Preface

If you have a RAZR mobile phone, a Windows personal computer (PC), a TiVo Digital Video recorder, a French credit card, an Xbox, or a Palm Pilot, you are using one. If you have bought anything on eBay or searched on Google you have used one too. All these products have at their core a software platform—a software program that makes services available to other software programs through Application Programming Interfaces (APIs). Those software platforms are at the heart of "economies" or "ecosystems" that consist of mutually dependent communities of businesses and consumers that have a symbiotic relationship with the platform. Software platforms are a general-purpose technology that first made its economic mark in the 1970s. These "invisible engines" have spawned many major industries—some directly, such as smart mobile telephones, and others indirectly, such as ringtones. They are in the process of transforming industries ranging from automobiles to home entertainment. They are likely to create more industries—one need only look at the applications that were quickly built with Google Maps soon after its release to see the potential. And, finally, they are challenging many long-established industries, some of which may not survive much longer. The PC rather quickly killed the typewriter industry, and the Internet may come close to finishing off the newspaper industry.

We speak loosely when we equate software platforms with the corresponding industries. It is easy to equate Windows and the PC industry, since Windows more or less defines that industry. It is harder to equate the Symbian operating system and the mobile telephone industry, however. The Symbian operating system is, in fact, only one element in a complex structure that links mobile phone operators, handset makers,

application providers, and software platform makers. But the thesis of this book is that the underlying software platform technology shapes these industries, and the business strategies employed by firms in those industries, in fundamental and important ways. By focusing on the software platform we hope to offer the reader a perspective on the business dynamics and strategies of industries, old and new, that have been powered by these invisible engines.

Although two of us (Evans and Schmalensee) have worked on issues related to a major software platform, Windows, since the early 1990s as consultants for Microsoft in several prominent antitrust cases in the United States and Europe, our interest in the power of software platforms emanated from a totally different body of work. We have also been working on and thinking about the payment card industry since the early 1990s. An interesting aspect of that business is that successful payment card systems have to get people to use cards and merchants to accept them in order to even have a product. Two French economists, Jean-Charles Rochet and Jean Tirole, realized in studying the economics of the payment card industry that it shares this fundamental property with many other businesses. Think singles clubs—they need men and women and in the right proportions to even have a product. Similarly, advertising-supported media need both eyeballs and advertisers. Any type of exchange, such as Sotheby's, Deutsche Börse, or eBay, needs both buyers and sellers. These are all examples of two-sided platforms.

The two of us have been engaged in the study of two-sided industries ever since our colleagues Rochet and Tirole made this basic observation in 2001. We applied that framework in the second edition of an earlier book, *Paying with Plastic*, to study the business strategies and dynamics of the credit, debit, and charge card industry.

The third member of our team (Hagiu) decided to write his doctoral dissertation at Princeton University on the economics of two-sided markets during this same period. This document contains the first theoretical model designed specifically to study two-sided software platforms.

All of us quickly recognized that software platform businesses have at least two sides. Software platforms consist of services that are often made available to developers through APIs. They are also made available to computer users, but those computer users typically avail themselves of

API-based services by buying applications that in turn use APIs. It is only a slight exaggeration to say that *all* software platform makers *all* the time invest in getting *both* developers and users to use their platforms. The developers/users are like the men/women, cards/merchants, advertisers/eyeballs, and buyers/sellers that we mentioned above. In fact, software platforms sometimes appeal to more than two distinct groups—including hardware makers and content providers.

The economics of two-sided platforms provides a number of insights into pricing, design, organization, and governance of platform-based businesses. We were interested in understanding how this new economic learning could help shed light on the strategies followed by software platforms. On the flip side, we were interested in understanding how a diverse set of industries based on software platforms could be probed to provide insights for students of this new economics.

This book is the result. It blends economics, history, and business analysis. It is intended for anyone who wants to better understand the business strategies that have been followed in industries based on software platforms. We focus on pricing, product design, and integration into downstream or upstream suppliers. Entrepreneurs and managers should find insights that they can apply in their own businesses.

We hope that anyone who wants a concise business history of software platforms will find our discussion useful. We present detailed studies of the PC, video game console, personal digital assistant, smart phone, and digital media software platform industries. We present shorter discussions of auction-based and search engine–based software platforms.

This book does not cover government policies that affect software platforms. A serious treatment of that subject would require at least another book. Microsoft alone has been the subject of intense antitrust scrutiny since the late 1980s as a result of having more than a 90 percent share of PC operating system sales and engaging in various business practices that some antitrust authorities and courts around the world have questioned. There is also a vibrant policy debate over the extent to which governments, especially in emerging economies, should promote open-source software that is produced by cooperatives and made available for free at the expense of proprietary software that is made by for-profit

firms and sold for profits. Google is increasingly at the center of a debate over the fair use of copyrighted material on the Internet. What can it, and similar services, copy and share with users? Does Google have to share any of its profits with the content owners? Our focus, however, is on what software platform businesses do and why they do it, and we stay away from debates about whether they should do it.

The book is not written in the technical language of economics journals, but we believe that our economist colleagues will nonetheless find that we have assembled factual material that both sheds light on the theory of two-sided markets and provides a useful reality check on that theory. We document several important regularities in software platforms. As in many two-sided industries, one side generally gets a really good deal. Developers get extremely valuable services for nominal cost from almost all software platform makers in almost all industries, but there is a notable exception. The size of software platforms expands exponentially because most makers in most industries add features over time. Less generally, the tendency is for software platforms to start as part of a vertically integrated business that becomes more decentralized over time as markets mature.

Software platforms, working closely with microprocessors in computing devices, have revolutionized many industries since they became commercially important in the 1970s. Looking forward, Web-centric software platforms that work on arrays of servers and that are connected to the Internet are, we believe, likely to produce changes that dwarf the revolution we have seen in the last quarter century. Our invisible engines aren't the whole story of the tectonic industrial shifts that are upon us. But they are a central part of the story, to which we now turn.

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