IS LOSS OF PRIVACY THE PRICE THAT CONSUMERS PAY FOR OTHERWISE FREE ONLINE SERVICES?

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One of the consumer harms from monopoly online platforms commentators point to is the loss of privacy. That is, privacy is a dimension over which platforms complete, and lack of competition has generated low levels of privacy. However, some view serious difficulties in bringing actions when the anticompetitive effect relate to quality instead of price. Thus, some commentators have argued that loss of privacy should be thought of as a price that consumers pay for otherwise free services. Here I argue that the difficulties in analyzing competition over quality are likely easier to overcome than most think. I show that at the profit-maximizing level of privacy consumers will generally prefer more privacy to less even with the worse advertising matches that would result. I also show in the merger context how to quantify the anticompetitive effects in quality without the need to specifically measure quality.

I. INTRODUCTION

The intersection of online privacy policy and antitrust enforcement has received significant attention recently. Commentators approach the subject from at least three different angles. For some, concerns over privacy should play no part in the enforcement of competition laws. For those commentators, if anything, privacy concerns are primarily consumer protection problem rather than the purview of competition laws.[2]

Another group of commentators see privacy as a potential concern of competition laws but see privacy as a dimension of the quality offered consumers, and as with other types of product quality, these commentators see the methodological barriers that competition agencies face in trying to incorporate privacy concerns into their analyses.[3]

Yet another side to the debate decries the failure of competition laws to protect consumers from the intrusions on their privacy by online monopolists. These commentators tend to view the situation as a "crisis" that requires a major shift in priorities to fix.[4] This group tends to advocate for treating the data collected on consumers by online platforms as the price that consumers pay for using the platforms.

By defining loss of privacy as a price, the hope is that any difficulties associated with bringing actions based on quality competition will be short-circuited. Here I argue that there is a sense in which this view is correct but treating privacy as a dimension of quality competition need not hamper enforcement efforts.

The use of customer data and its effects on consumers and competition by online platforms will differ from case to case. Therefore, as is common in the analysis of anticompetitive effects, each situation usually requires its own fact-based enquiry. Here, the focus will be on platforms such as Google and Facebook, that offer their service to consumers without an explicit fee but monetize through the serving of targeted advertisements to consumers based on information collected from the consumers.

In this article, I argue that competition over quality can be analyzed in similar ways as competition over price despite the fact that measurement might be more difficult. I seek to skewer a number of myths that appear to get in the way of antitrust enforcement relating to privacy and analyzing competitive effects on the consumer side of these services where the price appears to be free. In answer to the question of the title, in many ways competitive effects on privacy can be analyzed in ways that are quite similar to price, but generally equating the loss of privacy to a price risks losing some important differences between the two.

II. COMPETITION LAWS PROTECT MORE THAN JUST PRICE COMPETITION

Analyzing competition over privacy protections runs into the same misunderstandings regarding price versus quality competition.[5] A frequently repeated refrain is that because online platforms often offer services to consumer for free there cannot be anticompetitive effects on consumers from the conduct or acquisitions under a consumer welfare approach. However, competition laws and guidelines do not purely focus on price effects. The tools for analyzing and quantifying price effects are more developed than those for quality effects, but harm to consumers through a decrease in the quality of the service offered is just as cognizable a harm and decrease in consumer welfare as an increase in price.

While it should be self-evident that firms do not compete on price alone, the fact that some products are provided at a price of zero tends to trip-up even competition professionals. In my view, competition derives from a firm taking a margin lowering action in order to attract

2 For example, JC Cooper ('Privacy and Antitrust: Underpants Gnomes, the First Amendment, and Subjectivity' (2013) 20 George Mason L R 1129–46) states, "[h]owever facially appealing it may be to combine privacy and antitrust, the merger of these two policy issues presents some serious concerns. Once we realize that publishers [use the data collected from consumers to improve the quality of their product], the analogy between [reductions in] privacy and [reductions in] quality breaks down. What's more, limiting a firm's ability to collect and use data is likely to suppress protected speech. Finally, the inherent subjectivity in the exercise will increase incentives to divert resources from marketplace competition to curry favor with antitrust regulators. It will also cause firms to underinvest in beneficial uses of consumer data. Collectively, these problems suggest that antitrust is the wrong vehicle to address privacy concerns."

3 For example, AP Grunes, 'Another Look at Privacy' (2013) 20 *George Mason L R* 1107–27.

4 For example, D. Srinivasan, 'Why Privacy Is an Antitrust Issue,' *New York Times*, May 28, 2019. P Swire, 'Protecting Consumers: Privacy Matters in Antitrust Analysis' [2007] https://www.americanprogress.org/issues/regulation/news/2007/10/19/3564/protecting-consumers-privacy-mattersin-antitrust-analysis/; and RH Lande, 'The Microsoft-Yahoo Merger: Yes, Privacy Is an Antitrust Concern' (2008) 714 *FTC Watch*.

5 There is also a serious question — one I do not deal with in this article — of whether consumers are equipped to effectively evaluate the level of privacy offered by the different services. If they cannot, one would not expect competition over privacy protections to resolve issues with the lack of privacy.

customers to its product or service. When customers chose that product or service in response to the action, those customers are usually lost by "competitors" offering a substitute product or service. Often the action would be offering a lower price, but such an action can also be to offer a higher quality product. When price for some reason is fixed at zero, competition will only be over quality.

Therefore, quality competition and thus competition over privacy is as worthy of legal protection as price competition, but commentators have pointed to several barriers that competition authorities face when trying to protect quality competition. These barriers involve the general difficulty of dealing with competition on nonprice dimensions that result from the subjective nature of quality and the difficulty with measurement. According to an Organisation for Economic Cooperation and Development ("OECD") report on the incorporation of quality competition in the enforcement of competition laws:

> [C]ompetition policy is just as concerned with quality as it is with prices. While the importance of quality is undisputed and issues about quality are mentioned pervasively in competition agency guidelines and court decisions, there is no widely-agreed framework for analysing it which often renders its treatment superficial. There are a number of reasons why in practice, courts and competition authorities rarely analyse quality effects as rigorously as they analyse price effects. First, quality is a subjective concept and therefore much harder to define and measure than prices. In addition, microeconomic theory offers little help in predicting how changes in the level of competition in a market will affect quality and it is usually up to empirical analysis to determine how quality will change in response to varying degrees of competition in the context of particular markets.[6]

The OECD report focuses on two reasons for the difficulty in incorporating considerations of quality competition into antitrust analyses: (1) Quality is often subjective, multidimensional, and difficult to measure relative to the measurement of price; and (2) "[M]icroeconomic theory offers little help in predicting how changes in the level of competition in a market will affect quality."[7]

However, for cases such as online services that charge a zero price and that price is not expected to change, economic theory is not ambiguous about how competition effects quality. The theoretical models that are described as suggesting ambiguous effects on quality as a result of changes in competition involve firms that compete on both price and quality dimensions; thus, they are not relevant in cases in which price is in some way constrained.

For the case in which price is constrained, as is the case when price is seemingly fixed at zero, it has long been understood that increased competition leads to higher levels of quality on a per unit basis.[8] When price is fixed, an increase in competition leads to firms to offer higher quality in order to hold onto/increase users and usage.

III. CONSUMER WELFARE AND PRIVACY

Exactly what is the source of consumer preference for privacy? Is it a preference that economists should take as given — an innate preference of the consumer — part of the consumer's utility function? Or is the source the preference for privacy based on the (perhaps perceived) negative consequences from the use of a consumer's data? Or, more likely, is it a combination of the two?

A recent strand of economic research on the use of consumer data by online platforms assume that data is used to price discriminate.[9] The resulting price discrimination in aggregate lowers consumer welfare. Informational externalities between consumers — data from one consumer provides useful information about other consumers — means that consumers need not be fully compensated for the value of their information and thus not be fully compensated for the aggregate decrease in consumer welfare from the use of the data generally. The subtext of these models seems to be that consumers' preference for privacy derives from the negative consequences of the use of consumer data to extract consumer surplus.

However, platforms according to many definitions provide value by matching two or more sides. In the case of Google and Facebook it is matching consumers with advertisers. Providing better matches of consumers to advertisers, itself generates value. Thus, models involving the use of data to price-discriminate are unlikely to be useful when analyzing platforms that use consumer data to improve matches.

6 OECD, *The Role and Measurement of Quality in Competition Analysis* (Paris 2013), cover page.

7 OECD, *The Role and Measurement of Quality in Competition Analysis* (Paris 2013), Overview.

8 See LJ White, 'Quality Variation when Prices Are Regulated' (1972) 3 *Bell J Economics Management Science* 425–436.

9 For a recent survey of this literature see, D Bergemann & ABonatti "Markets for Information: An Introduction" (2019) 11 *Annual Review of Economics* 85–107.

While consumers likely benefit from good matches with advertisers, the relevant question is whether at an online service's profit-maximizing level of privacy and advertising matching, would consumers prefer to an increase in privacy at the expense of somewhat less well-matched advertising. The trade-off between less privacy and better advertising matches for consumers will likely change depending on the level of privacy being provided by a service.

As I show below in Section IV, there is a profit incentive to decrease privacy and increase the quality of advertising matching to the point where consumers prefer more privacy and lower quality matches. Therefore, even if consumers benefit from well matched advertising, it is likely that at the margin consumers would prefer more privacy relative to the levels that services have a profit incentive to provide.

IV. A SIMPLE MODEL OF PRIVACY AND ADVERTISING REVENUE

The goal of most advertising is to induce consumers to take some action (e.g. purchase a product, register on a website, or vote in a particular way). Let p^A denote the price for advertising normalized for effectiveness such that p^A can be thought of as the price to induce a consumer to take the desired action. The effectiveness of advertising is sometimes called the conversion rate, which we can think of as the probability that a user exposed to the advertising takes the desired action. In the model of competition below we will assume that competing services are constrained by the market to charge the same price for advertising normalized by the conversion rate, i.e. effectiveness.

If r denotes the conversion rate and d denote the number of users (or some other measure of usage intensity), the advertising revenue for a service could be written mathematically as $d \times r \times p^A$, and the per-user advertising revenue would be $r \times p^A$. Note that advertising revenue of the service increases in the number of users and the conversion rate. Better-targeted advertising would increase advertising revenue by increasing the conversion rate.

Using this simple advertising model, it is easy to show that at the profit-maximizing level of privacy, consumer usage of an online platform should be increasing in relation to the level of privacy offered. Assume that increases in privacy protections decrease the service's ability to target ads and thus generates a lower conversion rate. An online service could continue to increase profit by decreasing privacy protections unless further decreases also generated lower usage. Thus, the profit-maximizing level of privacy has to be at a point where further decreases in privacy would lower demand.

To see this mathematically, define t as the level of privacy protection. Thus, an increase in t corresponds to more privacy. Both demand and the conversion rate will be functions of t and thus we can write these as $d(t)$ and $r(t)$. Assuming that per-user costs c are not affected by the level of privacy protections and are constant in usage, the online service's variable profit can be written as

$$\left[r(t)p^A - c\right]d(t).$$

If the profit maximizing level of privacy protections is t^*, then for all levels of privacy protections t,

$$\left[r(t^*)p^A - c\right]d(t^*) \geq \left[r(t)p^A - c\right]d(t).$$

This inequality can be rearranged such that

$$-\frac{d(t^*) - d(t)}{r(t^*) - r(t)} \geq \frac{d(t)p^A}{r(t^*)p^A - c} > 0.$$

Therefore, assuming a positive margin (i.e. $r(t^*)p^A - c > 0$) and positive usage and advertising price, an increase in privacy from the profit maximizing level must lead to increased demand and usage of the online service since it would decrease the conversion rate.[10]

While it is possible to generate counterexamples, usually an increase in demand indicates an increase in consumer welfare. Thus, at the profit-maximizing level of privacy, all-else-equal, consumers would tend to be better off with an increase in privacy.

10 A noteworthy assumption here is that increasing privacy protections does not decrease per-user cost, it only decreases revenue. If an increase in privacy (e.g. collecting less data on consumers) decreases per-user costs enough so that per-user margins might increase with privacy, the result here could reverse.

V. QUANTIFYING EFFECTS WITHOUT MEASURING QUALITY

Now consider the effects of a merger when competition is not over price but rather over the provision of privacy or another qualitative aspect of the service. I focus on the effects of a merger, because a merger without efficiencies is one of the simpler examples of a decrease in competition. Prior to the merger, services will set the level of privacy to maximize their own profits.

After a merger with a rival, the firm would internalize the profits that would have been lost from a decrease in privacy protections or quality, because some of the users who would have sought substitutes in response would use the merging partner's service. This creates a unilateral incentive post-merger to decrease privacy protections or quality. Note that this is exactly the same logic as for unilateral price effects from a merger.

To formalize these effects and show how they might be measured I extend the simple model presented above. Suppose that there are $n > 1$ online services that compete in the industry. I will add a subscript to the quantities and functions defined above to associated each with one of the services. I only need to focus on the two services that are merging. Assume these are services 1 and 2. Thus, t_1 and t_2 denote the level of quality including privacy offered by online services 1 and 2 respectively. The demand for service 1 is denoted as $d_1(t_1, t_2)$ and the demand for service 2 is denoted as $d_2(t_1, t_1)$.

These demand functions are written as functions of the firm's own privacy level and the other merged firm's privacy level, but each will be a function of many factors include the privacy levels of services other and 1 and 2. However, for my purposes here it is not necessary to write these out explicitly. Similarly, the conversation rates and per-user costs for services 1 and 2 are denoted $r_1(t_1)$, $c_1(t_1)$, $r_2(t_2)$, and $c_2(t_2)$. To simplify the notation, let $R_1(t_1)$ and $R_2(t_2)$ denote the per-user advertising revenue for the two service. (For example, $R_1(t_1) = r_1(t_1)p^A$.) As t_1 and t_2 denotes the level of quality including privacy offered by the services that otherwise do not charge a monetary price, I assume that per-user costs are a function of quality.

With this new notation I can write the variable profit functions of the two services as

$$m_1(t_1)d_1(t_1, t_2)$$

$$m_2(t_2)d_2(t_2, t_1),$$

where the variable per-user dollar margins are $m_1(t_1) = R_1(t_1) - c_1(t_1)$ and $m_2(t_2) = R_2(t_2) - c_2(t_2)$.

In the pre-merger Nash equilibrium in quality levels t_1^* and t_2^* (assuming differentiability and an interior solution) we have the necessary conditions,

$$\frac{\partial m_1(t_1^*)}{\partial t_1} d_1\left(t_1^*, t_2^*\right) + m_1\left(t_1^*\right)\frac{\partial d_1(t_1^*, t_2^*)}{\partial t_1} = 0 \qquad (1)$$

$$\frac{\partial m_2(t_2^*)}{\partial t_2} d_2\left(t_2^*, t_1^*\right) + m_2\left(t_2^*\right)\frac{\partial d_2(t_2^*, t_1^*)}{\partial t_2} = 0 \qquad (2)$$

The merged firm will set and to maximize joint profit

$$m_1(t_1)d_1(t_1, t_2) + m_2(t_2)d_2(t_2, t_1)\,.$$

The derivative of the joint profit function with respect to service 1's quality evaluated at the pre-merger quality levels is

$$\frac{\partial m_1(t_1^*)}{\partial t_1} d_1\left(t_1^*, t_2^*\right) + m_1\left(t_1^*\right) \frac{\partial d_1(t_1^*, t_2^*)}{\partial t_1} + m_2(t_2) \frac{\partial d_2(t_2^*, t_1^*)}{\partial t_1}$$
$$= m_2(t_2) \frac{\partial d_2(t_2^*, t_1^*)}{\partial t_1} < 0,$$

where the equality follows from condition (1) and the inequality from the assumption that $\partial d_2 / \partial t_1 < 0$. Hence, this indicates that post-merger there will be a unilateral incentive to decrease service 1's quality and by the same logic decrease service 2's quality.

A measure of the size of the incentive to decrease quality can easily be derived that is similar to the upward pricing pressure measure. I will refer to this as Downward Quality Pressure (DQP).[11] There are a number of specific ways one can do this, but one useful approach would be to determine the decrease in per-user cost that would be needed to eliminate the incentive to decrease quality post-merger. A cost decrease of Δ_1 eliminates the incentive to decrease quality post-merger of service 1 if t_1^* maximizes the post-merger profit function:[12]

$$\left[m_1(t_1) + \Delta_1\right] d_1\left(t_1, t_2^*\right) + m_2\left(t_2^*\right) d_2\left(t_2^*, t_1\right).$$

Using condition (1), results in

$$\Delta_1 \frac{\partial d_1(t_1^*, t_2^*)}{\partial t_1} + m_2\left(t_2^*\right) \frac{\partial d_2(t_2^*, t_1^*)}{\partial t_1} = 0.$$

Rearranging this we get

$$\Delta_1 = m_2\left(t_2^*\right) \times D_{12}, \tag{3}$$

where D_{12} is the diversion ratio from service 1 to service 2. That is,

$$D_{12} = -\frac{\partial d_2(t_2^*, t_1^*)/\partial t_1}{\partial d_1(t_1^*, t_2^*)/\partial t_1}.$$

Put in terms of the percentage decrease in costs needed to eliminate DQP and measuring using the percentage margin, the DQP measure (3) can be rewritten as

$$\frac{\Delta_1}{c_1(t_1^*)} = \frac{m_2(t_2^*)}{R_2(t_2^*)} \times D_{12} \times \frac{R_2(t_2^*)}{c_1(t_1^*)}, \tag{4}$$

which in words is that the percentage decrease in costs for service 1 needed to eliminate DQP is equal to service 2's percentage per-user margin times the diversion from 1 to 2 times the ratio of service 2's advertising revenue by service 1's per-user cost.

11 M.A. Salinger in "Net Innovation Pressure in Merger Analysis" (2019) (available at https://ssrn.com/abstract=3051249) derives an expression for the net innovation pressure from a merger. His approach differs from the model here in that the costs of innovation or quality improvement are entirely made up of fixed costs, while here I assume none of the costs to improve quality or privacy are fixed. Salinger also allows for R&D spillovers between the merging firms, and internalizing the externalities associated with those spillovers has important implications for the effects of the merger on innovation.

12 Assuming no merger-specific efficiency for service 2 in this derivation is the same simplifying assumption that J Farrell & C Shapiro ('Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition' (2010a) 10 *BE J Theoretical Economics Policies and Perspectives*, article 9) used to derive the simple version of the UPP formula. There has been some debate regarding the accuracy of this simple version. More complicated and possibly more accurate formulas tend to be more interventionist. For example, see R Schmalensee, 'Should New Merger Guidelines Give UPP Market Definition?' (2009) 12 *CPI Antitrust Chron*; J Farrell & C Shapiro, 'Upward Pricing Pressure and Critical Loss Analysis: Response' (2010b) *CPI Antitrust* J 1–17.

The quantities in the DQP formula above are generally not more difficult to quantify than those in the UPP formulas and do not necessarily require the actual measurement of quality. Premerger margins are an important input in UPP calculations; these are the same premerger margins that are inputs to the DQP formula. The diversion ratios associated with price effects need not be that different from diversion ratios associated with small changes in quality.

While demand estimation can provide a good estimate of the degree of substitution between products as a result of price changes, without a measure of quality or privacy protection a similar estimation would not be possible. However, it is only possible to estimate demand if there are the time, data, and budget, which is not common. Instead, diversion ratios for price effects are usually estimated in ways that could easily be applied to the case of quality effects.

As a starting point, diversion ratios are estimated using market shares. If services 1 and 2 have shares s_1 and s_2 and users leaving service 1 in response to a decrease in quality divert to other services in proportion to the other services' shares, then $D_{12} = s_2/(1 - s_1)$. This will not be the right assumption if there is significant diversion outside of the market used to calculate shares or if the merging services 1 and 2 are atypical competitors in the sense of being either close or far in product space.

Another common approach is to use switching data to estimate a diversion ratio. Even though the switching observed in the data is often not the result of price changes, this switching will often be used to inform the closeness of competition between the products of the merging parties. It seems just as legitimate to use such switching to quantify the diversion between merging services to quantify the diversion as a result of changes in quality.

The effect of natural experiments is also used to inform the diversion ratio from price changes even when the "natural" event that drives the resulting changes in the market is usually not exogenous changes in price. In fact, one may be able to use discreet changes in quality to measure substitution patterns. Notice that it is unnecessary to measure the size of the change in quality, only the effect of that change on the number of service users.

As long as the online services make a trade-off between attracting more users through higher quality or providing more privacy protections and lower per user profits, then they are acting as if they are optimally setting the variables $t_1, \ldots, t_n$, as described above. The analysis above demonstrates that those variables need not be precisely defined to provide a quantification of merger effects similar to quantifications commonly used by competition authorities.

VI. CONCLUSION

As I have shown here, in many ways, we can think of a decrease in privacy as being similar to an increase in the price consumers pay for otherwise free online services. However, it is not clear what advantage is realized by using such rhetoric. Above, I have demonstrated how, when price is fixed at zero (as it tends to be for online services), one can easily treat privacy as one of the dimensions of quality, and analyze competitive effects over quality in ways that are not much more involved than the analysis of price competition.

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