



The Role of Economics in Online Advertising

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An Excerpt from the originally published piece

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Abstract

Online advertising has grown rapidly in the last decade. It now accounts for almost one-seventh of all advertising spending and contributes to the preponderance of revenues for most websites. It is projected to increase sharply as more consumers spend time online on their personal computers and as additional devices such as mobile phones and televisions are connected to the web. This article describes the market structure of the online advertising industry and several complex economic aspects of it. Using the lens of the new economics of multi-sided platforms it examines search-based advertising platforms, as well as platforms that facilitate the buying and selling of advertising space on websites. The unique features of online advertising include the use of Internet-based technologies and data collection mechanisms to target and track specific individuals, and to automate the buying and selling of advertising inventory. Like modern finance, online advertising relies heavily on advanced economic and statistical methods.

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Introduction

Online advertising began in 1994 when HotWire sold the first banner ads to several advertisers.¹ Revenue in the United States grew to an estimated \$7.1 billion in 2001 or about 3.1 percent of overall advertising spending. The dot-com bust destroyed or weakened many of the early online advertising industry players and reduced the demand for online advertising and related services.

The industry regained momentum by 2004 as the business model for “Web 2.0” came together.² A number of businesses emerged that facilitated the buying and selling of advertising space on web pages.³ Entities that operated web portals settled on the traditional “free-tv” model: generate traffic by giving away the content and sell that traffic to advertisers. Most web sites, with the exception of transaction ones such as eBay, generate the preponderance of their revenues from the sale of advertising inventory—the eyeballs that view space allocated for promotions—to advertisers.⁴ In the first half of 2007 alone, advertisers in the US spent more than \$10 billion advertising on websites.⁵ That was about 14 percent of all advertising spending.

The portion of advertising that is done online will increase significantly over time as more devices such as mobile telephones and televisions are connected to the Internet and people spend more time on these devices. The valuations that the capital markets are placing on businesses related to online advertising are consistent with this prediction. Google has had a seven-fold increase in its market value from August 2004 when it was valued at \$29 billion to \$215 billion in December 2007. During 2007 several companies in the online advertising market were purchased at multiples of 10-15 times annual revenues.⁶

¹Barbara K. Kaye and Norman J. Medoff, *Just A Click Away: Advertising on the Internet* (Massachusetts: Allyn and Bacon, 2001).

² “Hundreds of Internet companies have emerged since the dot-com crash, looking to capitalize on a resurgent online advertising market. Companies in this new wave -- known as Web 2.0 -- have focused on online collaboration and sharing among users. They hope to attract millions of users and become the next YouTube, which was acquired by [Google](#) Inc. earlier this year for \$1.65 billion.” See *Is 'Web 2.0' Another Bubble?*, *The Wall Street Journal*, December 27, 2006.

³ These include Google, Yahoo, Microsoft, DoubleClick, Advertising.com, and ValueClick.

⁴ For example, of the 20 most heavily trafficked web sites in the United States, 14 primarily use an advertising-based business model. (Of these 14, five also use a subscription model to supplement revenues.) Out of the remaining six, four use the merchant model, one uses the auction model (eBay.com), and one is a not-for-profit (wikipedia.org).

⁵ *IAB Internet Advertising Revenue Report*, October 2006, http://www.iab.net/media/file/IAB_PwC_2007Q2.pdf.

⁶ Google announced in May 2007 that it would purchase DoubleClick for \$ 3.1 billion which is more than 10 times DoubleClick’s revenues according to one account. Louis Story and Miguel Helft, *Google Buys an Online Ad Firm for \$3.1 Billion*, *New York Times*, April 14, 2007. Microsoft purchased aQuantive at a multiple of about 13. Peter Galli, *Microsoft's aQuantive Buy Shows Big Ad Plans*, *eWeek.com*, May 18, 2007. Yahoo paid some \$680 million for 80 percent share of

The online advertising industry burst into the public eye in 2007. Google's sky-rocketing stock price and its forays into industries such as word processing software, online payments, and mobile telephones drew significant attention. More than 500 articles on Google appeared in the *New York Times*, *Wall St. Journal* and the *Financial Times* during the year. The U.S. Federal Trade Commission and the European Commission launched in-depth antitrust investigations into Google's acquisition of DoubleClick, which provides software technology and services to online advertisers and publishers.⁷ Privacy concerns also came to the fore in 2007 as consumers, government agencies and the media started focusing on the massive amount of personal data that online advertising companies were storing and using.⁸

Although the online advertising industry has revolutionized many aspects of an age-old business, it is important to understand that the new industry has much in common with the old. The unique features of online advertising include the use of Internet-based technologies and data collection mechanisms to target and track specific individuals and to automate the buying and selling of advertising inventory. Like modern finance, online advertising relies heavily on advanced economic and statistical methods. The online advertising industry is highly complex, undergoing a series of rapid changes, and could well result in a high degree of concentration, if not monopoly, in the intermediation of advertising inventory and the control of personal data. This piece provides an overview of some of the key principles related to how the online advertising industry works, focusing on several complex economic aspects of this business.⁹ A more detailed analysis of these issues can be found in my longer piece by the same name on the MPD web site (www.marketplatforms.com)

Basic Context: The Advertising Business

Advertising is designed to promote the sale of a product or service. It has been around in some form since ancient times and occurs in many cultures. The business of presenting advertisements to people became enormous during the 20th century with the development of various methods of mass communication and the perfection of the advertiser-supported model for

Right Media which generated about \$35 million in revenues in 2006. Michael Liedtke, *Yahoo snaps up Right Media for \$680M*, USA Today, April 30, 2007.

⁷ European Commission Press Release, *Mergers: Commission opens in-depth investigation into Google's proposed take over of DoubleClick*, November 13, 2007; Google SEC Filing, *Form 8-K*, sec.gov, May 29, 2007. Also, the United States Senate held hearings on this acquisition. See *An Examination of the Google-DoubleClick Merger and the Online Advertising Industry: What Are the Risks for Competition and Privacy?*, Senate Judiciary Committee, September 27, 2007. The FTC cleared the transaction on December 20, 2007. See *Statement of Federal Trade Commission concerning Google/DoubleClick*, FTC File No. 071-0170, <http://www.ftc.gov/os/caselist/0710170/071220statement.pdf>.

⁸ Vidya Ram, *EU Turns Spotlight On Google*, Forbes, May 28, 2007; Steve Lohr, *Google Deal Said to Bring U.S. Scrutiny*, New York Times, May 29, 2007; Darren Waters, *Google privacy policy 'is vague'*, BBC News, May 31, 2007.

⁹ A companion article examines several issues of law and public policy, in particular competition policy, privacy rights, and copyrights, that arise in part because of the unique economic and technological characteristics of the industry.

delivering content. Advertising spending worldwide is over \$625 billion a year, a number that exceeds worldwide spending on wireless voice communication.¹⁰

The advertising industry has developed at least in part as a result of media companies realizing—as web sites have recently—that a profitable business model involves using content to attract viewers and selling access to those viewers to advertisers. The magazine industry settled on this “two-sided” model in the late 19th century.¹¹ One of the leading publishers dropped its magazine price sharply to increase circulation, and instead earned revenue from selling advertisements. Revenue and profits increased from this pricing innovation. Most magazine publishers quickly followed, and today that is how most earn their profits. The radio industry initially struggled with a subscription-based model, but several stations discovered the power of advertising and the rest quickly followed. Television followed the same path.¹²

Pricing and Business Models

Traditional media that use content to attract viewers have adopted two different models. In the subscription/advertising model the publisher charges viewers a fee to obtain access to the content, and advertisers a fee to obtain access to the viewers. Many newspapers and magazines follow this model. They then balance the demand from advertisers and subscribers to maximize revenues. Some magazines, e.g., the *Economist*, have adopted reader-friendly strategies with high reader fees but sparse advertising. Others have adopted advertiser-friendly strategies, e.g., *Vogue*, with lower reader fees and more advertising, some of which makes reading the magazine difficult. In the free-media model the publishers do not charge viewers for access to the media at all, and in fact try to distribute the media as widely as possible. They earn all of their revenues and profits from the sale of advertisements. Free radio and television have embraced this model in the United States. However, there are many free newspapers and magazines that have adopted the free-tv model. And pay-television and satellite radio have adopted the mixed subscription/advertising model. These different business models are now better understood as a result of the work on multi-sided platforms.¹³

¹⁰ Stuart Elliott, *Forecasters Say Madison Avenue Will Escape a Recession, Just Barely*, The New York Times, December 4, 2007. Stephen Minton, *Worldwide Telecom Spending 2007–2011 Forecast: Worldwide Telecom Black Book, 2007*, IDC, November 2007.

¹¹ For an introduction to two-sided business models see, David S. Evans and Richard Schmalensee, *Catalyst Code: The Strategies of the World's Most Dynamic Companies* (Massachusetts: Harvard Business School Press, 2007). The seminal economics paper in this area is Jean-Charles Rochet & Jean Tirole, *Platform Competition in Two-Sided Markets*, 1 J. OF EUR. ECON. ASS'N 990 (2003).

¹² Evans and Schmalensee, *supra* note 11; Microsoft Encarta *supra* note **Error! Bookmark not defined.**

¹³ Rochet and Tirole, *supra* note 11; Simon Anderson and Régis Renault, *Advertising Content*, American Economic Review, 96(1), 93-113 (2006). Simon Anderson and Stephen Coate, *Market Provision of Broadcasting: A Welfare Analysis*, Review of Economic Studies, Vol 72, No. 4, October 2005, pp. 947-972.

The Online Advertising Industry

The online advertising industry concerns buying and selling advertising space that is accessed by viewers through the Internet. Industry observers often divide the on-line advertising industry into: (1) “search advertising” that appears on search-results pages; (2) “display advertising” that appears on non-search web pages; (3) classified listings that appear on web sites; and (4) Internet e-mail based advertisements. Tables 1a and 1b report U.S. advertising spending for 2006 in these categories, and annual growth since 2002.

Table 1a. US Ad Spending, 2002 - 2006 (Billions). Display includes display ads, rich media, and sponsorship. Rich media includes interstitials.

| | Search | Display | Classifieds | E-mail | Other | Total |
|------|--------|---------|-------------|--------|--------|--------|
| 2002 | \$0.90 | \$3.42 | \$0.90 | \$0.24 | \$0.54 | \$6.0 |
| 2003 | \$2.56 | \$2.99 | \$1.24 | \$0.22 | \$0.29 | \$7.3 |
| 2004 | \$3.74 | \$3.65 | \$1.73 | \$0.19 | \$0.29 | \$9.6 |
| 2005 | \$5.13 | \$4.25 | \$2.13 | \$0.25 | \$0.75 | \$12.5 |
| 2006 | \$6.76 | \$5.41 | \$3.04 | \$0.34 | \$1.35 | \$16.9 |

Source: LAB Internet Advertising Report, 2002-2006 Full-Year results. Available at http://www.iab.net/insights_research/1357.

Table 1b. US Ad Spending, 2002 – 2006, % change year to year. For each category, denotes the change in how much revenue each category brought in, from Table 3a.

| | Search | Display | Classifieds | E-mail | Other | Total |
|-----------------|--------|---------|-------------|--------|--------|-------|
| % Change | | | | | | |
| 2002-2003 | 183.9% | -12.5% | 37.9% | -8.8% | -45.9% | 21.7% |
| % Change | | | | | | |
| 2003-2004 | 46.5% | 21.9% | 39.2% | -12.3% | -1.4% | 31.5% |
| % Change | | | | | | |
| 2004-2005 | 36.9% | 16.5% | 23.0% | 30.2% | 160.4% | 30.2% |
| % Change | | | | | | |
| 2005-2006 | 31.9% | 27.2% | 43.2% | 35.2% | 80.3% | 35.2% |

Source: LAB Internet Advertising Reports, 2002-2006 Full-Year results. Available at http://www.iab.net/insights_research/1357.

Search-based advertising accounted for the largest portion with 40 percent followed by display-related advertising with 32 percent in 2006 (of which 22 percent was display advertising, with rich media and sponsorship accounting for the remaining 10 percent.) All segments have grown rapidly in the last few years.

Three drastic innovations, however, distinguish online from off-line advertising. *The first* has transformed the service obtained by the advertiser: the Internet provides a highly efficient mechanism for delivering ads to individual users and collecting information for targeting ads to those users. *The second* has transformed the process of buying and selling advertising space: the Internet has enabled the development of more efficient intermediation markets for advertising- the keyword bidding system used for search and contextual advertising is the most mature example of this development. *The third* is leading to economies of specialization: traditional publishers have integrated content provision for attracting viewers with selling advertising space to advertisers; online publishers are increasingly turning selling advertising space over to specialized advertising platforms.

As more advertising moves to Internet-connected devices these radical innovations will dramatically alter the advertising ecosystem. These innovations are mainly affecting search and display advertising.

Economic Factors Affecting Two-sided Market Structure

In many ways search-ad platforms are subject to the same economic considerations as traditional media platforms. They are two-sided businesses based on using bait to attract eyeballs and selling access to those eyeballs to advertisers. However, several features of the technologies underlying search-ad platforms give rise to unique features.

Pricing of Keywords

As noted above, consumers generally use a single platform for a search query.¹⁴ This is akin to consumers who use a single yellow pages directory for looking up merchants. Advertisers often use multiple search-ad platforms just as they put ads for the same product in magazines that are likely to reach different consumers, such as *Vogue* and *Popular Mechanics*. As a result of these facts, market forces do not necessarily lead to the same CPC for a given keyword across search-ad platforms. Neither consumers nor advertisers are making marginal substitution decisions between a

¹⁴ There would not seem to be any economic or technological obstacle to consumers using multiple search engines. They are most likely to use the search engine that they expect will provide the best search results which may be some combination of organic results and ads. However, it would seem possible that a market structure could arise with differentiated platforms in which consumers find it useful to rely on several platforms or in which they have greater incentives to use a meta-search platform that combines results from several platforms. Therefore the existence of single-homing may be endogenously determined by the market structure.

given keyword on different platforms. If the CPC for “flat panel televisions in Chicago” was higher on platform 1 than on platform 2, a Chicago television retailer would still use both platforms so long as the CPC was worth the value of the lead generated.¹⁵

The CPC is ultimately determined by the keyword bidding auction on each platform. Those auctions could result in similar CPCs for given query terms if there were the same bidders, the auction rules were similar, and the values of leads for different platforms were similar. We would expect, as noted above, that platforms that attract fewer bidders for keywords would tend to have lower CPCs for those keywords. We would also expect that platforms that have less efficient auctions, or generate less valuable leads would have lower CPCs for given keywords.

In fact, there are significant differences in CPCs for keywords across the search-ad platforms. None of the platforms reports these measures, but industry estimates generally place Google significantly above Yahoo. One estimate places Google’s worldwide CPC at around \$2.00, nearly three times its estimate of Yahoo’s CPC of around \$0.75.¹⁶ It is possible that these differences are partly the result of compositional effects and do not reflect just differences in the CPCs for given keywords. That would be the case if Google tended to get more clicks on more valuable keywords.

The Role of Indirect Network Effects

It might appear that indirect network effects are insignificant for search-ad platforms, if they are present at all.¹⁷ An advertiser only pays when a consumer clicks on his ad. That value does not

¹⁵ In reality there are a variety of ways to generate leads, beyond search-ad platforms, and there may be some substitution between these different methods. Moreover, there may be diminishing returns to the value of leads for a variety of reasons including diseconomies of scale in production and distribution.

¹⁶ See *Not Out of the Woods But A Step In The Right Direction*, Bear Stearns, October 17, 2007. Other estimates of revenue per search (RPS), which is equal to the CPC times the CTR for each search (not the CTR for each advertiser), place Google substantially above Yahoo. Mark Mahaney, an analyst in Citigroup, estimated that in 2006 Google made 4.5 cents to 5 cents on every search, while Yahoo generated only 2.5 cents to 3 cents a search (See Miguel Helft, *A Long-Delayed Ad System Has Yahoo Crossing Its Fingers*, New York Times, February 5, 2007); Caris & Co. analyst Tim Boyd estimates that Yahoo made on average between 10¢ and 11¢ per search in 2006, and Google made between 19¢ and 21¢ per search (See Catherine Holahan, *Why Yahoo’s Paname Won’t Be Enough*, BusinessWeek, Dec 26, 2006); Justin Post, an analyst with Merrill Lynch, estimated that in 2006, each US search generates 4¢ for Yahoo and 11¢ for Google (See Robert D. Hershey Jr., *Sunny and Gloomy Signs at a Web Crossroads*, New York Times, Nov 19, 2006.); A recent article states that most analysts estimate that Yahoo’s RPS is about 30 percent less than Google’s (See Henry Blodget, *The Real Reason Yahoo’s Revenue Per Search Stinks*, Silicon Alley Insider, Oct 2, 2007.). The differences between these estimates is likely due to whether one looks at searches only within the U.S. or worldwide, and whether one looks at only searches for which there are ads or all searches. But within each estimate, Google is placed significantly above Yahoo.

¹⁷ Although search-ad platforms have to make investments in developing search engines and other technologies it does not appear that there are significant scale economies that would, by themselves, limit the market to one or just a few players. Search-ad platforms are readily scalable by adding servers and communication. Eisenmann estimates that a search-based advertising platform could break even with about 7.5 percent of the global market. See Eisenmann, *supra* note 16.

depend on whether any other consumer on the platform clicks on the ad. The advertiser should therefore be indifferent to using a platform with few or many searchers so long as the value exceeds the cost of each click the advertiser gets. Searchers do not benefit in any obvious way from other searchers. So long as they obtain the information they are looking for they do not care whether the search provider has many or few searchers. They probably value search-ad platforms that have more ads. But given that advertisers are indifferent, the density of ads on search pages should not vary depending on the number of searches. This view, however, ignores key features of transaction platforms that would appear to lead to strong indirect network effects.

Search-ad platforms are similar to other transaction platforms that seek to match buyers with sellers and consummate trades. With more buyers there is a higher likelihood that a seller will find a suitable match that will lead to a beneficial sale, and with more sellers there is a higher likelihood that a buyer will find a suitable match that will lead to a beneficial purchase. The importance of “liquidity”—the volume of buyers and sellers that could reach mutually profitable trades—is well documented for exchanges.¹⁸ Without enough liquidity markets are too thin and unsustainable.

In the case of search-ad platforms the advertisers are the buyers of access to Internet users while the searchers are selling that access through the ad search platform. More advertisers and more searches increase the likelihood of profitable matches given that advertisers and searchers are heterogeneous. It is useful to consider why in more detail.

Searchers obtain more relevant ads when there are more advertisers. Suppose an individual is in Germany and needs a SIM card. She types in “Germany SIM cards” into Google. On September 26, 2007 she will see ten ads of which eight are directly relevant to her query. If she types the same query into the smaller MSN on that same day she will see eight ads of which two are directly relevant to her query.

That phenomenon is general: search-ad platforms with more advertisers will generally deliver more relevant ads to the searcher; that statement is particularly true for less common keyword combinations, for which there is a thinner advertising market. Since many searchers are looking to buy things, the larger platform is more valuable to them and they are therefore more likely to use the larger platform all else equal.¹⁹

¹⁸ See, for example, Kenneth D. Garbade and William L. Silber, *Structural Organization of Secondary Markets: Clearing Frequency, Dealer Activity and Liquidity Risk*, *The Journal of Finance*, Vol. 34, No. 3 (June 1979), pp.577-593; See also Nicholas Economides, *Network Economics with Application to Finance*, *Financial Markets, Institutions & Instruments*, Vol. 2, No. 5 (1993a), pp. 89-97.

¹⁹Search engines typically capture data on searches and accumulate this over time. (Maria Godoy, *Google Records Subpoena Raises Privacy Fears*, NPR.org, January 20, 2006. They use this information to improve the ability of the search engine to deliver relevant results. Some studies have found that there are not significant differences in the quality of search results across the major platforms despite the extreme differences in the number of searchers. Thus it would appear that direct

Advertisers also value more searchers. Consider an advertiser that earns \$50 per unit on the sale of widgets. It has access to platform 1 and platform 2 where the first platform has 10 times as many searchers as the second. On average every click generates a sale 20 percent of the time. Suppose that it pays \$0.50 per click to obtain the 3rd slot on each platform. Platform 1 sends 200 clicks per week generating 40 sales and platform 2 sends 20 clicks per week generating 4 sales. Then the advertiser earns \$2000 in revenue per week from its campaign on platform 1 for which it pays \$100 and earns a profit of \$1900; it earns \$200 in revenue per week from its campaign on platform 2, for which it pays \$10 and earns a profit of \$190. The advertiser therefore values access to the large platform more than it values access to the small platform, even though it does not value a click or a searcher on one more than the other.²⁰

The existence of fixed costs, together with the difference in platform value documented above, has a potentially strong effect on the economics of the search-ad platforms, given the CPC pricing structure. Advertisers incur two costs of running campaigns that are independent of the number of clicks. First, they incur costs of setting up the platform, installing software, and learning how to use it.²¹ Consequently, the advertiser must exceed a minimal volume of advertising (or more specifically, a minimal level of incremental profits) from this campaign before contracting with another search ad platform. Platform set-up costs discourage smaller advertisers from joining smaller platforms.

Second, advertisers incur costs of running a campaign on keywords. They have to make decisions on the bids and monitor the performance of the campaign.²² These tasks generally cannot be automated fully and therefore require humans. Thus, the advertiser must exceed a minimal volume of clicks on a campaign before mounting it on an ad platform that has been set up. To take the example above, if it cost \$200 per week to monitor a campaign for widgets the advertiser would run the campaign on platform 1 but not platform 2. Therefore, campaign monitoring costs also discourage advertisers from mounting campaigns on smaller platforms.

These considerations lead to a positive feedback loop between the search and advertiser sides. To see this, consider starting in a situation in which two platforms have equal numbers of searchers and advertisers. Now suppose platform 1 has an exogenous increase of 10 percent in

network effects from search are limited. However, search and click-through histories enable search-ad platforms to estimate CTRs better and therefore gives rise to another potentially significant scale effect.

²⁰ This statement is true except for the situation in which it pays its maximum value per click of \$10. Then it earns zero profit from either platform and is indifferent between them. While the second-price auction in theory is designed to get bidders to pay their maximum values in reality it will not do so perfectly and we disregard this extreme situation.

²¹ There is also an activation fee for the major search-ad platforms. Google and Microsoft each charge \$5; Yahoo has no fee for the “Self Serve” version, but charges \$199 for an assisted setup.

²² Maintaining an advertising campaign requires choosing the right keywords and fine tuning them, modifying bids, selecting the best landing pages, revising ad text, and monitoring account statistics such as clicks, impressions, CTR, average CPC, average position, and conversion rate.

search traffic with platform 2 holding steady. That will result in some advertisers joining platform 1 that had previously found it unprofitable to join either platform, and in some advertisers mounting campaigns on platform 1 that they had previously decided not to mount on either platform. Platform 1 now has more relevant ads for searchers. We would expect that some searchers would switch from platform 1 to platform 2. That in turn would increase the volume of advertising on platform 1. One could go through the same argument with an exogenous increase in advertising on the other platform. In both cases the effect of an advantage on one side becomes magnified as a result of the positive feedback effects.

Platform 1 obtains a further advantage as it obtains more advertisers. As a result of the keyword bidding system, an increase in advertisers may increase the bids on keywords. Consider first a situation in which we would expect the two platforms to secure identical CPCs. Platforms 1 and 2 have the same 20 bidders interested in 10 slots; the slots are as valuable on platform 1 as on platform 2; and the keyword auction is equally efficient in the sense of getting the bidders to reveal their highest values. In this case we would expect the auction to result in the same bids for the same slots. Now suppose that the number of advertisers on platform 1 increases exogenously by two advertisers, while the number of advertisers on platform 2 is unchanged. If the new advertisers are situated similarly to the existing advertisers (e.g., if they are all drawn from the same distribution), then it is likely that one of the new advertiser's optimal bid will place it in one of the top 10 slots. Suppose, for example, the new advertiser falls into the sixth slot. This has two main positive revenue effects for the platform. First, the new advertisers in slots 6 through 10 all have higher bids than before (because the new 10th place slot is taken by the advertiser previously in slot 9, and so on). With the higher bids come higher payments to the platform. The second effect comes from the new advertiser in slot 6 having a higher bid than the prior advertiser in slot 6. This higher bid increases the bid of every advertiser in slots 1 through 5, because their optimal bids depend (positively) on the level of the bidder below them.²³

Positive feedback effects alone would tend to lead one ad search platform to achieve a monopoly position.²⁴ The largest platform would always realize the highest CPC and provide the largest overall value to searchers and advertisers in the aggregate. The platform that provided the highest quality search engine for users and ad platform for advertisers would necessarily win the market. We would, expect, though, that these positive feedback effects would diminish with the size

²³ See Varian, *supra* note 25.

²⁴ This is the classic tipping story for markets with indirect network effects. See Brian Arthur, *Increasing Returns and the New World of Business*, Harvard Business Review 74 (July–August 1996): 100–109; Michael Katz and Carl Shapiro, *Systems Competition and Network Effects*, Journal of Economic Perspectives 8 (Spring 1994): 93–115. Tipping does not occur in many real-world markets as discussed in David S. Evans and Richard Schmalensee, *The Industrial Organization of Markets Based on Two-Sided Platforms*, Competition Policy International, Spring 2007.

of the platform. That is because the value of additional bidders decline and more keywords would have thick markets.

Concluding Remarks

Internet-based technologies are revolutionizing the stodgy \$625 billion global advertising industry. Advertisers once had only crude methods available for targeting their ads to consumers who were likely to buy their products. That was done mainly by selecting advertising media—such as particular television shows or magazines—that specialized in the relevant audiences. Advertisers also had little information on who actually watched their ads and what activities followed. The Internet has changed that by allowing advertisers to target specific individuals and paying only when those individuals click on the ads. More sophisticated technologies are beginning to track not only whether individuals clicked on an ad but whether that actually translated into a sale. Search-based advertising has developed the most advanced methods for targeting consumers and charging for results. Non-search based advertising is not far behind.

These new technologies are critically important for understanding the evolution of the advertising business because more of the devices that people use for consuming content will have an internet connection in the future. Most mobile phones will have Internet connections and the initial success of the iPhones at least points to the likely popularity of this development. Most televisions will also have Internet connections. It is too early to know whether the product will catch on, but Amazon's e-book reader has an always-on wireless feature that would enable it to deliver targeted ads as well.

These changes are important for understanding the current structure and evolution of the online advertising business. They are also critical for numerous public policy issues that have emerged. Will a single ad platform emerge or will several remain viable? What are the consequences of alternative market structures for ad platforms for a web economy that is increasingly based on selling eyeballs to advertisers? Data is central to these ad platforms. Historically, communication providers such as the telephone companies have been extremely respectful of privacy rights. The ad platforms have business models that are based on collecting and hoarding highly personal data from individuals. The implications of that have not been fully thought through by either consumers or policymakers. Finally, web publishers have irritated copyright holders who argue that they are using copyrighted material to attract traffic. These issues are addressed in a companion piece.

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Additional topics covered in the original 50-page paper include:

- The relationship between ad price and ad placement in search
- Analysis of the online display advertising market
- The use of data and targeting
- Market structure for advertising on publisher websites
- Pricing and competition in search and display advertising
- Market participants, role and revenue
- Market evolution

To request the original paper from which this excerpt was derived, please contact elizabeth.liu@marketplatforms.com.