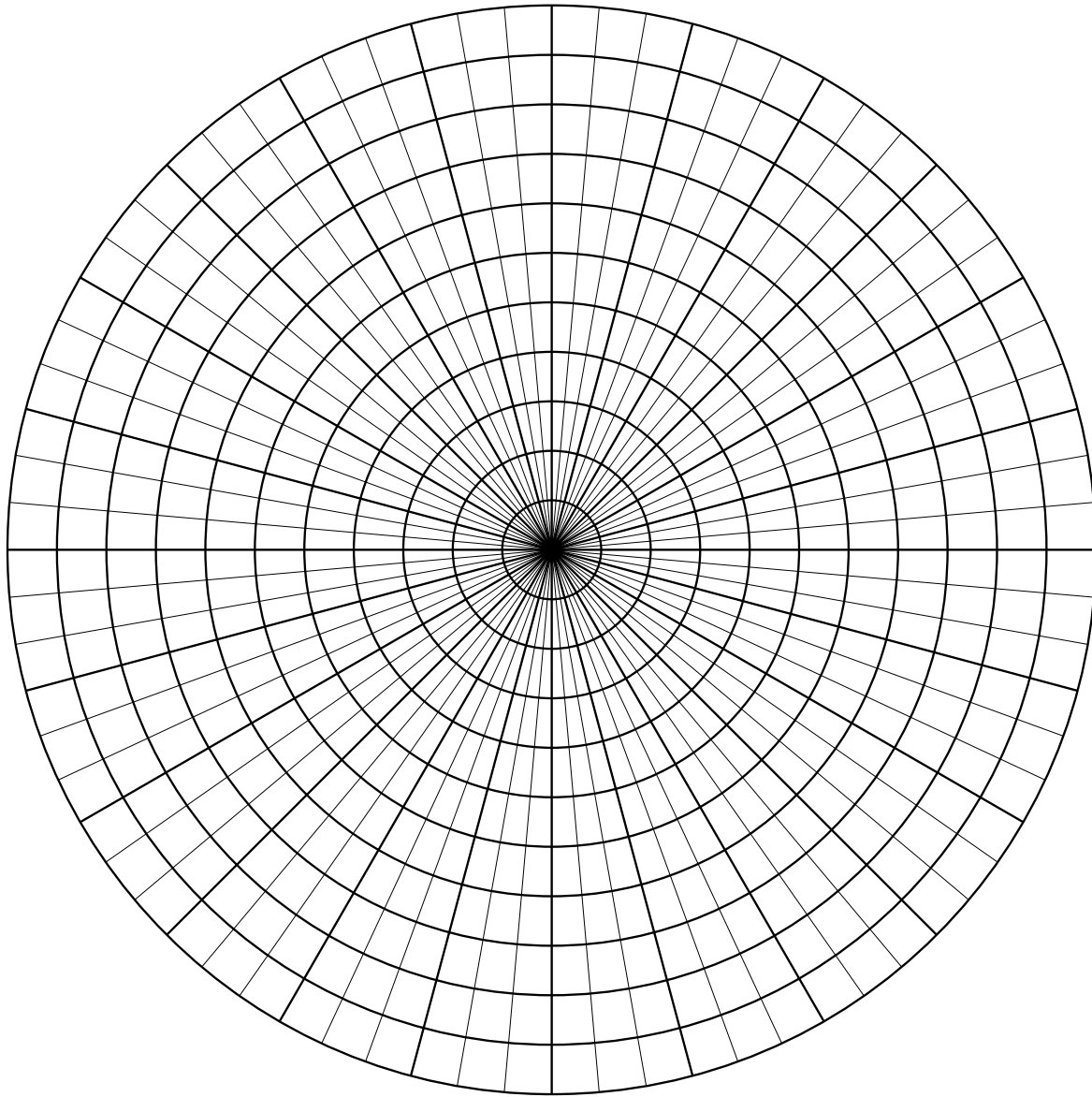


REVEALED PREFERENCE AND WELFARE CONSIDERATIONS IN ONLINE ADVERTISING MARKETS



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REVEALED PREFERENCE AND WELFARE CONSIDERATIONS IN ONLINE ADVERTISING MARKETS

By Kenneth C. Wilbur

We consider how textbook economic techniques should be applied in online advertising markets. We argue that the necessary conditions for revealed preference theory fail for most advertisers, due to incentive misalignments, ambiguity about available advertising opportunities, and fundamental challenges in estimating causal advertising effects. We also argue that some advertisers' choices may reveal preferences, particularly those who pursue performance advertising objectives, buy their own media, and try to estimate incremental advertising effects. Finally, we argue that revealed preference theory can apply to consumers and creators with appropriate model specification.

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Multi-sided platforms enable customers to exchange scarce resources like money, time and attention for products, services, information, entertainment, and other goods. Online advertising markets, in particular, facilitate exchanges of attention, entertainment, advertising and money between advertisers, consumers and creators.

Multi-sided platform markets continue to evolve, with new technological capabilities, user behaviors, pricing models, competitive dynamics, and other related topics. The academic literature is following that evolution, developing new theories, models, and findings.

This article briefly reviews a policy intervention in an important advertising market which may have mischaracterized the relevant welfare criteria. We discuss online advertiser welfare considerations in depth, hoping to help inform future policy interventions, and with pointers to relevant academic literature and measurement suggestions for relevant concepts. Then we discuss welfare considerations related to consumers and creators.

I. REGULATING ADVERTISING PLATFORMS: A CAUTIONARY TALE

In *U.S. v. National Association of Broadcasters* (1982), the U.S. Department of Justice aimed to invalidate several points in the broadcast television industry group's self-regulatory code.² The dispute was settled with a consent decree, which determined that banning promotion of multiple products within a single television ad was a per se illegal restraint of trade.

The U.S. also challenged two other points on antitrust grounds: a cap on the number of advertisements per hour, and a maximum of 9.5 minutes of non-program material per hour. The government theorized that limiting competing networks' advertising sales acted as an industry-wide output restriction, harming actual advertisers by driving up prices, and harming potential advertisers by limiting advertising opportunities. However, the consent decree did not resolve these two points.

With hindsight, the government's argument may have excluded some important welfare considerations. In particular, the government neglected how the advertising time restriction may have affected television viewers and television creators.

The consent decree did not ignore viewer welfare completely. It acknowledged the potential social benefits of limiting ad time during children's programming, but left the decision to individual television stations and the Federal Communications Commission. However, it failed to consider the possibility that limiting total advertising time during adult programming might be similarly desirable.

In fact, broadcast networks have increased national advertising minutes substantially from the 9.5-minute hourly limit they imposed on themselves in the 1970s. The four leading broadcast networks averaged about 15 minutes of non-programming time per hour in 2019, according to Kantar Media (2019).³ National cable television networks aired even more, with about 16-17 minutes per hour given to paid advertising and other non-program material.

Television advertising time increases coincided with increasing competition for viewer attention and improved television advertising avoidance technologies (Wilbur 2008). This trend raises the possibility of market failure due to miscoordination between advertisers and viewers and may suggest a "circulation spiral" (Gabszewicz et al. 2007).⁴

The modern academic literature posits that advertising time and nuisance function as the attentional prices that viewers pay for consuming advertising-supported entertainment. Many economic models suggest that increasing ad time reduces audience size as marginal viewers tune away (Anderson & Coate 2005;⁵ Anderson, Foros, & Kind 2018;⁶ Wilbur 2008).⁷ These theoretical models regularly predict that market competition may be insufficient to reach efficient outcomes, partly due to platform markets' winner-take-all nature.

2 *United States v. National Ass'n of Broadcasters*, 536 F. Supp. 149 (D.D.C. 1982).

3 Kantar Media. 2019. Kantar Media Ad Time Tracker. Accessed May 2023. <https://web.archive.org/web/20190614085149/https://www.kantarmedia.com/us/thinking-and-resources/data-lab/kantar-media-ad-time-tracker>.

4 J.J. Gabszewicz, P.G. Garella & N. Sonnac. 2007. Newspapers' market shares and the theory of the circulation spiral. *Information Economics and Policy*, 19(3-4): 405-413.

5 Anderson, Simon & Stephen Coate. 2005. Market provision of broadcasting: A welfare analysis. *Review of Economic Studies*. 72(4): 947-972.

6 Anderson, Simon, Øystein Foros & Hans Jarle Kind. 2018. Competition for advertisers and for viewers in media markets. *Economic Journal* 128(608): 34-54.

7 Wilbur, Kenneth C. 2008. A Two-Sided, Empirical Model of Television Advertising and Viewing Markets. *Marketing Science*, 27 (3): 356-378.

Small audience minorities may benefit from particular advertisements, but ample empirical work supports the notion that ad time is an “attentional price” for consuming “free” programs. About 27 percent of TV ad breaks are interrupted by channel changes (Wilbur 2015),⁸ indicating frequent viewer disinterest in ads. McGranaghan et al. (2022) measured focal attention to television ads in a large panel of households paid to install cameras within their living rooms.⁹ The cameras could identify viewer bodies, recognize viewer faces, and infer the moments when faces were pointed at the main television in the room. Channel switching disrupted just 4 percent of all potential advertising exposures, but viewers were absent from the room during 40 percent of potential exposures on average, and paid focal attention to just 12 percent of advertising time played on their television screens. The body of evidence raises the possibility that, from a viewing perspective, there may be an inefficiently high number of advertisements on television.

Hence, if viewing advertising is the “price” of watching a television program, an antitrust enforcement action may have increased this price. The price change exceeded 50 percent: from a maximum of 9.5 minutes per hour before the consent decree, to more than 15 minutes per hour in 2019. Today, mainstream economic analysis would understand that television networks charge both advertisers and viewers. Most economists would agree that advertiser welfare should be considered alongside competing outcomes, such as viewer welfare and creator welfare (Gentzkow et al. 2022; Wilbur 2008).¹⁰

II. ADVERTISER-RELATED WELFARE CONSIDERATIONS IN ONLINE ADVERTISING MARKETS

Welfare analysis is more complicated in multi-sided markets than in traditional supply-and-demand markets. Moreover, welfare analysis of *advertising purchases* is even more intricate than traditional consumption contexts.

Economic theory provides necessary conditions for economic actions to reveal consumer welfare, also known as revealed preference. Economic analyses often assume the rational consumer model applies and erroneously conclude that observed actions always reveal preferences. In fact, there are several well-founded reasons to question the application of revealed preference theory in online advertising markets.

Revealed preference theory requires that agents are self-interested, well-informed about available goods, and make choices freely. Under those conditions, agent actions are assumed to maximize utility, and therefore directly reflect agent welfare. However, if these conditions are not met, actions may not always reveal preferences.

All three necessary assumptions can be challenged in the context of online advertising markets. We focus on each in turn.

A. Advertiser Self-interest

Advertiser profit maximization may be disrupted by three types of incentive misalignments (Gordon et al. 2021).¹¹ First, firm management may not fully coordinate distinct groups that operate within the firm.

A common example appears in setting advertising budgets. Often, the finance department determines the advertising budget, with annual revisions based on advertising effectiveness estimates. One flaw in this process is that most advertisers are unable to estimate precise causal advertising effects (Gordon et al. 2021).¹² Typically, the firm’s marketing executives present correlational evidence, alongside a belief that all “credit” for any advertising-linked sales should accrue solely to the advertising.

Finance and marketing executives both understand that the principal/agent problem can distort the advertising budget away from the optimum. Yet the arrangement often persists anyway. A few corporations have moved responsibility for advertising effect estimation from the marketing team to the finance team, to reduce the severity of the potential internal miscoordination.

8 Wilbur, K.C. 2015. Advertising Content and Television Advertising Avoidance. *Journal of Media Economics*, 29 (2): 51-72.

9 Matthew McGranaghan, Jura Liaukonyte & Kenneth C. Wilbur. 2022. How Viewer Tuning, Presence and Attention Respond to Ad Content and Predict Brand Search Lift. *Marketing Science*, 41(5): 871-1027.

10 *Supra*, nn. 4 and 7.

11 Gordon, Brett, Kinshuk Jerath, Zsolt Katona, Sridhar Narayanan, Jiwoong Shin & Kenneth. C. Wilbur. 2021. Inefficiencies in Digital Advertising Markets. *Journal of Marketing*, 85 (1): 7-25.

12 *Ibid*.

Second, marketing organizations often contract with a variety of specialist advertising agencies to design, purchase, monitor and evaluate advertisements. Advertising agencies offer valuable expertise but they seek to maximize their own profits, more so than the advertiser's. As the word "agency" suggests, this potential principal/agent problem offers a second type of incentive misalignment.

Marketing organizations can resolve agency miscoordination with contracts that align the two parties' incentives. For example, they may write a contract that ties the agency's compensation directly to the marketer's incremental profits from advertising campaigns. However, the statistical difficulty of estimating precise, causal advertising effects can make such compensation functions too uncertain. Such incentive-compatible contracts can sometimes be observed in practice, but they are not standard.

Another approach is to start an "in-house" agency rather than relying solely on external specialists. This avenue is feasible for firms who buy enough advertising to justify the fixed cost and risk of starting and staffing a dedicated internal unit. Horsky (2006) analyzed the economics of using in-house agencies.¹³

One way to measure the empirical importance of agency expertise is to look at the proportion of marketers who use platforms' self-service interfaces to purchase advertising, rather than relying on external agencies to purchase it for them. A related metric might be the typical fees, markups or commissions charged by specialist agencies serving a particular online advertising market. Higher commissions suggest greater importance of agency specialization and more challenging oversight.

Third, online advertising markets enable miscoordination among channel partners. For example, hotels that offer direct reservations might compete for online ads with the travel search engines they pay for generating reservations. That competition can increase advertising costs and lead to excessive advertising spending. Again, contractual remedies exist, yet distribution channel partners often compete in well targeted advertising environments, as enforcement and monitoring are costly and imperfect.

The extent of such miscoordination can be measured by the frequency of brand/partner competition in advertising auctions, as opposed to competition with rival products and services. For example, if Radisson's most frequent rivals in the "hotels los angeles" keyword auction are Expedia and Booking.com, then the assumption of self-interested advertisers might be questionable. However, if Radisson's most frequent rivals in the same keyword auction are Hilton and Sheraton, then revealed preference theory would be more appropriate.

B. Advertiser Information

Revealed preference theory assumes that economic decision makers observe the properties of the goods they purchase. However, online advertisers face both uncertainty and ambiguity about key attributes of online advertising opportunities. Important unknowns include the accuracy of consumer targeting, the ratio of humans to machines among ad recipients, the response to advertising, and the incremental effects of advertising on sales, revenue, and profit.

Two related factors can indicate advertiser knowledge of online advertising characteristics. The first is advertising objectives. The second is how the advertiser estimates incremental effects of advertising on sales.

Broadly speaking, there are two types of advertising objectives. Brand advertising campaigns buy ads to influence consumer awareness, perceptions and/or attitudes—results that are typically infeasible to directly attribute to ads (Du et al. 2019).¹⁴ Therefore, branding campaigns typically focus on audience, audience characteristics, and costs as the outcomes of interest. Performance advertising campaigns buy ads to stimulate measurable behaviors, such as clicks, leads or sales.

The two advertising objectives lead to different testing methods. Brand advertisements are more often tested *prior* to placement in the market, using copy testing and related services; performance ads are more often tested *after* placement in the market, by comparing measurable objectives between those exposed to different creatives, or not exposed to advertising. Correlational estimates of performance advertising effectiveness is common, whereas causal estimation of performance advertising effects is possible but infrequent (Gordon et al. 2021).¹⁵

¹³ Horsky, Sharon. 2006. The changing architecture of advertising agencies. *Marketing Science*, 25 (4), 367-383.

¹⁴ Du, Rex, Mingyu Joo, & Kenneth C. Wilbur. 2019. Advertising and Brand Attitudes: Evidence from 575 Brands over Five Years. *Quantitative Marketing and Economics*, 17 (3): 257-323.

¹⁵ *Supra*, note 11.

Most large advertisers do not fall neatly into a binary brand/performance classification. Instead, most large advertisers run numerous brand campaigns and numerous performance campaigns, with distinct teams typically involved in each. A common question is how to divide the total advertising budget between brand and performance campaigns.

Performance advertising offers advertising response data, so it is typically thought to be the more objectively measurable of the two types. This is partially true. The incremental measurability is more likely under certain conditions, such as: (i) zero actions without advertising, as this provides a stable baseline against which ad effects may be reliably measured; (ii) relatively few false positives in the response data, and (iii) sufficient exogenous variation and transparency in the advertising purchasing process. When all 3 conditions apply, it may be that simple correlations indicate incremental effects of advertising on performance outcomes, and advertisers are well informed about advertisement attributes. However, such co-occurrences are not typical.

More commonly, performance advertisers run into some significant challenges:

- i) Large advertisers have non-zero baseline performance objectives. Performance advertising objectives may be affected by past customers' repeat purchases, word-of-mouth, or other promotional efforts like publicity or offline advertising (Liaukonyte et al. 2015).¹⁶
- ii) Online advertising fraud can lead to untrustworthy estimates of advertising audience, clicks, and conversions. Most industry estimates indicate that 10-30 percent of online advertising expenditure is lost to fraud (Gordon et al. 2021).¹⁷ Fraudulent techniques can include generating false performance outcomes, especially with regards to clicks, but also sales leads and even phone calls (Bowen 2022).¹⁸ Furthermore, platform opacity and consumer privacy regulations often hinder advertisers' ability to verify performance outcomes.
- iii) Exogenous variation depends on the marketer's willingness to experiment to learn advertising effects. Unfortunately, many marketing executives are reluctant to run experiments (Nosko, Rao & Simonov 2018),¹⁹ likely due to adverse perceptions about methodological difficulty, inconclusive policy guidance, potential time delay, financial cost of running suboptimal conditions, and career risk if past campaigns are shown to be suboptimal. Some advertising platforms offer experimentation tools to client advertisers, so advertisers' frequency and intensity of experimentation may measure advertiser knowledge of ad effects.

Advertisers will likely know advertising characteristics when (a) they run frequent experiments; (b) they manage their own campaigns, rather than relying on external agencies; (c) they focus on measurable performance objectives; (d) advertising supply chains offer transparent, exposure-level data and are externally audited; and (e) response data indicate high levels of true positives and low levels of false positives. Although these are not the most likely conditions in the online advertising market, there may be well-informed advertisers in any sufficiently large group of online advertising purchasers. Particularly well-informed advertisers may offer insights into quality measurement of online advertising inventory.

C. Competitive Supply of Advertising

Revealed preference theory requires a decision maker who makes a free choice among competing alternatives. However, this contradicts the canonical "competitive bottlenecks" theory of multi-sided platforms presented by Armstrong (2006). Armstrong (2006) analyzes an equilibrium in which competing platforms each offer exclusive access to different segments of the consumer market, and in which an advertiser who seeks to reach the entire market has no alternative but to purchase from both competing platforms.

As a more concrete example, it may be the case that some consumers multi-home across advertising-supported platforms. For example, some consumers use both YouTube and Tiktok, or Instagram and Snapchat, or Google and Bing. However, many consumers focus most of their usage within a single digital service. The degree, regularity, depth, and proportions of consumer overlap across competing platforms may indicate how competitive the supply of online advertising is.

A related measurement is how many advertisers respond to meaningful changes in platform advertising pricing terms. For example, a common pattern among online advertising sellers is to stimulate growth early on by introducing numerous advertiser-friendly features. Then, once advertiser adoption starts to level off, a platform may increase monetization of advertising sales by altering various levers to better exploit advertising demand.

¹⁶ Liaukonyte, Jura, Thales Teixeira & Kenneth C. Wilbur. 2015. Television Advertising and Online Shopping. *Marketing Science*, 34 (3): 311-330.

¹⁷ *Supra*, note 11.

¹⁸ Bowen, Pete. 2022. Getting a lot of junk leads from Google Ads? Accessed May 2023. <https://web.archive.org/web/20221110213833/pete-bowen.com/getting-a-lot-of-junk-leads-from-google-ads>.

¹⁹ Simonov, Andrey, Chris Nosko, Justin M. Rao. 2018. Competition and Crowd-Out for Brand Keywords in Sponsored Search. *Marketing Science*, 37(2): 200-215.

Advertisers in a competitive marketplace should reduce their advertising budgets, perhaps all the way to zero, when advertising prices rise. They should behave similarly when other advertiser-friendly features are removed or made less favorable. The degree to which this happens may indicate how substitutable the particular form of advertising is with available alternatives. The platforms that gain business in response to a focal platform's price change likely consist of the relevant competitive set. Such substitution may change over time as the platform matures and as advertisers develop their understanding of the platform and its consumer market.

One way to measure substitution across online advertising platforms is to look at quasi-experimental data showing how platform feature changes and advertising pricing terms predict advertiser usage. When advertisers tend to respond to platform changes in ways that are consistent with canonical consumer choice theory, we should have a greater presumption that revealed preference may indicate advertiser welfare.

However, if a platform were to alter its pricing or services and we do not observe much variation in advertisers' identities or expenditures, that may indicate a setting in which the platform is offering substantially differentiated advertising services that are difficult to realize elsewhere. In such cases, if the advertising platform has such a unique hold on its consumers that it imposes a "toll" on brand/consumer interactions, it may be that revealed preference is a poor indicator of advertiser welfare.

III. CONCLUSION: CREATOR AND CONSUMER WELFARE CONSIDERATIONS

Traditional economic analysis may be directly applicable to study creators and consumers in online advertising markets. However, certain aspects can be nonstandard or present challenges.

Online advertising markets often support various types of valuable content, such as text, images, videos, audio, or combinations. Consumer data are used to rank this content, which may be duplicated across different platforms. Traditional economic analysis should reflect the "experience good" nature of digital content markets — consumers often do not realize the value of the content until after they have started consuming it. Additionally, a measure of platform quality is available in the proportion of content available on a platform that is designed expressly for that platform's format, and remains unduplicated across competing platforms.

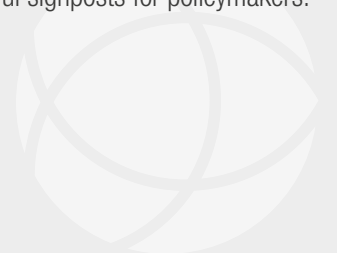
Consumer utility of online advertising platform usage may depend on several factors including the volume and quality of content, network effects from friends' usage, the amount of advertising embedded in the content, direct payments to creators or the platform, and valuable advertisements leading to purchases. Creator utility of online advertising platform usage may depend on financial compensation for content, content exclusivity on the same platform and across rival platforms, total audience response, and other forms of monetization such as through affiliate marketing or direct sales.

Unlike advertiser welfare, the consumer and creator welfare of using online platforms is likely estimable using revealed preference theory. However, it still requires proper specification of consumer and creator welfare functions, and therefore may not always be straightforward.

IV. CONCLUSION

We question the application of revealed preference theory to all advertisers in online advertising markets. We think it applies to some advertisers, but probably not to the modal advertiser. However, we do think revealed preference theory may be applied to estimate consumer and creator welfare functions, conditional on proper model specification. We have suggested measurement possibilities throughout to help gauge market efficiency and to evaluate necessary conditions for revealed preference theory.

We believe that economic policies and regulations can help to maximize market efficiency and reduce market failure, so long as policy objectives are properly formulated and reflect institutional practices. We hope the points we raise may offer helpful signposts for policymakers.



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