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ROUNDTABLE ON TWO-SIDED MARKETS

-- Note by the Delegation of the United States --

This note is submitted by the delegation of the United States to the Competition Committee FOR DISCUSSION at its forthcoming meeting to be held on 9 - 11 June 2009.

English text only

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TWO-SIDED MARKETS

-- Note by the United States --

1. Introduction

1. The economics of two-sided markets is increasingly informing the antitrust analysis of markets such as electronic payments, computer operating systems, Internet services, real estate, and newspapers. At issue is how antitrust analysis should account for settings in which two-sided markets are present.

2. In two-sided markets, firms or "platforms" connect two different groups of customers, allowing the groups to interact. Customers in each group obtain value from interacting with customers from the other group, and this value is greater when more customers use the platform. In the jargon of economics, there are network externalities that operate across the two groups of customers. For example, in electronic payments, a brand of credit card is more valuable to a merchant, the more cardholders carry the card; conversely, a brand of credit card is more valuable to a cardholder, the more merchants accept the card. A commercial website (such as eBay or Craigslist) is more valuable to sellers if more potential buyers visit the site, and is more valuable to buyers if more sellers offer products and services using the site. Similarly, if more Internet users are connected to an advanced broadband network, the network will be more valuable to providers of applications and content that require data transmission at very high speeds; and users are more likely to value an advanced broadband network if they can access more content and applications using it.

3. An important function of platforms is to attract both groups of customers in sufficient numbers or in a suitable balance. If a platform were to attract only one group of customers (e.g., service providers but not consumers of such services), there would be no interactions between groups. If one group of customers is more difficult to attract than another, platforms may structure their pricing so that one group pays less than the other. In some cases, one group of customers may be paid to participate in the platform. In the economics literature, a market is considered two-sided if the volume of interactions on a platform depends on the way in which the platform allocates prices across the two groups of customers, as well as on the total price charged to the two sides.[1]

4. The two-sidedness of a market is a matter of degree. In some markets, the network interactions between the two sides are so significant that both sides of the market are important for economic analysis. In newspaper markets, methods that account for network interactions between newspaper readers and

[1] This definition of two-sided markets follows Jean-Charles Rochet and Jean Tirole, "Two-Sided Markets: a Progress Report," *RAND Journal of Economics*, 37, 645-667 (2006). For early work on network externalities, *see* Michael Katz and Carl Shapiro, "Network Externalities, Competition and Compatibility," *American Economic Review*, 75, 424-440 (1985); Joseph Farrell and Garth Saloner, "Standardization, Compatibility and Innovation," *RAND Journal of Economics*, 16, 70-83 (1985); and Marc Rysman, "Competition Between Networks: A Study of the Market for Yellow Pages", *Review of Economics Studies*, 71(2), 483-512 (2004).

advertisers have been used in economic analysis for decades.[2] In other markets, the interactions between the two sides of the market may be insignificant or may not be relevant for a particular antitrust issue. In *United States v. Microsoft Corp*.,[3] the U.S. Department of Justice (DOJ) alleged that Microsoft had taken actions to impede the distribution of Netscape Navigator. Although computer operating systems are a two-sided market with respect to PC users and application developers, the two-sidedness was not central for this part of the case.

2. Skewed Pricing Structures in Two-Sided Markets

5. A feature of many two-sided markets is a highly skewed pricing structure. That is, one group of customers pays a high price to use the platform, while the other group pays a very low or even negative price. For example, newspapers, web portals (e.g., Google or Yahoo.com), and websites offering information or entertainment content are often provided to readers for free, while advertisers pay the fees that cover the newspaper's or website's costs of production. In credit card systems, the transactional services (those services associated with the physical process of making a payment, as distinct from the supply of credit) are sometimes provided to cardholders for free. For credit cards that carry reward programs, the cost of the transactional services is subsidized by the rewards so that the effective price to a cardholder for using the card is negative. Merchants, on the other side of the market, however, often pay substantial fees for credit card transactions.

6. In a traditional market, prices either significantly above or significantly below production cost can raise antitrust concerns. In a two-sided market, however, a highly skewed pricing structure may be efficient. In order to maximize volume in the network, a platform may set prices above production cost on one side of the market in order to subsidize the other side. Perhaps the most basic reason for this is that the nature of externalities often differs across the two groups of customers.[4] If one group gains more from interacting with the other group than vice versa, platforms will tend to charge that group more. In newspaper markets, advertisers subsidize readers because they place higher value on the interaction.

7. To illustrate these concepts formally, consider a simple model of a payment network. Payment networks connect two groups of customers, issuing banks and acquiring banks. The issuing bank is the cardholder's bank, while the acquiring bank is the merchant's bank. A payment network charges two prices for a payment transaction: price p_I is charged to the issuing bank, and price p_A is charged to the acquiring bank. An important distinction in the economics literature is between the price level and the price structure. The *price level* is the sum of the prices that the network receives for each transaction: $p = p_I + p_A$. The *price structure* is the allocation of the price level across the two groups.

2 For early foundational research on newspapers, *see* James M. Ferguson, *The Advertising Rate Structure in the Daily Newspaper Industry* (1963); and James N. Rosse, "Daily Newspapers, Monopolistic Competition, and Economies of Scale," *American Economic Review*, 57, 522-33 (1967). For more recent research, see Ambarish Chandra and Allan Collard-Wexler, "Mergers in Two-Sided Markets: An Application to the Canadian Newspaper Industry," Leonard N. Stern School of Business Working paper No. EC-07-03 (2008) available at http://ssrn.com/abstract=985581; and Patrick J.G. Van Cayseele and Stijn Vanormelingen, "Prices and Network Effects in Two-Sided Markets: The Belgian Newspaper Industry," (2009) available at http://ssrn.com/abstract=1404392.

3 *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 20 (D.D.C. 1999) (Findings of Fact), 87 F. Supp. 2d 30 (D.D.C. 2000) (Conclusions of Law), 97 F. Supp. 2d 59 (D.D.C. 2000) (Order), 353 F.3d 34 (D.D.C. Cir. 2001) (en banc). See http://www.usdoj.gov/atr/cases/ms_index htm.

4 The nature of competition and market power also affect how price is allocated between the two sides of the market. *See* Mark Armstrong, "Competition in Two-Sided Markets," *RAND Journal of Economics*, 37, 668-691 (2006) and footnote 6 below.

8. Let the marginal cost of a transaction be $c = c_I + c_A$ where c_I is the marginal cost of providing network services to the issuing bank and c_A is the marginal cost of providing network services to the acquiring bank. A basic feature of payment networks is that it may be efficient for price to be below marginal cost on one side of the market (e.g., $p_I < c_I$) and above marginal cost on the other side of the market ($p_A > c_A$). The profit margin of the network, $p - c$, does not depend on how the total price is split between the two sides of the market, except to the extent that the split functions to balance the participation in the network among cardholders, merchants, and their respective banks. In credit card markets in the United States, the price split is typically structured by the network so that merchants effectively subsidize participation by cardholders.

3. Competition in Two-Sided Markets

9. A central question for competition policy is how competition affects prices. One of the most basic notions in economics is that competition drives prices toward the marginal cost of production, increasing economic efficiency and consumer surplus. In a two-sided market, it is possible for competition between platforms to have different effects on each side of the market, making conclusions about prices less clear.

10. One possibility is that competition reduces market power and prices on both sides of the market.[5] The price decrease may be stronger on one side of the market than the other, but consumers on both sides of the market benefit. Another possibility, however, is that competition reduces market power and price on one side of the market, but leads to the same or higher price on the other side of the market.[6]

11. Credit card markets offer an example where competition has the potential to decrease price on one side of the market, while raising it on the other. Credit card networks set two important sorts of fees for each payment transaction: switch fees and interchange fees. The issuing and acquiring bank each pay a switch fee that is retained by the network as revenue. The acquiring bank also pays an interchange fee that is not retained by the network, but rather is paid out to the issuing bank of the cardholder, subsidizing the issuer's card operations. Competition for issuing banks may lead a credit card network to raise its interchange fee - effectively decreasing the price to issuing banks while increasing the price to acquiring

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5 Conversely, a reduction in competition can increase market power and prices on both sides of the market. In 2001, for example, Attorney General Janet Reno approved a joint operating arrangement between two daily newspapers in Denver despite a concern that prices to both subscribers and advertisers would rise. The arrangement was approved under the Newspaper Preservation Act to prevent failure of one of the papers while preserving editorial and reportorial independence of both newspapers. See Press Release, Department of Justice, "Attorney General Approves *Denver Rocky Mountain News* And *The Denver Post* Joint Newspaper Operating Arrangement," (January 5, 2001) available at http://www.usdoj.gov/atr/public/press_releases/2001/7222 htm. Also *see* Report of the Assistant Attorney General in Charge of the Antitrust Division in the Matter of: Application By The E.W.Scripps Company and MediaNews Group, Inc. For Approval Of A Joint Operating Arrangement Pursuant To The Newspaper Preservation Act, 15 U.S.C. §§ 1801-1804, Public File No. 44-03-24-15, 4-5 (2000), available at www.usdoj.gov/atr/cases/f6500/6508.pdf.

6 E. Glen Weyl, "The Price Theory of Two-Sided Markets," Harvard University (2009), available at http://ssrn.com/abstract=1324317, refers to this scenario as "unbalanced" competition. Weyl uses the multiplicative-demand monopoly model of Jean-Charles Rochet and Jean Tirole "Platform Competition in Two-Sided Markets," Journal of the European Economic Association, 1, 990-1029 (2003). Weyl models greater competition as a reduction in market power on one or both sides of the market. He derives conditions on the demand system such that a decrease in market power (defined as the price divided by the elasticity of demand) on just one side of the market causes the price on that side of the market to fall while the price on the other side of the market rises. He also considers a notion of balanced competition in which market power falls on both sides of the market and both prices fall in the new equilibrium.

banks. Thus, competition drives price on one side of the market up as it drives price on the other side of the market down.

12. In *United States v. Visa U.S.A., Inc.*, the DOJ had to consider this possibility when it challenged exclusionary rules that restricted the ability of American Express and Discover to compete for issuing banks.[7] Because American Express sets the highest prices to merchants of all of the credit card networks, it seemed possible that a ban on the exclusionary rules would drive Visa and MasterCard to raise their interchange fees to be closer to the merchant fees of American Express. This would, however, have occurred as part of an increase in competition. Since the banning of the exclusionary rules in 2004, Visa and MasterCard have introduced premium cards with higher interchange rates targeted at the same high-end consumers that American Express targets.[8] This may have happened for a variety of reasons, but it is consistent with a conclusion that increased competition with American Express led to an increase in interchange fees.

13. The nature of competition may also be very different on each side of a two-sided market. Competition may prevail on one side of the market, while the other side of the market may be subject to monopoly or oligopoly market power. For example, consumers in some areas of the United States may soon be able to choose among several different broadband Internet access services. This may lead to competitive pricing for the provision of access services to end-users. Such competition, however, may not be accompanied by competition for the providers of Internet content and applications who are on the other side of the market. A provider of Internet content or applications can address a *particular* consumer only if the provider obtains access to the broadband network to which the consumer has chosen to subscribe. This essentially gives the network operator a monopoly over access to its end-users.[9] The network operator may thus have the leverage to extract supra-competitive prices from providers of applications and content. This problem, sometimes referred to as the "terminating access monopoly," is at the core of recent "network neutrality" debates in the United States.[10]

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7 *United States v. Visa U.S.A., Inc.*, 163 F. Supp. 2d 322 (S.D.N.Y. 2001), *aff'd*, 344 F.3d 229 (2d Cir. 2003). See http://www.usdoj.gov/atr/cases/indx57 htm.

8 *See* H. Michael Jalili, "Visa: Competition Dictated Decision To Adjust Rates," *American Banker*, April 19, 2007.

9 This illustrates the "competing bottlenecks" model of Mark Armstrong, "Competition in Two-Sided Markets," *RAND Journal of Economics*, 37, 668-691 (2006). Consumers on one side of the market use only one platform (Internet users have one service provider), while consumers on the other side of the market use multiple platforms (content and applications providers use multiple platforms). A platform has monopoly power over its multi-homing customers (content and applications providers), because it is the only provider of access to its single-homing customers (Internet users).

10 *See* FTC Staff Report, "Broadband Connectivity Competition Policy," pp. 89-95 (June 2007) (available at http://www ftc.gov/reports/broadband/v070000report.pdf); Concurring Statement of Commissioner [now Chairman] Jon Leibowitz Regarding the Staff Report, "Broadband Connectivity Competition Policy," available at (http://www ftc.gov/speeches/leibowitz/V070000statement.pdf) ("There is a real reason to fear that, without additional protections, some broadband companies may have strong financial incentives to restrict access to content and applications…. If broadband providers begin to sell, to application and content providers, the right to access their customers, then the broadband market will become what some economists call a 'two-sided market.' The concern arises because the broadband provider's market power when it sells its service to the application and content providers dwarfs its market power on the other 'side' of the market (where they sell that service to consumers). Once a consumer chooses a broadband provider, then that provider has monopoly power over access to that consumer for any application or content provider that wants to reach that customer. If a large national broadband provider were to begin charging Internet application and content providers to reach its customers, it would have monopoly power over access to potentially millions of customers nationwide…. As the Report notes, the dangers from this

4. Merger Analysis in Two-Sided Markets

14. In the United States, merger review uses the framework of the *Horizontal Merger Guidelines* (Guidelines)[11] issued jointly by the DOJ and the Federal Trade Commission (FTC). The methodology in the Guidelines aims to identify mergers that are likely to create or enhance market power or to facilitate its exercise.

4.1 Market Definition

15. The purpose of market definition is to identify a relevant market in which firms could effectively exercise market power if they were able to coordinate their actions. The market definition test in the Guidelines asks whether a hypothetical profit-maximizing monopolist, not subject to price regulation, would impose at least a small but significant and nontransitory increase in price (a SSNIP), assuming the terms of sale of all other products are held constant. A relevant market is a group of products and geographic area that is no bigger than necessary to satisfy this test.

16. In a two-sided market, there are several prices that a hypothetical monopolist might increase.[12] In the simple model of electronic payments above, a platform sets two per-transaction prices, p_I to issuers and p_A to acquirers. The hypothetical monopolist exercises market power by raising the price level $p = p_I + p_A$. The SSNIP test is naturally applied to this price level. The monopolist can impose the price increase on one or both sides of the market by increasing p_I or p_A. It is also possible that the profit-maximizing monopolist might increase the price on one side of the market, while reducing it on the other side.

17. The issue of how to apply the hypothetical monopolist test in a two-sided market arose in *United States v. First Data Corp.*[13] In 2003, the DOJ challenged First Data's acquisition of Concord EFS because it would have combined the two PIN debit networks, STAR and NYCE.[14] PIN debit is an electronic payment method where a debit cardholder enters a personal identification number (PIN) to authorize its issuing bank to debit funds from the cardholder's bank account to complete a purchase. Like the credit

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monopoly power include increased prices being charged by Internet content and applications providers to consumers (to cover those providers' new costs of paying for access to those same consumers) and a reduction in the long run incentives for those application and content providers to develop new products, as the broadband firms would be able to expropriate the value of those new products."). *See also* Nicholas Economides & Joacim Tåg, *Net Neutrality on the Internet: A Two-Sided Market Analysis* (May 2009) (available at http://www.stern nyu.edu/networks/Economides_Tag_Net_Neutrality.pdf); *Formal Complaint of Free Press and Public Knowledge Against Comcast Corp.*, Memorandum Opinion and Order, 23 FCC Rcd 13028 (2008), appeal pending.

11 The Guidelines are available on the Agencies' websites at http://www.usdoj.gov/atr/guidelines/hmg.pdf and http://www ftc.gov/bc/docs/hmg080617.pdf.

12 For a discussion of the hypothetical monopolist test in payment card networks, *see* Eric Emch and T. Scott Thomson, "Market Definition and Market Power in Payment Card Networks," *Review of Network Economics*, 5, 45-60 (2006).

13 *United States v. First Data Corp. and Concord EFS, Inc.*, No. 03-CV-02169 (D.D.C.2003). *See* http://www.usdoj.gov/atr/cases/first0 htm. *See also* the FTC's statement on closing its Google/DoubleClick investigation - Statement of Federal Trade Commission Concerning Google/DoubleClick, FTC File No. 071-0170, available at http://www ftc.gov/os/caselist/0710170/071220statement.pdf.

14 First Data had a controlling ownership interest in NYCE and Concord owned STAR. The merger agreement was executed in April 2003, and the DOJ filed its complaint in October 2003. The parties settled on the eve of trial, when First Data agreed to divest the NYCE network. The Final Judgment was entered in May 2004.

card market, this is a two-sided market. Merchants value a brand of debit more, the more cardholders carry the card; debit cardholders value a debit brand more, the more merchants accept it. PIN debit networks set similar sorts of fees to those of the credit card networks. The acquiring bank and issuing bank each pay a switch fee to the network. The price level is the sum of these two switch fees. This is the network's revenue for a transaction. The acquiring bank also pays an interchange fee that is not retained by the network, but rather is paid out to the issuing bank.

18. In establishing that PIN debit constituted a relevant antitrust market, the DOJ applied the hypothetical monopolist test. The DOJ argued that a hypothetical, profit-maximizing monopolist would raise prices to acquiring banks (and hence to merchants) by at least 5% to 10%, holding the price set to issuing banks fixed. This approach applied the 5% to 10% price increase to the sum of the acquiring bank's switch fee and the interchange fee. Because the interchange fee is much larger than the switch fee, this was a much larger price increase than a 5% to 10% increase in the total switch fees.

4.2 Market Power and Consumer Welfare

19. The aim of merger review in the United States is that a merger should not be permitted to create or enhance market power or to facilitate its exercise. A two-sided platform has market power when it has the ability to raise its price level above the competitive level for a significant period of time. In the model of payments above, the exercise of market power is reflected in the profit margin $p - c$, where p is the sum of the prices p_I and p_A set to the issuing banks and the acquiring banks and c is the marginal cost of a payment transaction.

20. The effect of a merger on the prices set to each side of a two-sided market depends on the nature of competition. A merger can increase market power and increase price on both sides of the market. In this case, customers on both sides of the market are harmed by the merger. A merger can also increase market power primarily on one side of the market. In this case, price may increase for one group of customers, with either no change in price or a price decrease for the other group.

21. Due to the complexity of pricing in some two-sided markets, it may be difficult to make predictions about how a merger will change prices.[15] An alternative approach is to predict how a merger will impact transaction volume. In many economic models of two-sided markets, when a merged platform raises the price level (the sum of the prices to each side), the volume of interactions between customers falls.[16] Even if the price falls on one side of the market, a reduction in competition causes transaction volume to fall because of the increase in price on the other side of the market.

5. Civil Non-Merger Analysis in Two-Sided Markets

5.1 Network Effects and Joint Ventures

22. Network effects in two-sided markets sometimes motivate firms to form joint ventures. Antitrust authorities may decide not to challenge these joint ventures when the procompetitive network effects are significant. However, antitrust concerns may arise over particular rules maintained by a joint venture that limit competition between the member firms.

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15 In addition to the normal complexities of pricing, the sorts of fees used may be very different on the two sides of the market.

16 This is a property of the multiplicative demand model of Jean-Charles Rochet and Jean Tirole, "Platform Competition in Two-Sided Markets," *Journal of the European Economic Association*, 1, 990-1029 (2003). *See also* Eric Emch and T. Scott Thompson, "Market Definition and Market Power in Payment Card Networks," *Review of Network Economics*, 5, 45-60 (2006).

23. In real estate markets, for example, there are very strong network externalities associated with listing services (databases of houses available for sale). A listing service is more valuable to a buyer if more sellers list their homes on it, and is more valuable to a seller if more buyers search for homes with it. The network effects are so significant that individual realtors and real estate firms frequently join together to form a Multiple Listing Service (MLS). In the United States, it is common for almost every real estate agent in a city to be a member of the same MLS.

24. Antitrust concerns frequently arise over MLS rules that limit competition between real estate brokers. In 2006, the FTC issued a Complaint against the regional MLS, Realcomp, for allegedly agreeing to withhold certain listing services from discount real estate brokers while providing these services to its traditional full-service brokers.[17] The Complaint claimed that Realcomp had maintained policies to limit the public's ability to find listings of discount brokers on popular real estate websites, and to limit the ability of brokers to find such listings on the MLS system. Realcomp argued that its policies did not impair the ability of discount brokers to compete with traditional brokers. They also contended that the policies promoted efficiency by preventing home sellers who did not wish to pay full-service brokerage fees from free-riding on the cooperative efforts of brokers to develop and support the MLS. After an administrative hearing, the administrative law judge (ALJ) found that "[d]iscount listings are sufficiently accessible on the Realcomp MLS" and that the Respondent's efficiency arguments were plausible.[18] He therefore concluded that the policies did not unreasonably restrain trade in the two-sided market for brokerage services. The ALJ's decision is currently on appeal with the Commission.

25. In 2005, the DOJ filed a Complaint against the National Association of Realtors for adopting nationwide rules that limited competition from real estate brokers using the Internet and innovative business models to offer better services to their clients. The rules allowed traditional brokers to direct that their clients' home listing not be displayed on VOWs (virtual office websites).[19] In 2008, the DOJ filed a Complaint against an MLS in Columbia, South Carolina for adopting rules that required member brokers to provide a minimum set of brokerage services even when some consumers may not have wanted all of those services.[20] In both cases, joint venture members agreed upon rules that limited competition among real estate brokers, artificially stabilized the price of brokerage service, and deterred innovation and the emergence of new brokerage business models. In both cases, the DOJ reached settlements that eliminated the anticompetitive rules.

5.2 Single-Firm Conduct in Two-Sided Markets

26. Single-firm conduct covers a wide range of antitrust issues. The two-sidedness of a market may or may not be relevant to single-firm conduct, depending on the conduct in question.

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17 *See In the Matter of Realcomp II Ltd.*, FTC Docket No. 9320, available at http://www ftc.gov/os/adjpro/d9320/index.shtm.

18 *Id.*

19 *See* Final Judgment in *United States v. Nat'l Ass'n of Realtors*, No. 05-C-5140 (N.D. Ill. Nov. 18, 2008), available at http://www.usdoj.gov/atr/cases/f239600/239655.pdf.

20 *See* Stipulation and Proposed Final Judgment in *United States v. Consolidated Multiple Listing Serv., Inc.*, No. 3:08-cv-01786-SB (D.S.C. May 4, 2009), available at http://www.usdoj.gov/atr/cases/f245500/245547.pdf and http://www.usdoj.gov/atr/cases/f245500/245550.pdf.

5.2.1 Barriers to Entry

27. Conditions of entry into a market often play an important role in establishing monopoly power under Section 2 of the Sherman Act. In two-sided markets, the network externalities operating across the two customer groups can make entry difficult. A platform must attract sufficient numbers of customers on both sides of the market in order to create value. In electronic payments for example, if a new platform were to focus on winning the business of merchants, without simultaneously tackling the job of getting cards into the hands of consumers, then merchants would not value the network because it would not deliver much incremental cardholder business. Thus a new platform must solve the problem of appealing to both sides of the market even when it is immature. This chicken-and-egg problem is essentially a coordination problem, and it can be a difficult one for a new entrant to solve.

28. Two-sided network externalities played an important role in *United States v. Microsoft Corp.*[21] Microsoft operates in a two-sided market for computer operating systems. An operating system connects two groups of consumers, PC users and applications developers. PC users value an operating system more when more applications are written to it, and software developers do not want to write applications for an operating system unless there is a sizable and stable market of PC users for the applications. The district court concluded that this chicken-and-egg problem made entry into operating systems exceptionally difficult.[22] The court labeled the problem an "applications barrier to entry."[23]

5.2.2 Predatory Pricing

29. In one-sided markets, there may be a finding of predatory pricing in the United States if a firm sets its price below an appropriate measure of costs in the short term and has a dangerous prospect of recouping its investments in the below-cost prices.[24]

30. In two-sided markets, pricing below production cost on one side of the market may be profitable and efficient for competitive firms both in the short term and in the long term. Predatory pricing could still be a problem, but care has to be taken about what to infer from prices. Newspapers routinely sell to readers at prices below the cost of printing them. This is not taken as evidence of predation because advertising revenues cover the newspapers' costs of production. This pricing is procompetitive because advertisers seek to reach a wide audience of readers. By structuring prices so that advertisers subsidize readers, a newspaper efficiently expands circulation volume.

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21 *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 20 (D.D.C. 1999) (Findings of Fact), 87 F. Supp. 2d 30 (D.D.C. 2000) (Conclusions of Law), 97 F. Supp. 2d 59 (D.D.C. 2000) (Order), 353 F.3d 34 (D.D.C. Cir. 2001) (en banc). *See* http://www.usdoj.gov/atr/cases/ms_index.htm.

22 *See* Gregory J. Werden "Network Effects and Entry Conditions," *Antitrust Law Journal*, 69, 87-111 (2001), and cites therein.

23 *United States v. Microsoft Corp.*, 84 F. Supp. 2d 9, 18 (D.D.C. 1999) (Findings of Fact).

24 *See Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.* 509 U.S. 209, 222-24 (1993).