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Abstract

We analyze a search engine market from a law and economics perspective and incorporate the choice of quality improving innovations by a search engine platform in a two-sided model of internet search engine. In the proposed framework we, first, discuss the legal issues the search engine market raises for antitrust policy through analysis of several types of abusive behavior by the dominant search engine. We also explore the possible consequences of monopolization of the search engine market for advertisers and users in the form of excessive pricing and deterioration of the quality of the search results. Second, in the technical analysis part we incorporate these considerations in a two-sided market model and analyze the rate of innovation, pricing, and quality choices by the dominant search engine. Our findings show that a dominant monopoly platform results in higher prices and underinvestment in quality improving innovations by a search engine relative to the social optimum. More generally, we show that monopoly is sub-optimal both in terms of harm to advertisers in the form of excessive prices, harm to users in the form of reduction in quality of search results, as well as harm to the society in the form of lower innovation rates in the industry.

JEL Classification: K21, L10, L41, L50, L86, L88

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1 Introduction

Even though the search engine market is relatively young, law and economics literature is confronted with a number of important questions related to the rapid growth of online search, its concentration, and its increasing importance for our society. In this paper we analyze the implications of excessive concentration and market dominance in search engines market for different players (such as users and advertisers) and different market outcomes (such as prices charged to advertisers and the quality of search results). We analyze what issues the search market raises for antitrust policy and whether the search market requires regulation that would prevent it from monopolization by a single company (such as Google). The main aim of this paper is to illustrate how advanced economic models of two-sided markets can be employed to analyze possible legal antitrust issues arising in the search engine market.

The markets for search-based and online advertising have a number of specific features that set them apart from most markets. These features include network effects, double-sidedness, and high levels of R&D and innovation. Network effects often play an important role in analyzing competition in R&D intensive markets. Network effects present opportunities for enhanced consumer welfare, but also can create the potential for competitive harm and increased barriers to entry. There are certainly some positive network effects, in view of the improvement of the algorithmic results, following the increase of end users' searches and thus keywords. It is also possible to advance the existence of indirect network effects, as advertisers value more a search engine with a greater number of end users. Manne and Wright (2011) challenge nevertheless the importance of network effects: they note that network effects are 'unidirectional' as advertisers want more end users, but end users do not care about the number of advertisers (or they care negatively – having less advertisements is more appreciated).[1] On the contrary, Evans (2008) notes the existence of a positive feedback loop between the search and the advertiser sides. In any case, the potential interplay between network effects and innovation incentives in the search market must be examined (see e.g. Economides (2010) or Larouche (2009)). In this project we utilize the existing models of two-sided markets by e.g. Armstrong (2006) to analyze R&D efforts or investments into quality improvements by a dominant platform in the presence of possible network effects. This allows us to analyze the interplay between innovation and pricing incentives in the

[1] Manne and Wright (2011) also question the link between the number of end users and the value accorded by advertisers, observing that an increase in the number of users looking only for information and not aiming to purchase a good or service may be of little value for advertisers. In any case, indirect network effects, if there are any, are already internalized by the price advertisers have to pay to the search engine, as they are charged per effective click to the advertisers' landing page. Thus, there are no external benefits in the search engine business and advertisers are in principle able to switch to another search engine without the need to be compensated for lost external benefits (Manne and Wright, 2011).

search engine market and in two-sided markets in general.

Obviously, the structure of the search engine market and its pricing/quality strategies have certain distinctive features. The search engine acts as a platform intermediating between content providers (who want users), users (who want content), and advertisers (who want users). Closely related to this structure of connections between agents is the associated pricing structure, where users/searchers enjoy the service for free[2], advertisers are required to pay strictly positive prices for search engine services (at least with regard to sponsored or paid links)[3], and content providers are subsidized by the search engine. These features of the search engine markets call for applications of two-sided markets models as has already been recognized in Devine (2008), Evans (2010), Jeon et al. (2011), or Halaburda and Yehezkel (2011). While a positive price is only set for one of the three groups (i.e. advertisers), quality competition plays nevertheless an important role with regard to the relation between search engines and users and between search engines and content providers, by the intermediary of users (the better a search engine is, the more users it will attract and thus the more valuable it will be for content providers).

Furthermore, search engines are different from other web-sites because of their crucial gateway role. The users of search engines are more valuable from the advertisers perspective compared to the users of any other web-sites, since they provide important information about themselves and their intentions through their search query. Search engines act as "information gatekeepers": they do not only provide information on what can be found on the web (equivalent to yellow pages), but also they are "an essential first-point-of-call for anyone venturing onto the Internet" (see Pollock (2010)). To the difference of other two sided platforms, search engines detain an important amount of information about their customers and advertisers (the "map of commerce", Spulber (2009)). Utilizing this information allows

[2]Search engines are constrained to price at zero, as imposing negative or positive prices will produce transaction costs.

[3]Organic or natural results are generated without involving any direct cost for the websites linked. For example, the majority of Google's income comes from sponsored links paid by the featured organization, the amount of Google's charges been calculated according to a Vickrey second price keyword auction, adjusted by 'quality factors' and conducted through Google's AdWords platform. The 'quality score" is a metric looking at a variety of factors, such as the historical 'clickthrough rate', the user's account history, the quality of the landing page (determined by Google after analysis of the relevant and original content, transparency and ease of navigation), the relevance of the keyword to the ads in its ad group, the relevance of the keyword and the matched ad to the search query, the account's performance in the geographical region where the ad will be shown. 'Quality scores' make it possible to differentiate between advertisers: an advertiser with a low quality score will have to pay more per click (high cost per click) to achieve higher search results positions than advertisers with better quality scores, as a compensation for the opportunity cost for Google of not listing higher more relevant advertisements and consequently the degradation of the quality of the search engine, as it will produce less relevant results. The quality score formula is generally opaque, as making the ranking formula accessible will make it easier for people to game the system. The rest of Google's income comes from selling advertisements in designated spaces in third-party websites, through its AdSense application.

search engines to increase the relevance of their advertisements, and increased relevance means increased value to those who wish to advertise. Hence, the quality of matching and the quality and the relevance of search results are valued not only by users of the search engine, but also by advertisers. These arguments imply that the quality of the search and the relevance of the search results play a crucial role for both consumers and advertisers.

In pursuit of quality improvement, search engines invest heavily in technology. Search engines are R&D intensive and the market generally displays high levels of innovation. According to Devine (2008), the search engine industry operates in an innovative environment where firms compete not only to outdo competitors on price or quality, but also to displace one another's products entirely, if possible. In such a market, a dominant firm can acquire potentially displacing technology and thereby control future innovation, freeing itself from the burden of innovating further to maintain competitive advantage.[4]

Furthermore, according to Pollock (2010), search engines display many of the characteristics of natural monopolies, as their cost structure involves important fixed costs, such as hardware, support, updates, monitoring, but almost zero marginal costs on both the user and advertiser side of the market. This reinforces the tendency of this market to concentration. Possible strategies that might reinforce this trend are exclusions from own property or refusals to deal with competitors downstream (if the search engine is vertically integrated to specialized search or other services/products), anti-competitive capacity building or passive investment in competitors's business to maintain the dominant position in the upstream market (the so called structural abuses in EU competition law), bundling and tying.

Another example of "abusive behavior" by a dominant firm is exclusivity clauses in contracts with advertisers (see e.g. AdSence contracts with advertisers). In these cases the dominant firm may employ strategies reducing multi-homing by advertisers in the form of obstacles to the simultaneous use by advertisers of several search-based ads platforms. It has already been recognized that multi-homing by advertisers will enhance the development of scale, efficiency, and innovation for minor search platforms, while any policy aimed at limiting multi-homing creates obstacles to network effects (see e.g. Etro (2011b)).

An important aspect of the internet search market is its high levels of concentration. According to recent data, in the US, Google had a market share of 66.2%, Yahoo of 16.4%, and Bing of 11.8%. In the UK, just as in many other European countries, Google had a

[4] One of the main sources of this potentially displacing technology in the search engine market is the upstream market for talented creative programmers and software developers. As illustrated by Helft (2011) (New York Times) this market is quite thin and companies like Google or Facebook are willing to pay millions for young talented engineers. If a dominant firm (e.g. Google) buys out all the valuable resources (e.g. programmers with certain skills), these valuable upstream resources would be unavailable or too costly for other search engines, which may make it impossible for them to compete in quality dimension (and might reduce the quality of the search results even further).

market share of 90.83%, Yahoo of 3.21%, and Bing of 3.12%. See Pollock (2010) or Argenton and Prüfer (2012) for more detailed overviews. The basic conclusion is that a single firm (Google) is emerging to dominate the market at least in the US and in Europe.[5] The threat of domination and exclusionary conduct by dominant firms becomes even stronger in the search engine market, since it can result not only in excessive pricing for advertisers, but also in reduction of quality of search results, which harms both advertisers and users. Another concern is that excessive dominance in the search engine markets can harm competition in the upstream markets that are the main source of quality improving innovations in the search engine market itself.

The study assumes that the relevant market is online search advertising, for the simple reason that the European Union has already found in a number of its decisions that online advertising constitutes a separate market.[6] One might object to this finding by arguing that online search advertising competes with online non-search (social media-based) advertising (e.g. Facebook), hence Google's market share in online search does not indicate the existence of a dominant position. However, the impact of online non-search advertising on online search advertising revenue is for the moment relatively small.[7]

This paper analyzes a number of specific features of the search engine market from an economic perspective and incorporates the analysis of quality improving capital investments in a two-sided model of monopolistic internet search engine market. Our findings show that a monopoly platform results in higher prices and under-investment in quality improving innovations by a search engine relative to the social optimum. We find that there is a threat of reduction in the quality of search results, if search engine market is monopolized or dominated by a single firm (such as e.g. Google). In the more technical companion paper Motchenkova et al. (2012)[8] we extend the model to an asymmetric oligopoly setting,

[5] Google may not however dispose of a high enough market share if one includes among its competitors Amazon in the category of "product search". See, the recent discussion of this issue by Claire Caine Miller & Stephanie Clifford, Google Struggles to Unseat Amazon as the Web's Most Popular Mall, New York Times (September 9, 2012) and Hal Singer, Who Competes With Google Search? Just Amazon, Apple And Facebook, Forbes (September 18, 2012).

[6] See, Case IV/JV.1 – Telia/Telenor/Schibstedt, 27 May 1998, Case IV/M.1439 – Telia/Telenor, 3 October 1999 and Case IV/M.0048 – Vodafone/Vivendi/Canal Plus, 20 July 2000; COMP/M.4731 Google/DoubleClick, 11 March 2008 and COMP/ M.5727 – Microsoft/Yahoo! Search business, 18 February 2010.

[7] For example, see the European Commission's inconclusive approach in COMP/M.4731 Google/DoubleClick, 11 March 2008, par 52-54. For an excellent analysis of this issue, see, Florence Thepot, Market Power in Online Search and Social Networking: A Matter of Two-Sided Markets, CLES Working Paper, 2012, forth.

[8] Extending the model to an oligopoly setting is a natural step forward. It is a better description of the current practice with several engines competing in the search market (such as Google, Bing, Yahoo, ect...). Moreover an oligopoly set-up would also be more appropriate in the setting where online search advertising and online non-search advertising are substitutable and hence Facebook constraints Google or if the relevant

where we analyze the interplay between market dominance, network effects, and incentives to innovate in the search engine market. We also analyze the implications of the market dominance and network effects' asymmetries for pricing and the quality of search results.

The results we obtain are similar to the results in Argenton and Prüfer (2012). In simple oligopoly settings they also observe that monopolization of the search engine market has negative effects on the expected average search quality, the rate of innovation, consumer surplus, and total welfare. They find that there is a strong tendency towards market tipping and, subsequently, monopolization, with negative consequences for economic welfare. As a remedy they propose to require search engines to share their data on previous searches. Presumably, this would level the playing field in the quality dimension.

In our model, which is a modification of Armstrong's (2006) approach, we endogenize both pricing and quality decisions on both sides of the platform. In this framework we analyze possible abusive behavior by a dominant search engine, and how it influences the level of quality improving innovations. Our results are complementary to results of the oligopoly model in Argenton and Prüfer (2012), where only quality choices are endogenized.

The structure of the paper is as follows. We begin in section 2 with a literature review. In section 3 we give an overview of the legal issues the search engine market raises for antitrust policy through analysis of several types of abusive behavior by the dominant search engine. We also discuss the possible consequences of monopolization of the search engine market for advertisers and users. In Section 4 we incorporate the specific features of a search engine market into a two-sided model of monopolistic internet search engine. Further, we employ the two-sided framework in order to analyze abusive conduct in the online search advertising market. There we compare the results under social optimum to the performance of a monopolist and show that monopoly results in under-provision of quality relative to the social optimum.[9] Section 5 concludes and discusses possible remedies to address the above mentioned deficiencies. We argue that the evidence on increasing concentration and the theoretical results in the paper suggest that some form of intervention is needed in order to avoid abusive behavior by the dominant platform and to prevent the deterioration in quality and relevance of search results.

market is broader than online search and includes product search, hence finding that Amazon also competes with Google.

[9] In the more technical companion paper Motchenkova et al. (2012) we confirm that similar results hold in a two-sided oligopolistic market that is dominated by a single platform for a range of policy relevant parameter values.

2 Related Literature

Most of the existing literature focuses on the advertising side of search engines (see e.g. Edelman et al. (2007), Varian (2007), Ellison and Ellison (2004), Chen and He (2006), or Athey and Ellison (2011)). In this leterature, search engines are seen as a way for consumers to find commercial services or products they want or as some from of improved yellow pages. Given the two-sided nature of search and its similarity to 'yellow-pages', the obvious analytical tools to use would be those developed in the literature on two-sided markets (see e.g. Rochet and Tirole (2003, 2006), Caillaud and Jullien (2003), Armstrong (2006), Armstrong and Wright (2007), or Gomes (2010)). The search engine business fits well within the models of two-sided markets after some proper modification and adaptation of existing models and taking into account the importance of quality improving capital investments (or innovation efforts) by the platform. This point will be central to our analysis and it differentiates our analysis from much of the existing literature. The issue of quality and innovations has not been addressed in the theoretical literature on two-sided markets so far. Moreover, also surprisingly, there are very few attempts to model a search engine as a two-sided platform (exceptions are Jeon, Jullien, and Klimenko (2011), and Halaburda and Yehezkel (2011)).

Another stream of the literature looks at the importance of the quality of information provided by the search engine, but does not take into account its two-sidedness and alleged network externalities (see e.g. Pollock (2010) and White (2008)). The approach we take is also very different from Pollock (2010) and White (2008), while it still emphasizes the importance of quality considerations for the search engine market. Turning to our approach, it should be stressed that the two primary groups a search engine sits between are users and advertisers. There are many examples of markets in which two or more groups of agents interact via intermediaries or "platforms." Surplus is created when the groups interact. However, in some cases also cross-group externalities are present, and the benefit enjoyed by a member of one group depends upon how well the platform does in attracting customers from the other group. This general idea articulated in Armstrong (2006) seems to fit very well the situation in an internet search engine market with end users on the one side and advertisers on the other side, where quality of the search engine is important for both sides. Furthermore, a two-sided markets framework is convenient to analyze multi-homing by users and advertisers and the effects of strategies by dominant platform that limit multi-homing on either side of the market (see e.g. Armstrong and Wright (2007)).

Further, there is a number of articles on determination of the relevant market for on-line advertising, which highlight the differences between online and traditional advertising

and also between displayed and search-based advertising, within the class of online advertising. The recent examples are Ratliff and Rubinfield (2010), Etro (2011), Evans (2009), or Goldfarb and Tucker (2011). See also French Competition Authority report (2010). These references imply that there is no substitutability between online and traditional advertising and only limited substitutability between displayed and search-based advertising. Hence, search-based advertising can be considered as a separate market. In this paper we mainly concentrate on the market for search-based advertising, where two-sided aspect and innovation incentives aimed at increasing quality and relevance of search results play a crucial role. For the search-based advertising segment of the market the technology of matching adds on the one side to search queries by users on the other side is essential. Search-based advertising is facilitated by the search platform and, actually, can only exist on the basis of such a platform.

3 Overview of the Legal Issues

A recent investigation by the European Commission identified four concerns where Google business practices may be considered as abuses of dominance.[10] Firstly, in its general search results on the Web, Google displays links to its own vertical search services differently than it does for links to competitors. In connection to this the European Commission expresses concerns that this may result in preferential treatment compared to that provided to competing services. Secondly, there is a concern that Google may be copying original material from the websites of its competitors and using that material on its own sites without their prior authorization. In this way Google appropriates the benefits of the investments of competitors. This in turn could reduce competitors' incentives to invest in the creation of original content for the benefit of internet users. The third concern relates to agreements between Google and partners on the websites of which Google delivers search advertisements. The agreements result in de facto exclusivity requiring them to obtain all or most of their requirements of search advertisements from Google, thus shutting out competing providers of search advertising intermediation services. The Commission's fourth concern relates to restrictions that Google puts to the portability of online search advertising campaigns from its own platform to the platforms of competitors. There is a risk that Google imposes con-

[10] See, the recent investigations of Google by DG Competition of the European Commission in Case 39740 Foundem/Google; Case 39768 Ciao / Google; Case 39775 1plusV/Google (30.11.2010). The Commission has not also excluded the possibility of opening investigations for other related markets, such as applications for mobile phones. See Charles Arthur, Google faces mobile services pressure in antitrust case, The Guardian (July 20, 2012) reporting European Commissioner's Almunia statements. See the EC website at http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/12/372&format=HTML&aged=0&language=EN&guiLanguage=en.

tractual restrictions on software developers which prevent them from offering tools that allow the seamless transfer of search advertising campaigns across AdWords and other platforms for search advertising.

In this section of the paper we identify some competition law issues arising from the above discussion of the recent concerns outlined by the European Commission. We identify three types of abuses: these are strategies reducing multi-homing, leveraging, and exploitative practices. All of these strategies reinforce the trend towards increasing concentration in the search engine market even further. We will discuss each of them in the subsequent three sub-sections, respectively. In the formal analysis section we address the consequences of monopolization of the search engine market for advertisers and users (in the form of higher prices than in a perfectly competitive market for advertisers) and deterioration of quality improving innovation efforts by a dominant search engine, which can inflict negative impact on both users and advertisers in the form of reduction in the quality and relevance of search results.

3.1 Strategies reducing multi-homing

We assume the dominant position of Google in the paid search market, because of its high market shares (more than 50%)[11] and the existence of barriers to entry in the form of network effects and the substantial fixed costs related to R&D or the development and maintenance of service infrastructure. Search engines do not operate as neutral platforms but may adopt strategies to increase their revenue and thus optimize advertising and placement profits. This can be achieved by reducing multi-homing at the advertising and the end users side of the market (the two being interlinked). Strategies reducing multi-homing may take different forms.

As previously noted, in November 2010, the Commission decided to initiate proceedings under Article 102 TFEU against Google for a number of practices, including the alleged imposition of exclusivity obligations by Google on its advertising and distribution partners, preventing them from placing certain types of competing ads on their web sites, as well as on computer and software vendors, with the aim of shutting out competing search tools and for suspected restrictions on advertisers as to the portability of campaign data to competing online advertising platforms, again in order to limit the multi-homing of online advertising campaigns.[12] In an opinion delivered in December 2010 on the competitive operation of

[11] The European Commission has cited data proving that Google has a market share for paid search in Europe of more than 95% of the market. See, J. Almunia, Competition in Digital Media and the Internet, UCL Jevons Institute Lecture, London, 7 July 2010, SPEECH/10/365.

[12] European Commission, Antitrust: Commission probes allegations of antitrust violations by Google, November 30th, 2010, IP/10/1624; Cases COMP/C-3/39.740, COMP/C-3/39.775 & COMP/C-3/39.768.

online advertising, in the context of its consultative function to the French government, the French Competition Authority (FCA) also noted the existence of high entry barriers in the industry and the possibility that Google might use a number of practices to increase barriers to entry and thus maintain or reinforce its dominant position in the paid search market.[13] The FCA provided survey evidence that the privileged position of Google as a percentage of queries constitutes the main justification for opening AdWords account by advertisers. The high fixed costs of developing algorithms and hosting pages (corresponding to several hundreds of millions of Euros), the enhancement of the algorithm by the size of the search engine and the number of queries it receives, as well as Google's lead with regard to exhausting indexing on the end users' part of the market, combined with the lack of traffic on other search engines and the difficulty of launching an alternative search engine, on the advertisers' side of the two-sided market, led the FCA to conclude that the "one click away competition" argument advanced by Google does not hold, at least for the advertisers' side of the market. Relying on its market position and the high barriers to entry, Google could thus adopt practices that would aim to marginalize or exclude its competitors in the paid search market, in particular by artificially putting up barriers to entry in the search engine or search-based ads market. These can be of contractual or technical nature. The FCA listed among these practices, the existence of exclusive agreements related to indexed content, the inclusion of exclusivity clauses in the AdSence contracts concluded between Google and the advertisers, obstacles to competing search engines by content web-sites controlled by Google, such as YouTube and obstacles to the simultaneous use by advertisers of several search-based ads platforms. One could also add to this list input foreclosure of the upstream market of programmers and software developers by Google.

Several of these practices may fall under the scope of EU competition law, and in particular Article 102 TFEU (for both contractual and unilateral practices, although there is a possibility that Article 101 TFEU may apply to the former). It is also advisable to adopt a precautionary ex ante approach and subject to scrutiny merger activity that enhances the dominant position of Google and its capacity to reduce multi-homing (this aspect is not examined in this paper).

Concerning antitrust enforcement, the exclusivity strategies adopted by Google are likely to foreclose its competitors, search engines, from an important customer base (customer foreclosure) of advertisers and thus lead to their marginalization/exclusion, the subsequent reduction of innovation in the search engine market and eventually consumer harm. We have no information on the exact magnitude of customer foreclosure that may result from Google's

[13] French Competition Authority, Opinion No. 10-A-29, December 14, 2010 on the competitive operation of online advertising.

activities, such as the one referred to in the complaints at the European Commission. It is nevertheless clear that a foreclosure of competing engines from an important part of the advertising market through contractual or de facto exclusivity arrangements might reduce their ability to achieve the minimum efficient scale and thus to compete effectively with Google. The theory of harm (anti-competitive foreclosure) advanced in this case could be that by blocking competing search advertisers from gaining the requisite level of search traffic necessary to maintain a viable and competitive search advertising platform, Google has abused its dominant position.

These practices fall certainly within the scope of EU competition law, in particular Article 102 TFEU. In *Suiker Unie v Commission* the Court of Justice of the European Union (CJEU) noted that exclusivity may be an abuse if competitors are left with no available distribution channels through which they can market their products on a sufficiently large scale.[14] In *British Gypsum*, the General Court held that exclusive dealing was only abusive when it applied to 'a substantial proportion of purchases', concluding that in these circumstances, exclusivity would be 'an unacceptable obstacle' to market entry.[15] The General Court, confirmed by the CJEU, has also found in *Van den Bergh Foods Ltd v Commission* that the exclusivity might not result from specific legal obligations, but may take the form of de facto exclusivity: in this case, an ice cream supplier had abused its dominant position by offering an exclusive freezer cabinet free of charge to retailers who did not have their own freezer cabinet or a freezer cabinet supplied by a competitor. According to the Court, the tying of 40 per cent of outlets on the relevant market was an abuse because it had the effect of foreclosing competitors even if there was demand for their products.[16]

The European Commission has spelled out in its recent *Enforcement priorities guidance*, the main features of the competition analysis to be followed in exclusionary abuse cases.[17] First, the Commission will have to establish the existence of an anti-competitive foreclosure by looking to the position of the dominant undertaking (a super-dominant firm with high market shares undertakes a special responsibility to protect the competitive process), the position of customers and the difficulties they might have to switch or to counter the conduct of the dominant undertaking, the extent of the alleged abusive conduct (for example its duration), actual evidence of foreclosure (for example, following the adoption of such practices the market shares of the dominant undertaking have risen sharply), the existence of internal

[14] Joined cases 40 to 48, 50, 54 to 56, 111, 113 and 114/73 *Coöperatieve Vereniging "Suiker Unie" UA v Commission*, para 486.

[15] Case T-65/89 *British Gypsum*, paras 66 - 68.

[16] Case T-65/98 *Van den Bergh Foods Ltd v Commission* [2003] ECR II-4653 paras 159 - 160.

[17] Communication from the Commission – Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings [2009] OJ C 45/2.

documents and other direct evidence of exclusionary strategy. According to the Commission, it is easier to establish the finding of anti-competitive foreclosure, with regard to exclusive purchasing, if the dominant firm is an unavoidable trade partner for all or most customers (advertisers here), in which case even an exclusive purchasing obligation of short duration can lead to anti-competitive foreclosure. The dominant firm has of course the ability to argue efficiencies, but it is highly unlikely in practice that these will be able to outweigh the anti-competitive effects and they have never done so for Article 102 TFEU cases, in particular for a firm with the alleged dominant position of Google.[18] The Commission's priority guidance does not provide an exact figure for assessing the degree of customer foreclosure required for the application of Article 102 TFEU. Nevertheless, the Commission's Guidelines on vertical restraints suggest that for single branding practices, it is likely that they will not benefit from Article 101(3) if the foreclosure at the retail level is higher than 30% or 40%, and this for non-dominant undertakings in the primary market/wholesale level. It follows that in presence of a dominant undertaking, lower levels of input/customer foreclosure may be sufficient to prove anti-competitive foreclosure and thus an infringement of Articles 102 TFEU (and also probably 101 TFEU).

These thresholds are not substantially different from those required in US antitrust law for the application of Sections 1 and 2 of the Sherman Act. US antitrust law traditionally finds no antitrust concern if the foreclosure percentage is less than 40%, for exclusive dealing agreements concluded by a monopolist,[19] although there have been cases where a lower percentage of foreclosure was found sufficient for establishing antitrust liability.[20] The Trade-Comet complaints in the US against Google could have given the occasion to US courts to clarify the interpretation of the case law with regard to single branding practices, but they were dismissed for procedural reasons.[21]

In conclusion, one could make an arguable case of anti-competitive foreclosure if there is

[18] In view of the fact that the Court applies a proportionality test instead of a trade-of between the efficiency gains and the anticompetitive effects, hence an undertaking with high market shares may be disadvantaged in defending its conduct by arguing efficiencies: Case C-52/09, *Konkurrenverket v. TeliaSonera Sverige AB*, [February 17, 2011], not yet published, para. 76 (noting that "if the exclusionary effect of that [conduct] bears no relation to advantages for the market and consumers, or if it goes beyond what is necessary in order to attain those advantages, that practice must be regarded as an abuse").

[19] Jefferson Parish Hosp. Dist./ No. 2 v. Hyde, 466 U.S. 2, 7 (1984).

[20] United States v. Microsoft Corp., 253 F.3d 34, 70-71 (D.C. Cir. 2001).

[21] Available at http://www.courthousenews.com/2010/03/08/Google%20opinion.pdf According to the complaint, (I) Google entered into exclusive syndication agreements with certain high-traffic online publishers, thus foreclosing competing search advertising platforms from an important source of paid search revenue, (ii) Google restricted advertisers access to data at AdWords that would have made it easier for them to evaluate the performance of their advertising campaigns and to switch or add competing advertising platforms and (iii) Google deployed default mechanisms that make it difficult for users to select a search engine other than Google.

evidence of a foreclosure of at least 40% of the online search advertising business from rival search advertising platforms. It will be, however, important also to prove that competing advertising platforms need to have access to high-traffic websites to build scale, that is, search engines are an effective distribution method for advertising. For example, advertisers might have access to vertical or 'niche' search engine providers, alternative horizontal search engines, which might have a more significant market share in specific geographic markets, such as Seznam in Czech republic (outside the EU market one could cite Baidu for China, Blekko for the US, Yandex for Russia). Blocking an entire distribution channel, such as search advertising, is likely to be considered as leading to substantial foreclosure of the market. However, it is important to distinguish between different types of search: 'query navigation', where a user needs to find a specific web site which he knows or assumes to be present on the Web, should be distinguished from 'transactional navigation', where the user aims to reach a destination where a further market interaction will take place (Hoboken, 2012). For advertisers, it is the latest category of search which is of importance as this can lead to the purchase of a product or a service. Crane notes that Google accounts for less than half of the volume of traffic of the websites where market transactions are held (Crane, 2011). This share might be even smaller for Web sites that have developed a strong and recognizable brand, such as the big travel search sites, Expedia, Travelocity and Priceline. This is certainly an empirical question.

Yet, these practices may reinforce concentration in this market, which, as we will show in the following sections, may lead to consumer harm. First, a monopolist has incentives to reduce the quality of the search engine for the organic search results valued by end users. Second, innovation in the market may also be affected.[22]

3.2 Leveraging

Google or the market leader in the search engine market may also attempt to leverage its market power to enhance the market position (and market power eventually) of the Internet web-sites they control (e.g. Google and the promotion of Google Maps, or Google Books). In particular, Google has diversified its activities in search related activities, such as digitizing documentary collections of certain university libraries and private editors (Google Books), offering new specialized search engines relating to News (Google News), price comparison websites (Google Shopping), maps (Google maps), videos (YouTube), the Internet browser Google Chrome, online applications (such as cloud computing) and other services and applications (including technologies for marketing and disseminating advertising, such

[22] These results are confirmed in presence of a dominant firm in the oligopolistic market of paid search in a companion paper Motchenkova et al (2012).

as DoubleClick). Some of these ancillary activities may maintain or strengthen Google's position in the paid advertising search market (defensive leveraging).

Some of the complaints leveled against Google at the European Commission include allegations of leveraging. First, Google has been accused of lowering the ranking of organic search results of competing vertical search engines, such as Foundem, and of raising the ranking of its own competing services. The Commission is investigating how Google's algorithms rank search results (are the algorithms for Google's products the same than for its competitors?), or if Google has employed targeted measures, such as black-listing or white-listing of particular websites. Google opposes these allegations by putting forward the argument that it is not in its interests to bias the presentation of search results, as end users may detect this reduction of the quality of the search engine (in terms of relevance) and then turn to competing search engines. Second, the complainants allege that Google lowered the "quality score" for sponsored links of competing vertical search providers. Similar concerns have been identified by the French Competition Authority. In its Navx decision, the FCA dealt with the sudden closure of Navx's AdWords' account by Google for violation of its content policy. The FCA considered that such closure without warning was discriminatory and non-transparent and asked Google to re-establish Navx' account and to ensure the transparency of its content policy. Google proposed commitments as to the transparency of AdWords.[23] In its investigation on the competitive operation of online advertising,[24] the FCA also noted that Google and its subsidiaries participated to the Ad Words service bidding, by purchasing keywords related to their activity, thus artificially raising the cost for competing vertical search engines or competitors of Google's ancillary services and increasing the traffic on its site (and consequently its advertising revenues). This exclusionary bidding may exclude or marginalize competitors and thus constitute a competition law infringement.

The factual background of these allegations is highly imprecise and contested. For example, the existence of a bias of Google for its own services is widely debated and constitutes after all an empirical issue that cannot be examined in this study.[25] Should these allegations be true, however, it is likely that this might increase the web traffic of Google's well established ancillary services, as users are more likely to click on a result figuring at the top of the rankings and subsequently to purchase services from this website (Yang & Ghose, 2010). By biasing its search results against competing vertical services, Google may thus cause their exclusion from the market, because of lower end user and advertising revenues exposure (input foreclosure). The single monopoly profit theorem will not limit the incentive

[23] French Competition Authority, decision 10-D-30.

[24] See, Opinion No 10-A-29 of 14 December 2010 on the competitive operation of online advertising, available at http://www.autoritedelaconcurrence.fr/doc/10a29_en.pdf, p. 44.

[25] Compare, for example, Endelman & Lockwood (2011) with Wright (2011).

of Google to proceed with this vertical input foreclosure strategy: first because Google is not charging end users for the organic search, second because the strict conditions of the monopoly profit theorem do not apply in this context (Elhauge, 2009). Consumer harm for end users follows from the higher level of market concentration that will result from the exclusion of vertical search engines or other competing websites as well as the decrease of the quality of the search engine (in view of the substitution between organic results and sponsored results or deterioration of quality of search algorithms), and of lower innovation rates in the industry (see the following sections). Advertisers will also have to pay higher advertising charges, following the reduction of competition by vertical search engines and other websites, and the extension of Google's market power.

The application of EU competition law raises interesting questions. It is possible to conceive Google's universal search engine as an indispensable distribution tool, a sort of essential facility to which competing vertical search engines and websites should have access to. For example, in *Oscar Bronner*, the Court of Justice of the EU examined if access to a home delivery distribution network was indispensable for the distribution of daily press.[26] As it was previously noted, the cost structure of Google's universal search engine is close to that of natural monopolies (important fixed costs and low marginal costs), thus making it theoretically possible for the plaintiff to prove that the creation of a universal search engine is not a realistic potential alternative and that access to the existing system is therefore indispensable. Indeed, it is clear since the case law of the Court in *Oscar Bronner* that "it is not enough to argue that it is not economically viable by reason of the small circulation" (in this case traffic of the website) to establish this new universal search platform. "(I)t would be necessary at the very least to establish [...] that it is not economically viable to create a (second universal search platform) with a circulation (traffic) comparable to that of (Google)".[27] It is clear that such evidence will be particularly difficult to bring for the plaintiff and in any case requires some concrete empirical analysis.

The recent judgment of the Court in *TeliaSonera* indicates nevertheless that proving the "indispensability" of access to the input controlled by the dominant firm might not be such a difficult condition to fulfil for plaintiffs after all, and it might not even be required for the application of Article 102 TFEU to discriminatory practices by a dominant undertaking. First, it is only a requirement for refusals to supply and not for other types of abuses, such as the supply of services or selling of goods on conditions which are disadvantageous or in which there might be no purchaser.[28] According to the Court, the effectiveness of

[26] Case C-7/97 *Oscar Bronner GmbH Co. v. Mediaprint* [1998] ECR I-7791.
[27] Ibid.
[28] Case C-52/09 *Konkurrensverket v. TeliaSonera Sverige AB*, February 17, 2011, para. 55.

Article 102 TFEU might be compromised if the limiting principles for imposing a duty to deal, proclaimed in Oscar Bronner, were transposed from refusals to deal to all types of abuses.[29] At best, the Court envisions the condition of indispensability as a tool to unveil if the undertakings excluded are at least as efficient as the dominant undertaking. However, the Court examines also if the practice might be capable of having anti-competitive effects on the markets concerned, even when the wholesale product/service or input is not indispensable.[30] Second, there is no need to provide evidence of actual anti-competitive effects, the potential exclusion of an equally efficient competitor is a sufficient condition for Article 102 TFEU to apply.[31] It becomes thus clear that proving the indispensability of access to the dominant firm's input collapses to proving the possibility that equally efficient competitors may potentially be excluded. The cost structure of the dominant undertaking is of course the first element to consider for price related practices. But the Court is also open to the possibility that the "level of the dominant undertaking's costs is specifically attributable to the competitively advantageous situation in which its dominant position places it", in the absence of information on the dominant firm's costs. This of course places Google or, any other firm controlling the search market to a difficult stance, as they will be deemed enjoying an advantageous situation, should the relevant market be defined as that of online search. Indeed, search might be conceived as a pivotal product/service, which if controlled might influence the effectiveness of competition in a lot of related markets. The General Court also considered the possible application of the Oscar Bronner criterion of indispensability of access to other forms of abuses in *Kingdom of Spain v. Commission*,[32] again a margin squeeze case, and noted the following:

> "74. The Court of Justice has made it clear that it cannot be inferred from *Bronner* that the conditions to be met in order to establish that a refusal to supply is abusive must necessarily also apply when assessing the abusive nature of conduct which consists in supplying services or selling goods on conditions which are disadvantageous or on which there might be no purchaser. Such conduct may, in itself, constitute an independent form of abuse distinct from that of refusal to supply.

[29] Ibid., para. 58.

[30] Ibid., para. 72.

[31] Case C-209/10, *Post Danmark A/S v. Konkurrencerådet* [March 27, 2011], not yet published, para. 25; Case T-398/07, *Kingdom of Spain v. European Commission* [March 29, 2012], not yet published, para, 90-92 (for price related abuses). For no-price related abuses, there is no explicit additional requirement for an as efficient as competitor test: Communication - Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings, [2009] OJ C/7, para. 19-21.

[32] Case T-398/07, *Kingdom of Spain v. European Commission* [March 29, 2012], not yet published, para 68.

75. If *Bronner* were to be interpreted otherwise, that would amount to a requirement that before any conduct of a dominant undertaking in relation to its terms of trade could be regarded as abusive the conditions to be met to establish that there was a refusal to supply would in every case have to be satisfied, and that would unduly reduce the effectiveness of Article [102 TFEU]".

Hence, the indispensability condition does not work outside a clear refusal to deal framework. Yet, it seems unclear how Google's practices might be qualified as a refusal to deal, as Google does not refuse to provide access to its search engine, but only avoids to list the websites of its vertical competitors at the first places in the ranking. Could the refusal to deal be presented as a refusal to grant access to the highest ranking in the search engine? Should this proposition be accepted, every company whose website is not highly ranked (or at least ranked at the first page of the search results) could bring an antitrust case against Google, should Google be an actual or potential competitor with it at a vertical level... One can immediately understand that such characterization of the facts of the case leads to a potential unlimited liability for Google and cannot of course be of its interest. This leaves us of course unsettled as to the exact characterization of the alleged abuse by Google of its dominant position.

Another avenue is offered by some older case law where a duty to deal in a non-discriminatory manner was imposed on the dominant undertaking. The main issue raised in not the refusal of Google to grant access to its search engine,[33] but to discriminate between its own services and those of its competitors. As the Commission explains in its *Enforcement Priorities* Guidance (2009, para 76), "typically competition problems arise when the dominant undertaking competes on the "downstream" market with the buyer whom it refuses to supply", the term "downstream market" referring to the market for which the refused input is needed in order to manufacture a product or provide a service. The same conclusion imposes itself with regard to discriminatory practices. In *Sabre/Amadeus*, a statement of objections was sent to Air France for allegedly discriminating by refusing to provide Sabre (a competing Computer Reservation System owned by British Airways and American Airlines) with the same information and at the same time it was providing it to its own CRS, Amadeus.[34] In *British Midland v Aer Lingus*, the abuse was Aer Lingus's refusal to provide interline facilities to British Midland when the latter entered the London Heathrow – Dublin route. [35] British Midland could compete effectively and operate profitably over time. The refusal to

[33] One could think of applying here the classic "essential facilities" cases of Sealink/B&I – Holyhead [1992] CMLR 255; *Sea Containers v. Stena Sealink* [1994] OJ L 15/8.

[34] Commission, Press Release IP/00/835 (2000).

[35] *British Midland v Aer Lingus* [1992] OJ L96/34, para. 14 – 30.

supply, however, raised its costs and shrank its revenues. Aer Lingus had provided interlining facilities to British Midland before on other routes. The refusal to interline was clearly a reaction to entry aimed at protecting the dominant position on the relevant market.[36] The European Commission has also recently launched an investigation with regard to Apple's policy to impose through its license agreement with independent developers a requirement to use only Apple's native programming tools and approved languages when writing iPhone apps, to the detriment of third-party layers.[37] For the Commission, this practice could have ultimately resulted in shutting out competition from devices running platforms other than Apple's. Following the launch of the investigation by the Commission, Apple removed these restrictions, restoring the use of third-party layers and so giving developers more flexibility.

Should it be proven that Google has terminated contracts and cancelled AdWords accounts for vertically competing undertakings, the practice may also fall under the classic *Commercial Solvents* jurisprudence of the Court, a case concerning refusal to supply an indispensable raw material, regarding the termination of existing supply relationships.[38] In *Commercial Solvents*, the Court did not require a finding of consumer harm for an abusive refusal to supply to be established but took the view that the impairment of an effective competitive structure in the EU was sufficient. In *Clearstream*, a case concerning access to the Clearstream security clearance system, which was an unavoidable business partner as the only holder of German securities kept in collective safe custody, the Commission found that not supplying its downstream competitor, Euroclear Bank, harmed innovation and competition in the provision of cross border services and ultimately the consumers within the single market.[39] The Court of First Instance (now the General Court) held that the conduct had the *tendency* to harm innovation and, ultimately, customers of cross-border secondary clearing and settlement services.[40] The amount and cogency of evidence required for the proof of anticompetitive effect is thus lower than that required in *Oscar Bronner* for refusals to supply (eliminating all competition on the part of the undertaking requesting access) or *Magill* and *IMS/NDC Health* for refusals to license (elimination of all competition on the market) or in *Microsoft* for refusal to provide interoperability (elimination of all effective competition, Nazzini, 2012).[41]

[36] ibid, para. 26.

[37] Antitrust: Statement on Apple's iPhone policy changes, IP/10/1175, September 25, 2010.

[38] Joined cases 6-7/73, Istituto Chemioterapico Italiano S.p.A. and Commercial Solvents Corporation v Commission [1974] 223.

[39] European Commission, *Clearstream* [2009] OJ C165/7, paras 228, 231, and 232

[40] Case T-301/04 *Clearstream Banking AG and Clearstream International SA v Commission* [2009] ECR II-3155, para 149.

[41] Case T-69/89 *Radio Telefis Eireann v Commission* [1991] II-485 (*Magill*), appeal dismissed in Case C-241/91 and 242/91 P *Magill*; Case C-418/01 *IMS Health GmbH & Co OHG v NDC Health GmbH & Co KG* [2004] ECR I-5039; Case T-201/04 *Microsoft Corpn v Commission* [2007] ECR II-3601.

A further option is to characterize the conduct as some form of tying. Google may be found to have tied universal search with specialized search tools, which are allegedly two separate products. This could qualify as technical tying in EU competition law, as the two distinct products are integrated in one (Google's Universal search). One might quickly understand why it would be a good strategy for Google's competitors to insist on such theory of harm. In order to succeed a tying case in EU competition law, the plaintiff needs to prove that (i) the tying and the tied products are two separate products, (ii) the undertaking concerned is dominant in the market for the tying product, (iii) the practice (an agreement or technological integration) does not give customers a choice to obtain the tying product without the tied product (coercion), and (iv) the practice in question forecloses competition.[42] These are generally easier conditions to satisfy than the standards of the CJEU on refusals to deal, as once there is tying of two distinct products and the undertaking is dominant, a simple likelihood of anticompetitive effects may be sufficient evidence for the application of Article 102 TFEU.

Certainly, Google may argue that Universal search and specialized search tools are one product, rather than distinct ones, as search users would not likely integrate universal search with specialized search in the absence of a combined offering. Furthermore, in the US context, the distinct product rule has been abandoned for technical tying as it was thought backward-looking and therefore systematically a poor proxy for overall efficiency in the presence of new and innovative integration.[43] These arguments notwithstanding, the separate product test is more supply-oriented in EU competition law (Economides and Lianos, 2009). First, for a product to be considered distinct, it should not necessarily constitute a relevant market test: two products may be sufficiently differentiated that a company can be found to tie or bundle two distinct products. Second, the existence of different sources of supply and, in particular, of competing suppliers of the alleged tied product may provide an indication that the products are distinct.[44] The presence of undertakings specialized in the manufacture

[42] Case T 201/04, *Microsoft Corp. v. Commission of the European Communities* [2007] ECR II-3601. The European Commission in its Guidance on its enforcement priorities in applying Article 102 TFEU to abusive exclusionary conduct to dominant undertakings, [2009] OJ C 45/7, para. 50 does not refer to the condition of coerción. Indeed, some authors have previously argued that it is redundant (Economides and Lianos, 2009, at 519).

United States v. Microsoft Corp., 253 F.3d 34, 89 (D.C. Cir. 2001).

[43] *United States v. Microsoft Corp.*, 253 F.3d 34, 89 (D.C. Cir. 2001).

[44] The Court noted that "a not insignificant number of customers continue to acquire media players from Microsoft's competitors, separately from their client PC operating system, which shows that they regard the two products as separate": Case T 201/04, *Microsoft Corp. v. Commission of the European Communities* [2007] ECR II-3601, para. 932. The *Commission's Enforcement Priorities Guidance* also emphasizes the supply side by finding that "two products are distinct if, in the absence of tying or bundling, a substantial number of customers would purchase or would have purchased the tying product without also buying the tied product from the same supplier, *thereby allowing standalone production for both the tying and the tied*

and sale of the tied product without the tying product constitutes indirect evidence of the distinctness of the products. If we follow these rules in our case, the existence of a significant number of undertakings present only in the specialized (vertical) search may be a factor indicating that universal search and specialized search are distinct products.

The requirement of anticompetitive foreclosure can also be easily established by the plaintiff in tying cases. In *Microsoft*, the General Court found that there was a "reasonable likelihood" that the tying between Windows and WMP "would lead to a lessening of competition so that the maintenance of an effective competition structure would not be ensured in the foreseeable future".[45] A closer look at the alleged anti-competitive effects and their analysis by the General Court also reveals that most of these anti-competitive effects were harming consumers indirectly and emanated from the fact that Microsoft—as compared with its media player rivals—benefited from an "unparalleled advantage with respect to the distribution of its product" that "inevitably had significant consequences for the structure of competition" on the downstream market.[46] The underlying objectives of Article 102, in particular its emphasis on preserving consumer choice in the presence of a firm with an entrenched dominant position, may explain these relatively strict antitrust standards, in particular with regard to technical tying.[47]

A further possibility would be to argue that Google's strategy constitutes a "structural abuse" subject to Article 102 TFEU, following the long-established principle in *Continental Can* that "any commercial practice" damaging the maintenance of an effective competitive structure should be prohibited. This may happen if the dominant undertaking strengthens such position "in a way that the degree of dominance reached substantially fetters competition, ie that only undertakings remain in the market whose behavior depends on the dominant one".[48] This might take different forms, which could include lowering the ranking of organic search results of competing vertical search engines or the strategy of acquiring minority shareholdings in number of firms[49] with the aim to reinforce the network effects in the market and entrench ultimately the dominant position of the undertaking. Struc-

product".

[45] Case T 201/04, above, para. 1089.

[46] Ibid., para. 1054.

[47] *Enforcement Priorities Guidance*, para. 53, "(t)he risk of anti-competitive foreclosure is expected to be greater where the dominant undertaking makes its tying or bundling strategy a lasting one, for example through technical tying which is costly to reverse. Technical tying also reduces the opportunities for resale of individual components".

[48] Case C 6/72 *Continental Can Europemballage Corporation and Continental Can Company Inc. v Commission of the European Communities.* ECR [1973] 215, para. 26.

[49] David Gilo, The Anticompetitive effect of passive investment, 99 Michigan Law Review, p. 1-47 (2000), (finding that passive investment in an industry with only a few firms will raise prices even when firms are not colluding).

tural abuses are distinct from other exclusionary abuses, in that the latter are behavioral in nature,[50] hence the conduct requirement has less evidential importance in these cases.

To this extensive scope of Article 102 TFEU that can cover a variety of commercial strategies, one could also add the profound evidential asymmetry that exists in EU competition law between the standard of proof for anti-competitive effect and that for outweighing efficiency gains, thus rendering the task of the defendant even more difficult (Lianos, 2009). Despite the recent rhetoric towards an economic effects-based approach, following the publication of the Commission's *Enforcement Guidance*, the case law of the Court of Justice of the EU still emphasizes the role of principles, such as the protection of the "buyer's freedom as regards choice of sources of supply" or the protection of competitors' access to the market, which might seem antithetical to mainstream economics, although the Court makes the effort to package these principles in a more economics-friendly way, by also applying the as efficient as competitor test in the context of price related exclusionary abuses.[51] Yet, the as efficient as competitor test has not been extended to non-price abuses, hence theoretically there is no limitation to the application of competition law in these cases, other than the specific standards developed for each category of abusive conduct.

Google's practices may thus fall under the scope of Article 102 TFEU, under any of these specific standards of abuse (i.e. refusal to deal, discrimination, tying, structural abuse...). The fact that this is a rapidly evolving high technology market may not play a limiting role in EU competition law enforcement and could thus defeat a claim that imposing a duty to provide access or to unbundle in such a context, without evidence of actual anti-competitive effects, might jeopardize the incentives of the dominant firm to innovate and thus the level of innovation in this market. As the Court noted in *TeliaSonera*, "(p)articularly in a rapidly growing market, Article 102 TFEU requires action as quickly as possible, to prevent the formation and consolidation in that market of a competitive structure distorted by the abusive strategy of an undertaking which has a dominant position on that market or on a closely linked neighboring market, in other words it requires action *before* the anti-competitive effects of that strategy are realized".[52] The Commission has also taken a careful position with regard to the balancing of incentives to innovate in high technology markets. In its *Microsoft* case, the Commission did not undertake the difficult task of balancing incentives to innovate, as it assumed that the incentives of Microsoft would not be hampered by the prohibition of the refusal to supply interoperability, as innovating was considered a key

[50] Jonathan Faull & Ali Nikpay (ed.), The EC Law of Competition (OUP, 2007), p. 394.

[51] Case C-209/10, *Post Danmark A/S v. Konkurrencerädet* [March 27, 2011], not yet published, para. 21 and 26.

[52] Case C-52/09 *Konkurrensverket v. TeliaSonera Sverige AB*, para. 108.

factor for competing in a fast moving industry.[53] The Commission also found that the level of innovation in the whole industry would also increase, taking into account the incentive of the competitors of the dominant firm to innovate in the future.[54] Similar considerations may apply in this case, in view of the gatekeeping role of search engines in the development of the Internet.

3.3 Exploitative practices to Internet users and advertisers

Exploitative practices to Internet users or advertisers (in either side of the market) may take different forms. First, the participation of Google and its subsidiaries in AdWords bidding might lead the amount of the bid not to be proportional to the value of the service but to include a forcing-out premium. This could arguably constitute an excessive pricing claim, as it might lead to higher prices than in a perfectly competitive market for advertisers. The conditions for proving excessive pricing are quite strict in EU competition law thus imposing a higher standard of persuasion and cogency of evidence for the plaintiff. In *United Brands*,[55] the Court recognized that excessive prices can amount to an abuse, but found that the Commission did not meet the burden of proof, as it did not consider all objective justifications for price differentials between different markets. The Court laid down the standard for finding excessive pricing as follows:

> "Charging a price which is excessive because it has no reasonable relation to the economic value of the product supplied would be such an abuse... The questions... to be determined are whether the difference between the costs actually incurred and the price actually charged is excessive, and, if the answer to this question is in the affirmative, whether a price has been imposed which is either unfair in itself or when compared to competing *products*".[56]

Thus, the cost/price difference must be excessive and the price must either be unfair in itself or when compared to competing products (yardstick competition). These conditions are notoriously difficult to prove.

A more recent case may nevertheless be useful for Google's plaintiffs. In *Kanal 5*[57], the referring court asked whether the fact that a copyright management organization which

[53] Commission Decision, *Microsoft/W2000* (COMP/C–3/37.792), 24 March 2004, para. 725.
[54] Ibid., para. 783.
[55] Case 22/76, *United Brands v Commission* [1978] ECR 207.
[56] Ibid., para. 250-252.
[57] Case C-52/07 *Kanal 5 Ltd v Föreningen Svedska Tonsättares Internationella Musikbyrå* (STIM) UPA [2009] 5 C.M.L.R. 18.

enjoys a *de facto* monopoly in a Member State on the market for making available music protected by copyright for television broadcasts applies, in respect of the remuneration paid for that service, a remuneration model according to which the amount of royalties is calculated on the basis of the revenue of companies broadcasting those works and the amount of music broadcast constitutes an abuse of a dominant position prohibited by art. 102 TFEU and whether the fact that another method would enable the use of those works and the audience to be identified and quantified more precisely may have an effect on that classification. The Court considered that "a remuneration model may amount to an abuse, in particular when another method exists which enables the use of those works and the audience to be identified and quantified more precisely and that method is capable of achieving the same legitimate aim [...] without however leading to a disproportionate increase in the costs incurred for the management of the contracts and the supervision of the use of musical works protected by copyright".[58] Should Google's plaintiffs prove that the remuneration method employed by Google in the bidding process is artificially inflated and that another neutral and cost effective method exists, they might have a workable case under Article 102 (a) TFEU.

Price discrimination among different advertisers or Internet web-sites might also constitute an additional exploitative strategy: there should be in this case evidence of a competitive disadvantage under Article 102 (c). This is easier to prove – the case law requires only that the behavior tends to distort competition, and there is no need to adduce evidence of an actual quantifiable deterioration in the competitive position of the business partners taken individually.[59] The reduction of competition might refer to the foreclosure of talented programmers by Google, everything that can put Google's rivals (vertical search engines and other websites) in competitive disadvantage. One could also add the existence of consumer harm from unwelcoming advertising, but this is hard to prove as an antitrust violation.

In the remainder of the paper for the purpose of building the formal model and deriving policy implications we will concentrate on the consequences of the strategies identified in this section that may lead to monopolization or abuse of dominant position through excessive pricing and deterioration of the quality of search results. The theoretical model of section 4 below analyzes the impact of monopolization of the search engine market on advertisers in the form of excessive pricing and on investments in improvements of quality of search results by search engines themselves. We also show that the trend towards concentration in this market may lead to consumer harm. First, a monopolist has incentives to reduce the quality of the search engine for the organic search results valued by end users. Second, the level of innovation in the market may also be affected. More generally, we show that monopoly is

[58] Ibid., para. 40.

[59] Case C-95/04 *British Airways v. Commission* [2007] 4 CMLR 22, para. 144-145.

sub-optimal both in terms of harm to advertisers in the form of excessive prices, harm to users in the form of reduction in quality of search results, as well as harm to the society in the form of lower innovation rates in the industry.

4 The Model of Monopolistic Internet Search Engine

4.1 Structure of the Search Engine Market

In order to model the internet search market we first have to understand the structure of this market. As we discussed above, the search engine market has certain distinctive features related to structure, costs and pricing, which should be taken into account when building a theoretical model.

Firstly, the structure of the search engine market has a multi-sided aspect in which the search engine acts as a platform intermediating between content providers, users/searchers, and advertisers. This feature of the search engine market calls for applications of two-sided markets models.

Secondly, we discuss the pricing structure. Search engines do not directly charge users for their service but supply it for free, while content providers are actually subsidized by the search engines. Hence, in our framework we assume that search engines cannot set prices for users (whether positive or negative) but rather are constrained to price at zero. In the formal model we express it by setting $p_U = 0$. In addition, we do not model explicitly the content providers' side of the market. But rather implicitly incorporate them into the search engine technology through additional cost component. Next, similar to Pollock (2010) we assume that the pool of material made available by content providers is available to all search engines and, as such, content providers can be ignored as (strategic) agents leaving us to focus solely on the other three types (users, advertisers, and platform (or search engine) itself).

Next, we turn to the pricing structure on the advertisers' side of the market. Our approach to modeling advertisers' side of the market is simplified compared to Edelman et al (2007), Varian (2007), Ellison and Ellison (2004), Chen and He (2006), Athey and Ellison (2011), or White (2008). Since the primary aim of our project is to concentrate on the impact of network effects and quality improving innovation efforts, we believe the advertisers' side of the market can be modeled using the general approach in Armstrong (2006). This will capture an important characteristic of this market, namely that advertisers are required to pay strictly positive prices for search engine services. In the formal model the price charged to advertisers is denoted by $p_A > 0$. Advertisers also value the quality of the search engine. However, contrary to users the marginal cost of serving one additional advertiser is strictly positive. In the formal model we denote it by $f_A > 0$. This reflects the cost of,

for example, signing the contract, assisting, or arranging the auction procedures for each particular advertiser.

Finally, the important feature of the search engine market relates to technology and costs. In particular, search engines are R&D intensive and the market generally displays high levels of innovation. This innovation usually occurs within a particular software environment that determines the type of engineers (and specific skills) required. These specific skills may be scarce and very costly. In addition, considerable investment efforts are necessary for supporting, monitoring, and sponsoring content providers. This implies that running a search engine service is highly capital intensive. We will denote these investments (or innovation efforts) as k – quality improving innovation efforts. Both of these types of cost, whether related to R&D and acquiring young talented engineers, or the development and maintenance of service infrastructure and content, will be modeled as an increasing function of quality improving innovation efforts $F(k)$, with $F'(k) > 0$ for all $k \in [0, \infty)$.[60] At the same time the marginal cost of serving one additional user is very low and we will set it to zero, i.e. $f_U = 0$.

4.2 Two-sided Search Engine Market Model

Having established the evidence for the high degree of concentration and the threat of dominant position of Google in the internet search engine market, we present here the analysis for a monopoly platform in order to focus on the possible threat of abuse of dominant position by Google in the internet search engine market.[61] For the purpose of modelling a search engine market we adapt a modification of Armstrong (2006) two-sided market model. In particular, we consider here the model of a two-sided market, where only one side pays (advertisers). Advertisers value the presence of consumers (users), while the externality on consumers' side maybe positive, null, or negative. The platform can also raise the utility of both sides by investing k in quality improvements.

Suppose there are two groups of agents, denoted U (users) and A (advertisers). A member of one group cares about the number of the members of the other group who use the platform. Suppose the utility of an agent is determined in the following way: if the platform attracts n_U and n_A members of the two groups, the utilities of a group-U agent and a group-A agent

[60] We do not restrict this cost function to be convex in order to capture the S-shaped returns to scale. As motivated by Etro (2011b), the combination of network effects and learning by doing induces S-shaped returns to scale in the search engine market. Hence, the first stage cost function can be approximated by the concave increasing function, while the second stage cost function can be approximated by the convex increasing function.

[61] In the more technical companion paper Motchenkova et al. (2012) we extend the model to an asymmetric oligopoly setting, which allows to also analyze the interplay between market dominance, network effects, and incentives to innovate in the search engine market.

are respectively

$$u_U(k, p_U, n_A) = \alpha_U n_A + k - p_U \quad \text{and} \quad u_A(k, p_A, n_U) = \alpha_A n_U + k - p_A, \tag{1}$$

where p_U and p_A are the platform's prices to the two groups. Recall that $p_U = 0$, since users are served for free.[62] While p_A is assumed to be positive.[63] The parameter α_U measures the benefit a group-U agent (user) enjoys from interacting with each group-A agent (advertiser). We do not restrict this benefit α_U to be either positive or negative (i.e. we allow for two possible situations: users appreciate additional advertising or they only care about content and annoyed by the presence of additional advertising among the search result). We will analyze the implications of both cases when discuss the results of the model. Next, α_A measures the benefit a group-A agent (advertiser) obtains from each group-U agent (user). It is reasonable to assume that $\alpha_A > 0$, i.e. the benefit for advertiser from interacting with one additional user on the other side of the market is always positive. The variable k denotes the quality improving innovation efforts. Expression (1) describes how utilities are determined as a function of the numbers of agents who participate (n_j , $j = A, U$), network externalities (α_j, $j = A, U$), prices charged by the platform (p_j, $j = A, U$), and the amount of quality improving innovation investments incurred by the search engine (k).[64] Similar to Armstrong (2006) to close the demand model, we specify the numbers of participants as a function of the utilities. If the utilities offered to the two groups are u_U and u_A, then the numbers of each group who join the platform will be determined as follows

$$n_U = \phi_U(u_U) \quad \text{and} \quad n_A = \phi_A(u_A)$$

Here $\phi_U(\cdot)$ and $\phi_A(\cdot)$ represent increasing functions of utilities, with $\phi_j'(\cdot) > 0$ and $\phi_j''(\cdot) \geq 0$ for $j = A, U$.[65]

[62] Similar assumption is employed in e.g. Jeon, Jullien, and Klimenko (2011).

[63] Again, similar to Jeon, Jullien, and Klimenko (2011), we assume that each platform charges a positive subscription fee to advertisers. Actually, Google's advertising fee is per click, which can be incorporated in our model as a multiplicative function of the number of users n_U^i and the quality of the matching technology k^i (e.g. $f^c k^i n_U^i \sim f^c k^i x$), which enters the profit function of each platform with the positive sign. However, this would make it impossible to conduct analysis with closed form solutions in the current framework. That's why we postpone this extension to future research.

[64] We assume here that quality improving efforts (investments) map one-to-one to realized quality of the search engine, which is valued by users and advertisers. In general, the results of the model would go through for any increasing mapping from k to quality.

[65] This property of the $\phi-$function can be interpreted as follows. Firstly, the utility of each agent depends on the number of the agents on the other side of the platform. Then convex $\phi-$function can be interpreted as participation rates grow slowly when less agents join platform on the other side, since there is little value (especially for advertisers) in using platform if they cannot reach users. Similar effect was observed in Goyal and Kearns (2012) for online social networking services.

Under opposite assumption ($\phi''(u) < 0$) the results of Proposition 3 still can hold, but only under some specific parameter values. Under assumption $\phi''(u) < 0$, the results are generally ambiguous.

On the cost side, the monopoly platform incurs a per-agent cost f_A for group A (advertisers) and costs of quality improving capital investments $F(k)$, with $F'(k) > 0$ for all $k \in [0, \infty)$.[66] A per-agent cost f_U for group U (users) is assumed to be zero, $f_U = 0$. Therefore, the monopolistic search engine's profit is given by

$$\pi(k, p_A) = n_A(p_A - f_A) - F(k).$$

If we consider the platform to be offering utilities u_U and u_A rather than price p_A and quality k, then the implicit quality offered for users $k = u_U - \alpha_U n_A$ and the implicit price for group A (advertisers) is $p_A = \alpha_A n_U + k - u_A = \alpha_A n_U + u_U - \alpha_U n_A - u_A$. Therefore, expressed in terms of utilities, the platform's profit is given by

$$\pi(u_U, u_A) = \phi_A(u_A)[\alpha_A \phi_U(u_U) + u_U - \alpha_U \phi_A(u_A) - u_A - f_A] - F(u_U - \alpha_U \phi_A(u_A)). \quad (2)$$

Next, the aggregate consumer surplus of group U is denoted as $v_U(u_U)$ and the aggregate consumer surplus of group A is denoted as $v_A(u_A)$. Following Armstrong (2006), we employ that $v_j(\cdot)$ satisfies the envelope condition $v_j'(u_j) \equiv \phi_j(u_j)$, $j = A, U$. Then welfare, which is measured by the unweighted sum of profit and consumer surplus, is given by

$$w(u_U, u_A) = \pi(u_U, u_A) + v_U(u_U) + v_A(u_A). \quad (3)$$

4.3 Results and Policy Implications

In this section we, first, present the results of the analysis of the welfare-maximizing outcome. That is we derive socially optimal price and the socially optimal level of quality improving investments. Next, we compare this result to the outcome derived in case the search engine market is monopolized by a single firm. The two contrasting results are given in propositions 1 and 2, respectively.

Proposition 1 *The socially optimal price (p_A^*) and the level of quality improving innovation efforts (k^*) satisfy*

$$F'(k^*) = (\alpha_A \phi_U'(u_U^*) + 1) n_A^* + n_U^* \quad (4)$$

$$p_A^* = f_A - \alpha_U n_U^* - \alpha_U \alpha_A \phi_U'(u_U^*) n_A^* \quad (5)$$

[66] Having $F(k)$ an increasing function of k seems to be consistent with S-shaped returns to scale in the search engine market discussed in Etro (2011b). However, the approach to model the impact of quality improving efforts, k^i and $F(k^i)$, can be improved. For example, the cost of quality improving efforts can be increasing not only with k^i but also with n_U^i, since it might be more difficult to manage the engine when more queries are running. Then k^i and n_U^i should enter additively the cost function. Again, for the purpose of tractability of the current model we leave this extension to future research.

Proof. Taking the FOC of expression (3) wrt u_U and substituting $v_j'(u_j) \equiv \phi_j(u_j)$ and $n_j = \phi_j(u_j)$ for $j = U, A$ we obtain

$$\begin{aligned} \frac{\partial w(u_U, u_A)}{\partial u_U} &= \alpha_A n_A \phi_U'(u_U) + n_A + n_U - F'(\cdot) = 0 \\ &\Rightarrow F'(k^*) = (\alpha_A \phi_U'(u_U^*) + 1) n_A^* + n_U^* \end{aligned}$$

Taking the FOC of expression (3) wrt u_A and substituting $v_j'(u_j) \equiv \phi_j(u_j)$ and $n_j = \phi_j(u_j)$ for $i = U, A$ we obtain the following expression. Recall also that $\phi_A'(\cdot) > 0$ and $F'(\cdot) = (\alpha_A \phi_U'(u_U) + 1) n_A + n_U$.

$$\begin{aligned} \frac{\partial w(u_U, u_A)}{\partial u_A} &= \phi_A'(u_A) \left[p_A - \alpha_U n_A - f_A + \alpha_U F'(\cdot) \right] - n_A + n_A = 0 \\ &\Rightarrow p_A = f_A + \alpha_U n_A - \alpha_U F'(\cdot) \\ &\Rightarrow p_A = f_A - \alpha_U [F'(\cdot) - n_A] \\ &\Rightarrow p_A = f_A - \alpha_U [(\alpha_A \phi_U'(u_U) n_A + n_A + n_U - n_A] \\ \text{Hence, at the optimum } p_A^* &= f_A - \alpha_U n_U^* - \alpha_U \alpha_A \phi_U'(u_U^*) n_A^* \end{aligned}$$

This concludes the proof of proposition 1. ■

Analysis of expression (5) shows that the optimal price offered to advertisers equals the cost of supplying service (f_A) adjusted downward (or upwards) by the external benefit (or disutility) that an extra group-A agent (advertiser) brings to the group-U agents (users) on the platform. (There are n_U users on the platform, and each one benefits by α_U when an extra advertiser joins, provided that $\alpha_U > 0$.) In particular, prices should be below cost if $\alpha_U > 0$ or they can be higher than cost (f_A) if $\alpha_U < 0$. Recall $\alpha_A > 0$, $\phi_U'(u_U) > 0$, and $n_A > 0$. Expression (5) shows some similarity with the result obtained in Armstrong (2006) except of an additional term $-\alpha_U \alpha_A \phi_U'(u_U) n_A$, which would adjust the price offered by the platform to advertisers even further down in case $\alpha_U > 0$ (i.e. when additional advertising is appreciated by users). Or wise versa, the presence of this additional term would increase the price charged to advertisers above the one specified in Armstrong (2006) when $\alpha_U < 0$ (i.e. users do not care about advertising at all and are only interested in the content). In case $\alpha_U > 0$, this additional term can be interpreted as further downward adjustment in price charged to advertisers due to positive quality improvement spillover or due to improving the fit between customers and advertisers.

Next, we move to the discussion of the results and policy implications in the situation when the search engine market is monopolized by a single firm. In the next proposition we derive the profit-maximizing price and the level of quality improving investments chosen by the monopolist.

Proposition 2 *The profit-maximizing price (p_A^m) and the level of quality improving investments (k^m) chosen in the monopolized search engine market satisfy*

$$F'(k^m) = (\alpha_A \phi'_U(u_U^m) + 1)n_A^m \tag{6}$$

$$p_A^m = f_A - \alpha_U \alpha_A \phi'_U(u_U^m) n_A^m + \frac{\phi_A(u_A^m)}{\phi'_A(u_A^m)} \tag{7}$$

Proof. Taking the FOC of expression (2) wrt u_U and substituting $n_j = \phi_j(u_j)$ for $j = U, A$ we obtain

$$\begin{aligned} \frac{\partial \pi(u_U, u_A)}{\partial u_U} &= \alpha_A n_A \phi'_U(u_U) + n_A - F'(\cdot) = 0 \\ &\Rightarrow F'(k^m) = (\alpha_A \phi'_U(u_U^m) + 1)n_A^m \end{aligned}$$

Taking the FOC of expression (2) wrt u_A and substituting $n_j = \phi_j(u_j)$ for $j = U, A$ we obtain the following expression. Recall also that in case of monopoly optimal k is characterized by $F'(\cdot) = (\alpha_A \phi'_U(u_U) + 1)n_A$.

$$\begin{aligned} \frac{\partial \pi(u_U, u_A)}{\partial u_A} &= \phi'_A(u_A)\left[p_A - \alpha_U n_A - f_A + \alpha_U F'(\cdot)\right] - n_A = 0 \\ &\Rightarrow p_A = f_A + \alpha_U n_A - \alpha_U F'(\cdot) + \frac{n_A}{\phi'_A(u_A)} \\ &\Rightarrow p_A = f_A - \alpha_U[F'(\cdot) - n_A] + \frac{\phi_A(u_A)}{\phi'_A(u_A)} \\ &\Rightarrow p_A = f_A - \alpha_U[(\alpha_A \phi'_U(u_U) n_A + n_A - n_A] + \frac{\phi_A(u_A)}{\phi'_A(u_A)} \\ \text{Hence, at the optimum } p_A^m &= f_A - \alpha_U \alpha_A \phi'_U(u_U^m) n_A^m + \frac{\phi_A(u_A^m)}{\phi'_A(u_A^m)} \end{aligned}$$

This concludes the proof of proposition 2. ■

Hence, we can conclude that the profit-maximizing price offered to advertisers is equal to the cost of providing service (f_A), adjusted downward by ($\alpha_U \alpha_A \phi'_U(u_U) n_A$) the external benefit to both users and advertisers and quality improving efforts by the platform, and adjusted upward by a factor related to the elasticity of the group's participation $\left(\frac{\phi_A(u_A)}{\phi'_A(u_A)}\right)$. The difference with the results obtained in Armstrong (2006) is hiding in the second term ($\alpha_U \alpha_A \phi'_U(u_U) n_A$). Armstrong (2006) finds it equal to $\alpha_U n_U$, i.e. only external benefit to users would have influenced the price charged to advertisers in his setting. This difference again can be attributed to the presence of additional quality improvement spillover that improves the fit between customers and advertisers and also between search results and customer's queries.

Finally, comparison of the results of Propositions 1 and 2 implies the following proposition.

Proposition 3 *Monopolization of the search engine market leads to under-investment in improvements of the quality of the search engine compared to social optimum. In addition, it leads to increase in prices charged to advertisers above socially optimal level when* $\alpha_U \geq 0$.

Proof. The proof of this proposition contains three steps:

1. First, for the existence of interior maximum the profit function $\pi(u_U, u_A)$ in expression (2) is assumed to be strictly concave. In this case the social welfare function $w(u_U, u_A)$ in (3) represents a transformation of this concave profit function in (2) by adding consumer surpluses of two groups $v_U(u_U)$ and $v_A(u_A)$, users and advertisers, respectively. $v_U(u_U)$ and $v_A(u_A)$ are assumed to be increasing and concave functions as well. If these (rather common) conditions on the objective functions are satisfied, then u_U^*, which results from unconstrained optimization of (3) with respect to u_U and u_A, is strictly greater than u_U^m, which results from unconstrained optimization of (2) with respect to u_U and u_A. Hence, we have that $u_U^* > u_U^m$. The same holds for $u_A^* > u_A^m$. This implies that (by monotonicity of $\phi-$ functions, recall $\phi(.)$ functions are assumed to be strictly increasing) $n_A^* > n_A^m$ and $n_U^* > n_U^m$ as well.

2. Next, comparison of (4) and (6), taking into account that $F'(k) > 0$, $u_U^* > u_U^m$, $n_A^* > n_A^m$, and $\phi_U''(\cdot) \geq 0$, implies that $k^m < k^*$.

3. Finally, comparison of (5) and (7), taking into account that $\phi_A'(\cdot) > 0$, $u_U^* > u_U^m$, $n_A^* > n_A^m$, and $\phi_U''(\cdot) \geq 0$, implies that

$p_A^m > p_A^*$ when $\alpha_U \geq 0$

$p_A^m < p_A^*$ when $\alpha_U < 0$ and $|\alpha_U n_U| > \frac{\phi_A(u_A)}{\phi_A'(u_A)}$.

This concludes the proof of proposition 3. ■

This proposition shows that monopolization of the search engine market unambiguously results in under-investment in quality improvements by the search engine platform compared to social optimum. The effect on prices charged to advertises seems ambiguous. When the presence of advertisers on the search engine is welcomed by users (i.e. $\alpha_U \geq 0$), monopolistic search engine charges advertisers more compared to social optimum. This is an indication of exploitative abuse of dominant position through excessive pricing.[67] To summarize the analysis in this section we conclude that the monopoly platform choice of k (quality improving capital investments) is sub-optimal. The result is robust to any choice of functional forms. It is also quite intuitive. The main driver of the result is that there is no price for consumers

[67] It should also be mentioned that when presence of advertisers on the search engine is not welcomed by the users (i.e. $\alpha_U < 0$), monopolistic search engine charges advertisers less compared to social optimum. This harms consumers even more since it causes further increase of unwelcome advertising.

(on the users' side of the market). As a consequence, when choosing k the platform only cares about the indirect impact on the advertising revenue and not about the direct impact on the consumers' willingness to pay. This causes under-investment in quality improvements by the monopolist compared to the socially optimal value, which also takes into account users' utility.

5 Conclusions and Policy Proposal

The formal analysis in section 4 concludes that monopolization of the search engine market by a single firm (such as Google) would lead to reduction of quality of search results compared to the social optimum. In addition, it generally leads to an increase in prices charged to advertisers above socially optimal level. We argue that the evidence on increasing concentration, the current characteristics of the search engine market, and the theoretical results of the paper suggest that some form of intervention is needed in order to avoid possible abusive conduct by the dominant search engine that may lead to monopolization of this market (recall that we identified restricting multihoming and leveraging as abuses leading to monopolization). Hence, antitrust intervention is needed in order to prevent the deterioration in quality and relevance of search results.

The issue of maintaining proper quality and relevance of search results in practice is closely connected to maintaining proper quality of search algorithms, prevention of search bias and prevention of manipulation of rankings of organic search results, which by themselves maybe considered abusive. This implies that, since often the incentives to maintain higher quality for dominant firm may be reduced, the likelihood of the above mentioned abusive manipulation of rankings and search algorithms is higher when the search engine market is dominated or monopolized by a single firm. More symmetric distribution of power would lead to a better outcome in terms of quality.[68] In the current situation, regulators should be empowered to have more control over quality of search results or at least develop effective instruments that would provide proper incentives for dominant firm to comply with quality standards.

Some authors have argued that principles of "search neutrality" should apply to Google,[69] or any other dominant firm in online search, as part of a more general attempt to reflect on the self-regulation of online intermediaries' and to advance alternative regulatory options

[68] Similar to Argenton and Prüfer (2012), the desired reduction in the asymmetry in the size of network effects can be achieved through the remedy to require search engines to share their data bases and data on previous searches. This would reduce the degree of product differentiation and level the playing field in the quality dimension. These issues will be elaborated further in a more technical companion paper Motchenkova et al. (2012).

[69] Oren Bracha & Frank Pasquale, 2007

(including competition law).[70] In the EU context, such calls may have a stronger appeal, in view of the special responsibility of dominant firms to protect the competitive process under EU competition law[71] and the very active stance the European Commission has taken in the past to ensure openness of access (and interoperability) in major technological platforms for undertakings active in related and vertically situated markets.[72] The concept of "search neutrality" is quite general in scope, but it seems that it can be interpreted as requiring a search engine to ensure that it does not explicitly favour one website/company over another, for reasons other than those linked to the quality score of the specific website/or consumer preferences, and that the algorithms designed to discriminate on the basis of assigning value to the production of search results are set and applied transparently and objectively. Search neutrality should be compared to a process-oriented, rather than an outcome-oriented, norm, as it requires from the dominant undertaking to establish the adequate procedures for keeping the process exempt from any bias. "Bias" may have different meanings: it can relate to prejudice, inclination, partiality or tendency affecting judgment in the sense that no equal chance is offered to another idea or, in our example, website. Yet, not all forms of bias may form the object of an antitrust law action. Google or any dominant undertaking should be free to develop an intellectual, artistic or ideological "bias", as this forms integral part of their right to form an editorial judgment on the content displayed in their search engine, which is protected by their freedom of expression, under the first amendment of the US Constitution and the European Convention of Human Rights. After all, the ranking of a website is an opinion expressed about the likely relevance of this information (website) to a query. This intellectual bias should be distinguished from material bias, which is related to the economic interest of the dominant search engine to favour its own products in related or auxiliary relevant markets, such as the activity of specialized search. In this context, the bias is not protected by the freedom of expression, as its purpose is to distort competition and to maintain or extend the market power or dominant position of the search engine. The theory of harm is an essential step in linking the alleged material bias (facts) with the prohibition of an abuse of a dominant position (law) and hence inherently limits the scope of the antitrust remedy, according to the proportionality principle. Only by closely designing the remedy in response to the underlying theory of harm it is possible to fulfil the strict conditions of the proportionality test. The remedy should thus relate to the material bias only and should aim to remove any incentives the dominant firm has not to apply the relevant procedures for ensuring that all websites benefit from an equal chance to figure in the first rankings of its

[70] Berin Szoka & Adam Marcus (eds.), 2010, chapters 6 & 7.

[71] Case C-395/96 P *Compagnie Maritime Belge* [2000] ECR I-1365, para. 37 ; Case C-52/09, *Konkurrensverket v. TeliaSonera Sverige AB* [February 17, 2011], not yet published, para. 23;

[72] Economides & Lianos, 2010; Lianos, 2012.

search engine.

There are different options that may be followed. The first is to remove the structural conditions for the material bias to exist at the first place by divesting the general search engine function from specialized search tools, thus splitting Google into a general search company and a specialized search company, and thus removing any economic interest for the dominant search engine to favour one or another website. Divestiture is of course a drastic remedy, which should be the last resort, according to Article 7 of Regulation 1/2003, in view also of the difficulty to administer it while respecting the business model of each of the separated parts of Google, and the chilling innovation effects it might have.[73] It has been argued that the integrated Universal search, which was introduced by Google in 2007, was a major innovation, quickly followed by Google's competitors in the online search market (Marvin Ammori & Luke Pelican, 2012).

The second option would be to choose an assisted preemptive transparency remedy, linked to the implementation of information remedies aimed to increase market transparency for consumers with new disclosure rules indicating that Google's search results may be biased and thus be of lower quality than the counterfactual paradigm of a materially unbiased search engine. These disclosure rules will raise the cost for Google of manually adjusting the results of the algorithm with the aim to favour a proprietary website (which is difficult to monitor on a case by case basis), and thus create incentives for Google to adhere and apply effectively search neutrality principles. One of the advantages of this remedy is that it moves the cost of implementation to Google, while providing the latter some discretion to choose the most adequate tools to implement search neutrality. The remedy is based on the assumption that the quality of search results is difficult to observe, hence consumers would have no means on their own to know when the quality is low and thus to switch to competing search engines. Nothing also guarantees that competing search engines would not adopt similar policies, thus leading to an overall decrease of the quality of search and thus consumer welfare.[74] The fact that no equivalent remedy may be adopted against competing search engines is irrelevant, in view of the "special responsibility" of dominant undertakings in EU competition law. The remedy may also provide incentives for other search engines to differentiate themselves through an optional positive disclosure by indicating that they are not vertically integrated

[73] For similar comments on the effects of the proposed structural remedy against Microsoft in the Internet Explorer browser tying case, see Economides & Lianos, 2010.

[74] Our assumption is that search as any other service may be classified as good or bad quality, relevance to the consumer but also impartiality of the search opinion provided being among the quality criteria. One would have no hesitation to characterize a restaurant guide which ranks restaurants not on the criterion of their service or the culinary experience provided to the consumer, as one would have expected from a restaurant guide, but focusing on some form of material bias (favouring restaurants owned by the editor of the restaurant guide) as being a bad quality restaurant guide. The same applies here.

or that they have established internal procedures and/or Chinese walls between their general search and specialized search functions. Of course, a cease and desist order coupled with a penalty-based deterrence through the imposition of a fine might also provide incentives to the dominant search engine to develop internal procedures to promote the impartiality of its results.

A further possibility will be to assist the consumer by providing a reliable expert advice on the impartiality of the dominant search engine. This could be done by a technical committee or monitoring trustee recruited for this purpose or a consumer watchdog (from the voluntary sector appointed in the context of a cy press remedy), which would have as its task to publish periodically a report examining the commitment of the dominant search engine to impartial search results, after a careful empirical analysis of an array of search results across different categories. The periodic publication of the report will provide incentives to the dominant search engine to improve its score. One could however object to this remedy that consumers may not necessarily adjust their behavior in the marketplace to the findings of the report of this committee or consumer watchdog and thus stick with a search engine that demonstrably exercises material bias. In this case, the choice is either to consider that impartial and unbiased search is not among the preferences of the consumers, or at least those that are important enough to influence their behavior on the market, in which case this is the end of the antitrust story, or to advance a more libertarian paternalistic argument, that consumers need to be protected from their own failing to appreciate the importance of the impartiality of search, and thus move to a more regulatory intensive remedial option.

Inter-firm sharing of information about search results (data portability) may also enable the competitors of the dominant search engine to provide search opinions of at least a similar degree of relevance to the consumers' questions and thus serve as the default quality standard for search results. It would thus be possible to compare the search results of various search engines, having a similar amount of data, in order to find if the dominant search engine diverts considerably from the predominant practice of the other search engines, in which case one might assume that this diversion can be explained by material bias. Data portability would thus be an adequate remedy, but also would contribute to the finding of material bias by the technical committee/monitoring trustee or the consumer watchdog, should this option be finally pursued.

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