Economic background of the Microsoft/Yahoo! case
Andrea Amelio and Dimitrios Magos (∗)

Introduction

This paper offers an economic background for the analysis conducted by the Commission during the recent M.5727 Microsoft/Yahoo! transaction and complements the article ‘The Microsoft/Yahoo! Search business case’ published in this issue of the Competition Policy Newsletter that describes more in details the Commission decision (∗).

Search platforms are designed to search for information on the World Wide Web by providing the links to the information that the user is looking for in a fraction of the time that he would need in the absence of this tool. Search engines are a widespread tool among internet users. In the light of the importance and the resources allocated to search advertising (∗), the economic literature has shown a growing interest in understanding the business model of search engines.

This paper focuses on recent results of the economic literature in relation to two fundamental characteristics of internet search. The first section of the paper deals with the current auction mechanism selected by the most popular search engines and explains how prices form in the advertising market. In the second section, the paper focuses on the role of search engines in terms of providing relevant results to users. More precisely, we discuss what are the incentives for search engines to provide relevance to users when a results page includes revenue generating (sponsored) links alongside organic links.

The economic literature referred to for the purposes of this article served as a background for understanding the functioning of the internet search market and also provided valuable insights for the Commission to make its own assessment, especially concerning the development of theories of harm and the likely effects of the transaction on advertisers and end-users (∗).

The auction system

The understanding of the auction system — and all the related implementation choices — that search platforms have devised is instrumental in order to assess the existence of a significant effect on effective competition brought about by the merger on advertisers. These strategic decisions determine the current structure of the search advertising market and are at the core of the price formation mechanism in the advertising market (∗). Furthermore, given the pay per click nature of search advertising, in internet search, an advertiser can better attribute the cost of an ad to the sale that is generated. This ultimately is likely to modify the nature of advertising costs from typically a fixed to a variable cost which may be passed on to consumers in the form of higher price for the product/service the advertiser provides.

The choice of search platforms to post ads alongside the algorithmic search requires strategic implementation decisions. One of the most important decisions is how to allocate advertising spots across advertisers since this task has implications for the level of search platforms’ revenue. Different positions on the search result page have different values for advertisers (and thus involve a different willingness to pay): an ad shown at the top of a page is more likely to be clicked than an ad shown at the bottom. To perform this task of allocating advertising spots effectively, search engines have developed auction mechanisms. ‘Overture’ was the first search platform to introduce an auction mechanism whereby advertisers bid and pay on given keyword, a real time auction allocated several ad slots at the same time. The outcome of such an auction (also known as a ‘position auction’) was thus a ranking/positioning of several ads. Currently, auction mechanisms are in widespread use for internet searches, albeit in a different format from the original Overture auction.

(∗) The content of this article does not necessarily reflect the official position of the European Commission. Responsibility for the information and views expressed lies entirely with the authors. The authors work at DG Competition in the Chief Economist Team.

(⟨) For reference, please see ‘The Microsoft/Yahoo! Search business case’ published in this issue of the Competition Policy Newsletter.

(∗) In 2008 search advertising revenues are estimated at approximately EUR 5 500 million (Source IAB Europe/PWC).

(∗) See COMP/M. 5727 Microsoft/Yahoo! page 28-37.

(∗) The merger effects in the advertising market, as described in COMP/M. 5727 Microsoft/Yahoo! §178-200, were evaluated against this background.
All major search engines are currently making use of a second price auction (\(^7\)) (generalised second price or ‘GSP’) with a reserve price instead of the Overture’s first price auction. In the GSP auction, the winner of a given ad slot pays the bid of the next highest bidder (as long as the latter bid exceeds the reserve price) and the reserve price determines the minimum bid below which participation in the auction is not permitted. Another change carried out by search platforms in the auction mechanism is the use of weighted bids. As a result, advertisers’ bids alone determine neither the price that the advertisers pay nor the slot in which an ad is placed. In weighted auctions, search platforms rank advertisers according to the revenue that they are expected to generate for the platform. The expected revenue from an ad is contingent on the probability that an ad is clicked (measured by the likelihood that users click on ads, also known as the Click Through Rate (‘CTR’)) since advertisers pay platforms only when users click on the displayed ads. Search platforms use a ‘quality’ score, that reflects the expected CTR, to adjust the ranking accordingly (\(^7\)). Google was the first to introduce the idea of ranking the ads in 2002 by weighting the advertisers’ bids with the ‘quality score’. As explained on its web site, Google currently uses a variety of indicators that try to measure quality and determine the quality score of an advertiser (\(^7\)).

The auction design in internet search is currently the subject of several economic papers that are endeavouring to understand the underlying incentives for such auction mechanism choices (and their impacts on consumers), including the use of reserve prices and also of weighted bids. In the context of the merger review, these two elements were particularly important as two potential tools through which the merged entity could have increased prices as a result of the merger. Particular scrutiny was thus given to them (\(^7\)).

Reserve prices in standard auctions increase the revenue for the platform (\(^9\)) and decrease social welfare, since some transactions that would be beneficial for both sides of the platform if they occurred do not materialise (see also Edelman and Schwarz (2006)). However, Athey and Ellison (2009) show that, in a model where consumers incur costs of clicking on ads and act rationally in deciding how many ads to click and in what order, this result may change. In a setup like this, reserve prices may avoid some of the inefficient search costs that arise when clicking on low quality links; reserve prices act as a commitment device not to list products of low quality. This may in turn increase the number of searches that users are willing to make. In this setup, therefore, reserve prices can increase both search engine revenue and consumer surplus (\(^11\)).

Also weighted auctions increase the revenues of the search platform, because ads are ranked according to their potential contribution to search engine revenues. Weighted auctions therefore appear to distort the efficiency of the auction mechanism (as

\(^7\) Another economic issue under debate is whether the generalised second price auction (GSP) is the most efficient auction design and the choice of auction mechanism has implications in terms of platform revenues and efficiency. In standard auction theory, efficiency is maximised when, as a result of the auction, the object ends up in the hand of the bidder that values it the most. GSP is shown not to always achieve such an efficient outcome. In the equilibrium of a second price position auction (or GSP) each bidder prefers the position he is in to any other position (see Varian 2006). In choosing its bid the advertiser considers the incremental cost of moving up or down one position per click. If the incremental cost per click of moving up one position were less than the value per click, the advertiser would increase its bid. In equilibrium the incremental cost of moving up one position should exceed the bidder’s value per click, and the reverse applies to moving down one position. Using this logic, it is possible to construct equilibria in which the advertiser with the highest valuation would not be placed in the highest position. The underlying rationale is that an advertiser may be better off by shading his bid below his actual valuation for some given bid strategies of other advertisers. Therefore, GSP does not necessarily lead to an efficient positioning of the advertisers. An alternative auction mechanism that has attracted interest in the auction theory and is efficient is the Vickrey Clarke Groves (VCG) mechanism, i.e. the generalisation of the Vickrey (second bid) auction for position auctions (see Herman (1983)).

\(^9\) A standard result in auction theory is that it is optimal for a seller (platform) to exclude some bidders (advertisers) through the introduction of a small reserve price, see Krishna (2002).

\(^11\) Ad relevance is also a parameter of interest for search platforms i.e. their tolerance for irrelevant ads. Athey and Ellison (2009) argue that this dimension can be considered as similar to the reserve price question; users will be hurt when they click on irrelevant ads and anticipating this they will make fewer searches.

---

\(^1\) In a standard second price auction (or Vickrey auction) a single indivisible good is being sold and the highest bidder wins while the price paid is the second highest bid. In a standard first price auction, the highest bid wins and the price paid is the highest bid.

\(^2\) As illustrated by Edelman et al. (2007), advertisers are ranked by the product of their bids and the quality score (expected revenue). Furthermore, advertiser \(i\) ends up paying the bid of the next lowest revenue generator \(j\) weighted by the ratio of the quality scores of the advertiser \(j\) and own quality score.

\[^{\text{Per click}}\] (\(j\)) \(= \frac{\text{Per click bid}(j) \times \text{quality score}(j)}{\text{quality score}(i)}\)

\(^3\) See http://adwords.google.com/support/aw/bin/answer.py?hl=en&answer=10215
defined in standard auction theory), since it is possible that the advertiser with the highest valuation is not ranked highest. Note that the question of efficiency as described here considers only the welfare of advertisers; the welfare of users is not specifically addressed. However, users may have a different valuation on the efficient outcome of an auction and therefore there is an externality imposed on them as a result of the positioning of the ads via the auction mechanism. Therefore, broader welfare measures should also be considered, for instance including users’ benefits. In this broader perspective, advertisers that are more likely to be clicked (and implicitly more appreciated by consumers) have a greater chance of being placed higher up in the ranking. Thus, it seems possible that weighting bids weighted by the expected CTR can benefit consumers. However, Athey and Ellison (2009) show instances where weighting of an auction produces an inefficient outcome. In a setup where consumers incur search costs, either imperfections in accurately predicting the relevance of the advertisers by means of ‘quality’ scores or the strategic behaviour of advertisers may result in welfare losses.

This analysis is consistent with the search platforms’ ability to control the pricing mechanism and extract rent from the advertisers. This arises from several aspects that go beyond the bid that advertisers have placed such as the weighted auctions and the use of reserve prices. Stronger competition may ultimately affect the efficiency and advertiser’s surplus and therefore the transaction merited an in depth analysis of its effects on advertisers as described in the M.5727 Microsoft/Yahoo! decision.

**Organic search vs. paid search**

As explained in the article ‘The Microsoft/Yahoo! Search business case’, the Commission’s investigation focused also on the possible existence of a significant effect on effective competition on search users. In particular, the Commission has assessed whether as a result of the merger there are any possible anti-competitive effect as regards the incentives for search engines to provide relevant organic search results to users. This section describes a part of the theoretical background that informed the Commission’s assessment (15).

Search engines can generate economic efficiencies because they are gateways for a large number of economic transactions. Search engines can contribute to social welfare by providing consumers with relevant information about the quality of sponsored links, and this information allows them to search more efficiently (16). Spulber (2009) refers to the internet search engine as the ‘map of commerce’ and argues that these economic efficiencies depend on the strength of competition between search firms. Competition can play an important role in penalising platforms that attempt to lower the quality of the ads and may slow down innovation (17).

The merger decision analyses the incentive to decrease the relevance of the organic search. The theoretical rationale for possibly degrading the organic search (18) may stem from the trade-off with which search platforms appear to be confronted between the incentive to provide relevant organic results and to monetise its paid results. The trade-off may arise because when a platform tries to attract more users through greater relevance on the organic search results it runs the risk of losing revenues on the advertising side (i.e. users clicking less ads) due to users clicking predominantly on the organic side. This could be more likely to arise if both types of links were to lead the user to the same kind of information (thereby being substitutes). Therefore, supplying relevant results may run counter to incentives to maximise the platform’s revenue by prompting users to click on ads.

The degradation of organic search could occur by various means. For example, platforms might have an incentive to design the results page so as to allocate less space to organic results and more to searching advertising links, thereby providing proportionally more advertising links. As long as the advertising links are less relevant than the organic links, the relevance of the results page will decrease. Alternatively, the platforms may alter the ranking of the organic search results such that, from the user’s perspective, firms offering competing products to the sponsored links are given a less-than-optimal ranking on the organic side. For instance, instead of displaying links to additional merchants in the organic search results, search engines could display links to ‘informational’ sites or placing the links winning the auctions also in prominent positions in the organic search results (19), in order to decrease substitution between organic and paid searches.

A search engine may have such an incentive to ‘bias its results’ as long as the revenues lost from users who may stop using the platform are compensated

(15) See COMP/M. 5727 Microsoft/Yahoo! §201-226.
(16) See also Athey and Ellison (2008) for welfare analysis.
for by more clicks from the remaining users. Given that platforms, at least to some degree, provide different organic results and that users typically are not aware of the full range of the information available on the web (which is, in turn, the reason why they tend to rely on the search engines that are better placed), it is difficult for the user to assess whether the platform is engaging in this behaviour. It is precisely this role that competition would play in this market; alternative search platforms may offer ‘checks and balances’ against such incentives from the search platforms. Therefore, the theory goes that in the absence of strong competitive constraints, platforms may take advantage of this information advantage (i.e. asymmetric information) and, as a result, there will be biases in favour of advertising listings that might be harmful to users, to the extent that the relevance of their search will be reduced, and to social welfare.

This trade-off has been discussed in the economic literature. There are several papers that attempt to study the interaction between the organic results and the sponsored links, albeit on the basis of restrictive assumptions (17). For example, White (2008) builds on the two-sided markets literature to examine the motivations to distort the quality of organic search results. He claims that high quality search results have the potential to reduce a search engine’s profits and that a dominant search engine is in a position to wield a great deal of influence. Also, given the asymmetric information between users and platforms on the available information, he argues that it is not such a straightforward matter to identify ‘manipulative’ behaviour. At the same time he claims that users constrain the extent of such a trade-off, since few users would use a low relevance search engine otherwise (18) (19).

In summary, the literature suggests that an important role for competition is to induce search engines to provide more relevance. This ultimately affects the role for competition is to induce search engines to pay, even if the price mechanism works through an auction, making use of quality scores and reserve prices. Furthermore, the economic literature suggesting an interdependent relationship between the organic and the sponsored links provided part of the background to the Commission’s analysis of potentially negative effects on the relevance of the search results.

Conclusion

This short article has reviewed two topics on internet search that arose during the Microsoft/Yahoo! merger and that served as a background for the Commission’s assessment of the transaction. These topics have been widely studied in the literature and have also prominently spurred the recent economic debate. The economic literature has analysed different features of the auction mechanism providing insights into the functioning of the search advertising market. It supports the view that search engines may be able to influence the prices that advertisers pay, even if the price mechanism works through an auction, making use of quality scores and reserve prices. Furthermore, the economic literature suggesting an interdependent relationship between the organic and the sponsored links provided part of the background to the Commission’s analysis of potentially negative effects on the relevance of the search results.

References


