Proposal for NBER Digitization and Copyright Grant Program

Market Structure and Dynamics and Patterns of Innovation in Software "Apps" Markets

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The so-called "app economy" (i.e., the creation of specialized software applications on digital platforms such as mobile phones and social networks) has now reached scale of billions of dollars of annual revenues and hundreds of millions of downloads. At least as important, it is now part of daily life for hundreds of millions of users of these platforms and applications. The ability to organize, to connect with friends and family, the ability do one's work, to collaborate with coauthors, to divert oneself and have fun is now shaped by the quality and variety of software applications that are innovated on this new generation of digital platforms.

Just as in any innovative industry, economists should be deeply interested in how industry structure relates to patterns and rates of innovation–and how interventions and structural changes might affect the trajectory of innovation. Apart from the sheer scale and prominence of these industries, contexts of "apps innovation" perhaps deserve particular examination for more reasons. First, the structural conditions shaping the link between competition and innovation may somewhat differ from those in more traditional industries [1]. For example, developers of apps "on top" of platforms often use common tools, technologies and other inputs as other suppliers building on the same platform and these inputs are often readily provided for free or subsidized by platform owners. The same is often the case with distribution and promotion, again often provided by the platform. Apart from leveling the playing field, these common resources also reduce entry barriers to a point where even individuals, users and hobbyists can join into competition. At the same time, these digital markets often allow a virtually infinite product space, where a constant flow of novel ideas emerge. The "soft" nature of these innovations also create considerable scope for recombining ideas. These unique conditions, along with the "zero marginal cost" economics of information industries and a unique treatment of intellectual property rights in software [4], point to the uniqueness of these contexts–and the need for additional research.

A second reason for advancing economic analysis of these digital industries, is that industry structure is often especially "plastic" and shaped directly by platform owners. There are in fact a wide range of strategic instruments that digital platform owners can use to shape the structure of the apps markets–provision of information, subsidies, resources; shaping entry through licensing and pricing; etc. [2]. And yet, objective policy analysis remains rare in these contexts [3].

Agenda: Theoretically-Grounded Empirical Analysis of the Structure, Dynamics and Innovative Output of Apps Markets

This research program aims to pursue several key questions related to the points above:

- Just how (un)concentrated and (un)stable should we regard market structure and market leadership in apps markets? Can we attribute these conditions to underlying structural features of apps markets–and thus gain better insight as to how society or platform owners might alter these conditions?

- From an efficiency perspective, can the prevailing market structure be regarded as efficient in any way? To whom? By what standard? Should we understand that in these digital markets that unique economic mechanisms are at work to favor this kind of market structure?
- From a firm strategy perspective, how do we explain those cases in which suppliers have, in fact, been able to maintain and grow a strong position? How does this relate to or depart from our understanding from more traditional (non-digital) industries?

Apart from carefully building on relevant economic theory and dealing with usual challenges of estimating relevant causal relationships, we anticipate a need to advance beyond usual empirical methods in studying these contexts. For example, traditional aggregate measures of market concentration and power (e.g., Herfindahl, average price-cost margin) may not be sufficiently discerning. Further, even casual observation suggests a special need to characterize dynamics rather than just structure per se of these contexts.

Current Progress

To this point, we have assembled data sets related to multiple platforms on which apps are supported, to allow comparisons. In each case, these include data on individual suppliers, with apps on particular platforms in particular genres of software. In these data, we can observe characteristics and descriptions of the apps, indicators of quality and investment, pricing and market share. There are several sources of exogenous variation that might be exploited to discern relevant causal relationships. These include, differences across different genres of software, platforms and types of platforms; a variety of policy changes over time (particularly by platform vendors); and broader changes in the labor market for software developers.

Funding Requirements and Uses

I kindly request $20,000 of funding to carry forward with this research. The funding will be directed towards research assistance and travel.

References

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[4] Hal R Varian, Joseph Farrell, and Carl Shapiro. *The Economics of Information Technology.* An Introduction. Cambridge University Press, December 2004.