Innovation and Entrepreneurship in Mobile Applications

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Abstract

The explosion in applications developed for mobile devices testifies to the power of platforms to drastically reduce the cost of entrepreneurship. The nascent markets for applications running on Apple and Android devices, among others, exhibit a tremendous amount of experimentation as developers and platform sponsors figure out how to best manage and monetize innovation. We are undertaking a very large data gathering effort to study these new markets, focusing in particular on firm strategies to supply applications and their relationship to platform sponsor strategies. Our dataset has a great deal of information about applications and developers, including multi-platform activities.

Although too early to forecast conclusions, we are confident that we will be able to illuminate at least three different areas of developer supply: monetization/revenue models, application development models, and platform choice. Measuring and explaining the observed variety across developers on all three dimensions is the empirical goal of this paper. The analytical goal is to characterize the mobile platform market by documenting the different types of entrepreneurs and their strategies along these dimensions, especially in response to the environments defined by platform hosts. Analysis of market data combined with survey data will reveal much of the economic logic behind platform and developer strategy choice in an environment that already has spurred much innovation for the rapidly expanding mobile economy.

Introduction

A central fact of much of modern high-technology entrepreneurship is that many of the firms that are founded create innovations that leverage existing technology platforms, defined as technology architectures that are easily extendable and enable complementary products to be developed. Platforms lower the cost of entrepreneurship through the exploitation of social increasing returns to scale, allowing new ventures to focus on value-creating aspects of the business – e.g., innovative new functionalities and applications – while a platform sponsor or sponsors update and enhance the underlying infrastructure. However, research on entrepreneurship rarely examines how new ventures develop innovations, or how technology platforms contribute to this dynamic (focusing instead on large institution innovation processes or how entrepreneurs access resources like venture capital).[1]

There has been an explosion in the development of technology platforms in multiple industries, and scholarship about platforms is flourishing.[2] Yet studies of technology platforms tend to be from the perspective of the platform-owner, who is typically a large, established firm, or focus on the problem of common supply of the infrastructure components, e.g. in open source. The supply of applications is pushed into the background; suppliers of applications that run on a platform are modeled symmetrically to users, as price-takers with a given supply curve. The empirical study of entrepreneurial *innovation* in platform industries is relatively unexplored. Our purpose is to fill this research gap.

To examine how entrepreneurial firms effectively innovate and compete on technology platforms, we focus on developers of applications for mobile computing platforms, particularly Apple's iPhone & Google's Android. We chose application developers on these platforms because their previously untapped micro-scale entrepreneurial activity has emerged on mobile platforms as one of the largest sources of innovations in the contemporary economy. We began studying this industry in its relative infancy, while competing platforms and entrepreneurs are still evolving and learning. Apple and Google have radically different strategies facing developer innovation, developer revenue capture, and the distribution of apps.

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[1] See Allen, 1977; Brown & Eisenhardt, 1995; Clark & Fujimoto, 1991 & Stinchcombe, 1965; Sorenson & Stuart, 2001.

[2] See Armstrong, 2006; Gawer & Henderson, 2007; Rochet & Tirole, 2003; Weyl & Tirole, 2010.

Research questions

We observe a variety of different developer revenue models. Some apps are bought by the user, others supported by advertising; others are sold in a "freemium" model; others through "in-app purchases." Still others are supported by cross-promotion or as part of the services offering of a company that has a broader consumer products and service business. We are undertaking a considerable primary research effort to classify apps according to their revenue model and to examine the correlates of different revenue models. One very important hypothesis is that the different strategies of platform suppliers create different incentives for the use of revenue models.

We also observe a wide range of application development models. Some developers diversify over app categories while others specialize. Some update frequently, while others move on to new applications. Some are very responsive to consumer feedback (which is observable to a striking degree because of the online/mobile distribution channels for apps) while others are much less so. It is entirely possible that this is driven by variety in capabilities, since there is wide heterogeneity in developer types, including entrepreneurial organizations that are part-time hobbyists, full-time firms, applications developers who supply to consumers, and those who supply to large firms with consumer customers, etc.

Finally, developers have a wide variety of strategies for dealing with platform competition, including providing apps to only one platform, providing some apps to one and others to both, and systematically supplying others. Understanding this behavior is central to debates about platform competition. Furthermore, how entrepreneurial firms effectively innovate and compete on technology platforms plays a critical role in future economic growth as more economic activity centers around digitization.

Outline of Methodologies

There are three data sources from which this project will draw. The first is a large scale empirical dataset of all information about mobile applications and developers that has been scraped for the Apple, Android, Blackberry, Nokia, and Microsoft mobile platforms, supplemented by information gleaned from actual use of the apps by our RAs for a large stratified sample of apps. The second is a large scale developer survey we which investigates the identities and innovative choices made by application developers. The third is in-depth interviews of developers.

A great advantage of this dataset is that we are likely to see pre-IPO or even pre-venture backed firms as well as observe failed firms, which is typically not observed in the empirical entrepreneurship literature. This should allow us to more precisely identify the determinants of entrepreneurial success. Our dataset includes a large variety of applications in games, productivity, education, music, and all other categories on multiple platforms. Such variety should allow for a detailed comparison of diversification strategies in the context of multi-platform innovation. A survey of these early-stage entrepreneurs at such a large scale would be the first of its kind. We are particularly excited that the dataset and survey will allow us to make contributions to entrepreneurship and innovation by studying these developers and by exploiting a novel source for measuring quality of innovation: the ratings given by users to applications. Typically, the innovation literature has focused on patent data and citations for that measure. We believe we can enrich the field by providing a second, more direct measure of innovation through these ratings, since they directly reflect consumer utility.

Current State of Research Project

We are just now running preliminary regressions on the first year of 2 years of data which we have scraped off of Apple iTunes. This dataset consists of bi-weekly scrapes of all applications (13 million observations covering 381,000 applications by 86,000 developers, rated by 86 million users). We have made considerable progress matching that data to developers on Android. We have conducted in-depth interviews with several applications developers. We will be launching our developer survey this summer.