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I. INTRODUCTION

The European Commission has recently opened an antitrust investigation in connection to Google's commercial practices. This is just the last of a number of recent investigations in the high-tech sector, which have involved Microsoft, Intel, IBM, Qualcomm, Rambus, Apple, and SAP.

After reviewing the scope of the European Commission's investigation of Google (on the basis of the available public information), this article focuses on the question of whether there are characteristics of the high tech sector which make it particularly prone to monopolization or anticompetitive foreclosure, and which justify the European Commission's apparent focus on the sector.

First the article discusses the reasons militating in favor of close scrutiny of the technology sector, namely the tendency of high tech markets to be significantly concentrated, and the fact that high tech products tend to have significant complementarity and interoperability relationships which make exclusion of competitors a tangible possibility.

Then the article reviews the argument against close scrutiny of the technology sector, namely the fact that it is characterized by dynamic, fast-changing, platform competition, and that the legitimate by-product of innovative behavior is a transitory monopoly, the curbing of which may chill innovation incentives.

The article concludes that, on balance, high tech markets are a reasonable target for antitrust scrutiny because they have a propensity to "tip to monopoly;" exclusion of competitors is fairly easy and often profitable; the effects of market power on incentives to innovate are uncertain; and the sector is very important to the economy. Obviously this does not mean that all the cases the European Commission is investigating have merit—only time will tell if that is the case.

II. THE GOOGLE INVESTIGATION

Last November, the European Commission opened an antitrust investigation as a result of complaints that Google discriminated against competitors and in favor of its own services when ranking search results.[2] The investigation was broadened in mid December, when

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[2] The initial complaints were made by the U.K. price comparison site Foundem, French legal search engine Ejustice, and Microsoft-owned German price comparison site Ciao!.

complaints by three additional companies were added to the file, and the German competition authority transferred to the European Commission the portion of its investigation that overlapped with that of the European Commission.[3]

The press reported that the companies formally complaining to the European Commission have not been alone in their dissatisfaction of Google's ranking of search results.[4] In a nutshell, competitors complain that Google gives unfavorable placement in its search engine to sites that offer competing online services.

More specifically, the European Commission's investigation will focus on whether Google has infringed Art. 102 TFEU (i.e. abused a dominant market position) by lowering the ranking of the "organic" search results of competing services such as price-comparison sites, specialized (or "vertical") search services, and mapping sites; and by presenting the results of its own competing services at the top of the "organic" results list.[5] In addition, the European Commission will investigate whether Google raised its prices in a discriminatory manner to competitors advertising on Google's search engine, and whether Google requested exclusivity from a number of its partners.[6]

Complainants claim that users of Google's search engine rarely look beyond the first few search results, so a higher or lower placement on Google's organic result list has a significant impact on the level of Google-generated traffic to the listed site. As Google accounts for a very large proportion of all searches—especially in Europe—a lower ranking on Google's page translates to a very significant loss in advertising revenues.

Because of the commercial (and informational) importance of search engines, some have advocated that the European Commission should enforce "search neutrality," in order to ensure that search results are purely formulaic, transparent, and non-discriminatory.[7]

Google's initial defense is based on the principle that its search rankings follow the principle of providing users with the best possible response to their searches. As stated by Google in its reaction to the European Commission's investigation:

> Answering users' queries accurately and quickly is our number one goal. Sometimes the best, most relevant answer to a query is our traditional "ten blue links," and sometimes it is a news article, sports score, stock quote, video, or a map.[8]

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[3] The complaints to the German competition authority were made by two newspaper and magazine publishing associations, BDZV and VDZ, and the online mapping company Euro-Cities.

[4] A recent *Wall Street Journal* article stated that a number of Internet companies—TripAdvisor, WebMD, Yelp, and CitySearch—have complained about Google's search rankings (*Rivals Say Google Plays Favorites*, WALL ST. J., 12 (December 2010)).

[5] When users search for information, Google's search engine provides two types of results: "organic" search results (i.e. unpaid results based on a proprietary algorithm which calculates the relevance of each result to the user's particular query); and "sponsored links" (i.e. keyword-relevant paid advertisements which are displayed at the top and on the right hand side of Google's search results page).

[6] *See* the European Commission's press release, *Commission probes allegations of antitrust violations by Google*, IP/10/1624.

[7] *See*, for instance, Orange-France Telecom's response to the public consultation by the European Commission on the open Internet and net neutrality in Europe.

[8] *See* Google's Public Policy Blog, *Our thoughts on the European Commission review* (30 November 2010).

In other words, Google maintains that it is free to rank organic search results in any way it deems most appropriate to deliver its service to users.

The Google case is just the last in a string of high-profile Art. 102 (formal and informal) investigations in the high-tech sector (Microsoft, Intel, IBM, Qualcomm, Rambus, Apple, SAP). Does this mean that the European Commission is targeting high-tech firms? Are there characteristics of technology markets that make them more prone to monopolization and abusive foreclosing behavior, and thus need to be kept under close scrutiny? These are the questions that the rest of this article addresses.[9]

III. THE EUROPEAN COMMISSION'S FOCUS ON THE HIGH-TECH SECTOR

In the last couple of years, the European Commission has investigated a significant number of companies in the high-tech sector. The European Commission fined Intel for its conditional rebates in the x86 CPU market in May 2009[10] and dropped its investigation of Qualcomm's licenses in November 2009.[11] In December 2009, the European Commission accepted commitments from Rambus regarding the royalty license of future DRAM products[12] and from Microsoft regarding the tying of Internet Explorer with Windows.[13] The European Commission initiated an investigation of IBM's practices in its mainframe business in July 2010.[14] In September 2010, it closed an investigation of Apple's practices relating to iPhone warranties and the use of third-party tools for the development of iPhone apps (after Apple agreed to change some of its business practices[15]) and is currently considering complaints that SAP refused to allow interoperability of their products with competing software providers.[16]

The European Commission's active scrutiny of the high-tech sector is also evident from policy statements of Commissioner Almunia who, in recent speeches, has remarked on the importance of the sector for economic growth and, thus, of the value of maintaining effective competition in the market.[17]

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[9] Note that the U.S. press has highlighted a similar focus on high-tech markets on the part of the U.S. Department of Justice. *See, Federal Antitrust Probe Targets Tech Giants, Sources Say*, WASH. POST, (June 3, 2009).

[10] *See* Commission Decision COMP/C-3 /37.990 – Intel, 13 May 2009. The decision has been appealed to the General Court, and the appeal is pending.

[11] *See* the European Commission's memo, *Commission closes formal proceedings against Qualcomm*, MEMO/09/516.

[12] *See* the European Commission's press release, *Commission accepts commitments from Rambus lowering memory chip royalty rates*, IP/09/1897.

[13] *See* the European Commission's press release, *Commission accepts Microsoft commitments to give users browser choice*, IP/09/1941. This is separate from the earlier and more famous European Microsoft case relating to the tying of the Media Player with Windows, and the refuse to disclose interoperability information to competing suppliers of workgroup servers.

[14] *See* the European Commission's press release, *Commission initiates formal investigations against IBM in two cases of suspected abuse of dominant market position*, IP/10/1006.

[15] *See* the European Commission's press release, *Statement on Apple's iPhone policy changes*, IP/10/1175.

[16] *See*, *SAP Abused Dominance in Software Market, Versata Tells EU Competition Body*, BLOOMBERG, (June 29, 2010).

[17] *See Competition Policy: State of Play and Future Outlook*, European Competition Day, Brussels, "In relation to these cases, I would like to say a word on competition policy and the digital economy. In this fast-moving sector, we are monitoring market and technological developments closely" (October 21, 2010); and *Competition policy for an open and fair digital economy*, Second NEREC Research Conference on Electronic Communications, Madrid, "In an environment that is highly innovative it is of utmost importance to preserve the opportunity of new firms to enter a market and challenge established players. We need to safeguard a level-playing field and access to markets." (October 29, 2010).

Is this degree of activism justified? One of the main reasons for this focus on the high-tech sector is its importance for the economy. That the high-tech sector is a crucial driver of economic growth is undoubtedly true. Although estimates vary, it is clear that the ICT (Information, Communications, Technology) sector has a large impact on the overall economy, with estimates of its contribution to yearly GDP growth ranging from between 0.2 and 0.9 percentage points, depending on the country and time period.[18]

The high-tech sector is therefore very important for the economy, but is this a sufficient reason for closer antitrust scrutiny? Antitrust scrutiny can have a positive effect on the high-tech sector by ensuring that it remains competitive, but one cannot *a priori* rule out that increased antitrust scrutiny may have a chilling effect on innovation by constraining high-tech companies' commercial and innovation strategies.

To the extent that the effects of closer antitrust scrutiny on innovation are uncertain, closer scrutiny should only be contemplated if there is a presumption that the high-tech sector is more prone to foreclosing behavior and monopolization than other sectors, and that this has negative effects for the economy and ultimately consumers. The case in favor and against closer antitrust scrutiny of high-technology firms is developed in more detail in the rest of this article.

IV. THE CASE FOR CLOSER SCRUTINY OF THE HIGH-TECH SECTOR

The argument in favor of more antitrust scrutiny of the high tech sectors has two legs. First, high-tech markets tend to be more concentrated, and often "tip to monopoly." Second, high-tech markets are interconnected and characterized by the presence of many complementary products and this makes foreclosure and exclusion of potential and actual competitors more likely. Let us explore these arguments in turn.

There has been much economic research on the topic of whether innovative, R&D-intensive industries (such as the high-tech sector) tend to be more concentrated. From a theoretical point of view, although the relationship between R&D-spending and concentration is complex, industries characterized by significant R&D spending tend to be more concentrated.[19] Intuitively, the larger the R&D spending by firms, the higher their fixed costs, the lower the number of firms which will be able to cover them, and the more concentrated the market. This conclusion is supported by the empirical economic literature, which—although with some disagreement on the precise nature of the relationship and the direction of causation—tends to show a positive relationship between higher levels of R&D spending and market concentration.[20]

In addition, there are at least two characteristics of high-tech markets that tend to enhance this tendency towards concentration further:[21]

1. Network effects: These effects can be *direct*, when the value of a product or service increases as more people use it (e.g., social networking sites); [22] or *indirect*, when the

[18] A. Colecchia & P. Schreyer, *ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case? A Comparative Study of Nine OECD Countries*, OECD Science, Technology and Industry Working Papers, 2001/7, OECD Publishing.

[19] *See* J. SUTTON, TECHNOLOGY AND MARKET STRUCTURE, THEORY AND HISTORY, (1998).

[20] *See* Cohen & Levin, *Empirical Studies of Innovation and Market Structure*, in HANDBOOK OF INDUSTRIAL ORGANISATION, Ch. 18 at 1059 (1989).

[21] For a general review, *see* C. SHAPIRO & H. VARIAN, INFORMATION RULES, A STRATEGIC GUIDE TO THE NETWORK ECONOMY (1999).

popularity of a product (e.g. the iPhone) drives the supply of complementary products (e.g. "Apps"), which in turn increase the value of the original product. By reinforcing the value of the products with the largest (direct or indirect) network, network effects tend to result in concentrated markets and in an increase in the cost of entry for competing products.

2. Two-sided market effects: These effects arise when a product targets two (or more) sets of users, which enter in a symbiotic relationship. The increase in the number of users on one side of the market enhances the value of the product to another distinct set of users, and vice versa (e.g., buyers and sellers on eBay).[23] By reinforcing the value of the products with the largest set of users (on both sides of the market), two-sided market effects tend to result in concentrated markets, and in a 'chicken-and-egg' problem for new entrants.

In addition to being prone to become very concentrated (if not monopolized) as a result of large R&D fixed costs, direct and indirect network effects, and two-sided market characteristics, high-tech markets are also susceptible to anticompetitive foreclosure as a result of the relationships and interconnection between the different products.

Most high-tech products do not work in isolation, but are instead part of a "business ecosystem" in which the various products need to interoperate to provide value to customers (e.g. hardware and software, or different types of software).[24]

Firms have contrasting incentives to interoperate with the products of other firms in the ecosystem. As to "horizontal compatibility" (i.e. involving substitute products like, for example, two email systems), firms with a large user base will, on balance, prefer not to interoperate with firms with a smaller user base, while firms with a smaller user base will want to interoperate with larger firms. As to "vertical compatibility" (i.e. involving complementary products like, for example, operating systems and application software), firms will in general have an incentive to interoperate with a large number of complementary products, but would prefer that those complementary products are only compatible with their offer.

Thus, there are various circumstances in which a company with a large customer basis (i.e. often the largest or dominant firm in a given market) may decide to "break" the interoperability of its products, or engage in other exclusionary behavior.

Not only exclusionary behavior is facilitated by the complementarity relationships, but also sometimes product design has in itself been considered as potentially anticompetitive.[25] High-tech markets are very dynamic; products are redesigned frequently, and their boundaries are constantly changing (and often expanding, as testified by the fact that once upon a time a spell-checker was a product separate from a word processor, spreadsheets did not graph data, and mobile phones were not used to listen to music).

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[22] *See* M. Katz & C. Shapiro, *Network Externalities, Competition, and Compatibility*, 75(3) AM. ECON. REV., (Jun., 1985); and J. Farrell & G. Saloner, *Standardization, Compatibility, and Innovation*, 16 RAND J. ECON at 70-83 (1985).

[23] J. C. Rochet & J. Tirole, *Platform Competition in Two-Sided Markets*, 1(4) J. EUR. ECON. ASS'N at 990-1029 (2003); and D. Evans, *The Antitrust Economics of Multi-Sided Platform Markets*, 20(2) YALE J. REG. at 325-381 (2003).

[24] *See* J. MOORE, THE DEATH OF COMPETITION - LEADERSHIP AND STRATEGY IN THE AGE OF BUSINESS ECOSYSTEMS, (1996); and A. BRANDENBURGER & B. NALEBUFF, CO-OPETITION (1997).

[25] *See* J. Ordover & R. Willig, *An Economic Definition of Predation: Pricing and Product Innovation*, 91 YALE L.J. at 8 (1981).

Often when different functionalities, previously provided by distinct products, come together into a new product, the business models of suppliers of complementary products may be disrupted and allegations of technological and commercial tying are made, which are always very difficult to address.[26]

In conclusion, fixed R&D costs and network and two-sided market effects mean that markets tend to "tip to monopoly," while the presence of significant complementarity relationships and the dynamism of product design mean that foreclosure is possible and may often be profitable (either by commercial or technological tying or by strategic refusal of interoperability). This means that the high-tech sector is populated by dominant companies that can easily harm companies in their ecosystems.[27]

This militates in favor of close antitrust scrutiny. But there is an oft-cited alternative argument for why the high-tech sector should be subject to less stringent antitrust oversight, which hinges on the dynamism of these products and on the potential chilling effect on innovation that antitrust scrutiny may bring about.

V. THE CASE AGAINST CLOSE SCRUTINY OF THE HIGH-TECH SECTOR

The argument against close scrutiny of technologically intensive markets is based on the concern that the dynamism of high-tech renders antitrust scrutiny ineffective and, in fact, potentially harmful as it may stifle innovation. This concern is based on three concepts: (i) profits deriving from market power in high-tech markets are the reward for successful innovation; (ii) market power is short-lived as the flow of radical innovations displace each other; and (iii) antitrust enforcement cannot move at the same pace as the market, and so while it will be ineffective in restoring market competition, it will create uncertainty and chill innovation incentives.

This view is most commonly associated with Joseph Schumpeter.[28] Schumpeter viewed innovation as a process of "creative destruction," in which innovative entry drives economic growth, even if it jeopardizes existing business models. Successful innovation is—in Schumpeter's view—a source of temporary market power that replaces the position of old technologies and eventually surrenders to new innovations. At the basis of this process is the entrepreneurial quest for profits. Thus the temporary market power obtained as a result of innovation is a key determinant of the incentive to innovate.

The implication of this view is that, in the face of such dynamic, innovation-based competition, antitrust enforcement should be extremely cautious.[29] As competition primarily takes the form of innovation competition, traditional antitrust analysis, which focuses on static (price or output) competition, is inadequate. Firms in high-tech markets strive for temporary dominance of the market through the introduction of innovative products, and interfering with

[26] Consider the effort spent by the Court in *U.S. v. Microsoft* to determine whether an internet browser is a distinct product from the PC operating system.

[27] The motive behind anticompetitive exclusion is typically either a willingness to leverage market power from the core market to adjacent markets, or an attempt to reinforce barriers to entry and protect the monopoly in the core market.

[28] See J. SCHUMPETER, CAPITALISM, SOCIALISM AND DEMOCRACY (1942).

[29] *See*, e.g., R. Schmalensee, *Antitrust Issues in Schumpeterian Industries*, 90 AM. ECON. REV. at 193 (2000); and C. Pleatsikis & D. Teece, *The Analysis of Market Definition and Market Power in the Context of Rapid Innovation*, INT'L J. INDUS. ORG. at 665 (2001).

that process by limiting the gains of the dominant company, or by constraining its actions, would harm innovation competition and ultimately economic growth.

Moreover, high-tech industries are often difficult to analyze, given the complexity of technology, the web of interconnections and complementarities, and the shifting boundaries of product design. This means that careful antitrust scrutiny is necessarily slow. Given the rapid pace at which innovations are introduced in the market, such ponderous pace tends to make antitrust enforcement ineffective, as—by the time the antitrust dust has settled—the market will have typically moved on.[30] The conclusion of this reasoning is that antitrust authorities should not intervene in high-tech industries, and let the process of "creative destruction" play out and restore competition.

However, another influential 20th century economist, Kenneth Arrow, highlighted the logic by which innovation is best promoted by competition rather than (transitory) market power. His tenet is that a monopolist may be less innovative than competitive firms because it has more to lose from disrupting the *status quo*.[31] This Arrovian view is espoused by various commentators and most competition authorities who argue that competition has positive effects on innovation incentives.[32]

The debate between supporters of the Schumpeterian view and of the Arrovian view is still open in economics, and the last word on the subject has not yet been written. Given the contradictory prescriptions of economic theory, the inconclusive empirical evidence, and the complex interactions between market power and innovation incentives, the case against antitrust scrutiny of high-tech industries does not appear particularly strong.

VI. CONCLUSIONS

This article reviews the case for and against close antitrust scrutiny of the high-tech sector, and concludes that it is reasonable to keep a close watch on high-tech markets. This is because high-tech markets have a tendency to become dominated; because foreclosure is fairly easy and often profitable; because the effect of market power on innovation incentives is uncertain; and because of the importance of the high-tech sector for the economy. Obviously this does not mean that all the investigations that the European Commission has opened have merit; only time and a careful case-by-case assessment will tell.

[30] *See*, e.g., F. EASTERBROOK, THE LIMITS OF ANTITRUST (1984).

[31] *See* K. ARROW, ECONOMIC WELFARE AND THE ALLOCATION OF RESOURCES FOR INVENTION (1962).

[32] See, e.g., M. Katz & H. Shelanski, SCHUMPETERIAN' COMPETITION AND ANTITRUST POLICY IN HIGH-TECH MARKETS, 14 COMPETITION at 47 (2005; and J. Baker, *Beyond Schumpeter vs. Arrow: Antitrust Fosters Innovation*, 74 ANTITRUST L.J. at 575 (2007).