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January, 2014

The online advertising and tracking industry: technology, business model, and market structure

Henk LM Kox, *CPB Netherlands Bureau for Economic Policy Analysis*



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The online advertising and tracking industry: technology, business model, and market structure

Henk L.M. Kox¹

January 2014

1. Introduction

This research note is a sideline product for a more theoretical analysis of multisided markets on the Internet. This note provides auxiliary information on the Internet advertising and tracking industry: market structure, business model, targeting technologies, performance criteria, payment structures, main welfare aspects, and recent market trends.

The online advertising market is in fact a cluster of sub-markets in which the following players operate:

- *Product sellers*: firms that buy the services of advertising firms to promote their product;
- *Web publishers*: firms offering online information content to general public (e.g. news, journals, weather, porn, financial information, restaurants, research), either free or behind a paywall. These web publishers earn additional revenue from offering space to advertisements. Also social networking media like Facebook, LinkedIn and Twitter participate in this business.
- *Online advertising networks*: firms that sell online advertising services, and that commercially intermediate between web publishers and product sellers. This is a heterogeneous group that comprises of:
 - *traditional advertising and marketing conglomerates*: firms that have developed branches for online advertising.¹ Mostly they operate through multiple advertising media (newspapers, journals, other forms of printed material, billboards, Internet, video, mobile advertisement messages).
 - *Network search intermediaries* like Yahoo!, Google, Facebook, and Bing have joined online advertising by setting up advertising subsidiaries themselves after 2000.² For instance, Google has organised its online advertising business through subsidiaries like DoubleClick, AdMob, AdSense, and AdWords.³
- *Auxiliary advertising services*: firms that operate in the value chain of online advertising by offering specialist services that enable more effective customer targeting (B2C, B2B) by the advertising networks:
 - *Advertising and data exchanges*: An 'ad exchange' is an auction-based marketplace where sellers or advertising networks can bid to place advertisements in the space offered by websites. A 'data exchange' is a marketplace where advertisers bid for access to data about customers. The data can be that collected through the tracking

¹ Email: h.l.m.kox@cpb.nl. The author is associated with CPB Netherlands Bureau for Economic Policy Analysis (The Hague, Netherlands). However, only the author only is responsible for the contents of this paper.

and tracing of users' online activities and/or from offline sources (e.g. national statistics, census data, etc.).

- *Data brokers*: Firms that gather, merge and sell aggregated information on individual persons or firms. Part of their data may stem from public records and registries (e.g., census data, real estate records, vehicle registration, phone books, etc.). Other data are bought from third parties like network search intermediaries. By combining these data they offer profiles for individual firms and individuals, or for consumers and firm matching particular selection characteristics. The profiles may comprise simple items like residential address, phone, email address, but also much more private identifiers like age, gender, race, income range, social security numbers, employment background, debtor history, health data, court and police records.⁴
- *Tracking companies*. Specialist firms (other than the well-known search engines) that collect behavioural data of Internet users and sell these tracking data commercially. When a user visits a website, tiny tracking files (cookies) watch what they do and develop a profile of the user's behaviour. Often, a tracking company will sell this information directly to advertisers. Some also sell the tracking data to data brokers through a data exchange. The unique identification code embedded in cookies on the user's computer or handheld device allows advertisers to target advertisements to firms or individuals (cf. Angwin and McGinty, 2010; Reimbach-Kounatze, 2013).
- *Business analytics and profiling firms*, like SAS Institute. Some web intermediaries with search engines also have this function. They use draw available public, legally obtainable data about firms or individuals, and some times combine this with inferred data derived from search behaviour to construct profiles of firms and individuals (their preferences, business behaviour, etc.), which are then offered for sale to third parties like advertising networks.

Of special interest for this research project is the position of web-search intermediates in the online advertising business. The general public only knows Google, Yahoo, Bing, Facebook, Twitter, and other web-search operators from the search and network platform functions they offer for free. Few of them realise that their real business is advertising as Table 1 shows for Google's revenue structure. Also Yahoo, Twitter and Facebook basically are advertising networks.⁵

Table 1 Google revenue structure

		2010	2011	2012
Advertising revenues:				
Google websites	\$	19,444	26,145	31,221
Google Network Members' websites		8,792	10,386	12,465
Total advertising revenues		28,236	36,531	43,686
Other revenues		1,085	1,374	2,353
Total Google revenues (advertising and other)	\$	29,321	37,905	46,039
Other:				
Motorola Mobile revenues (hardware and other)		0	0	4,136
Total revenues	\$	29,321	37,905	50,175

Note: a) Data for Year Ended December 31. Google domestic and international revenues as a percentage of Google

revenues, determined based on billing addresses of customers for Google business. Source: Google Inc. Annual Report 2012 (Form 10-K, deposited at US Securities and Exchange Commission, Washington), pp.32 and 34.

Table 2 supplies information on the profitability of the four largest Internet-search and social-networking firms commercial returns. Google and Yahoo are most successful when measured by return on capital and sales margin. Yahoo appears to be extremely profitable; the main reasons is that Yahoo's costs are substantially lower. An important difference with Google is that Yahoo's fixed and R&D investments are substantially smaller. Google has large data storage centres, other fixed investments (e.g. participation in trunk connection lines) and more than \$6 billion investments in R&D in 2012.

Table 2 Mixed profitability of Internet-search and social-media intermediates, 2012

	<i>unity</i>	Google	Yahoo	Facebook	Twitter
Sales revenue	<i>million USD</i>	46000	4986	50100	310
Stockholders equity	<i>million USD</i>	71700	14560	11800	759
Net income after tax	<i>million USD</i>	10700	3945	53	-70
Margin on sales	%	23.3	79.1	0.1	-22.6
Return on equity	%	14.9	27.1	0.4	-9.2

Sources: latest Annual Reports (10-K forms, SEC), financial press.

Facebook had its IPO in 2012, and Twitter in Autumn 2013. Despite the increased role of stockholders, Table 2 indicates that Facebook and Twitter have a profitability problem. To keep their stockholders satisfied they might feel obliged to raise future advertisement intensity on their networking platforms. Legal class actions by Facebook users show that this strategy may become difficult (e.g. Kuchler, 2014). It stands to be seen whether this business model is feasible for both Facebook and Twitter.

2. Business model in online advertising

The advertisement ('ad') industry is hired by sellers to increase product sales. Consumers differ in their individual reservation price for goods and services. This reservation price in its turn is based on their (only partly observable) individual preferences and knowledge. Apart from this there are non-structural buying triggers that depend on the consumer's real-time situation and needs (e.g. hunger, thirst, current activity). So actual buying decisions depend on the consumer's structural situation and his real-time contextual situation:

- structural: disposable income, desire for the good (long term aspects, e.g. status goods), information about substitute goods, the prices of the good and its substitutes.
- real-time, contextual situation: short-term needs (e.g. hunger, thirst, need for shelter, medical needs), current preoccupation (present activity, search), social context, time of the day, geospatial location, local and social buying triggers (e.g. seeing the consumption of others).

Finding out these buying triggers and influencing them is the key service that the online advertising industry delivers to their commercial clients.

The online advertising industry provides is innovative in the type of information triggers they use to persuade potential customers into effectively buying the product. Three types of triggers are used.

- The technology provided by online search intermediates made it possible to get a much better idea of the potential customers and their preference structure. The potential customers indirectly reveal their preferences by their web queries, and using this information allows the advertising firms to target much more efficiently which individuals or firms are likely to be interested in the product that they are trying to sell. This allows to target more precisely on these clients, and show them targeted information triggers on the basis of which they might upwardly revise their reservation price. What used to be a latent, unobservable variable only known to the consumer himself is now increasingly becoming 'visible' via statistical analysis of the consumer's own web behaviour.
- A second determinant in the buying decision is the 'impulse' factor which in the past used to be almost completely invisible for advertisers. On the basis of the potential customer's web behaviour, web intermediates and tracking firms nowadays have more possibilities for determining what time it is for the customer, where he/she is at the moment, and what (web-related) activities he/she is engaged in. Large online advertisers like Google are now able to use this information in real time to create highly targeted information triggers that may appeal to the consumer's 'impulse' factor.
- A third element of information triggers comes from *re-targeting*. This is the identification of potential customers that have at least once shown their interest for a particular product. Such (apparently) hesitating consumers receive highly targeted sales triggers to influence their buying decision variable.

The prime performance criterion for the advertising industry from the perspective of the sellers is the *conversion rate*, i.e. the relation between the actual buying decision and the information trigger provided by the advertising firm. An old dream of the marketing industry has been to develop interactive marketing, in which the information triggers (to buy products) can be tailored to individual preferences, thus increasing the likelihood of positive buying decisions of potential customers.⁶

3. Online consumer targeting technology

Particularly since 2000, the technology of online advertising, consumer targeting and finding out individual preferences of potential customers has made revolutionary progress. Advertising has developed from undifferentiated, general-purpose publicity campaigns to tailored, individualised information triggers. The technological change in consumer targeting can be described in five steps.

A. Newspaper-like targeting. The online advertising industry has started immediately after the Internet was opened for commercial participants in 1992. Advertisers buy space on the websites of other parties to show information about their own brands or products. Consumer targeting is relatively crude, and the initial method used was more or less the same for newspaper, TV, radio and the Internet. The basis for consumer targeting is formed

by the advertiser's own knowledge or guesses about the preferences of their potential clients (socioeconomic category, age, gender, family status). On this basis the advertiser makes choices as to (a) the content medium (like newspaper, TV channel, website) where the advertising is launched, and (b) the form of the advertisement. Online advertisers place their display ads on websites they expect to be regularly visited by their clients. Advertisements initially mostly had a 'banner' or 'pop-up' character, soon followed by click-through links to the product seller's own website. This type of consumer-preference targeting is quite unspecific, because once the medium has been chosen, the advertisement has a one-size-fits-it-all character.

B. Keyword-based targeting. A next phase in targeting arose around the year 2000 when web-search intermediaries gained importance due to the explosion in web-content sites. The position of the search intermediaries in the advertising value chain changed drastically. Their position gradually changed from passive suppliers of advertising space from advertisers to active creators of advertising demand. This went together with technological changes. A first step was the introduction of "sponsored search", a form of covert advertising. In 'sponsored search' the web intermediaries offers advertisers the possibility to be included in the results of a search for selected and specified search keywords (Jansen and Mullen, 2008; Batelle, 2005). That may be an advertisement popping up alongside the search results, or it can be a higher ranking of the advertiser in the display of the search results. Web intermediaries soon started to use auctions to sell such keyword-linked advertising options. GoTo.com created the first sponsored search auction, and Google's sponsored-search auction took place in 2002 (Fain and Pedersen, 2006).⁷ Search engines like Google, Yahoo and Bing presently generate substantial revenues from auctioning off their ad spaces (e.g. Koh, 2013). Google's AdWords market is an auction where businesses place bids for individual keywords, together with limits specifying their maximum daily budget. The search engine company earns revenue from businesses when it displays the product seller's ads in response to a relevant search query (if the potential customer actually clicks on the ad).

This form of consumer targeting is still fully based in the knowledge base of the advertisers (his choice of tagged keywords), but targeting is much more specific than 'newspaper-like' targeting. Due to the added services and the auction, the role of the search intermediate in the value chain has increased. Smart algorithms ensure that the search intermediate's revenues are maximised by striking an efficient balance between the advertiser's budget and the consumer's search action (e.g. Mehta, 2011). The consumer may not be aware that the ranking of the search results that he obtains is in fact a form of covert advertising (cf. Table 3). Search diversion is evident if one looks for a specific hotel or air flight through Google. Direct links to the particular flight or hotel often can only be found after pages of links to commercial booking sites, which achieved display priority after paying the web intermediate for this service.

C. Contextual targeting (without history). This is a form of advertising that ensures that ads pop up right beside search results or website content that relates to the advertiser's product or service. The prime contextual targeting elements are still the keywords of the search, but

the search intermediary uses his own statistical analysis to detect statistical links between keywords (cf. Heaven, 2013), so that the probability and efficiency of hitting the consumer's real preferences increase.⁸ A further targeting element that the search intermediate adds information on language, the geo-location, time zone (linked to IP address or routing information), and the real day time at the searcher's location. These targeting elements

Table 3 Open and covert forms of online advertising

Delivery forms	Description
Open advertising	
Pop-ups/pop-unders	A pop-up ad is displayed in a new web browser window that opens above a website visitor's initial browser window. A pop-under ad opens a new browser window under a website visitor's initial browser window.
Floating ad	A floating ad, or overlay ad, is a type of rich media advertisement that appears superimposed over the requested website's content. Floating ads may disappear or become less obtrusive after a preset time period.
Expanding ad	An expanding ad is a rich media frame ad that changes dimensions upon a predefined condition, such as a preset amount of time a visitor spends on a webpage, the user's click on the ad, or the user's mouse movement over the ad. Expanding ads allow advertisers to fit more information into a restricted ad space.
Trick banners	A trick banner is a banner ad where the ad copy imitates some screen element users commonly encounter, such as an operating system message or popular application message, to induce ad clicks. Trick banners typically do not mention the advertiser in the initial ad, and thus they are a form of bait-and-switch. Trick banners commonly attract a higher-than-average click-through rate, but tricked users may resent the advertiser for deceiving them.
Interstitial ads	An interstitial ad displays before a user can access requested content, sometimes while the user is waiting for the content to load. Interstitial ads are a form of interruption marketing.
Text ads	A text ad displays text-based hyperlinks. Text-based ads may display separately from a web page's primary content, or they can be embedded by hyperlinking individual words or phrases to advertiser's websites. Text-based ads often render faster than graphical ads and can be harder for ad-blocking software to block.
Covert advertising	
Sponsored search	Sponsored search (also called sponsored links or search ads) allows advertisers to be included in the sponsored results of a search for selected keywords. Modern search engines rank sponsored listings based on a combination of bid price, expected click-through rate, keyword relevancy, and site quality.
Search Engine Optimization	Search Engine Optimization, or SEO, attempts to improve a website's organic search rankings in SERPs by increasing the website content's relevance to search terms. Search engines regularly update their algorithms to penalize poor quality sites that try to game their rankings, making optimization a moving target for advertisers.
Search Engine Marketing	Search Engine Marketing, or SEM, is designed to increase a website's visibility in search engine results pages (SERPs). Search engines provide sponsored results and organic (non-sponsored) results based on a web searcher's query. Search engines often employ visual cues to differentiate sponsored results from organic results. Search engine marketing includes all of an advertiser's actions to make a website's listing more prominent for topical keywords.
Adware	Adware is software that, once installed, automatically displays advertisements on a user's computer. The ads may appear in the software itself, integrated into web pages visited by the user, or in pop-ups/pop-unders. Without the consumer's consent this should be regarded as malware.
Sources: Wikipedia (lemma 'Online Advertising', retrieval: August 2013); PWC-IAB France-SRI (2010).	

further increase the likelihood of identifying the searcher's willingness to buy at a given time and location. A controlled biometric study by Yahoo assessed that adding personal and contextual relevance strengthens the impact of online ads. They found that ads which combine both personal and contextual relevance may very fast draw attention, achieve more and longer eye fixation, and get more positive emotional response and cognitive processing (Marlowe and Levine, 2011).

Though the advertiser is still the one who selects the keywords, the share of the search intermediate in targeting the consumer's actual preferences has increased. Network-search intermediaries like Google do comprehensive research on the relation between

individual keywords (e.g. Levy, 2011). This means that they often know better than the product seller what keyword combinations are best for generating extra advertisement incomes. They sell this knowledge to the product sellers or their advertising firms, thus increasing their share in the value chain of online advertising (compared to targeting technology B).

D. Contextual targeting with a historical user profile. One step further in consumer-preference targeting is achieved if the search intermediate uses the individual consumer's *past* searches as an input for a better contextual interpretation of a *current, real-time* search action. The historic profile is used to improve the personal-relevance component of targeting, thereby possibly increasing the consumer's reservation price for a specific products. Such exploitation of 'big data' by the search intermediary will further enhance the efficacy of the ad. The extra services go beyond what most individual advertisers could ever hope to achieve themselves with respect to consumer targeting.⁹ The intermediaries' share in the advertising value chain is likely to further increase due to this type of targeting services.

E) Re-targeting or re-messaging. This further step in targeted advertising is fully based on a consumer's search behaviour in the past. A consumer's earlier interest in a particular product or product group is used to re-target them afterwards with directed advertisements. According to industry observations, some 90% of visitors to E-commerce websites leave these websites without actually making a purchase (Antarieu et al. (2010). The intermediaries register such patterns, because they form a signal that the visitors are potentially interested consumers, and such valuable information can be sold to advertisers.

4. Specialisation in online advertising industry

The online advertising industry is subject to specialisation in the value chain between consumer and product sellers. A growing share of the online advertising market is applying behavioural targeting (i.e. types C, D, E). In the USA the expenses for behaviourally targeted advertisements were estimated at US\$ 925 million in 2009, which would be about 5% of total online ad revenues.¹⁰

The auxiliary firms in the online advertising chain like specialist online tracking firms have displayed strong growth during the last few years. Evidon (2013) identified 1300 different firms that specialise in tracking traffic to and from particular websites in 2013. In the USA the average number of trackers deployed per website amounts to 9, in the UK 8.4, in The Netherlands 7.4, and 5.9 in China.¹¹ The trackers can be split in four categories depending on their tracking specialisation (cf. Table 4).

Slightly less than half of all trackers concentrate on delivering ads and track users for future ad delivery. One-fifth of all trackers is in the business of behavioural tracking, i.e. classifying web users for future ad and contents targeting. The trackers typically gather their information in - on average- about half a second. However, further evidence by Evidon (2013) shows that in particular the Google-owned trackers can do it in less than 200 milliseconds, which is probably a big competitive advantage in contextual and keyword targeting.

Table 4 Types of tracking firms that collect data on traffic to and from particular websites, 2013

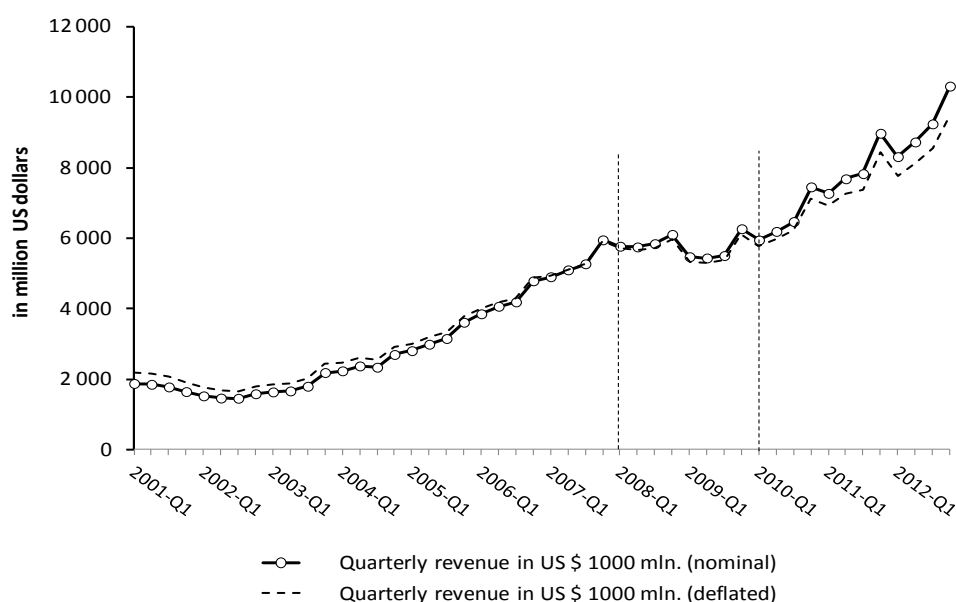
Type	Activity	Examples	Average speed of tracking action in milliseconds a)	Average share in total worldwide tracker count
Ad scripts	Deliver ads and track website users for future ad delivery	Google AdSense, DoubleClick (Google), Quantcast, Google Adwords Conversion, Microsoft Atlas	534.1 ms	46%
Analytic scripts	Provide data to website owners about their audience	Google Analytics, Omniture, Stacounter	510.1 ms	22%
Behavioural trackers	They segment users for ad and content targeting	Rambler, DoubleClick Floodlight (Google), eXelate, BlueKai	526.6 ms	21%
Page widgets	Collect data from users while providing some function to the user (e.g. via apps)	Facebook Connect, Facebook Like Button, Google +1, Twitter Button, AddThis, LiveInternet, Twitter Badge, ShareThis, Tumblr, AdFox	542.0 ms	11%

Note: a) Action speed is measured in latency (milliseconds of time required for retrieving main tracking information on traffic between source and destination). Source: Evidon, Global Tracker Report (March 2013).

5. Trends in online advertising markets

The growth of the US Internet advertising market is depicted in Figure 2 by the quarterly Internet advertising revenues. The figure displays an overall growth that was mildly interrupted by the 2002-3 “dotcom crisis” and more harshly by the 2008-10 financial crisis.¹² after the demise of Lehman Brothers. In the 4th quarter of 2012 the US revenues in online advertising for the first time topped the \$10 billion mark (IAB-PWC, 2013).

Figure 2 Development of US Internet advertising market, measured by quarterly revenues, 2001-2012



Data sources: Interactive Advertising Bureau/ PWC (2013); GDP deflator data (2007=100): Federal Reserve Bank of St. Louis.

Table 5 depicts the different forms that online advertising may take. The Interactive Advertising Bureau predicts continued growth in mobile advertising with the adoption of location-based targeting and other technological features not available or relevant on personal computers. Industry groups such as the Mobile Marketing Association have attempted to standardize mobile ad unit specifications, similar to the IAB's efforts for general online advertising. Mobile advertising is growing rapidly for several reasons. There are more mobile devices in the field, connectivity speeds have improved (G3-G4 networks), screen resolutions have advanced, mobile publishers are becoming more sophisticated about incorporating ads, and consumers are using mobile devices more extensively.

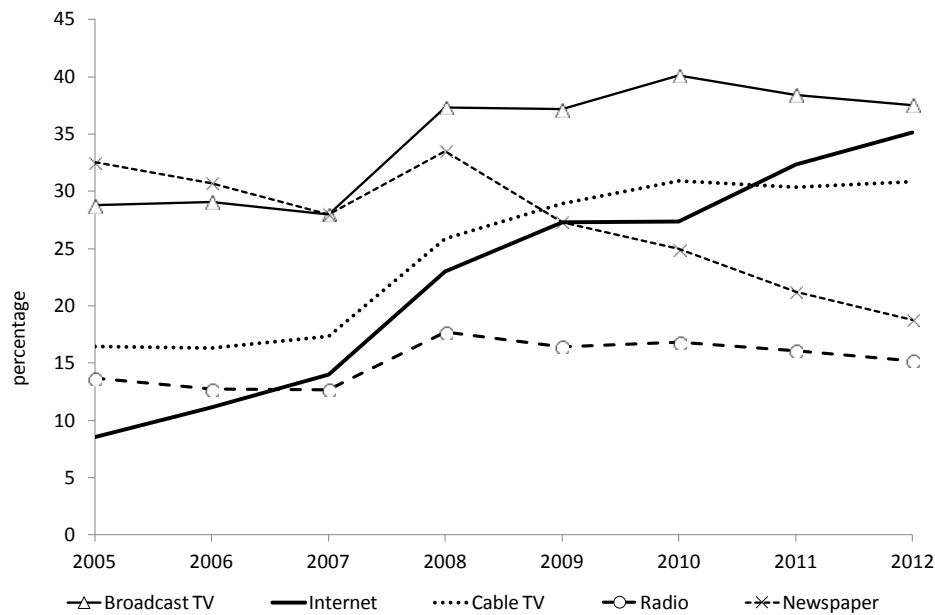
Table 5 Different media for online advertising

Type of online medium	Description
Mobile Advertising	Mobile advertising is ad copy delivered through wireless mobile devices such as smartphones, feature phones, or tablet computers. Mobile advertising may take the form of static or rich media display ads, SMS (Short Message Service) or MMS (Multimedia Messaging Service) ads, mobile search ads, advertising within mobile websites, or ads within mobile applications or games (such as interstitial ads, "advergaming," or application sponsorship).
Social media marketing	Social media marketing is commercial promotion conducted through social media websites. Many companies promote their products by posting frequent updates and providing special offers through their social media profiles.
Email Advertising	Email advertising is ad copy comprising an entire email or a portion of an email message. Email marketing may be unsolicited, in which case the sender may give the recipient an option to opt-out of future emails, or it may be sent with the recipient's prior consent (opt-in).
Affiliate Marketing ('lead generation')	Affiliate marketing (sometimes called lead generation) occurs when advertisers organize third parties to generate potential customers for them. Third-party affiliates receive payment based on sales generated through their promotion.
Online classified advertising	Online classified advertising is advertising posted online in a categorical listing of specific products or services. Examples include online job boards, online real estate listings, automotive listings, online yellow pages, and online auction-based listings. Craigslist and eBay are two prominent providers of online classified listings.
Sources: Wikipedia (2013); Antariou et al. (2010).	

The share of Internet in the total advertising market has steadily increased over other advertising media such as broadcast TV, newspapers, cable TV and radio. Figure 3 pictures for the USA the share of different media in total advertising revenues over the period 2005-2012.¹³ The annual market growth rates of Internet as advertising media have outpaced other advertising media, although also Cable TV (local and national networks) had a positive growth of its market share over the observation period. The market share of newspapers as advertising outlet has steadily decreased. A possible reason from the perspective of advertisers is that newspapers perform worse in targeting their advertisements.

Until recently, overall Internet traffic used to be transmitted through fixed lines (copper, fibre optics), but the share of mobile Internet access through handheld devices is rapidly growing. This is also reflected in the growth of advertisement revenues related to mobile Internet (cf. Table 6). North America and the Asia-Pacific region together represent 80% of the market for online Internet advertising, with growth rates especially strong in North America.¹⁴ Europe accounts only for about one-sixth of the global market for mobile Internet advertising.

Figure 3 Market share (%) per advertising medium in total US advertising market (revenue-based), 2005-2012



Source: calculated on the basis of data of Interactive Advertising Bureau/ PWC (2013).

Table 6 Estimated mobile advertising revenues (in million Euros), by region, 2011-2012

By region	2011	2012	Change %
Asia-Pacific	1732	2769	60
North America	1302	2743	111
Western Europe	610	1167	91
Central Europe	51	87	71
Middle East & Africa	50	85	70
Lat. America	23	39	70
Total	3768	6890	83

Source: Knapp et al. (2013)

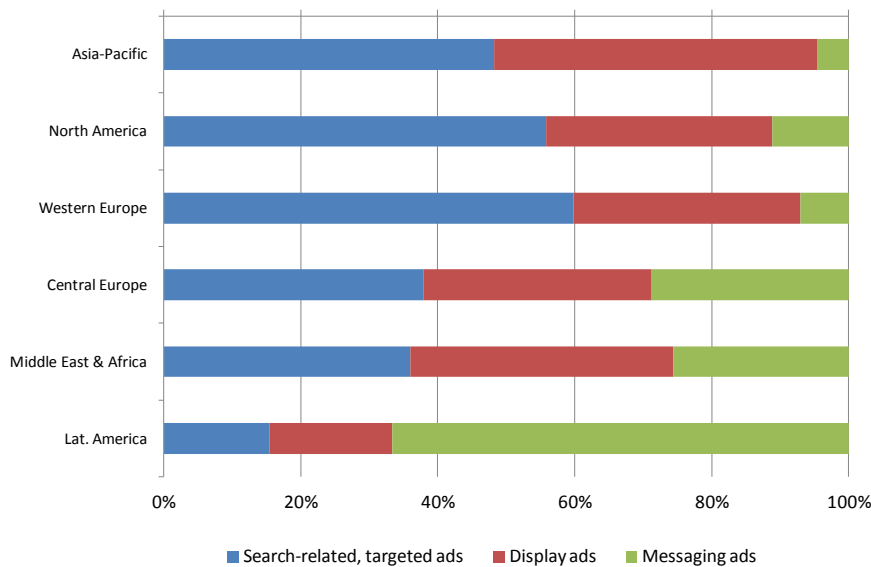
For mobile advertisements three advertisement ‘technologies’ may be distinguished:

- search-related targeted advertisements: advertisers pay online companies to list and/or link the advertiser’s company site domain name to a specific search word or phrase;
- display ads: the advertiser pays an online company for space on one or more of the online company’s web pages to display a static advertisement, banner or logo;

- advertising through text messaging services, tailored to be delivered through wireless mobile devices such as smartphones and media tablets.

In Western Europe 60% of all mobile advertisement revenues is estimated to be related to search-related ads, and this share is higher than in North America or the Asia-Pacific region (cf. Figure 4). In Central Europe, the Middle East and Latin America, messaging services still form a substantial source of mobile advertisement revenues.

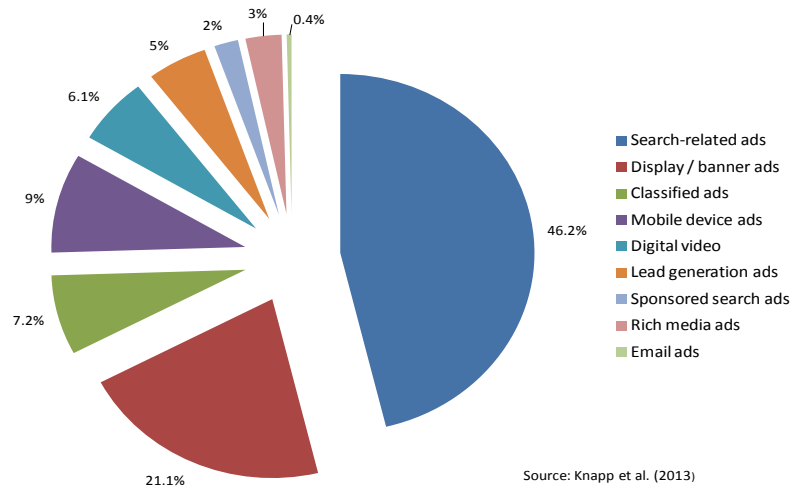
Figure 4 Decomposition of regional mobile advertising revenues by type of advertisement, 2012



Source: Knapp et al. (2013)

The largest part of total online ad revenues is related to search-based advertising, followed by traditional advertisements where the advertiser’s banner, logo or ad text is displayed (cf. Figure 5).¹⁵ In dynamic terms, the growth of online ad revenues was strongest in ads for mobile devices (share went up from 5% in 2011 to 9% in 2012).

Figure 5 Market revenues by online advertisement format, USA 2012 (share in %)



Source: Knapp et al. (2013)

6. Payment models in online advertising

The growth of the online advertising industry has brought dynamic changes in the relations between product sellers, advertising firms and website owners. One element of the changes is the incentive structure of the advertising contracts. It has led to new types of contract models:

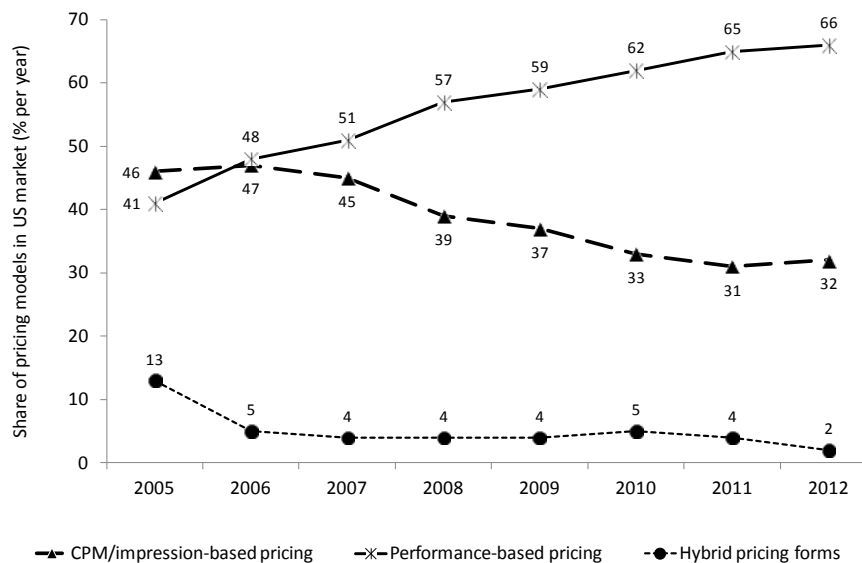
- *no cure, no pay*: the advertiser receives a fee for advertising that results in a positive buying decision. The problem in this contract type is the attribution of new customers; are they only the result of the online advertising or are still other factors at play?
- *mixed payment systems*: advertising network is paid for each click-through to the product seller's website (*pay per click*), or for the number of times that a banner has been displayed to web-site visitors (*pay per view*). Both '*pay per click*' and '*pay per view*' can be based on website statistics nowadays.¹⁶

The online advertising markets has a heterogeneous structure. The intermediaries' revenues come from the third-party E-commerce sites (advertisers), which typically pay fixed fees proportional to the number of consumer visits (per click) or to the total value of sales generated. There are several forms of payment and incentive systems running alongside each other. Here are some of the most popular payment systems:

- *Cost per Mille (CPM)*, or "*Cost per Impression*": compensation system in which advertisers pay a fee to the search intermediary for every thousand displays of their advertisement/message to potential customers. This form of compensation is gradually losing popularity because it is susceptible to fraud as many incidents show.¹⁷
- *Cost per Click (CPC)*: advertisers pay the publisher (typically a website owner) when the ad is clicked. compensation system in which advertisers pay a fee to the search intermediary each time a user clicks on the advertisement. This form of measurable performance has become more popular over the years (cf. Figure 6). Pay per click (PPC) (also called cost per click) is an It is defined simply as "the amount spent to get an advertisement clicked." [1]
- *Other performance-based compensation systems* are 'Cost per Action' (also called 'Cost per Acquisition') and 'Pay per Performance' (PPP). These system imply that the advertiser pays for the number of potential customers that perform a desired action.

The highest placed advertisement-links generally collect more clicks than those place at the lower positions. This score performance per link is measured by the so-called 'click-through rate'. The most common type of auction is generalised second-price, shortly GSP, which means that each advertiser bids on the 'per-click' price of the link, and his total payment to

Figure 6 Development of pricing models in market for online advertising, USA 2012



the search intermediary is the ‘per click’ price multiplied by the ‘click-through rate’. It is enlightening how Google advertises its own advertisement space and keyword-linked search ranking:

“AdWords gives you control over your advertising costs. There's no minimum amount that you have to spend. You set an average daily budget and choose how you'll spend your money. Go to your account at <https://adwords.google.com> to see full reports of your advertising costs and billing history anytime. Every time someone searches on Google, AdWords runs an auction to determine the ads that show on the search results page, and their rank on the page. To place your ads in this auction, you first have to decide what type of customer action you'd like to pay for. For example, you might choose to pay for the following actions:

- 1. The number of times your ad shows.** This is known as a cost-per-thousand-impressions, or CPM, bid. We recommend the CPM bidding method if you want to increase awareness of your brand. Note that CPM bidding is available for Display Network campaigns only.
- 2. Each time one of your ads receives a click.** This is known as a cost-per-click, or CPC, bid. We recommend the CPC bidding method if you want to drive traffic to your website.
- 3. Each time people take a specific action on your website after clicking on one of your ads.** This is known as a cost-per-acquisition, or CPA, bid. We recommend the CPA bidding method for seasoned AdWords advertisers who are interested in [conversions](#), like purchases or signups. These are called your bidding options. Most people starting out in AdWords use the basic **CPC bidding** option, which means they accrue costs based on the number of clicks they get on their ads. If you use this option, the amount you're charged per click depends in part on the [maximum cost-per-click bid](#) you set in your account, also called maximum CPC bid. This represents the highest amount that you'll ever pay for an ad click (unless you're setting bid adjustments, or using [Enhanced CPC](#)). In fact, you'll be charged only the amount necessary to keep your ad at its position on the page (including any applicable [service fees](#) that may apply to Display Network campaigns).”¹⁸

7. Some welfare effects

Privacy. A first welfare effect of online advertising practices relates to privacy issues. The price for data in the market is determined by the of supply and demand. But personal data is a “non-rival” good in economics, meaning that the use of the data by one person or firm does not diminish the stock of the good; the same record can be sold many times to many

customers, and the same record can be used multiple times by the same customer. As a result, the market price for a record sold to one customer does not reflect the full monetary value of the underlying data but rather provides an indication of the market clearing price that individual customers pay for a copy of the data (Reimsbach-Kounatze et al., 2013).¹⁹

From a privacy perspective, the targeting types D and E (cf. section 3) constitute a form of BiBiWyRySy (*'Big brother is not only Watching you, but also Remembering you and Selling information about what You did'*). This is experienced as creepy and undesired by many consumers. In a controlled experiment setting Preibusch (2013) found that 86% of participants would like to see a feature in web search that prevents data sharing with third parties. Similarly, 74% of participants found it important to remove queries from their search histories, and four out of five participants appeared to turn on the search feature that disables data sharing with third parties. Brandimarte et al. (2010) find - also in a controlled experiment- that more *perceived* control over the release of private information decreases individuals' concern about privacy, and it increases their propensity to disclose sensitive information, even when the *objective* risks associated with such disclosures do not change.²⁰ Tsai et al. (2010) show that, under certain conditions, consumers try to purchase from more privacy protective merchants even when that may entail paying modest price premia.

Behavioural consumer targeting types D and E (section 1.X) could be at odds with the OECD privacy guidelines. Other consumers, might find it convenient that they get such personalised advertisements and search results.²¹ The revision of the OECD privacy guidelines that are at present under discussion speak of:

"the individual right to a) to obtain from a data controller, or otherwise, confirmation of whether or not the data controller has data relating to him; b) to have communicated to him, data relating to him (within a reasonable time, at a non-excessive charge -if any-, and in a reasonable manner, and in a form that is readily intelligible to him); c) to be given reasons if a request made under subparagraphs (a) and (b) is denied, and to be able to challenge such denial; and d) to challenge data relating to himthem and, if the challenge is successful to have the data erased, rectified, completed or amended" (OECD, 2013).

Implementation of these revised guidelines by OECD member states could have very large implications for the online advertising and targeting sector.

Increasing the cost of information. A second welfare effect of recent practices in online advertising regards the impact on market and information transparency. The practices of sponsored search advertising, search engine marketing and re-targeting advertisements imply that search intermediaries do not necessarily reduce search costs for consumers, but rather the opposite, and purposefully rather than by accident. The practice of manipulating search results on the basis of the fee's that advertisers pay on keyword auctions means that consumers can no longer trust that the search intermediaries (web platforms) are really interested in showing the best or the most relevant results in response to the consumer's web-search query.²²

Hagiu and Jullien (2011) observe that, although recommender systems and contextual advertising may help consumers find what they want, they are also used by E-

commerce platforms in order to extend users' visits and shift (more or less subtly) their focus from the products they were initially looking for, towards discovering products they might be interested in - and eventually buy. More flagrantly, there is evidence that online intermediaries sometimes use recommender systems to direct attention to products with a higher profit margin, not necessarily the ones that are the best match for consumers' preferences.²³ Hagiu and Jullien (2011) identify two original motives for diverting consumer search.

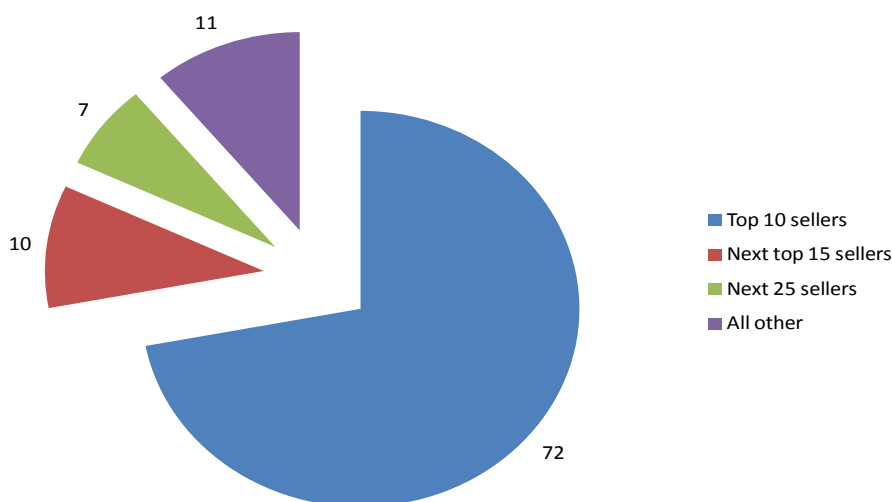
A) The first motive is that, due to a failure of the Coase theorem, consumers do not internalise *ex ante* all the externalities that their search activities generate. In particular, they do not account for the gains from trade bestowed on all of their potential trading partners - advertisers in this case - when deciding to perform a search through the intermediary. This may lead to "insufficient" search. Because the search intermediary derives revenues whenever consumers transact with advertisers, it has an incentive to introduce some noise in the search process, i.e. to divert search. If consumers anticipate this, they might be less likely to use the intermediary's service. Therefore, the intermediary has to trade off higher total consumer traffic against a higher average number of searches per visitor.

B) The second motive identified by Hagiu and Jullien (2011) is that an intermediary may use search diversion as an instrument to influence the strategic choices (pricing in particular) made by its advertisers. Such indirect control is desirable for the search intermediary because individual advertisers do not fully internalise the effect of their strategic decisions on total consumer demand for the intermediary's service. Search intermediaries gain by more consumer search demand. By altering the composition of the demand faced by each advertiser, search diversion can force advertisers to lower their prices, thereby increasing the surplus left to consumers²⁴ and ultimately their traffic to the intermediary.

It is interesting to investigate under what conditions the intermediaries' incentive for search diversion would *not* arise. Hagiu and Jullien (2011) show that in an unregulated market the only case in which the need for search diversion entirely disappears arises, if three conditions are simultaneously fulfilled: (i) the intermediary can charge consumers access fees; (ii) the intermediary subsidises a second search by consumers; and (iii) intermediaries fully control and credibly commit to store prices of the advertiser. Their analysis further demonstrates that search diversion is not necessarily eliminated by competition among intermediaries.

Market power. Finally, a third welfare concern, apart from privacy and search diversion is market power, which may partly be explained by huge fixed-cost indivisibilities in setting up a search network, data storage and data-analysis capacity. The market for online advertising services is a multisided market with a high concentration of market shares. Figure 7 indicates that in the USA only 10 firms accounted for almost three quarters of all revenues in 2012. If the top-10 firms succeed in cooperating they could successfully exploit their market power vis-à-vis advertisers and consumers. The market dominance and technological edge performance of Google and its various specialised subsidiaries deserve special attention in this context.

Figure 7 Market concentration: share (%) of total revenues from selling online advertising, USA 2012



Source: Knapp et al. (2013)

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Endnotes

¹ With conglomerate firms like WPP Group, Publicis Omnicom Group, Young & Rubicam, Saatchi & Saatchi, BBDO, McCann, Dentsu, Havas, and Interpublic.

² Cf. Batelle (2005); Jansen and Mullen (2008); Levy (2011).

³ The Google 2012 Annual Report describes the relationship between Adwords and AdSense: *“The goal of AdWords, our primary auction-based advertising program, is to deliver ads that are so useful and relevant to search queries or web content that they are a form of information in their own right. With AdWords, advertisers create simple text-based ads that then appear beside related search results or web content on our websites and on thousands of partner websites in our Google Network, which is the network of third parties that use our advertising programs to deliver relevant ads with their search results and content. [...] Our AdSense program enables websites that are part of the Google Network to deliver ads from our AdWords advertisers that are relevant to the search results or content on their websites. their websites.”*

⁴ Large data brokers are LexisNexis (mainly B2B business background checks), Experian (focus on credit information), Acxiom, Accurant, Everify, Graydon (Netherlands, mainly in creditworthiness checks). More specialist data brokers such as LocatePeople.org, MelissaData.com and 123people.com provide localisation data like personal addresses, email addresses and phone numbers (cf. Reimsbach-Kounatze et al., 2013). Illustrative is data broker Everify.com (see: www.Everify.com). The firm advertises with instantaneous background checks for individual persons in the USA, providing data on name, phone numbers, birth date, criminal and court records (lawbreaking activities, sex offences, law suits), bankruptcies, marriage/divorce records, property ownership, address history, names of relatives and associates. Price: \$19.99 for a simple profile. On top of this you may obtain (for an additional price) data from Everify's *Deep Web Search* tool, which scans further information on a person by searching social media; this would yield photos, videos, blogs, professional interests, social networking profiles, archives and publications.

⁵ Yahoo's Annual Account 2012 (Form 10K, SEC, p.3) states its business as: *“We create value for advertisers and their brands by connecting them with targeted audiences of users through their daily habits. Advertisers can build their businesses through advertising to these targeted audiences on our online properties and services (“Yahoo! Properties”), or through our distribution network of third-party entities (“Affiliates”) who integrate our advertising offerings into their Websites or other offerings (those Websites and other offerings, “Affiliate sites”). We generate revenue principally from display advertising on Yahoo! Properties and some Affiliate sites and from search advertising on Yahoo! Properties and Affiliate sites. Additionally, we generate revenue from other sources including listings-based services, facilitating commercial transactions, royalties, and consumer and business fee-based services”*. In 2012, 81% of Yahoo!'s worldwide revenues came from online display and search advertisements (Form 10K, p.110). Facebook and Twitter had sales revenues of, respectively, about \$5 billion and \$310 million in 2012, mainly from advertising. Facebook states the following about its advertisement business: *“Advertising revenue is generated by displaying ad products on the Facebook website or mobile app and third-party affiliated websites or mobile apps. The arrangements are evidenced by either online acceptance of terms and conditions or contracts that stipulate the types of advertising to be delivered, the timing and the pricing. Marketers pay for ad products either directly or through their relationships with advertising agencies, based on the number of impressions delivered or the number of clicks made by our users. The typical term of an advertising arrangement is approximately 30 days with billing generally occurring after the delivery of the advertisement. We recognize revenue from the delivery of click-based ads in the period in which a user clicks on the content. We recognize revenue from the display*

of impression-based ads in the contracted period in which the impressions are delivered. Impressions are considered delivered when an ad is displayed to users.” (Annual Account, Form 10K, SEC,p.66)

⁶ E.g. Blattberg and Deighton (1991): *“It is a marketer’s dream - the ability to develop interactive relationships with individual customers Technology, in the form of the database, is making this dream a reality. Now companies can keep track of customer preferences and tailor advertising and promotions to those needs”.*

⁷ GoTo.com was renamed Overture in 2001, and acquired by Yahoo! in 2003.

⁸ One-by-one approaches in keyword analysis is not always successful at matching content to ads because many words have additional meanings (polysemy), and the correct meaning may be hard to determine using individual keywords without contextual information elements. Contextual advertising is more likely to connect the advertiser’s ad to the right search context.

⁹ The Google 2012 Annual Report mentions the following about the newly introduced service Google Now: *“[It] is a predictive search feature that gets you just the right information at just the right time. It tells you the day’s weather before you start your day, how much traffic to expect before you leave for work or school, when the next train will arrive as you’re standing on the platform, or your favorite team’s score while they’re playing—all automatically with cards appearing throughout the day at the moment you need them”.*

¹⁰ Calculated on the basis of PWC-IAB data for the USA in 2009.

¹¹ The top-10 tracking firms active in the Netherlands in 2013 were in the following order: Google Analytics, Google AdSense, Facebook Connect, Google +1, Facebook Like Button, DoubleClick (Google), Twitter Button, AddThis, Omniture, and Quantcast (Evidon, 2013).

¹² Note that the US advertising revenues already went into stagnation three quarters before the 2008-Q4 demise of Lehman Brothers and the financial crisis that it evoked.

¹³ Data from Interactive Advertising Bureau (2013). The IAB (headquartered in New York) is the branch organisation of more than 500 leading media and technology companies that are responsible for selling 86% of online advertising in the United States. IAB evaluates and recommends standards, guidelines on interactive advertising and supports research in this area. The IAB has regional branches in Europe and many European countries, which also operate in the same activities.

¹⁴ The North American market for mobile advertising is by far the most developed of all regions. Per mobile subscription advertisers in North America spent € 7.10 in 2012, against € 2.20 in Western Europe and € 1.0 in Asia-Pacific (Knapp et al. 2013).

¹⁵ Some clarification regarding the legend elements of Figure A4 that have not mentioned before in this paper. Search ads include paid listings, contextual text links and paid inclusion in search results. Digital video refers to ads that appear before, during or after digital video content. Lead generation includes referrals. Email includes embedded ads only; excludes mobile ad spending. Lead generation is a form of ads in advertisers pay a fee to online companies for referring qualified potential consumers to being contacted by a marketer. Classified ads refer to fees paid to advertisers by online companies to list specific products or services (e.g. in Yellow Pages). Rich media means ads that integrate some component of streaming interactivity (e.g. Flash or Java script) or in-banner / in-text videos

¹⁶ Although these statistics may not be entirely undisputed, as will be shown later in this paper.

¹⁷ Cf. Story (2007); Jacob (2013); Chen et al. (2012); Shields (2013).

¹⁸ The text above is literally retrieved (August 2013) from Google’s commercial pages: https://support.google.com/adwords/answer/1704424?hl=en&ref_topic=3121763 (web links removed).

¹⁹ The issue is at present debated in the OECD. The review of the OECD Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data arises out of the Seoul Declaration for

the Future of the Internet Economy, which was adopted by Ministers in June 2008. The Seoul Ministerial Declaration calls for this review in light of “changing technologies, markets and user behaviour and the growing importance of digital identities”. Privacy frameworks should be reviewed, developed and adapted to reflect the broader scale of today’s uses of personal data “with a view to more effectively protecting a fundamental value and to foster both individual trust and the economic and social benefits associated with responsible and innovative uses of personal data”.

²⁰ See also Acquisti (2010) on this privacy paradox. Acquisti (2008) points out that Privacy Enhancing Technologies may be used to protect sensitive data while nevertheless allowing the gathering, analysis, and profitable exploitation of non-sensitive, or de-identified, or aggregate data - with shared benefit for both data subjects and data holders.

²¹ On its Adwords services website Google appears well aware of the privacy tension “Privacy is also very important to Google. That's why we do the following to protect your customers' privacy: (a) Servers for conversion tracking and search results are separated. (b) Conversion Tracking cookies persist for a limited time only. (c) Conversions aren't isolated: This means that you can't match conversion data to specific customers, just see overall data for ads and keywords. (d) Conversion Tracking includes option to notify customers about cookies”

(https://support.google.com/adwords/answer/1722022?hl=en&ref_topic=3119146, retrieved August 2013).

²² When trying to book a particular air flight or hotel through Google one often has to wrestle through pages of links to commercial booking sites before finding the direct links to the hotel or the actual air flight provider.

²³ Hagi and Jullien (2011) cite evidence of how Netflix uses its recommender system to steer users towards movies that generate higher revenues for Netflix (Shih et al., 2007), and evidence about some E-commerce recommenders steering users towards the sites and products that yield them higher revenues (“Where E-Commerce Meets Chat, Social Retailing Gains Traction,” Wall Street Journal, November 27th 2007).

²⁴ Even though search diversion by itself lowers consumer utility.