

**THE ROLE OF SWITCHING COSTS IN ANTITRUST ANALYSIS:
A COMPARISON OF MICROSOFT AND GOOGLE**

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ABSTRACT

Recently there has been a chorus of competition complaints asserting that Google's conduct and position today is parallel to Microsoft's position in the "Microsoft case," the antitrust case brought by the Department of Justice in 1998. Any monopolization case against Google Search would have to be very different from the Microsoft browser case, because the cost for a user switching from Google Search is much lower than was the cost in the 1990s (or today) of switching away from the Microsoft operating system. It would likewise need to be different because Google has not attempted to manipulate the cost of a user switching away from Google Search, at least not to a significant degree. Low switching costs should and likely will have important implications for antitrust analysis of Google.

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INTRODUCTION

Is Google the new Microsoft? Many think that it is, and in particular there has been a chorus of competition complaints (ironically many originating from Microsoft) that assert that Google's conduct and position today is quite parallel to Microsoft's position in the "Microsoft case," the case brought by the Department of Justice in 1998.¹

We contend in this article, however, that there is a central difference which should remain in constant focus in any antitrust analysis. The cost of a user switching from Google Search to another search engine today is trivial compared to the cost of a user switching from Microsoft Windows to another operating system in 1998. Moreover, in the Microsoft case, the government's theory was that Microsoft was taking strategic actions to maintain high switching costs by maintaining an "applications barrier to entry."² There is no parallel with Google, and the implication as we shall explain is that Google Search, if it poses any threat today, does not pose the same antitrust threat that Microsoft Windows posed in 1998. In this article, we explore the importance of high switching costs in the Microsoft case and in antitrust cases more generally, and we explain the criticality of the absence of significant costs for users switching from Google Search.

The Federal Trade Commission (FTC) recently decided not to bring a monopolization case against Google Search after a 19-month investigation.³ But this is by no means the end of the matter: the European Commission (EC) is "examining proposals put forward by Google to resolve complaints" and expects

¹ According to Gary Reback, for example, "[Google] is Microsoft redux . . . [i]t is almost exactly the same case." Don Clark & Ashby Jones, *Google Probe Stirs Echoes of Microsoft Antitrust Case*, WALL ST. J., June 24, 2011, <http://online.wsj.com/article/SB10001424052702304231204576404181313872882.html>. See also Bianca Bosker, *Google Antitrust Inquiry: Microsoft's History Looms Large*, HUFFINGTON POST (June 23, 2011, 9:48 PM), http://www.huffingtonpost.com/2011/06/23/google-antitrust-inquiry-n_883389.html; Ian Paul, *10 Ways Google is the New Microsoft*, PCWORLD (Feb. 10, 2011, 6:00 PM), http://www.pcworld.com/article/219384/10_ways_google_is_the_new_microsoft.html; James Rowley, *Antitrust Pick Varney Saw Google as Next Microsoft*, BLOOMBERG (Feb. 17, 2009, 6:22 PM), <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aG9B5.J3B11w>.

² *United States v. Microsoft Corp.*, 87 F.Supp. 2d 30, 36 (D.D.C. 2000); see also *United States v. Microsoft Corp.*, 253 F.3d 34, 55 (D.C. Cir. 2001).

³ *Google Agrees to Change Its Business Practices to Resolve FTC Competition Concerns In the Markets for Devices Like Smart Phones, Games and Tablets, and in Online Search*, FED. TRADE COMM'N (Jan. 3, 2013), <http://ftc.gov/opa/2013/01/google.shtm>.

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resolution after the Commission's summer break.⁴ The FTC decision notwithstanding, competitors continue to complain to antitrust authorities and urge them to investigate Google Search for anticompetitive conduct.⁵ On January 30, 2013, the Initiative for a Competitive Online Marketplace (ICOMP), a coalition including Microsoft Corp., submitted a new dossier of allegations to the European Commission.⁶ The most widely reported accusations against Google claim that it biases in favor of its own information or services in search results.⁷

Comparisons between antitrust complaints in the Microsoft case with current (so far non-litigated) complaints against Google Search ignore two fundamental differences related to the switching costs facing users of Microsoft Windows and Google Search. First, Microsoft has dominated operating systems for personal computers for nearly 30 years, mainly because switching costs for users and application developers were and are high—prohibitively high for many. In stark contrast, the costs of users switching among competing search engines is markedly lower, because every Web

⁴ Foo Yun Chee, *EU Sees Google Competition Deal After August*, REUTERS (Feb. 22, 2012, 6:46 PM), <http://in.reuters.com/article/2013/02/22/eu-google-idINDEE91L07Y20130222>.

⁵ See, e.g., Amir Efrati & Brent Kendall, *Google Dodges Antitrust Hit*, WALL ST. J., Jan. 3, 2013, <http://online.wsj.com/article/SB10001424127887323874204578219592520327884.html> (“A Yelp spokesman said . . . that the probe's end ‘represents a deeply disappointing missed opportunity to protect innovation in the Internet economy, and the consumers and businesses that rely upon it.’”).

⁶ Aoife White, *Google Faces New EU Antitrust Complaint from Technology Group*, BLOOMBERG BUS. WK., Feb. 5, 2013, <http://www.businessweek.com/news/2013-02-05/google-faces-new-eu-antitrust-complaint-from-technology-group>.

⁷ See, e.g., Marvin Ammori & Luke Pelican, *Why Search Bias Claims Against Google Don't Hold Up*, FORBES (June 7, 2012, 4:20 PM), <http://www.forbes.com/sites/ciocentral/2012/06/07/why-search-bias-claims-against-google-dont-hold-up/> (“At the heart of the antitrust scrutiny is Google's competitors' claim of ‘search bias.’”); Efrati & Kendall, *supra* note 5, (“TripAdvisor and Expedia referred to comments from FairSearch.org, a group that represented them and other companies opposed to Google.”); see also *The Power of Google: Serving Consumers or Threatening Competition?: Hearing Before the Subcomm. on Antitrust, Competition Policy and Consumer Rights*, 112th Cong. 35-36 (2011) (statement of Jeremy Stoppelman, Co-founder and Chief Executive Officer of Yelp, Inc.), <http://www.gpo.gov/fdsys/pkg/CHRG-112shrg71471/pdf/CHRG-112shrg71471.pdf>; Ian Paul, *Google Faces Anti-Trust Accusers Expedia, Nextag, and Yelp Wednesday*, PCWORLD, (Sept. 21, 2011, 9:31 AM), http://www.pcworld.com/article/240330/google_faces_anti_trust_accusers_expedia_nextag_and_yelp_wednesday.html; Danny Sullivan, *Given Nextag's Lack Of Transparency, Its WSJ Opinion Piece Asking For Google Transparency Isn't Wise*, SEARCHENGINELAND.COM (June 8, 2012, 1:41 PM), <http://searchengine-land.com/given-nextags-lack-of-transparency-its-wsj-opinion-piece-asking-for-google-transparency-isnt-wise-124045>; Shara Tibken, *Yelp CEO: Yep, Google Can Be Pretty Evil*, CNET (Nov. 27, 2012, 2:44 PM), http://news.cnet.com/8301-1023_3-57555084-93/yelp-ceo-yep-google-can-be-pretty-evil.

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browser is more or less equally compatible with competing search engines.⁸ Thus, Google was able to gain high market share at Yahoo's expense with a negligible marketing budget because the cost of users switching from Yahoo search was relatively small and many consumers found Google search superior to Yahoo and other alternatives.⁹

Second, Microsoft was not simply an innocent beneficiary of high switching costs: it made strategic choices¹⁰ to substantially increase switching costs in PC operating systems (Windows), productivity applications (such as Word, Excel, PowerPoint and Outlook), Internet browsers (Internet Explorer), and server operating systems (Exchange Server). In contrast, it is easy for a user to switch away from Google Search, and Google has not acted strategically to substantially increase the inherently low switching costs across search engines. Irrespective of web browser, users can easily change their default search engine setting from one search engine to another, or easily use multiple search engines no matter what their default setting. This article addresses these differences in switching costs and the strategic use of switching costs to explain why Google is quite different from Microsoft from a competition policy perspective.

The relative absence of switching costs (both inherent and strategic) for Google's search users means that Google is subject to market discipline if it provides a worse search experience than other search engines. It provides a strong reason to think that the FTC acted rightly in deciding not to bring a case against Google. It also limits the short run and long run market power that Google has over its users and should provide caution for European antitrust

⁸ Because the Web is an open system, there is no equivalent "applications barrier to entry" in search. It is possible, though, that (1) an operating system could cause one search engine to perform better than another (e.g., Windows 8 advantages Bing over Google) and/or (2) the operating system causes one browser to perform better than another (e.g., Microsoft designs Windows 8 to advantage Internet Explorer over Mozilla Firefox), which could in turn advantage its companion search engine (Internet Explorer & Bing). See, e.g., Loek Essers, *Mozilla Hits Microsoft With Complaint About Windows RT Browser Choices*, PCWORLD (May 10, 2012, 3:50 AM), <http://www.pcworld.com/article/255365>.

⁹ For a concise summary of the rise and fall of the leading search engines over the past 15 years, see Michael L. Katz, *A Guide to Network Effects, Switching Costs, and Competition in Online Search* (2010) (unpublished manuscript) (on file with author). See also Aaron Wall, *History of Search Engines: From 1945 to Google Today*, SEARCH ENGINE HISTORY, <http://www.searchenginehistory.com> (last visited Apr. 1, 2013).

¹⁰ For a discussion of the strategic use of increased switching costs to gain competitive advantage, see MICHAEL E. PORTER, *COMPETITIVE ADVANTAGE: CREATING AND SUSTAINING SUPERIOR PERFORMANCE* 286-88 (1985).

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enforcers investigating Google, as well as a significant hurdle for private plaintiffs.

Accusations that Google unfairly or unreasonably privileges its own information or services in results for users searching for stock data or weather information are very difficult for a court or regulator to usefully arbitrate.¹¹ However, in the absence of switching costs, users can usually defend themselves in a free marketplace, and there are strong incentives to provide better results (as judged by users) than the next kid on the block. In the absence of meaningful switching costs, there should be a high hurdle for those who claim consumer injury.

In Section I, we summarize the economics of switching costs and distinguish the main types of switching costs, including: compatibility costs (and their relationship to network effects), contractual costs, transactions costs, search costs, learning costs, and shopping costs. We provide illustrations of each type of switching cost and explain the interdependencies across types. We also explain the fundamental difference between “inherent” switching costs, those that occur naturally in any given market, and “strategic” switching costs, which are created or elevated by a competitor (or group of competitors) to reduce the incidence of switching.

In Section II, we show that high switching costs—both inherent and strategically created—were central to the government’s browser case against Microsoft.¹² The high cost of buying a new computer (relative to a new operating system) was an important factor in the determination that the relevant market was Intel-compatible operating systems. Second, the “applications barrier to entry” (premised on the extremely high cost of switching to a different operating system) was central to finding that Microsoft had monopoly power. Microsoft’s efforts to increase already high switching costs were likewise central to the

¹¹ There are many complexities both of principle and of practice in arbitrating product decisions of this sort. Part of the problem is that it is not clear what a user wants from a search engine, apart from the revealed choices users make to use one engine instead of another. If Google puts weather data that it has purchased and packaged directly into a search result, this might be viewed by a user as a service, even if a competing weather service would prefer to have their own links there in place of the Google information. Users’ views are bound to be heterogeneous, which compounds the difficulty of a court confidently predicting user views apart from their search engine choices. And, as to the ordering of links in Google search results, if a Google algorithm has selection criteria (other than hardcoding a Google site at the top) that result in high placement for a Google site, it will in most cases be difficult for a court to conclude that the criteria are unreasonable.

¹² For a discussion of the economic issues raised in the United States’ case against Microsoft, see Richard J. Gilbert & Michael L. Katz, *An Economist’s Guide to U.S. v. Microsoft*, 15 J. ECON. PERSP. 25 (2001).

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government's case that Microsoft's behavior was exclusionary. Microsoft's exclusive deals with original equipment manufacturers (OEMs) to install Internet Explorer would have been ineffective had it not been difficult in the mid-1990s for people to download Netscape Navigator. Microsoft's co-mingling of browser and operating system code was a strategic effort to increase switching costs, as were Microsoft's deceptive statements to developers that its version of Java was fully compatible with Sun's Java.¹³

Section II also explains why the importance of switching costs in the Microsoft antitrust case is not anomalous. The effects of high switching costs have played a substantial role in other antitrust cases as well, even though courts have not always used the explicit language of switching costs. We briefly review several important instances in which switching costs were crucial to the competitive analysis and the litigation outcome, including the *Intel* case¹⁴ and the 1992 *Kodak* case.¹⁵

In Section III, we compare and contrast the switching costs for Microsoft Windows users to those of users of Google Search and other generalized search engines.¹⁶ We review the evidence on switching costs in generalized search to show that switching costs are low—markedly lower than those found in PC operating systems and office applications. We also review the many alternatives to generalized search engines (GSEs), including vertical search engines (VSEs) and mobile applications, as well as toolbars, bookmarks, and other methods of facilitating direct access to Websites.

We acknowledge that Google and other generalized search engines typically operate in a “two-sided market,” with users on one side and advertisers on the other. In almost all cases, search engine operators price their service at zero in the first market, and earn revenues from advertisers in the second. This article will not address switching costs in the advertising market. However, it is important to note that success on the advertising side of the market is dependent on success in attracting users and usage. If Google or any other GSE were to reduce the quality of their search results, they would also reduce the attractiveness of their site to advertisers. The lower switching costs are for search users, the easier it is for users to switch search engines and more likely it is

¹³ WILLIAM H. PAGE & JOHN E. LOPATKA, *THE MICROSOFT CASE: ANTITRUST, HIGH TECHNOLOGY, AND CONSUMER WELFARE* 200 (2009).

¹⁴ *Advanced Micro Devices, Inc. v. Intel Corp.*, No. 05-441, 2008 WL 5377979 (D. Del. Dec. 18, 2008).

¹⁵ *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 451 (1992).

¹⁶ For arguments and evidence that switching costs in the online advertising market are low, see Katz, *supra* note 9; Geoffrey A. Manne, & Joshua D. Wright, *Google and the Limits of Antitrust: The Case Against the Antitrust Case Against Google*, 34 HARV. J.L. & PUB. POL'Y 171 (2011).

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that they will switch if they are dissatisfied with search results—for whatever reason.

Finally, we conclude that so long as users can easily switch from Google's search engine—to other GSEs, VSEs, or search alternatives—Google, Inc. will only be successful to the extent that it continues to generate as good as or better search results for users than its competitors. Because of low switching costs, Google search is vulnerable to existing competitors and new entrants to the market in a way that Microsoft's operating system never was. We think this fundamental difference in switching costs is highly relevant to any antitrust analysis of Google and its position or conduct in the market—just as it was in government and private litigation against Microsoft, but with fundamentally different implications.

I. THE ECONOMICS OF SWITCHING COSTS

A. *Switching Costs and Competitive Analysis*

Switching costs are those costs that are incurred when switching from one supplier of a particular good or service to another supplier, including money costs and the value of users' time.¹⁷ Because switching costs sometimes inhibit consumers from switching from supplier A to supplier B, it is common for supplier B to implicitly or explicitly subsidize the cost of switching (e.g., by offering a substantial discount, or by providing free training to new users). "Lock-in" is defined as switching costs that are sufficiently high so that buyers stay with a current supplier rather than switch to a supplier whose product they consider to be preferable (or, alternatively, that the costs of switching suppliers exceed the benefits of switching).

Inherent switching costs are those that arise from the nature of the product(s) or their market. Strategic switching costs reflect choices made by firms designed to create switching costs or increase them above their inherent level. The distinction between inherent and strategic switching costs is fundamentally important to antitrust analysis, particularly to a showing of monopolization or attempts to monopolize.

Although some suppliers find it in their interest to increase switching costs, there can be consequences associated with such

¹⁷ Joseph Farrell & Paul Klempner, *Coordination and Lock-in: Competition With Switching Costs and Network Effects*, in 3 HANDBOOK OF INDUS. ORG. 1967, 1971 (M. Armstrong & R. Porter eds., 2007). In many cases, the value of users' time is the most important component of switching costs; for example, in installing a different PC operating system or converting from Microsoft Office to an online productivity suite.

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activities, because consumers often prefer to buy products or services from suppliers where switching costs are low.¹⁸ Alternatively, some suppliers pursue strategies, often through industry standards,¹⁹ that reduce switching costs to very low levels in order to expand the market by attracting customers with the knowledge that they can “mix-and-match” from various suppliers (a good example of which is audio-video systems).²⁰ In these cases, firms are acting strategically to *lower* switching costs.

There is one important point to note about switching costs: they are not static. An analysis of the competitive effects of switching costs in a given industry should consider how innovation in the industry—as well as the broader economic environment in which it operates—affects switching costs. One of the most important developments in the history of switching costs is the Internet and the emergence of online commerce, often in competition with “brick-and-mortar” in retailing²¹ or the traditional means of distributing media content.²² As we will note in discussing the various types of switching costs, the extraordinarily low costs of search on the Internet and the rise of online services have dramatically lowered search costs, shopping costs, and uncertainty costs.

¹⁸ Many consumers are aware and take account of switching costs in their purchase decisions. So, if suppliers act strategically to raise switching costs from their product to a competitor’s product, consumers may reduce or modify their purchase decisions to avoid those higher switching costs. Thus, suppliers often face a tradeoff between raising switching costs to retain their current customers and lowering switching costs to attract new customers. However, when there are powerful network externalities (e.g., a new user adopts Word or Excel because so many others already use them), this tradeoff is less likely to constrain efforts to raise switching costs.

¹⁹ For example, a number of companies cooperated to develop the Bluetooth wireless communications protocol, which enables users to mix and match equipment and switch from one supplier to another with very low switching costs.

²⁰ For example, a Sony TV can easily be paired with a Toshiba DVD player, which can then be combined with a Bose speaker system. Such devices are designed to work together with few, if any, incompatibilities.

²¹ There is growing evidence that, due to the low cost of search and shopping on the Internet, retail stores often function as “showrooms” in which customers compare products, but then use mobile devices to compare prices and purchase online. For a discussion of this trend, see Laura Heller, *Best Buy Wants You to Stop Using Its Stores as Showrooms*, DEALNEWS (Apr. 12, 2012), <http://dealnews.com/features/Best-Buy-Wants-You-to-Stop-Using-Its-Stores-as-Showrooms/566172.html>.

²² Contrast the high costs of switching between cable and satellite delivery of video programming versus the very low costs of using an existing broadband connection to switch among alternative sources of delivery of video programming via Internet streaming to PCs, TVs, or mobile devices (so-called “over-the-top” delivery).

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B. Types of Switching Costs

In each market, particular types of switching costs frequently play a prominent role, whereas other types usually do not. In some cases, switching costs are tangible and relatively easy to measure (if not precisely quantify). Other switching costs may be more intangible and more difficult to observe, but still play a significant role in consumer choice and competition in the market. Buyers and sellers, therefore, take steps to increase or decrease switching costs for competitive purposes. For example, in the face of high switching costs, sellers often use introductory pricing to attract new customers, effectively paying some or all of the costs of switching.²³ Though there is no standardized categorization of switching costs, the following categories can be useful in analyzing the role of switching costs in market competition.

COMPATIBILITY COSTS: When there are complementary products, purchase decisions about one product can “lock” a consumer into purchasing follow-on products—or at least create costs of switching to an alternate supplier. This situation can arise when consumers purchase durable products and consumable or replacement complements, such as razors and blades or computer printers and ink cartridges. Compatibility costs often play an important role in the computer industry, among hardware components (computer and printer), or between hardware and software.

Compatibility costs are often interconnected with network effects, meaning that adoption of a product by additional users is complementary and, therefore, the benefits of adoption by any single user increases as other consumers adopt. According to Farrell and Klemperer:

Switching costs and network effects bind customers to vendors if products are incompatible, locking customers or even markets in to early choices. Lock-in hinders customers from changing suppliers in response to (predictable or unpredictable) changes in efficiency, and gives vendors lucrative ex post market power – over the same buyer in the case of switching costs (or brand loyalty), or over others with network effects.²⁴

Direct costs are incurred if consumers actually switch or actually adopt incompatible products. Consumers may avoid those costs by not switching, or by buying

²³ Farrell and Klemperer refer to this strategy as “bargain-then-ripoff” pricing. Farrell & Klemperer, *supra* note 17, at 1972.

²⁴ *Id.* at 1970.

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from the same firm, but that ties together transactions and thus often obstructs efficient buyer–seller matching These entry hurdles may be broadly efficient *given* incompatibility, but they nevertheless represent a social cost of incompatibility.²⁵

Thus, strategic choices of compatibility or incompatibility by early entrants can shape the development of the market and make it difficult for later entrants to choose a low switching cost approach. For example, the early strategic choices of Microsoft and Intel ensured the compatibility between MS-DOS (and its successor, Windows OS) and Intel’s x86 CPUs, but had the effect of making applications written for “Wintel” PCs incompatible with Apple’s OS or other operating systems.²⁶ Such systems may be called “proprietary” or “closed.” For that reason, Klemperer argues that “[b]ecause switching costs very often make competition, and especially entry, less effective, I (and many others) favour cautiously pro-compatibility public policy. Policymakers should look particularly carefully at markets where incompatibility is strategically chosen rather than inevitable.”²⁷

The same logic applies to the enforcement of antitrust laws: firms that strategically use incompatibility to raise switching costs should be subject to heightened scrutiny. Alternatively, firms may choose to compete by creating an ecosystem of many compatible products, increasing total demand by facilitating mixing-and-matching components or applications across a wide range of sellers (e.g., audio systems or the Web). Such systems may be called “open” or “non-proprietary.” Firms may develop industry standards to facilitate compatibility and interoperability (e.g., “http” and “html” were crucial to the development of the Internet; 2G, 3G, LTE, and WiFi have facilitated the phenomenal growth of wireless communications).²⁸

Firms may choose a set of strategies that combines both approaches. Apple, for example, has chosen to *open* the development of iPhone and iPad apps to independent, third-party developers. However, Apple has also chosen to *close* the

²⁵ *Id.* at 1972.

²⁶ See *MS-DOS*, WIKIPEDIA, <http://en.wikipedia.org/wiki/MS-DOS> (last visited Apr. 1, 2013) (describing history of MS-DOS).

²⁷ Paul Klemperer, *Switching Costs*, in THE NEW PALGRAVE DICTIONARY OF ECONOMICS (2008), [http://www.dictionaryofeconomics.com/article?id=pde2008_S000460&edition=current&q=switching costs&topicid=&result_number=1](http://www.dictionaryofeconomics.com/article?id=pde2008_S000460&edition=current&q=switching%20costs&topicid=&result_number=1).

²⁸ The use of industry standards to promote competition while achieving interoperability (e.g., mobile communications) creates a substantial lock-in effect if patentees whose claims are standards-essential extract economic rents by committing patent hold-up. See Joseph Farrell et al., *Standard Setting, Patents, and Hold-Up*, 74 ANTITRUST L. J. 603 (2007).

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distribution and sale of those apps to its App Store, and requires approval of the app prior to its sale. The net effect is that there are very high user switching costs from the Apple ecosystem to another ecosystem (e.g., Android), but very low/no switching costs within Apple's ecosystem (e.g., one app to a similar app).²⁹

CONTRACTUAL COSTS: Suppliers often find it advantageous to raise switching costs that might otherwise have been low. Likewise, consumers may accept high switching costs in return for "upfront consideration," reduced uncertainty, or other benefits. To attract new or retain existing customers, and to upgrade their service plans, for example, most mobile carriers subsidize the price of a new smartphone in exchange for a term contract with penalties for early termination. Contracts can also be used to reward loyalty, as in frequent buying from a given vendor: a frequent flyer program is basically a contract between airline and consumer that provides travel awards and other benefits, depending on how many miles the consumer flies on the airline. Contracts can also reward large purchases or purchase commitments with price discounts. Exclusive provisions in contracts can effectively "lock-in" the customer to that supplier for the duration of the contract. Of course, in all these instances, knowing and willing buyers and sellers can realize "gains from trade" by making such commitments to each other. Problems arise, though, when a buyer feels that they have to accept terms from a supplier because they are dependent on that supplier in some way, such as depending on their services or products because of deep discounts. This possibility suggests the importance of examining the competitiveness of the market in which one observes these exclusive contracts or other contract provisions that raise switching costs.

TRANSACTIONS COSTS: Especially in the case of services that are provided on a continuing or subscription basis, customers often incur costs of switching to an alternative supplier. Switching financial service providers, such as checking accounts, credit cards, or investment management, often requires substantial time, effort, and expense. While many financial services providers attempt to make switching accounts easy, most consumers understand that it will be anything but. Recent developments in online financial services may have, in some cases, increased transaction switching costs. This is especially true if consumers have set default values in software that are connected to their current supplier (e.g., Quicken linked to Bank of America), registered credit cards for automatic payments or online purchases

²⁹ Some strategic choices may increase switching costs but have offsetting benefits to consumers (e.g., a higher degree of integration, interoperability and ease of use, as in Apple iPhone/iTunes).

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(e.g., a Bank of America Visa card on an Amazon account), or programmed their checking account to auto-payments to other suppliers (e.g., using a Bank of America account to auto-pay monthly utility bills). The value of users' time required to change these settings and values would constitute a transaction cost of switching an electronic banking account from one financial institution to another.

One important aspect of transaction switching costs is the element of risk. In deciding whether to switch financial institutions, for example, consumers recognize that, even if the benefits exceed the expected costs of switching, there is almost always a risk factor. That is, there is some probability that the actual costs will exceed the expected costs of switching, if, for example, mistakes are made in the switching process—whether by the consumer, the current supplier, or the new supplier. Often, consumers amplify such risks, in that their subjective perception of the risk is higher than an “objective” measurement of that risk. This is perhaps because such mistakes can be so exasperating when they occur. In any case, many consumers would admit to being dissatisfied with their current supplier, but do not switch because the risk-adjusted switching costs are too high.

In software and online services, one important source of transactions costs is the difficulty of moving data or files from one supplier to another (e.g., contact information from one organizer to another or personalized information from one social network to another). Thus, the degree of “data portability” can be an important determinant of switching costs. Another significant potential source of transactions costs is the use of and degree of difficulty in setting or changing “defaults” (e.g., default browser, search engine, or media player).

SEARCH COSTS: In the process of making a choice between continuing to purchase from his or her current supplier or switching to an alternative supplier, consumers must first know or find alternatives. In some cases, alternatives are reasonably well known through advertising or product placement and promotion. In other cases, though, consumers incur the costs of searching for alternatives. In the satisficing³⁰ model of consumer choice, consumers often initiate search for alternatives because they are at least somewhat dissatisfied with their current product or supplier. Two of the most important roles of advertising are directly related

³⁰ Satisficing, a combination of “satisfying” and “sufficing”, refers to a model of decision-making that results in a choice that meets some acceptability requirements even if suboptimal. *See generally* JAMES G. MARCH & HERBERT SIMON, ORGANIZATIONS (1958); HERBERT SIMON, MODELS OF THOUGHT (1979); HERBERT SIMON, *Theories of Decision Making in Economics and Behavioral Science*, 49 AMER. ECON. REV. 253 (1959).

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to search costs. First, advertisers provide free information to potential consumers to reduce their search costs in case they are considering a switch. Second, advertisers attempt to persuade consumers that, whether or not they are dissatisfied with their current choice, there is a superior alternative available to them. Advertising is also used to convey that switching costs are low, or, in cases where there are significant non-search switching costs, that the advertiser will pay some or all of the switching costs.

Whereas consumers incur transaction costs only if they make a switch, they incur search costs before they switch and, therefore, whether or not they ultimately switch. Thus, search costs can substantially affect other switching costs, because consumers conduct searches not merely to identify alternatives, but to obtain information about the costs and benefits of switching. For example, in deciding whether to change a mobile phone supplier, a customer can search for alternative carriers, the quality of service on that carrier's network (reducing uncertainty costs), whether there are lower-priced plans and/or subsidized devices available, and whether there are promotional pricing plans available to cover some or all of the costs of switching from another carrier (e.g., a contract cancellation fee).

LEARNING COSTS: Many goods are not merely "consumed": they require consumers to actively participate in the use of the product in order to gain the benefits of the product. When a consumer uses a new type of product for the first time, they incur a learning cost, but it is not a switching cost. If products of a given type are similar in the way they operate and/or are operated (e.g., microwave ovens), there are little to no learning costs. The more significant the differences are across products, and the longer or more concentrated the effort required to learn how to use a different product, the greater the costs of switching between products. Computer operating systems and enterprise software are the prototypical products with high learning switching costs. Even if it were much easier to initially learn how to use software program A than program B, there could still be high learning costs associated with switching from B to A.

UNCERTAINTY COSTS: When a consumer is purchasing from one supplier, she gains information about the benefits of using that supplier from experience. For products that are difficult to evaluate without such experience (hence the term "experience" goods), the differential between the experience a customer has had with the current supplier and the lack of experience with alternative suppliers can represent a switching cost. Additional uncertainty about the degree of risk in switching exacerbates these uncertainty costs:

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Switching costs also reflect the business risk of changing vendors. Even if additional training and replication costs are minimal . . . uncertainty around how successfully a business will adapt to a new [enterprise software] package . . . can lead executives to be heavily biased towards an existing vendor. This bias is enhanced by “urban legends” of customers’ businesses being harmed after switching software providers.³¹

An increasingly important method of reducing uncertainty costs is the use of consumer ratings and reviews of products in services, made easily available via the Internet. Whereas advertising presents information from the supplier’s point of view, ratings and reviews offer information about the experience of other users, which in many cases may be more relevant and less biased than suppliers’ advertising. The benefits of sharing experience are heightened when consumers have reasons to trust the raters (e.g., Facebook friends) or the ratings (e.g., collaborative filtering on Amazon, Netflix, and others). Thus, the “pooling of experience” among users can reduce uncertainty costs to the point at which consumers are willing to switch (assuming other switching costs are not so high as to prevent it).

If there are no or low switching costs of other types, uncertainty costs are not important: the consumer can try the product of one supplier, then try another and another, and finally choose the product that best suits his or her preferences. However, when other switching costs are high, uncertainty costs can amplify those switching costs. A prominent example of this effect generates the “fatalism effect”: because consumers are uncertain about whether the services of another financial services provider are better than their current supplier, the high transactions cost of making a change prevents them from trying the other supplier to find out. This compounded effect of high transaction and uncertainty switching cost effects mean consumers may not switch even when they are very dissatisfied with their current supplier.

SHOPPING COSTS: Even when consumers know which product they will buy, there are costs related to the buying process - namely, shopping for the products. Whereas compatibility and transaction switching costs cause consumers to buy different, complementary products from the same supplier over time, the existence of shops offering a broad portfolio of brands helps

³¹ Ian Larkin, *Bargains-Then-Ripoffs: Innovation, Pricing and Lock-In in Enterprise Software*, 2008 ACAD. OF MGMT. ANN. MEETING PROCEEDING 1, 7 (Aug. 1, 2008).

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consumers save transaction costs, or “shopping costs.” The switching cost examples mentioned above involved repeat purchases of the same product from the same supplier over time. Instead, shopping costs create incentives to purchase different products from the same supplier at the same point in time.

Some businesses are based on the principle of reducing search and shopping costs. For example, supermarkets offer a broad range of products to reduce the costs of shopping at multiple stores with narrow product lines (e.g., a butcher shop, a fruits and vegetables store, a bakery). Shopping malls offer an aggregation of many specialty stores, but closely situated for ease of access, making it easier for shoppers to identify and compare alternatives before making purchase decisions. In other lines of business, one observes the “Hotelling effect”³² in independent locational decisions by suppliers, which also have the effect of reducing search and shopping costs (e.g., auto rows, or collections of specialty food stores).

Having described the types of switching costs, we now turn to a discussion of their relevance to the Microsoft browser case and other antitrust cases.

II. THE CENTRALITY OF HIGH SWITCHING COSTS, INHERENT AND STRATEGIC, TO THE MICROSOFT BROWSER CASE AND OTHER ANTITRUST CASES

Microsoft has dominated personal computer operating systems for over three decades. This feat is partly explained by the quality of Microsoft's products, which have continuously improved during that time. It is also explained by the sizable switching costs that users incur if they switch to another operating system. These switching costs played a central role in the United States government's monopolization case against Microsoft, though the term “switching costs” was rarely used explicitly.³³

Microsoft has been protected from competition by at least three of the types of switching costs discussed above: compatibility costs, transaction costs, and learning costs. Compatibility costs played a particularly central role in *Microsoft*. In particular, users

³² Named for the economist Harold Hotelling, the Hotelling effect explains why businesses selling relatively homogeneous goods have an incentive to locate themselves almost adjacent to each other to prevent the other firms from claiming a larger share of the market. See Harold Hotelling, *Stability in Competition*, 39 ECON. J. 41, 41–57 (1929).

³³ United States v. Microsoft Corp., 253 F.3d 34 (D.C. Cir. 2001). Switching costs also played an important role in the European Commission's case against Microsoft. Its 2004 order found that Microsoft had vertically leveraged control from its operating system to media viewers and interface standards between PCs and servers. See Farrell & Klemperer, *supra* note 17, at 2011.

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of Microsoft Windows enjoyed its compatibility with a vast array of applications designed specifically to work with Windows. Because these Windows applications would not work with other operating systems (unless the applications were rewritten for them), users who switched from the Windows operating system suffered a large compatibility switching cost. What the Department of Justice (DOJ), the district court, and the D.C. Circuit came to call “the applications barrier to entry” expresses the idea that it is difficult for a rival operating system to attract users when users who switch from Windows will bear a large compatibility switching cost.³⁴

As we explain below, switching costs played a central role in the market definition in *Microsoft*. Switching costs were also instrumental to the DOJ’s proof that Microsoft had monopoly power and to the government’s basic narrative about Microsoft’s wrongful conduct.³⁵

A. *Switching Costs were Key to the Government Showing that Microsoft had Monopoly Power*

The DOJ successfully proved in *Microsoft* that the relevant market was Intel-compatible PC operating systems. The district court and D.C. Circuit viewed the Macintosh operating system (Mac OS) as outside of the market because

][C]ustomers would not switch from Windows to a Mac OS in response to a substantial price increase because of the costs of acquiring the new hardware needed to run Mac OS (an Apple computer and peripherals) and compatible software applications, as well as because of the effort involved to learning the new system and transferring files to its format.³⁶

These formidable switching costs could easily tally several thousand dollars even for customers with a modest cost of time, so it is understandable that the district court and D.C. Circuit excluded the Mac operating system from the relevant market definition.

After defining the market, the DOJ needed to prove Microsoft’s monopoly power and, as one would expect, switching costs again played a starring role. Microsoft’s share of Intel-compatible operating systems exceeded 95%, but a high share does

³⁴ See, e.g., *Microsoft*, 253 F.3d at 55; *United States v. Microsoft Corp.*, 87 F.Supp.2d 30, 36 (D.D.C. 2000).

³⁵ *Microsoft*, 253 F.3d at 60.

³⁶ *Id.* at 52.

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not alone prove that a firm has monopoly power. If entry is sufficiently easy and switching costs are low, the threat of entry can constrain a firm's prices to competitive levels. Switching costs were the cornerstone of the DOJ's case: the government argued that the applications barrier to entry—an important form of compatibility switching cost—was substantial and gave Microsoft its monopoly power.

Let us consider the relationship between the applications barrier to entry and switching costs. With Windows, consumers had access to more than 70,000 applications.³⁷ Most of these applications were not available on other operating systems because porting (i.e., “switching”) them to other systems was too costly. Moreover, while Microsoft was correct to point out that a user only wants a small fraction of these applications and might be entirely satisfied by those on a rival operating system like Mac OS, the user will find it costly to switch operating systems later when a new need emerges. Accordingly, investing in a rival operating system with a thinner pool of applications is risky and potentially costly.

B. Microsoft Acted Anticompetitively to Increase, Maintain, and Exploit High Switching Costs

As we have seen, the Microsoft operating system monopoly was protected by an applications barrier to entry. From the consumer perspective, this barrier represented a cost to users who switched away from Windows. From the perspective of an applications developer, it resulted from the high cost of porting Windows code to non-Windows operating systems. Microsoft was naturally concerned about anything that would—or had the potential to—erode an application's barrier to entry. That is exactly what the non-Microsoft browser Netscape threatened to do.

Cloud computing was in its infancy in the 1990s. Still, Netscape's threat to Microsoft's operating system monopoly was apparent. Netscape exposed application program interfaces (APIs)³⁸ that allowed software on distant servers to compute and communicate results in useful ways with a user's personal computer. Many of these APIs were part of the Java virtual machine (JVM)³⁹ that came with every installation of Netscape.

³⁷ *Id.* at 56.

³⁸ An API is a protocol or library that includes the structure and details used to operate a piece of software or coding language.

³⁹ JVM is a Sun Microsystems program designed to execute other programs composed in Java bytecode.

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Sun's slogan for Java was “Write Once, Run Everywhere.”⁴⁰ Sun's idea was that the JVM (like the Navigator APIs) would be the same across different operating systems so that a program written to call Java's APIs could be used on any system with low or no switching costs. Because Netscape and the JVM were being made available across most operating systems—not just Windows—they had the potential to commoditize the operating system if a sufficient mass of useful programs were written to use the Netscape or JVM APIs.

Netscape thus threatened to erode (or in Sun's dreams and Microsoft's nightmares, obliterate) the applications barrier to entry, opening all operating systems to compete on their intrinsic merits as opposed to the merits derived from the array of programs written for them. Moreover, if Java and Netscape-based applications worked across operating systems, users would not become locked into Microsoft's operating system by learning applications unavailable elsewhere or by investing in non-portable data. Since Microsoft in many ways created and exploited the switching costs inherent in the applications barrier to entry, it could not afford to risk Netscape becoming ubiquitous. Paul Maritz, a Microsoft executive, said that Internet Explorer would allow Microsoft to “cut off Netscape's air supply.”⁴¹

To be brief, the problem from Microsoft's vantage was that Netscape Navigator and the Java virtual machine that came with it threatened to *lower switching costs* for consumers who changed operating systems. Netscape Navigator and Java were written for multiple operating systems, and if they became sufficiently popular, then “developers could rely upon the APIs exposed by such middleware” to cheaply port programs to other operating systems.⁴² Microsoft's basic strategy was to make sure that as many users as possible received Microsoft's browser, Internet Explorer (IE), as their default browser and to make switching away from IE as difficult as possible. This would maintain the incompatibility of applications (and Microsoft's application advantage) so that it would be costly for users to switch away from Windows.

Microsoft orchestrated a thorough campaign intended to promote Internet Explorer and limit Netscape's market penetration. It did so by strategically raising contractual, transactional, and

⁴⁰ For a discussion of “Write Once, Run Anywhere,” see Nick Langley, *Write Once, Run Anywhere?*, COMPUTERWEEKLY.COM (May 2002), <http://www.computerweekly.com/feature/Write-once-run-anywhere>.

⁴¹ Plaintiffs' Joint Proposed Findings of Fact at 91.3.1, *United States v. Microsoft Corp.*, 87 F. Supp. 2d 30 (D.D.C. 2000) (No. 98-1232).

⁴² PHILIP AREEDA, LOUIS KAPLOW & AARON EDLIN, *ANTITRUST ANALYSIS* ¶ 403 (7th ed. 2013) (forthcoming August 2013).

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uncertainty switching costs. It started by signing up deals with computer manufacturers (OEMs), Internet service providers, and Apple to install IE and not Netscape. Later, Microsoft decided to “weld IE to Windows,” intermingling browser and operating system code, and not allowing the “Add/Remove program” utility to uninstall IE.⁴³ Finally, Microsoft “took steps ‘to maximize the difficulty with which applications written in Java could be ported from Windows to other platforms, and vice versa.’”⁴⁴ In some internal documents Microsoft called the incompatible version of Java it developed “polluted” Java and at least one Microsoft document stated as a strategic goal: “Kill cross-platform Java by grow[ing] the polluted Java market.”⁴⁵ At the same time, Microsoft deceived developers, leading them to believe that its “polluted” Java was pure and that their applications would be portable to other operating systems.⁴⁶

Overall, Microsoft's browser wars were an effort to maintain high switching costs among operating systems by maintaining the applications barrier to entry. Switching costs also played an important role in the means Microsoft chose to achieve this end, as Microsoft made it difficult and costly to switch to Netscape from Internet Explorer by designing “Windows 98, ‘so that using [Netscape] on Windows 98 would have unpleasant consequences for users’”⁴⁷ and by excluding Netscape from the cheapest and easiest distribution channels such as major Internet service providers (like AOL) and computer manufacturers (like Dell), so that users in many cases needed to download Netscape over what were then extremely slow telephone modems.⁴⁸

C. Role of Switching Costs Elsewhere in Antitrust Case Law

The central role of switching costs in the Microsoft antitrust case is no anomaly. Antitrust cases often revolve around switching costs (even when the term “switching costs” is not explicit in court opinions). One reason is that high switching costs may lead to a narrow market definition and a finding of high defendant market shares. Switching costs also lead to barriers to entry and barriers to expansion for rivals. The combination of high defendant market share and rivals suffering from barriers to entry

⁴³ United States v. Microsoft Corp., 253 F.3d 34, 64 (D.C. Cir. 2001).

⁴⁴ *Id.* at 74.

⁴⁵ *Id.* at 76-77.

⁴⁶ *Id.* at 76.

⁴⁷ United States v. Microsoft Corp., 253 F.3d 34, 65 (D.C. Cir. 2001) (quoting United States v. Microsoft Corp., 84 F.Supp.2d 9, 52 (D.D.C 1999)).

⁴⁸ United States v. Microsoft Corp., 84 F.Supp.2d 9, 47, 60 (D.D.C 1999).

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and expansion will frequently lead to a finding of market power. Finally, the alleged exclusionary conduct in an antitrust case often involves efforts to strategically raise switching costs.⁴⁹ On the other hand, an absence of switching costs provides an antitrust defendant with strong arguments that consumers will not suffer a price increase above competitive levels, and that entrants with superior offerings will attract customers.

1. Role of Switching Costs in Narrowing Market Definition

A variety of aftermarket cases have used switching costs to justify narrow one-brand markets.⁵⁰ The first such case was *Kodak*.⁵¹ In *Kodak*, there was ample competition among different brands of photocopiers, but independent service organization plaintiffs who serviced Kodak equipment successfully alleged that parts and services for Kodak copiers was a relevant product market. The key to the case was that once the customers purchased or leased long-term a Kodak machine, there was a high transaction cost of switching away from Kodak, because a customer would need to take a significant loss to sell the Kodak machine (or cancel the lease) and buy or lease another brand.⁵² Moreover, because Kodak had changed policies midstream and stopped supplying parts to independent service operators, even intense ex-ante competition at the time of the photocopier sale would not necessarily have ameliorated all potential problems.⁵³

Other aftermarket cases that have followed in the wake of *Kodak* and used switching costs to define narrow markets include *Newcal Industries v. Ikon* and *In re Apple & AT & TM*. In *Newcal*, the cost of breaching a long-term equipment lease was a sufficiently high switching cost to justify a narrow market definition.⁵⁴ With *Apple & AT&T*, the switching cost was the sizable cost of buying a new phone if a customer wanted to leave AT&T after the initial two-year agreement.⁵⁵

⁴⁹ See Farrell & Klemperer, *supra* note 17, at 1976.

⁵⁰ Aftermarkets are markets for parts and services that go with a durable good. Thus the toner market is an aftermarket for printers; auto repair is an aftermarket for automobiles.

⁵¹ *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 451 (1992).

⁵² *Id.* at 462-80.

⁵³ The other reason that ex-ante competition might not ameliorate problems was the possibility that too few customers would engage in life-cycle pricing.

⁵⁴ *Newcal Indus., Inc. v. IKON Office Solution*, 513 F.3d 1038 (9th Cir. 2008).

⁵⁵ *In re Apple & AT & TM Antitrust Litigation*, 596 F.Supp.2d 1288 (N.D. Cal. 2008).

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2. *Role of Switching Costs in Assessing Market Power*

In all of the above cases, as in *Microsoft*, the presence of high switching costs led courts to define a market narrowly. If a market is sufficiently narrow then a defendant will tend to have a high market share, which can be used to justify an inference of market power.

Of course, high market share does not necessarily imply market power. If expansion of the remaining suppliers or new entry is easy, then even a firm with high market share may have limited power to raise prices. Here again, switching costs play an important role. High switching costs will limit new entry and impede the expansion of rivals, so that a firm with high market share can profitably raise prices. High switching costs thus make the connection between high market share and market power more convincing. In the *Microsoft* case, the high switching costs of porting applications or data created the entry barriers, which were critical in proving Microsoft's monopoly power.

3. *Role of Switching Costs in Exclusionary Conduct*

Switching costs were also critical to proving anticompetitive conduct by Microsoft. In particular, Microsoft's efforts to strategically raise switching costs became the foundation of the government's monopolization claim. This role of switching costs was also not unique to Microsoft. The importance of strategically imposed switching costs in antitrust is at least as old as *United Shoe*.⁵⁶ Judge Wyzanski found that United, instead of competing on merits, chose contractual lease terms that "created barriers to entry by competitors." These barriers can largely be understood as creating high contractual switching costs. In Judge Wyzanski's words:

[T]he complex of obligations and rights accruing under United's leasing system in operation deter a shoe manufacturer from disposing of a United machine and acquiring a competitor's machine. He is deterred more than if he owned that same United machine, or if he held it on a short lease carrying simple rental provisions and a reasonable charge for cancelation before the end of the term. The lessee is now held closely to United by the combined effect of the 10 year term, the requirement that if he has work available he must use the machine to full capacity

⁵⁶ *United States v. United Shoe Machinery*, 110 F.Supp. 295 (D. Mass. 1953), *aff'd per curiam*, 347 U.S. 521 (1954).

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and by the return charge which can in practice . . . be reduced to insignificance if he keeps this and other United machines to the end of the periods for which he leased them.⁵⁷

Another string of recent “switching cost” cases involve alleged attempts to embed patented technologies in industry standards (Dell,⁵⁸ Rambus,⁵⁹ and Broadcom⁶⁰) without would-be infringers knowing about the patent or falsely claiming that the patent would be licensed under fair reasonable and nondiscriminatory (“FRAND”) terms. The potential problem in these cases is that the plaintiff can postpone negotiation over license fees until a time when the costs of switching to a rival technology are prohibitively high (hence the term “patent ambush”). Thus, for example, after receiving a patent in 1991 on a “mechanical slot configuration used on the motherboard to receive the VL-bus card,” Dell joined the Video Electronics Standards Association (“VESA”).⁶¹ Dell representatives were members of VESA's Local Bus Committee, which approved the VL-bus design standard. Dell represented that the VL-bus proposal did not infringe any Dell patents, but after adoption of the standard was widespread, attempted to enforce its patent rights.⁶²

There are a couple of types of switching costs relevant to these patent ambush cases. The first is a transaction cost - namely, the cost of organizing industry players to create a standard that does not rely on the patents at issue. If it were trivial to redo the standard and exclude the patent in question, then the patent holder could not extract unreasonably high prices even after inclusion in the standard. Standard setting, however, is an involved and time-consuming practice, and standards, once set, are not easily redone, not only because it can take years of meetings to select a standard, but also because a variety of firms invest in producing products compatible with the standard.⁶³

⁵⁷ *Id.* at 340.

⁵⁸ Consent Order, Etc., in Regard to Alleged Violation of Sec. 5 of the Federal Trade Commission Act, *In re Dell Computer Corp.*, 121 F.T.C. 616 (1996) (No. C-3658), 1996 WL 33412055 [hereinafter *Dell Consent Order*].

⁵⁹ Order Denying Motion for Stay, *In re Rambus, Inc.*, (No. 9302), 2002 WL 1729621 (2002).

⁶⁰ *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297 (3d Cir. 2007).

⁶¹ *Dell Computer Settles FTC Charges; Won't Enforce Patent Rights For Widely Used Computer Feature*, FED. TRADE COMM'N (Nov. 2, 1995), <http://www.ftc.gov/opa/1995/11/dell.shtm>.

⁶² *Dell Consent Order*, *supra* note 58, at 617.

⁶³ For more discussion of these patent ambush cases, see AREEDA, KAPLOW & EDLIN, *supra* note 42, at ¶ 340.

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A second type of switching cost (which is a reason that standards are sticky) is the fact that many firms will frequently make irreversible investments in designing products that are compatible and complementary with the patented technology once it is part of a standard.⁶⁴ The point of having standards, after all, is exactly this sort of coordination (electrical plugs fitting in outlets, for example). Because these switching costs are large, antitrust courts have a significant interest in making sure that anticompetitive conduct does not allow firms to attain and exercise market power through standard setting.

A final line of cases involving switching costs concerns loyalty pricing arrangements, or bundled discounts, of firms like 3M⁶⁵ and Intel.⁶⁶ Loyalty pricing arrangements can be understood as the strategic creation of, or increase in, contractual switching costs. Both 3M and Intel sold a line of products and gave a discount across the whole line if purchasing targets were achieved by a purchaser. The court in *3M* quotes the Areeda and Hovenkamp treatise to the effect that “the defendant rewards the customer for [continuing to buy] its product B rather than the plaintiff’s B, not because defendant’s B is better or even cheaper, but because the customer does not want to lose a discount on A, which the plaintiff does not produce.”⁶⁷ The lost discount on A is a cost of switching from defendant’s B to plaintiff’s B. Whether and when the imposition of such a switching cost is anticompetitive is of course a subject of controversy,⁶⁸ but the fundamental antitrust complaint can be seen as an allegation that strategically created switching costs prevents rivals from entering or expanding.

III. A COMPARISON OF SWITCHING COSTS: MICROSOFT
WINDOWS VS. GOOGLE SEARCH

The basic premises of this article are that (1) the analysis of switching costs are critical to antitrust policy and enforcement and (2) the enormous difference in switching costs between Microsoft Windows (high) and Google Search (low) is fundamental to any comparison of the two companies with respect to claims of monopolization or attempts to monopolize. In this section, we first compare the switching costs of Microsoft and Google by each

⁶⁴ Farrell et al., *supra* note 28, at 607-09.

⁶⁵ *LePage’s Inc. v. 3M*, 324 F.3d 141 (3rd Cir. 2003).

⁶⁶ *Advanced Micro Devices, Inc. v. Intel Corp.*, No. 05-441, 2008 WL 5377979 (D. Del. Dec. 18, 2008).

⁶⁷ *LePage’s Inc.*, 324 F.3d at 155 (quoting PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* ¶794, at 83 (2002 Supp.)).

⁶⁸ See Jonathon M. Jacobson, *A Note on Loyalty Discounts*, *THE ANTITRUST SOURCE*, June 2010, at 1-10.

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type. We also present a brief review of empirical evidence and studies regarding the switching costs of search—first among generalized search engines, then between generalized search and vertical search, and finally among other means of finding information on the Internet, which in our framework are all competitive constraints on generalized search engines.

A. Comparison by Types of Switching Costs

Compatibility Costs: The substantial differences in switching costs between Microsoft Windows and Google Search arise from a fundamental difference: whereas the Windows operating system *is* a proprietary platform, Google Search runs *on* an open platform—the Internet. A personal computer (or mobile device) typically runs a single operating system that is compatible with the CPU; in turn the operating system can run many different applications, so long as they are compatible with the operating system.⁶⁹ Thus, the fact that applications are compatible with Windows but incompatible with other operating systems such as Linux or Mac OS creates very large switching costs.⁷⁰ So high are those switching costs that most users are reluctant to switch to an alternative operating system,⁷¹ at least until they decide to buy a new computer.⁷² This fact was even more true at the time of the Microsoft browser case, when Linux was in its infancy and cloud computing did not yet exist.

Google Search—and other forms of Internet search and discovery—run on the open Internet platform, i.e. the World Wide Web. Typically, Google and other generalized search engines

⁶⁹ There are limited instances in which a computer can be partitioned to run two different operating systems (e.g., a Mac can run Mac OS and Windows), but most users do not have the technical sophistication to do so and, in this case, there is the additional expense of purchasing two operating systems.

⁷⁰ If Microsoft had instead promoted an open system that allowed for cross-platform compatibility, it is highly likely that these competing operating systems would have been much more successful in gaining market share. In other words, Windows is not a “natural monopoly.”

⁷¹ Jung Suk Hyun & Jae H. Pae, *The Role of Switching Costs in Technology Commitment: the Case of High Technology Market*, 6 ASIA PAC. ADVANCES IN CONSUMER RES. 303 (2005); Seung-Hyun Hong & Leonardo Rezende, *Network Effects, Switching Costs, and Underlying Preferences in Operating Systems for Servers: A Case of Linux vs. Windows* (Networks, Elec. Commerce, and Telecomm. Inst.. Working Paper No. 06-12, 2006).

⁷² Because of incompatibility of applications across platforms, we typically observe “uni-homing” in computer operating systems, at least on any given device. Of course many users have multiple devices, each with a different operating system (e.g., a Windows PC, an iOS iPhone, and an Android tablet). It is rare, though, for users to change the operating system on any given device; indeed, in many cases it would be very difficult or impossible to do so.

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attract users by offering free search services (“native” or “organic” search results) and charge advertisers whenever users click-through on “sponsored” search results.⁷³ However, in contrast to Windows, any computer or mobile device using any operating system and any Web browser can reach any search engine once the computer is connected to the Web. Thus, for the user side of search, *the Web is the platform*: an open system that promotes interconnectivity and interoperability through a set of industry standards, such as hypertext transfer protocol (HTTP) and hypertext markup language (HTML). The Web is the ultimate compatibility platform; indeed, the extraordinarily high level of compatibility largely accounts for the explosive growth of the Internet.⁷⁴

Thus, while any given user typically has one and only one operating system per computer, any user can access an unlimited number of websites and can reach those websites through an unlimited number of paths by searching on a generalized or specialized search engine, by entering a Web address manually, or by clicking on a bookmark or a link from another website or an email. The more actively a consumer uses the Internet, the more likely they are to have learned the many different means of getting the information they seek and getting where they want to go on the Internet.

Contractual Costs: When a user purchases an operating system, they are effectively entering into a contract for the right to use that operating system (as embodied in a license agreement). Typically, consumers buy an operating system that is pre-installed on the computer they are purchasing. Microsoft enters into contracts with computer OEMs to pre-install Windows and Windows applications (e.g., Office, Internet Explorer) on the machines they sell. As noted in Section C, Microsoft used those contracts to disadvantage or exclude competitors of applications (such as the Netscape Navigator browser). Once a user has a computer with pre-installed Windows/Office, he or she can buy upgraded versions of those programs at prices that are discounted from the prices a new user would pay.

While OEMs may also have contracts to set Bing or Google as the default search engine on a computer or smartphone,⁷⁵

⁷³ See *Advertise Your Business on Google*, GOOGLE, <http://www.google.com/ads/adwords2/> (last visited Apr. 1, 2013) for an overview of Google’s AdWords search advertising service.

⁷⁴ Because the Web is an open system, we typically observe “multi-homing” in search, as consumers use a number of different search methods, including one or more generalized search engines, vertical search engines, mobile applications, and others.

⁷⁵ For an overview of the discussion to switch the default search engine from Google to Bing on Apple’s mobile devices, see Ian Paul, *Bing to Become the*

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changing the default setting to a different search engine requires only a few simple steps.⁷⁶ For that reason, default search engine contracts with OEMs do not generate significant switching costs. In contrast, Microsoft's Windows/Office contracts with OEMs generated substantial switching costs because of the difficulty and complexity of changing the operating system on a personal computer. Moreover, the use of a search engine requires no license agreement between the user and the supplier. Just as there is no need to buy the right to use a search engine, there is no need to buy upgrades. Rather, search engines are continuously upgraded and improved, at no cost to users.

Transaction Costs: If a user were to switch from Windows to a different operating system, she would also have to replace most or all of her applications programs, since Office and other Windows-compatible programs are not compatible with other operating systems. Likewise, in many cases, documents, files, or content created with Windows applications would at minimum need to be converted to different formats to be useable with those newly purchased applications. In the worst cases, the formats are not only incompatible: there are no practical means of converting them. For these reasons, the transactions costs of switching away from Windows/Office are extraordinarily high, which is why many of us continue to use Windows/Office.

It should be noted, though, that these transaction costs may be lowered by technological change, as competition for the market provides incentive for sellers to reduce the switching costs of proprietary systems and/or offer a competing open system. Likewise, Cloud-based Google Docs is becoming a significant competitor to Microsoft Office.⁷⁷

iPhone's Default Search Engine?, PCWORLD (Jan. 20, 2010, 5:25 AM), http://www.pcwORLD.com/article/187261/bing_to_become_the_iphones_default_search_engine.html. Similarly, HP reached a deal with Microsoft to set Bing as the default search engine on HP devices. Nathania Johnson, *Bing to Be the Default Search Engine on HP Devices*, SEARCH ENGINE WATCH (Jan. 7, 2010), <http://searchenginewatch.com/article/2051356/Bing-to-Be-Default-Search-Engine-on-HP-Devices>.

⁷⁶ Changing the default search engine is a straightforward process on Android devices and other similar devices. The steps required on an AT&T Samsung Galaxy Note, for example, are as follows: 1) open web browser, 2) go to the browser's "Settings," 3) scroll through the list to "Select Search Engine," and 4) choose from available options. Zedomax, *How to Change Default Search Engine on Android Browser! - [AndroidDummies]*, YOUTUBE (Mar. 20, 2012), <http://www.youtube.com/watch?v=4SF1Q8YSpU>.

⁷⁷ See Brandon Widder, *Best Free Microsoft Office Alternatives*, DIGITAL TRENDS (Apr. 19, 2013), <http://www.digitaltrends.com/computing/best-microsoft-office-alternatives/> (stating that several free open-source products are challenging Microsoft's dominance of office software, including Google Docs).

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Across search engines, there are virtually zero transactions switching costs. As we will detail in the next sub-section, users not only frequently switch search engines *between* search sessions, they often switch *during* a search session. And switching is bi-directional: it is as costless to switch from Google to Bing as it is from Bing to Google. Likewise, users can easily change default settings for search, and just as easily change them back again. To coin a term, “switch-back costs” are low. In contrast, the high transactions costs of switching back to Windows/Office, after switching to Mac OS, would essentially be the same, which amplifies the effects of learning (or “re-learning” after not using an operating system for some time and returning to it only to find that the latest version has changed) and uncertainty costs in making the decision to switch in the first place.

Search Costs: Switching from one computer operating system to another—e.g. from Windows to Linux—first requires searching for alternative operating systems that are compatible with the hardware at hand. Additionally, switching from one OS to another requires switching applications programs and/or files that were created with those programs. Thus, there are substantial search costs for users to identify alternative operating systems and determine whether their current applications programs and files will be compatible with an alternate operating system. In contrast, there are minimal, if any, search costs for finding other search engines, partly because consumers can use a search engine to search for alternatives.⁷⁸ Indeed, even when users are not explicitly looking for other search engines, their search engines often return links to other search engine results.⁷⁹ If the user finds those other search engines helpful, it is a simple matter to bookmark them or install an app for direct access in future uses.

Learning Costs: Due to substantial differences in user interfaces, instruction sets, and capabilities of operating systems and application programs, there are substantial learning costs associated with switching from Windows/Office to competing systems. Moreover, the longer someone has used Windows/Office, the higher those learning costs become. Users are well aware of these learning costs, which therefore represent a very high hurdle to switching. Indeed, there are high learning costs of switching

⁷⁸ For example, a Bing search on “search engine” returns many results, including individual search engines and guides to or reviews of search engines. A Query for Search Engine, BING, <http://www.bing.com> (search for “search engine”) (last visited Apr. 1, 2013).

⁷⁹ For example, a Google search on “restaurants Berkeley” generates many individual restaurants, e.g., Chez Panisse, but two of the first native results are the vertical search engines Urbanspoon and Yelp. A Query for Berkeley Restaurants, GOOGLE, <http://www.google.com> (search for “restaurants Berkeley”) (last visited Apr. 1, 2013).

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from the Windows version of Office products to the Mac OS version, due to dramatic differences in user interfaces, toolbars, and command structure.

In contrast, there are little or no learning costs associated with the use of search engines, general or vertical. While there are many slight differences in user interface or presentation of results, most users can begin using a new or different search engine almost immediately: as there is no learning curve, there are no switching costs.

Uncertainty Costs: There are several different uncertainty costs associated with switching from Windows/Office. Included among these are not knowing whether or not applications will be available for the alternate operating system; whether files will be convertible into a format that is compatible with the new applications; and, not least, whether—once the user has learned how to use the new operating system and applications—she will actually find it preferable to Windows/Office. Many of these costs are inherent switching costs, but some may be strategic. Competitors have frequently complained of Microsoft's efforts to increase uncertainty switching costs by spreading fear, uncertainty, and doubt ("FUD") about competitors' products.⁸⁰

By comparison, there are low uncertainty costs of switching search engines. As the evidence will show, users do care about the quality of results they obtain. Therefore, uncertainty about whether an alternative search engine may or may not present better results could represent a switching cost. However, given how low all of the other types of switching costs are, it is very easy for users to try an alternative engine to see whether it produces the desired results (which, needless to say, vary significantly from user to user). A user can simply open two browser windows or tabs to compare search results side-by-side in different search engines.⁸¹ Indeed, Microsoft is currently running a "Bing It On" challenge,

⁸⁰ For an overview of FUD related to Microsoft, see Eric S. Raymond, *Why Microsoft Smears—and Fears—Open Source*, IEEE SPECTRUM 14 (Aug. 2001); and Nicholas Petreley, *The Microsoft FUD Campaign vs. the Customer*, LINUX J. (May 16, 2007), <http://www.linuxjournal.com/content/microsoft-fud-campaign-vs-customer>. For a more recent FUD case involving Apple and iPhone "jailbreaking," see David Kravets, *iPhone Jailbreaking Could Crash Cellphone Towers, Apple Claims*, WIRED (July 28, 2009, 4:18 PM), <http://www.wired.com/threatlevel/2009/07/jailbreak>.

⁸¹ Indeed, using Blekko, users can compare search results of Blekko, Bing, and Google in three side-by-side columns. 3 *Engine Monte*, BLEKKO, <http://blekko.com/ws/+/monte> (last visited Apr. 1, 2013).

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encouraging users to compare Bing and Google results side-by-side.⁸²

These low switching costs explain why most users actually use more than one search engine, typically a combination of a default generalized search engine, other GSEs, and a stable of vertical or specialized search engines for particular purposes (e.g., travel booking, product review, product purchasing, people finding, etc.).

Shopping Costs: Even if a consumer is buying a new computer based on the Windows operating system, there are shopping costs involved. However, by our definition, those are not switching costs.⁸³ Rather, the shopping costs of switching are only those additional shopping costs associated with changing from Windows-based computer to an alternative (e.g., a Mac or a Chromebook). Those additional costs include the costs of finding that combination of hardware and software that will replace the consumer's current setup, as well as the costs of finding software or other methods of converting files from the current operating system and applications to the new.

If there are any shopping costs to switching among alternative, typically free, search engines, they are close to zero. Indeed, one important use of search engines is finding other search engines, whether in the organic or sponsored results. The Web is the ultimate "department store," with a practically infinite number of "departments," all located conveniently on the user's computer or mobile device, all reachable by many different means.

B. Evidence of Switching Across Generalized Search Engines (GSEs)

As a general proposition, the more often a user searches for particular types of information, the more likely the user has developed a preference for a special purpose website and goes "straight there" through recall, bookmarks, or apps. Thus, not surprisingly, the data show that a large share of searching is done on special purpose websites, not GSEs (and those data do not include "searching" on vendor sites), and that only 4% of users' online time is spent searching.⁸⁴ Also, switching costs among

⁸² *Bing Challenges Nation to 'Bing It On,'* MICROSOFT (Sept. 6, 2012), <http://www.microsoft.com/en-us/news/Press/2012/Sep12/09-06BingChallengePR.aspx>.

⁸³ Nor, by definition, do the shopping costs incurred by a first-time computer buyer constitute switching costs.

⁸⁴ *State of the Media: The Social Media Report – Q3 2011*, NM INCITE 2, <http://www.nielsen.com/content/dam/corporate/us/en/reports-downloads/2011-Reports/nielsen-social-media-report.pdf> (last visited Apr. 4, 2013), [hereinafter *State of the Media*].

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different types of search engines are not substantially different from switching from one GSE to another. Even if there is a tremendous volume of searches on GSEs, though, that does not necessarily mean that a narrow market definition is correct for antitrust purposes. In any case, we will first evaluate switching costs among GSEs, and then across the broader range of Internet search alternatives available to and used by consumers. Indeed, the lower the switching costs across types of search alternatives and the greater the observed switching, the stronger the argument for defining the relevant market more broadly.

We note, though, that one should not assume that the degree of switching is an indicator of switching costs: whereas a high rate of switching almost certainly indicates low switching costs, low switching does not necessarily indicate high switching costs. According to a report to the United Kingdom's Office of Fair Trade, one should not "focus[] on the rate of switching alone,"⁸⁵ because a relatively low rate of switching may simply reflect the fact that consumers' preferences between products are stable. This explanation is supported by evidence that consumers easily can and readily do switch to alternatives, but then switch back to their preferred search engine.

With those caveats, we turn to empirical evidence of actual switching among search engines. Numerous recent studies at Microsoft Research⁸⁶ (or authored by Microsoft researchers) have found that switching is easy and frequent.⁸⁷

A user's decision to select one search engine over another can be based on factors including reputation, familiarity, effectiveness, and interface usability. Searchers may not use the same engine for all queries; *they often switch between different engines within and between sessions. . . .*

⁸⁵ Nat'l Econ. Research Assocs., *Switching Costs, Part One: Economic Models and Policy Implications*, OFFICE OF FAIR TRADING, DEP'T OF TRADE & INDUSTRY, UK 3 (Apr. 2003), http://www.oft.gov.uk/shared_oftr/reports/comp_policy/oft655.pdf.

⁸⁶ *Our Research*, MICROSOFT RES., <http://research.microsoft.com/apps/catalog/default.aspx> (last visited Apr. 1, 2013) ("[E]stablished in 1991, [Microsoft Research] has become one of the largest, fastest-growing, most respected software research organizations in the world. Its distinguished researchers and scientists help shape the computing experience of millions of people worldwide . . .").

⁸⁷ Presumably, one of the motivations of these studies is that Microsoft Research has an interest in learning about search engine users' behavior so Microsoft can encourage or incentivize users to switch from Google or other search engines to Bing. It is surprising, though, that Microsoft Research has consistently found that search switching costs are very low, which is completely at odds with Microsoft's public policy advocacy.

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Of the 14.2 million users in our log sample, 10.3 million (72.6%) used more than one engine in the six-month duration of the logs, 7.1 million (50.0%) switched engines within a search session at least once, and 9.6 million (67.6%) used different engines for different sessions (i.e., engaged in between-session switching). In addition, 0.6 million users (4.4%) “defected” from one search engine to another and never returned to the previous engine.⁸⁸

Note that this Microsoft Research study only counts switching between GSEs, during or between “search sessions.” If a user switched from a GSE to a VSE (a vertical search engine such as Amazon), that action is treated as an “end” to the search session, rather than a “switch” to another search engine. Given the extraordinarily large number of vertical search engines—and the frequency with which they appear in the native search results—that restricted definition of search likely understates the frequency of search engine switching to a substantial degree.

Even with that limitation, Microsoft Research found that dissatisfaction with the search results was the primary reason that searchers switched engines:

40.4% of subjects reported having defected from one search engine to another and never or very rarely returning to the pre-switch (origin) engine. 82.7% of subjects reported that they were happy with their

⁸⁸ Ryen W. White & Susan T. Dumais, *Characterizing and Predicting Search Engine Switching Behavior*, MICROSOFT RES. 1, 3 (2009), <http://research.microsoft.com/en-us/um/people/sdumais/CIKM2009-Switching-fp1012-white.pdf> (emphasis added) (citations omitted). This article is just one of many Microsoft Research studies of search behavior and search switching, all reaching similar conclusions - namely that switching search engines is easy and frequent. See, e.g., Doug Downey, Susan Dumais & Eric Horvitz, *Models of Searching and Browsing: Languages, Studies, and Applications*, MICROSOFT RES. (2007), http://research.microsoft.com/en-us/um/people/horvitz/search_models_ijcai-07.pdf; Qi Guo et al., *Why Searchers Switch: Understanding and Predicting Engine Switching Rationales*, MICROSOFT RES. (2011), <http://research.microsoft.com/en-us/um/people/sdumais/sigir2011-searchengine-switching-fp348-guo.pdf>; Allison P. Heath & Ryen W. White, *Defection Detection: Predicting Search Engine Switching*, MICROSOFT RES. (2008), <http://research.microsoft.com/en-us/um/people/ryenw/papers/heathwww2008.pdf>; Ryen W. White, Ashish Kappor & Susan T. Dumais, *Modeling Long-Term Search Engine Usage*, MICROSOFT RES. (2010), <http://research.microsoft.com/en-us/um/people/ryenw/papers/whiteumap2010.pdf>; Ryen W. White et al., *Enhancing Web Search by Promoting Multiple Search Engine Use*, MICROSOFT RES. (2008), <http://research.microsoft.com/en-us/um/people/ryenw/papers/white-sigir2008a.pdf>.

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decision to defect The main reasons for defection were many dissatisfactory experiences with the origin engine (43.9%), one particularly dissatisfactory experience with the origin engine (7.9%), more relevant results on other engine (20.1%), or a new entry point such as a browser search box or optional browser toolbar (28.1%).⁸⁹

The Microsoft researchers concluded that:

The reasons for switching are varied and include: perceived poor quality of results on original engine, desire for verification or additional coverage, and user preferences. Approximately half of all users in our log sample and around two-thirds of survey respondents engage in within-session switching. *It is clear that the utilization of multiple search engines is an important aspect of users' Web search behavior. Since switching is mainly associated with dissatisfaction with the search results on the origin engine, that engine could tailor the search experience for queries with a high observed switching rate.*⁹⁰

These Microsoft Research results are reinforced by a recent study by Slingshot SEO, which highlighted the difference in the effectiveness of search results between Bing and Google, largely explaining users' preference for the latter over the former. The Slingshot SEO study found that Bing's click through rate for the first result on a search result page was only half that of Google's (9.66% vs. 18.20%); Bing also had lower click-through rates on its top 10 search results.⁹¹ This marked difference in click-through rates between Google and Bing indicates that Google is returning search results that better meet users' needs and could explain the preference of Google users over Bing. Because users differ in their preferences, though, other users prefer Bing as their first choice of GSE.⁹²

⁸⁹ White & Dumais, *Characterizing and Predicting Search Engine Switching Behavior*, *supra* note 88., at 4.

⁹⁰ *Id.* at 9 (emphasis added).

⁹¹ Casey Szulc, *A Tale of Two Studies: Google vs. Bing CTR*, DIGITAL RELEVANCE (Oct. 26, 2011), <http://www.relevance.com/blog/a-tale-of-two-studies-google-vs-bing-ctr>. Digital Relevance also found that users clicked-through to Google's top organic results at roughly double the rate of Bing search results: second result, 10.05% v. 5.51%; third result, 7.22% v. 2.74%; fourth result, 4.81% v. 1.88%.

⁹² According to "an independent study commissioned by Microsoft Corp people chose Bing Web search results over Google nearly 2-to-1 in blind

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Slingshot SEO also noted the ease with which users can switch from one search engine to the other – by entering the name of the other search engine into the search bar of the origin search engine:

Every month, roughly 117 million searches are made for “google” in Bing. It’s hard to fathom why one would search for a search engine while using a search engine, but let’s face it, users are aware that Bing and Google provide very different results. To put this number in perspective, consider the fact that, on average by month, only 55 million searches are made for “google” in Google and 4 million searches are made for “bing” in Google.⁹³

This is but one example of a broader phenomenon: the use of a GSE not for searching, but as a “navigational aid.” Evidently, many users find the easiest way to get to Facebook is by entering “f” in the search bar (both Bing’s and Google’s respective autocomplete functions list “Facebook” as the first entry when “f” is entered), allowing the user to click on “Facebook” to go to Facebook. This probably explains why “Facebook” was the number one search entry on search engines in 2011. In fact, all of the top 10 search terms in 2011 and 2010 were navigational in nature, which included terms like “ebay,” “youtube” and “craigslist.”⁹⁴ In addition, comScore notes a similar trend in navigational searches: “About 12.5 billion searches were performed in July on the Big 5 search engines (Google, Yahoo, Bing, Ask, AOL Search) in the United States. Of those, approximately 1.9 billion were navigational in nature, or more than 15 percent of all searches in a given month.”⁹⁵

The use of a search engine to easily navigate to other sites all but eliminates the costs of switching to an alternative GSE, VSE, or other site. When users enter “a” into the GSE’s search bar, they are often navigating to “Amazon” to *search* for products, product reviews, and the like, the same as with many other sites to which users navigate by use of a GSE search bar. Arguably,

comparison tests.” Chris Crum, *Bing Says Most People Prefer Bing to Google*, WEBPRONews (Sept. 6, 2012), <http://www.webpronews.com/bing-says-most-people-prefer-bing-to-google-2012-09>.

⁹³ Szulc, *supra* note 92.

⁹⁴ *Facebook was the top search term for third straight year*, EXPERIAN, <http://www.experian.com/hitwise/press-release-facebook-was-the-top-search-term-for-2011.html> (last visited Apr. 1, 2013).

⁹⁵ Eli Goodman, *Navigational Search: Turn Right at the Big Chicken*, SEARCH ENGINE WATCH (Sept. 13, 2010), <http://searchenginewatch.com/article/2067933/Navigational-Search-Turn-Right-at-the-Big-Chicken>.

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counting these as “searches” overstates the frequency of searches on GSEs and understates the ease of switching from a GSE to other search methods or navigating directly to other sites.

These Microsoft Research and Slingshot SEO findings are consistent with the findings of other studies,⁹⁶ which have also found that low training investment, low customization investment, ability to experiment with other search engines, and the obviousness of better results means that switching costs are low among GSEs.⁹⁷ This research is quite revealing of user preference and search relevance as being the driving factor behind users’ willingness to switch search engines.

Overall, these findings are significant on two counts: they demonstrate that users *do* switch among search engines and they explain *why* users switch: “switching is mainly associated with dissatisfaction with the search results on the origin engine.”⁹⁸ These facts are critical for success in competing for search engine users: the better the results, the less likely users are to switch away. But conversely, if search results are degraded—for whatever reasons—users are more likely to switch to an alternative. In extreme cases, users defect: they switch search engines and do not switch back. If users defect from a search engine—or use it less—that would translate directly into fewer advertising revenues and lower profits: strong reasons *not* to degrade the quality of search results. Therefore, the argument that Google would bias its search results in a manner that would degrade users’ experience makes no economic sense, because users could and would switch some of their searching usage to other search engines, causing a loss of click-through advertising revenue to Google.

C. Alternatives to Generalized Search Engines for Searching

Market share data for search often assumes a “narrow” market definition for search, one that includes only GSEs, such as Google, Bing, Yahoo, and Ask. However, when consumers are searching for information on the Internet, from a computer or mobile device, they have a rapidly growing number of and improving quality of alternatives to GSEs. So, the first choice

⁹⁶ For example, a survey found that “62% of [r]espondents [w]ould [b]e [w]illing to [c]onsider [s]witching [s]earch [e]ngines.” IMRAN KHAN ET AL., NOTHING BUT NET: 2009 INTERNET INVESTMENT GUIDE 21 (2009).

⁹⁷ E.g., Dharmesh Shah, *Why It Will Be So Easy to Switch Away from Google Search*, ONSTARTUPS (Dec. 4, 2006), <http://onstartups.com/tabid/3339/bid/64/Why-It-Will-Be-So-Easy-To-Switch-Away-From-Google-Search.aspx>.

⁹⁸ White & Dumais, *Characterizing and Predicting Search Engine Switching Behavior*, *supra* note 88, at 9.

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consumers typically make is where and how to search for information, and that choice typically involves a host of alternatives, including vertical search engines (VSEs) such as BizNar, Technorati, or KellyBlueBook. There are also a growing number of special purpose sites (SPS) that offer specialized search capabilities, including content sites (NYTimes, CNET), content aggregators (Pulse, FlipBoard, Huffington Post), comparison shopping sites (BizRate, NexTag), multiple-vendor retailing sites (Amazon, eBay), price comparison sites (Kayak), booking sites (OpenTable, Expedia), and product vendors (United.com, Ford.com). There is a growing use of social networks to search for information (e.g., which movies do my Facebook friends “like”). It is also apparent that search engines face growing competition from mobile apps and “search intermediaries,” such as Apple’s Siri.

Moreover, the costs of switching among these alternatives are low or even zero. So, not surprisingly, there is abundant evidence that a growing amount of “search” is being done on vertical search engines, or on websites or apps that are not typically considered search engines—even though they compete directly for users who are looking for information on the Internet. Let us consider some of that evidence.

1. Evidence on Switching Between Vertical Search and Generalized Search

As previously noted, the ability of consumers to use a combination of general and vertical search engines to find information is not hindered by switching or “multi-homing” costs. Hotchkiss found similar results in an online survey of 400 consumers’ search engine usage.⁹⁹ When it came to searching for more specific results, he found that 80% of those surveyed

[W]ould use a well known non search site to help narrow down their choices. For travel related searches, these would typically be a travel portal such as Expedia.com or Travelocity.com. For home electronics, it could be a well-known retailer, such as Circuit City. We also found E-bay and Amazon used for this purpose as well.¹⁰⁰

Other researchers have also noted that Internet users often turn to vertical sites. For example, as the number of products and

⁹⁹ Gord Hotchkiss et al., *Into the Mind of the Searcher*, ENQUIRO SEARCH SOLUTIONS (2004), <http://c.y.mcdn.com/sites/www.sempo.org/resource/resmgr/Docs/searcher-mind.pdf>.

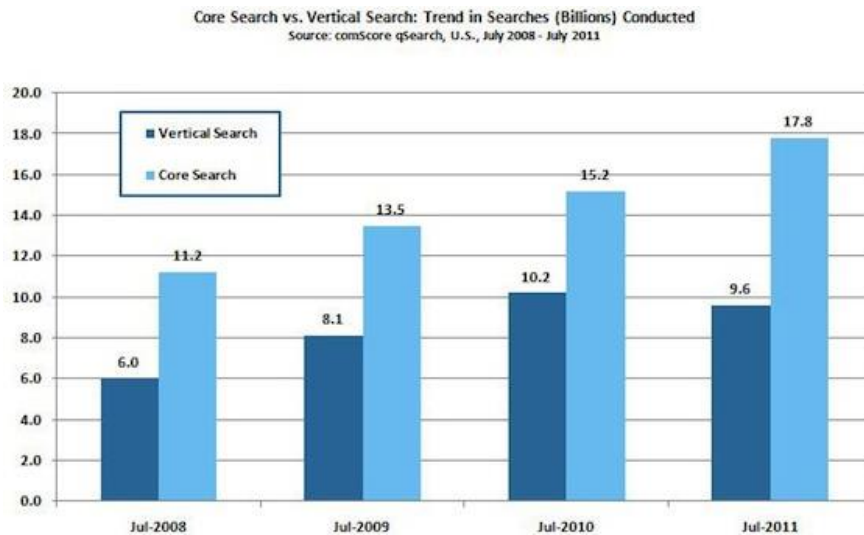
¹⁰⁰ *Id.* at 19.

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product reviews has increased on Amazon, Amazon competes directly with Google for product searches:

“Google and Amazon both have the same end goal, to be the destination that people go to to do their product searches, and Amazon's winning that battle,” said Michael Griffin, founder and chief technology officer of Adlucent, which does search marketing for online retailers.¹⁰¹

Horizontal search engines sometimes provide too much “noise” in cases where users are specifically looking for shopping, travel, or other “vertical” fields. Vertical search engines can provide more focused results depending on the intent of the searcher. Not surprisingly, therefore, vertical searches are a significant portion of total online searches, serving a third of all search volume, as shown in the following graph.¹⁰² In response to vertical search engines, generalized search engines such as Bing and Google are attempting to improve their performance by focusing results according to users’ search queries.



One of the reasons VSEs are competitive with GSEs is that switching costs are so low across vertical search engines and between vertical and generalized search. Unlike an operating system—where most users have one and only one—Internet users

¹⁰¹ Claire Cain Miller, *Google Struggles to Unseat Amazon as the Web's Most Popular Mall*, N.Y. TIMES, Sept. 9, 2012, <http://www.nytimes.com/2012/09/10/technology/google-shopping-competition-amazon-charging-retailers.html>.

¹⁰² *Does Search Still Matter?*, WHERE2GETIT (Oct. 4, 2011), <http://blog.where2getit.com/2011/10/does-search-still-matter/>.

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can easily have a “stable” of vertical search engines (and other means of searching the Internet) with zero marginal costs. Moreover, in the virtual world, “shopping costs” are essentially zero. Recall from Section B that the reduction of shopping costs explains both department stores and supermarkets on the one hand, and closely situated specialty stores on the other. Consider one block on College Avenue in Berkeley, for example, with an independent wine and cheese shop, a fresh fruits and vegetables market, a meat and seafood market, a bakery-patisserie, and a pharmacy. Directly across the street is a Safeway, offering all of those products and a good deal more.

In these brick-and-mortar examples, the specialty stores are analogous to vertical search (one can only search within a given category, such as autos) and the supermarket to generalized search (one can search across many categories).¹⁰³ But while those independent stores have reduced shopping costs as much as possible by locating so closely together, there are still significant shopping costs and transactions costs (e.g., waiting in line for service and/or to check out at each store visited). Contrast the brick-and-mortar case to the virtual world of vertical search: a user can easily set up bookmarks for a host of vertical sites such as product review and purchasing (Amazon or eBay), travel reviews (TripAdvisor), travel price comparisons and/or booking (Priceline, Kayak, Expedia), news (New York Times, Flipboard, Pulse), and as many more as the user chooses. The cost of identifying these sites is near zero, as is the costs of switching from one to another. Indeed, one of the primary benefits of generalized search engines is that, each time a GSE takes a user to a VSE that the user finds particularly well-suited to her preferences, the user can bookmark that site (and/or sign up for email alerts or RSS feeds), which makes it costless for the user to return directly to the site without using the GSE as an intermediary. The same logic also applies to apps, which explains why many customers have a stable of apps to easily and costlessly navigate to a wide range of specialized sites or information without the use of a GSE.

2. Evidence on Switching Between GSEs and Mobile Apps

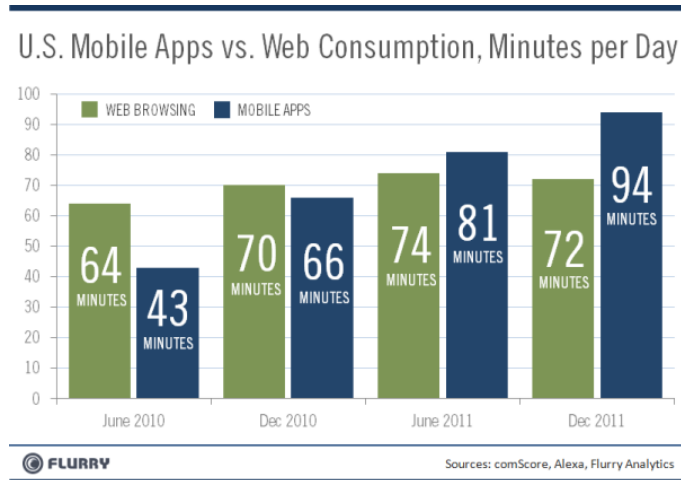
The recent boom in mobile device use has not only led to an increase in internet usage with the ubiquitous nature of data

¹⁰³ Note, though, the advantage that some VSEs have over GSEs: the user can search for information and take further actions. For example, one can search Google or Bing for product reviews, then go to another site to make a purchase. One can search for product reviews, compare prices, and actually make a purchase on Amazon.

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plans, but has also led to a shift in consumer focus from traditional browser and webpage-based Internet services to mobile applications. These applications, especially with the introduction of the iPhone, Android devices, and other smartphones, have become a significant source of business for web developers. Services such as local business reviews, weather forecasts, and social networks are increasingly served through mobile applications. With over 830,000 applications in the iTunes App Store¹⁰⁴ and over 660,000 applications in the Android Market,¹⁰⁵ it is not surprising that applications are now competing with traditional web pages.

In fact, as of June 2011, the amount of time spent with mobile apps per person per day reached 81 minutes, compared to 74 minutes on the web. This represented an 88% increase in time spent with apps as compared to June 2010. In December 2011, the amount of time spent with mobile apps per person per day increased again to 94 minutes, with the amount of time spent on the web decreasing to 72 minutes.¹⁰⁶



This is an especially important trend: not only are consumers switching away from the traditional Web consisting of websites and webpages, but they are finding that applications such as those designed by Facebook or Yelp are providing more directed and focused portals of information. Searching horizontally

¹⁰⁴ *App Store Metrics*, 148APPS.BIZ, <http://148apps.biz/app-store-metrics/> (last updated June 1, 2013, 11:07 PM).

¹⁰⁵ *Number of available Android applications*, APPBRAIN, <http://www.appbrain.com/stats/number-of-android-apps> (last updated Apr. 3, 2013).

¹⁰⁶ Charles Newark-French, *Mobile App Usage Further Dominates Web, Spurred by Facebook*, FLURRY BLOG (Jan. 9, 2012), <http://blog.flurry.com/bid/80241/Mobile-App-Usage-Further-Dominates-Web-Spurred-by-Facebook>.

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is no longer a necessary precursor to finding specific information on the Internet.

24/7 Wall St. researched the most popular categories U.S. users search for on Google, and then compared them to the Apple Store's most popular apps (i.e. those that produced comparable or superior results to Google). They found that search categories like retail, lyrics, navigation, email, games, video, news, reference, and weather all had free apps for Apple devices that could skip a search on a search engine entirely.¹⁰⁷

Not surprisingly, industry analysts have highlighted the growing competition between Web search engines and mobile apps, and the ease with which users can switch between the methods of finding information and answers to questions:

Behold the biggest threat to mobile search -- apps . . . It's much easier to interact with content through an app than through Web pages. And it's much easier to complete a task through instructions than search queries.¹⁰⁸

[A]s we shift our usage to the mobile web . . . we're using apps. On their face, these apps don't seem like search at all. Except they are . . . For nearly every structured set of results, there'll be an app for that, if there isn't already.¹⁰⁹

Our mobile app accounted for approximately 40% of all searches on our [Yelp!] platform for the quarter ended September 30, 2011.¹¹⁰

Moreover, most of these platforms are creating applications program interfaces to enable and encourage independent apps developers to expand the capabilities of their respective platform.¹¹¹ Given the growing number of platforms that provide

¹⁰⁷ See *How Apple Killed the Future of Search*, 24/7 WALL ST. (Apr. 8, 2010), <http://247wallst.com/2010/04/08/how-apple-killed-the-future-of-search/>.

¹⁰⁸ Aaron Goldman, *Mobile Matters: 15 Mobile Search Stats That Ring True*, MEDIAPOST BLOGS (Oct. 19, 2011), <http://www.mediapost.com/publications/article/160766/mobile-matters-15-mobile-search-stats-that-ring-t.html>.

¹⁰⁹ John Battelle, *The Evolving Search Interface: Mobile Drives Search as App*, SEARCHBLOG (Jan. 15, 2010), http://battellemedia.com/archives/2010/01/the_evolving_search_interface_mobile_drives_search_as_app.php.

¹¹⁰ Yelp! Inc., Registration Statement Under the Securities Act of 1933 (Form S-1) 75 (Nov. 17, 2011).

¹¹¹ Jan Bosch, *From Software Product Lines to Software Ecosystems*, in PROCEEDINGS OF THE 13TH INTERNATIONAL SOFTWARE PRODUCT LINE CONFERENCE (2009).

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APIs and the resulting explosive growth in the number of apps for Apple, Android, Microsoft, Facebook, Twitter, and other platforms, it is evident that the competition between apps and search engines will continue to increase. Arguably, the relevant market for search should include those apps which incorporate significant search capabilities.

3. Evidence on Switching Between Social Media Search and Generalized Search

A recent comprehensive report by Outbrain found that social networks are becoming a significant referral source for content pages: “While search still reigns supreme in terms of directing traffic to content pages (41% of external referrers), social is gaining share at 11%.”¹¹² This view of the growing importance of social media for search is shared by a number of observers:

As people spend more time on Social Media sites, it would be logical to assume that they would do more Search activity on these sites. Use of portal sites and direct entry (to Websites) appear to have declined as a means to Search for content . . . as Facebook increasingly socializes content and commerce, we would expect people to find rich Search results influenced by social signals from their friends.¹¹³

In [Google’s] web, everything starts with a search But in recent years the web has tilted gradually, and perhaps inexorably, toward [Facebook’s] world. There, rather than search for a news article, you wait for your friends to tell you what to read. They tell you what movies they enjoyed, what brands they like, and where to eat sushi.¹¹⁴

¹¹² Kelly Reeves, *Study Gives Insight Into Content Discovery Trends Across the Web’s Leading Publishers*, OUTBRAIN (Apr. 14, 2011), <http://www.outbrain.com/blog/2011/04/outbrain-content-discovery-report.html>.

¹¹³ Mark Gongloff, *Facebook Sucks Up a Ridiculously Huge and Growing Share of Our Time Wasted Online*, WALL ST. J., Sept. 26, 2011, <http://blogs.wsj.com/marketbeat/2011/09/26/facebook-sucks-up-a-ridiculously-huge-and-growing-share-of-our-time-wasted-online/> (quoting Mark Mahaney, former Citigroup Interwebs analyst).

¹¹⁴ Miguel Helft & Jessi Hempel, *Facebook vs. Google: The Battle for the Future of the Web*, CNN MONEY (Nov. 29, 2011), http://money.cnn.com/2011/11/03/technology/facebook_google_fight.fortune/index.htm.

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Social networks and blogs consume almost a quarter of U.S. users' time online. In comparison, only 4% of U.S. users' time is spent on search.¹¹⁵

[G]rowth in search advertising is slowing, and advertisers are putting more of their limited dollars into Facebook, with its 800 million users, many of whom spend more time on Facebook than on any other site.¹¹⁶

Advertising revenues at Twitter grew 213% to \$139.5 million in 2011—the company's second full year of selling advertising—and strong international growth is expected to push the company's ad revenues to \$259.9 million in 2012. . . . By 2014, eMarketer estimates, global ad revenues at Twitter will reach \$540 million.¹¹⁷

4. *Evidence on Arrival Rates at Websites Directly or Indirectly, Not From a GSE*

Whereas a user cannot operate a personal computer without an operating system, one can search and find information on the Internet without using a GSE. Most important of these is by entering the URL of favorite sites (or clicking on bookmarked favorites). Outbrain found that 67% of *all* "arrivals" to websites were direct to the site (i.e. the user entered the URL or clicked on a bookmark or email link) or from the site itself (i.e. the user clicked on a link on the site to bring up another page on the same site); 10% of arrivals were from other content-based Websites; and 6% were from Web portals. Arrivals from generalized search engines represent only 14% of the total visits to Websites.¹¹⁸

5. *Evidence on Competition Between Emerging Technologies and Generalized Search*

In addition to the rapid growth in vertical search, newly emerging technologies are beginning to have a significant impact on the means and methods used to search for information or find

¹¹⁵ *State of the Media*, *supra* note 84.

¹¹⁶ Helft & Hempel, *supra* note 115, at 46.

¹¹⁷ *After Strong 2011, Twitter Ad Revenues to Grow 86% to \$259 Million in 2012*, EMARKETER NEWSROOM (Jan. 31, 2012), <http://www.emarketer.com/newsroom/index.php/strong-2011-twitter-ad-revenues-grow-86-259-million-2012/>.

¹¹⁸ Reeves, *supra* note 113.

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answers to questions on the Internet. Due to rapid technological change—for example, enormous strides in voice recognition and artificial intelligence—technological advances will increase alternatives to traditional search and further reduce switching costs among those alternatives. Perhaps the prototypical example of these developments is Siri, which is fast becoming a direct competition to GSEs, as noted by industry analysts:

No longer is the search box the front-end of searches on the iPhone 4S. Google is the back-end technology that is suddenly less visible. Or rather, one of the back ends. Because of the rise of specialized searches like Yelp and Wolfram|Alpha, Siri can easily bypass Google's search algorithms for many queries.¹¹⁹

Siri could seriously reduce how much we use Google's services and revenue in the long run. Siri is a serious game changer¹²⁰

There's an obvious reason Apple would sit on [Google's new natural speech-to-text search] app. It competes with Siri. Siri goes out of its way to avoid searching Google Apple wants users to be in the habit of asking Siri for everything.¹²¹

Siri and other similar “personal assistant” applications have the potential to bypass generalized search engines entirely.¹²² By inputting a verbal request for facts, location information, or commands, search engines are relegated to the background, providing only as much information as is requested by the user. This trend in mobile and desktop automation will bypass traditional search engines and reduce the role of conventional search advertising. Although search will not become obsolete any time soon, the prominence of services like Siri will reduce its role in delivering user requested information.

¹¹⁹ Kevin Kelleher, *Yes, Google, Siri is a Serious Threat*, CNN MONEY (Apr. 17, 2013), <http://tech.fortune.cnn.com/2011/11/09/yes-google-siri-is-a-serious-threat>.

¹²⁰ Charlie Zhou, *Why Google Should Be Scared Of Siri*, SEEKING ALPHA (Oct. 17, 2011), <http://seekingalpha.com/article/299926-why-google-should-be-scared-of-siri>.

¹²¹ Jon Mitchell, *Another Way Apple's Fight with Google is Hurting Users*, READWRITEWEB (Oct. 3, 2012), <http://www.readriteweb.com/archives/another-way-apples-fight-with-google-is-hurting-users.php>.

¹²² Siri and other personal assistants can also obtain information from, or direct users to, vertical search sites such as OpenTable and Yelp.

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Given the extraordinary rate of technological advancement in computing, artificial intelligence, software, applications development, cloud computing services, and communications devices, it is a near certainty that Siri is just the first of many fundamentally different approaches to searching and finding information on the Internet. And, because the Web is an open platform, with industry standards and high degree of compatibility, it is also a near certainty that the costs of switching among these alternatives will be extremely low. This, then, is the fundamental difference between the Windows operating system and Google Search on the Internet.

SUMMARY AND CONCLUSION

Any monopolization case against Google Search would have to be very different from the Microsoft browser case, because the cost for a user switching from Google Search is much lower than was the cost in the 1990s (or today) of switching away from the Microsoft operating system. It would likewise need to be different because Google has not attempted to manipulate the cost of a user switching away from Google Search, at least not to a significant degree. Low switching costs should and likely will have important implications for antitrust analysis of Google.

First, just as high switching costs helped to narrow the market in the Microsoft case, a relative absence of switching costs provides a good reason to include vertical search engines in an antitrust market. No single vertical search engine or even all of them combined are a perfect substitute for a universal search engine, but they do not need to be to provide meaningful competition. Low switching costs mean that users can switch among a portfolio of vertical search engines, or other search applications when convenient, and also use Google, Bing, Yahoo, or other GSEs when they are most convenient.

Second, regardless of the market definition, low switching costs give Google a strong argument that it does not have market power even if the market is restricted to generalized search engines. Market power typically means the ability to profitably charge more than a competitive price for the goods in a market. Search is given to searchers for free, which is likely the competitive price. Money is made from advertisers. Despite Google's current popularity, it is doubtful that Google has market power with respect to search users, if market power is understood in its traditional sense as the ability to raise prices above competitive levels. After all, if Google began to charge users even a minimal price to search on its site, let alone a significant price, it would surely lose a substantial share of its users to Bing, Yahoo, or

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other services. Why should anyone pay, let alone register a credit card, to enter a search term when other roughly comparable services are free, even if many users apparently have a preference for Google Search at today's free price? Many, probably most, would not. Consider not just the hassle of paying for search but the fact that users have come to expect basic Internet services to be free.

Another way that low switching costs could make it difficult to prove market power is that they take away an entry barrier in the sense that a better product should be able to gain market share very quickly, just as Google once did. Some courts, like the D.C. Circuit in *Microsoft*, hold that proving monopoly power requires showing both a high market share and also the presence of barriers to entry.

A final and overarching implication of low switching costs is that Google must continue to innovate and stay ahead of other search engines if it hopes to maintain its position as the most often-used general search engine. Google would be vulnerable to any competitor that is able to present users with more relevant and desirable search results, because the cost for users of switching to that provider is so low. Some may argue that Google is a monopoly today (though we argue above that it does not have monopoly power over users), but even if it is, Google is not protected from competition by high user switching costs as Microsoft has been. If users prefer to use Siri to search by voice or Bing to search by typing, they are free today to switch over entirely from Google, or to mix and match.