

American Economic Association

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Source: *The American Economic Review*, Vol. 90, No. 2, Papers and Proceedings of the One Hundred Twelfth Annual Meeting of the American Economic Association (May, 2000), pp. 184-187

Published by: American Economic Association

Stable URL: <http://www.jstor.org/stable/117217>

Accessed: 10/10/2009 14:44

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A Competitive Perspective on Internet Explorer

By STEVEN J. DAVIS AND KEVIN M. MURPHY*

Microsoft's Internet Explorer (IE) technologies are included in Windows at no separate charge. Versions 1 and 2 of IE functioned as add-on features in Windows 95. They were not tightly integrated into Windows and did not make applications programming interfaces available to other software. Over time, IE became increasingly integrated into Windows, sharing code with other Windows features and supplying processing services to other operating-system components and to software applications. In addition to distribution as part of Windows, Microsoft has routinely offered free IE distribution and upgrades through other channels. Microsoft has also compensated internet access providers (IAP's) and internet content providers (ICP's) for their efforts to promote the use and distribution of IE. Despite IE's "no-revenue" track record and assurances of free availability in the future, Microsoft spends large sums developing and promoting IE.

One interpretation of these (and other) facts holds that Microsoft unlawfully "tied" the browsing functionality of IE to Windows 95 and 98 for anticompetitive purposes. This view rests on the premise that a non-Microsoft web browser could evolve into a substitute for Windows or promote potential substitutes. Of course, the emergence of a substitute would erode the profitability of Windows. Hence, according to this view, Microsoft sought to preclude or forestall the emergence of alternative software platforms by tying its own web browser to Windows and by entering into promotional agreements that raise costs for rival web browsers.

As an alternative to this view, we offer a pro-competitive perspective on Microsoft's behavior with respect to IE. Our perspective resonates with several other aspects of Microsoft's

behavior as well. It also carries important implications for the connection between market structure and consumer welfare.

I. Zero-Price Distribution of Internet Explorer

Several factors play a role in the design, pricing, and distribution of IE, but a key factor is the complementary nature of the demand for Windows and the demand for web use. The web has sparked a tremendous upsurge of interest in personal computers (PC's) and PC software. Since every PC requires an operating system, developments that tap the latent demand for web access also increase the demand for Windows. In this regard, lower prices, wider distribution, and better technology for web usage all stimulate the demand for Windows.

It is helpful to develop this logic in the context of a two-good linear demand system: $q_1 = a_1 - b_1p_1 + dp_2$ and $q_2 = a_2 - b_2p_2 + dp_1$, where q and p denote quantities and prices, and the parameters satisfy $a > 0$, $b > 0$, and $0 < d < b_1, b_2$; $d > 0$ corresponds to complementary demand. Also, let c_1 and c_2 denote constant marginal costs of production. This demand system admits explicit analytic solutions for the integrated single-firm market structure and for a two-firm market structure with Cournot or Bertrand competition.

Consider the integrated, single-firm solution. Because of complementary demand, a profit-maximizing firm may price one good below marginal cost. The firm prices good 2 below marginal cost if and only if $a_2 < (a_1d)/b_1$. If the marginal costs are modest, the profit-maximizing outcome can involve a zero or negative price for one good. This outcome is more likely, other things equal, for the good with lower demand as measured by its relative value of a . As an example, for $a_1 = 100$, $a_2 = 20$, $b_1 = b_2 = 1$, $c_1 = c_2 = 10$, and $d = 0.5$, the unconstrained profit-maximizing prices are $p_1 = 65$ and $p_2 = -15$. Here, complementary demand leads the firm to set p_2 below marginal cost to stimulate additional sales of good 1 and,

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so long as marginal cost is not too high, to set p_2 below zero.

In practice, a negative price may or may not exploit complementary demand more effectively than a zero price. If a negative price can be conditioned on actual use, then the firm earns more profits in the example by paying for the distribution or use of good 2. Alternatively, if paying for use is infeasible, there is no point in offering the product at a negative price. Instead, by distributing the product at no charge, the firm maximizes product usage (and any effects of complementary demand) without incurring the additional expense of paying customers to take possession. Taking this observation into account and setting $p_2 = 0$ leads to a profit-maximizing price for the first good of $p_1 = 57.5$.

The example captures three salient aspects of the pricing and distribution of Windows and related Microsoft software. First, an operating system is highly complementary with applications software and web use. Second, marginal costs (of production, distribution, and customer support) are modest for many types of software, so that below-cost pricing can easily involve a zero-price outcome. Third, the demand for Windows is greater than the demand for a particular component or for a separate applications product, which implies that Windows plays the role of good 1 in the numerical example.

This analysis provides a simple explanation for the zero-price bundling of IE with Windows and the promotion and free distribution of IE through other channels.¹ There are no dynamic or strategic considerations in this explanation, just basic price theory. Thus far, we have also ignored any direct technological benefits of integration, as opposed to mere bundling. Instead, the key elements of the explanation are low marginal costs for the bundled feature and complementary demand with Windows.

¹ Benjamin Klein (1999) focuses on ancillary revenues generated by Web portal traffic in his explanation for the zero-price distribution of web browsers. Such revenues are small in Microsoft's case, and they do not figure in our explanation. However, Klein's analysis suggests that the price of browsing software would have gravitated to zero even absent Microsoft's aggressive pricing. Many Internet-based firms have powerful incentives to promote free Web access.

Two additional cost factors reinforce the complementary demand motive for zero-price bundling with Windows. First, bundling (or integration) is more convenient for the consumer than other distribution methods, because it eliminates the time and effort required to obtain and install the zero-price item. Second, bundling is less costly for the software firm. There are no separate distribution costs and no customer support costs related to separate installation. If complementary demand and low marginal costs lead to a negative or zero price, these additional cost factors make bundling or integration the preferred distribution method.

II. Market Structure and Consumer Welfare

Complementary demand across product lines gives Microsoft a stronger incentive than rivals to set low prices, even when it has the same cost structure as rivals and the same degree of market power for particular software products. Whether through zero-price bundling of software features or lower prices on stand-alone products, aggressive pricing to exploit complementary demand raises output, improves economic efficiency, and benefits consumers. In Davis et al. (1999), we develop the analysis for the linear two-good demand system. Given $d > 0$, we show that the integrated, single-firm outcome generates more consumer surplus than the Bertrand or Cournot equilibrium with a separate firm producing each good. Compared to the integrated solution, both prices are higher with Cournot behavior, and at least one price is higher with Bertrand behavior.

Very much in line with this analysis, Microsoft has been a price-cutter in many software application categories including CD encyclopedias, web browsers, personal financial planning, and core business applications. Stan Liebowitz and Stephen Margolis (1999 pp. 154–57) provide systematic evidence. This behavior is a natural consequence of Microsoft's broad software product line, given that distinct categories of software applications are complements in use and, especially, given the strong complementarity between Microsoft's platform products like Windows and its software applications that run on Windows.

This analysis also leads to a simple pro-competitive interpretation of Microsoft's

willingness to spend large sums developing Internet Explorer despite the availability of alternative web browsers. In terms of the model, suppose that two complementary products, OS and WB, are initially developed and marketed by separate firms who behave as Cournot or Bertrand actors. In light of the preceding analysis, the two firms have a strong incentive to merge, and a merger would benefit consumers.

Nevertheless, suppose that merger is not viable, either because other aspects of the two businesses do not mesh well or because of opposition by the antitrust authorities. Instead, the two firms might enter into a subsidy arrangement designed to internalize the demand complementarity. An optimal arrangement would provide for net-of-subsidy prices that replicate the integrated solution. Indeed, many firms enter into mutual promotion agreements that involve cross-subsidies, but these arrangements can run into serious implementation problems. For example, if the OS firm subsidizes the sale of WB, the WB firm may respond by exaggerating its sales or by expanding into market segments that are not especially helpful to the OS firm. In addition, disagreements regarding demand may hamper an effective subsidy arrangement. Most important, the subsidy solution does not confer common ownership and control, which creates problems if the two firms have imperfectly aligned incentives over how to market or develop their respective products. Thus, even with a subsidy arrangement that optimally internalizes the static demand complementarity, each firm has a continuing incentive to bring the two products under common ownership and control.

Consider the issue in the two-good demand system. Rule out cross-firm subsidies and make four particular assumptions. First, the two goods are initially sold by different firms. Second, it is costly for the OS firm to develop its version of WB, but much more costly for the WB firm to develop a version of OS. Third, the demand structure and marginal production costs are such that the profit-maximizing price of WB is zero or negative in the integrated solution. Fourth, the markets for OS and WB are large enough that entry into the WB market is profitable for the OS firm. These assumptions parallel the market situation circa 1994 as it pertains to Microsoft and its Windows operat-

ing system, on the one hand, and Netscape and its Navigator Web Browser, on the other.

Given these assumptions, the OS firm finds it profitable to develop its version of WB despite large development costs. The OS firm then proceeds to give away its version of WB at no charge. It may even pay others to distribute WB or pay consumers to use it. This obviously harms the original WB firm. Indeed, in our stylized model with perfectly substitutable WB products, the OS firm drives the original WB firm out of the market. But consumer surplus and total profits are higher than in the initial two-firm equilibrium.

The "stylized facts" in this analysis parallel important elements of Microsoft's behavior with respect to IE. Microsoft spent large sums developing IE, then proceeded to bundle it with Windows at no charge and aggressively promoted and distributed IE through other channels. Our analysis casts these facts in a pro-consumer, pro-efficiency light. In contrast, the government interprets Microsoft's decision to spend large sums to develop and promote a "zero-revenue" product as clearly "anticompetitive" and "predatory" actions.

The complementary-demand perspective explains Microsoft's large and broad presence in software markets as a natural consequence of its ownership of Windows, the product with the largest development costs and most extensive complementarities. It also explains why Microsoft is the leading supplier of software development tools, and why it intensively cultivates the development of software applications by other firms, even its competitors. Note that Microsoft's incentive to stimulate applications persists even if there is no entry threat in the market for software platforms. Hence, the motive for cultivating applications identified here is distinct from any desire to fortify an "applications barrier to entry."

If the complementary-demand interpretation of Microsoft's product development and pricing behavior is correct, or even an important part of the full story, then Microsoft's broad presence in software markets has highly beneficial effects for consumers and economic efficiency. By the same logic, breaking Microsoft apart so as to separate the software applications division from operating systems and software platforms, as some have suggested, would raise prices, lower

output, and reduce consumer welfare. On top of these static losses, by undermining Microsoft's ability to internalize demand complementarities, a breakup would lessen its incentive to develop new and improved software applications through its own efforts or by subsidizing the efforts of other firms.

III. Direct Benefits of Integration

The foregoing analysis does not explain why Microsoft integrated IE more tightly into Windows over time. We offer brief remarks here and treat the general topic of software integration at some length in Davis et al. (1999).

An important motive for integration was Microsoft's desire to make IE functionality available to other Windows components and to software that runs with Windows. For example, integration made it easy for other software vendors to create specialized browser shells by calling upon the IE functionality built into Windows. The manner of integration is also important. In particular, the "componentized" architecture of IE makes it possible for other software applications to call upon IE functionality in a selective manner that affords greater flexibility to the software developer and is less obtrusive to the computer user. This aspect of IE's internal design was an important factor in Intuit's decision to switch from Navigator to IE as its primary browser for Quicken products. Intuit subsequently distributed five million copies of IE with 1997 versions of Quicken, TurboTax, and QuickBooks. IE's componentized architecture also played an important role in the decision by America Online to switch from Navigator to IE. These examples illustrate some of the consumer benefits of IE integration that enhance the platform value of Windows.

Microsoft's integration path for IE exhibits two important similarities to its behavior in other settings that do not involve allegations of

anticompetitive conduct. First, many stand-alone software features are later integrated into Windows and other commercial software platforms. Disk compression, memory management, and printer drivers are among numerous examples of software features that once stood apart from the operating system but were later integrated. This strong tendency toward integration and expanding functionality is by no means limited to software platforms. Commercially successful word processors now incorporate vastly more features than the word processors of years past. Second, software bundling is often a precursor to software integration. For example, Microsoft's highly successful Office Suite was first marketed as a bundle of compatible software products. Over time, the underlying software code became increasingly integrated, partly to facilitate a more uniform feature set and user interface. Code sharing also reduced software development costs and made it more worthwhile to optimize the design of particular software components.

These brief remarks point to pro-competitive aspects of IE integration into Windows that reinforce the pro-competitive aspects of zero-price *bundling* motivated by complementary demand.

REFERENCES

- Davis, Steven J.; MacCrisken, Jack and Murphy, Kevin M. "The Evolution of the PC Operating System: An Economic Analysis." Unpublished manuscript, University of Chicago, 1999.
- Klein, Benjamin. "Microsoft's Use of Zero Price Bundling to Fight the 'Browser Wars'," in J. A. Eisenach and Thomas M. Lenard, eds., *Competition, innovation and the Microsoft monopoly*. New York: Kluwer, 1999.
- Liebowitz, Stan J. and Margolis, Stephen. *Winners, losers, and Microsoft*. Oakland, CA: Independent Institute, 1999.