the life of people who want to be connected 24/7. As a matter of fact, according to Venturebeat, the app market has shown an astonishing growth stepping from less than $10 billion

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[1] Note that the revenue sharing rule relates to how the revenue generated from each transaction involving apps is allocated between developers (70%) and app store owner (30%). This is different from the revenue models that developers can adopt to monetize from their apps. The present study focuses on the latter.

annual revenue in 2011 up to estimated $70 billion by 2017 (Takahashi 2014). Other sources provide even rosier predictions suggesting that the global mobile market will reach $150 billion by the end of 2015 (Ghose and Han 2014). To take advantage of the great potential of this market, in the last few years, numerous mobile device makers, such as RIM, Samsung, etc, have followed Apple's move. Such a rapid proliferation of app stores has involved not only traditional players of the smartphone industry, but also important new entrants such as Google, which launched its Android mobile Operating Systems (OS) and made the Android Market (later rebranded as Google Play) available to app users in 2008. However, as a result of great market consolidation, nowadays the scene is dominated by only two players: Apple's App Store and Google Play, which have become by far the most popular stores, retaining together almost 90% of the market (Gartner 2013). In particular, although Apple's App Store still generates higher revenue, Google Play delivers 60% more app downloads than Apple (Wallenstein 2015). These exemplificative figures as well as the online nature of the transactions in the app market demonstrate the relevance of this market in the context of Electronic Commerce (EC).

In this highly dynamic and competitive environment app developers are required to make several important decisions. For instance, they have to choose the type and the number of apps to market, which mobile operating systems to develop for and, hence, which app store to target, and finally which revenue model to choose for each app. These decisions are naturally pivotal for developers as they determine the success or the failure of apps (and their developers) in the market. However, in contrast to the huge popularity, the academic world has started devoting attention to the dynamics of success in this market only recently. For instance, a few initial empirical studies have focused on app demand estimation (Carare 2012; Garg and Telang 2013; Ghose and Han 2014) or purchase intention of paid apps (Hsu and Lin 2015). In addition, focusing on a case study, Halaburda et al. (2011) have examined the rationale behind the choice of the platform to develop for. However, no empirical studies have instead investigated the impact of the revenue model chosen for an app on its performance in the market. It is extremely important to shed light on this issue for two main reasons. From a practical viewpoint, the choice of the revenue model is perceived as one of the most difficult and crucially important decisions by app developers in order to succeed in the market, as demonstrated by the numerous industry articles focusing on this issue (Sourcebits 2014; Pappas 2013; Wilcox 2013; Munir 2014). As a matter of fact, a multitude of app developers struggle with the choice of the appropriate revenue model for their apps as the mobile app market has become very competitive and many developers suffer from low sales (Sourcebits 2014). From a literature viewpoint, our study is important because, although the performance implications of revenue models in the context of information goods and/or EC have been extensively discussed in the literature, still no univocal indications can be drawn. In fact, in this respect, contrasting views have emerged with some early studies supporting the economics of free with advertising (Anderson 2009), and other studies documenting the recent trends toward the use of models that require a payment to all or some users (i.e., paid or freemium) for online content provision (Pauwels and Weiss 2008). Therefore, further research is needed to better understand the effectiveness of different revenue models, especially with regard to a business setting such as the app market, where the choice of the revenue model and the relative economic consequences have never been investigated in previous literature in spite of being so pivotal for the fate of an app and its developer. The empirical investigation developed in this study contributes to fill this gap. Specifically, it aims at shedding light on:

1. The impact of existing app revenue models (namely, free, paid, freemium) on the app revenue performance, as measured by the app daily revenue rank, and whether (and how) this impact depends on the store (Apple's App Store vs. Google Play) where the app is marketed and the nature of the app itself (i.e., the category to which the app belongs).
2. The revenue performance implications of adopting the practice of in-app purchase (i.e., purchase of additional app features directly inside the app at incremental prices), and whether (and how) these revenue implications depend on the store where the app is marketed and the nature of the app itself.

With regard to the first point, in line with previous studies (e.g., Pauwels and Weiss, 2008) and motivated by the large popularity of free apps, we characterize our empirical study as a comparison of payment-based (paid and freemium) versus free models. That is, we formulate our hypotheses mainly as a comparison between payment-based (paid and freemium) versus free models to be consistent with prior literature. However, our analysis also takes into account the comparison between paid and freemium models (which is indeed included in one of our hypotheses). By testing our hypotheses through different statistical methods, we are able to compare the revenue performance of all the considered revenue models (free, paid, and freemium) and thus answer to our research question on revenue models for apps. With regard to the second point, we endeavor to understand whether the adoption of the in-app purchase practice in addition to the chosen revenue model can yield a revenue performance advantage to developers, and thus formulate our hypothesis accordingly. By providing empirical evidence of the effectiveness of in-app purchase, we also contribute to the literature on versioning (Shapiro and Varian 1999; Bhargava and Choudhary, 2001, 2008), as in-app purchase is indeed a peculiar form of versioning. Finally, with regard to both first and second points, it is important to understand whether and how the effects of revenue models and in-app purchase decisions depend on distribution platform and app nature. Thus, we formulate hypotheses on whether (and how) the store (Apple's App Store vs. Google Play) and the app category influence the relationship of revenue models and in-app purchase with revenue performance.[2] As explained later in detail, different platforms may be accessed by consumers with different characteristics (e.g., willingness to pay). As a result, developers' ability to monetize on their "creatures" depends not only on the choice of the revenue model (and in-app purchase) but also on whether and how the given revenue model (and the practice of in-app purchase) fits with the environment (Apple vs. Google ecosystems) where the app is marketed and the nature of the app itself.

To our purposes, we utilize an *ad-hoc* panel dataset of randomly selected apps obtained by collecting data from the two major app stores, Apple's App Store and Google Play, for a period of twenty weeks. To increase reliability and robustness of our findings, we test our hypotheses by using two different statistical approaches, namely regression analysis and Mann–Whitney non-parametric tests performed on opportunely matched subsamples. By way of anticipation, our findings reveal that there is no absolute dominance of a specific revenue model. Indeed, the effect of the revenue models is strongly contingent upon the distribution platform where the given app is marketed. Specifically, we find that in the Apple's App Store, paid and freemium models are shown to be more effective than the free model in terms app revenue

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[2] Given the large number of app categories commercialized in major app stores, we do not formulate a priori hypotheses on the relationship between revenue models and app revenue performance for each specific category. Rather, posit that the category certainly plays a role in shaping such relationship and postpone the discussion related to specific categories to the result and practical implications sections.