TYING OF "FREE GOODS" IN DIGITAL PLATFORM MARKETS

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As dominant platforms offer related services and expand into adjacent markets, there are serious concerns for anticompetitive tying that may serve to extend their market power to other markets. In this article, I review recent theoretical developments in the leverage theory of tying in relation to digital platform markets where goods are often provided for "free." With zero pricing, the monopolist of the primary good may be unable to appropriate a rival firm's efficiencies through the pricing of the primary product and therefore have an incentive to resort to tying to foreclose the rival firm and expropriate any rents associated in the tied product market. I also briefly discuss practical issues that may pose challenges in putting theory into practice. In particular, given potential precompetitive and efficiency-enhancing effects of tying, a rule of reason approach that carefully balances pro- vs. anticompetitive effects would be advisable.

I. INTRODUCTION

As a few big digital platforms, collectively known as "Big Tech," FAANG,[2] or GAFAM,[3] play an increasingly important role in our daily lives, competition authorities and regulators around the world are expressing concerns about their market domination and potentially imposing unfair terms on businesses and consumers as gatekeepers. In particular, more scrutiny is called for any actions taken by these firms that may enhance their existing market power or limit the entry by more or equally efficient competitors.

One such practice is tying, which can leverage existing market power in one market to acquire market power in adjacent markets.[4] The European Commission ("EC"), for instance, fined Google €4.34 billion in July 2018 for engaging in "illegal tying" by requiring "manufacturers to pre-install the Google search app and browser app (Chrome), as a condition for licensing Google's app store (the Play Store)." The EC concluded that the Play Store is a "must-have" app, so such tying thereby "den[ied] rivals the chance to innovate and compete on the merits."[5] In the recent *Epic v. Apple* litigation, Epic alleged that Apple tied IAP, its in-app payment solution for in-app purchases of digital goods, to the distribution of iOS apps through the App Store. Epic defined two separate markets — one for iOS app distribution and another for iOS in-app payment solutions — and claimed that Apple "uses its monopoly power in iOS app distribution to coerce developers of iOS apps to use Apple's payment solution [IAP]" by "contractually [tying] together app distribution and payment solutions for in-app purchases of digital goods."[6]

One challenge for competition policy in the area of digital platforms is that many two-sided platforms provide free services to consumers and generate revenue by charging the other side, such as advertisers or application developers (Rochet & Tirole, 2005; Amelio & Jullien, 2012; Choi & Jeon, 2021).

This article introduces some of the recent theoretical developments on tying in platform markets and discusses practical issues in implementing competition policies against potentially anticompetitive tying arrangements. In particular, I focus on the tying of "free goods," a practice that is uniquely prevalent in platform markets, unlike traditional markets where an elevated price in the affected market is the main mechanism through which antitrust effects arise.

II. THE LEVERAGE THEORY OF TYING AND THE CHICAGO SCHOOL CRITIQUE

Tying occurs when a firm provides a consumer with a product A (the tying product) under the condition that the consumer also obtains a different product B (the tied product) from the firm. In the case of tying, the tying product cannot be obtained separately even though the tied product can be; (pure) bundling occurs when the two products can only be obtained jointly as a package. The practices of tying and bundling are widespread simply because they are often efficient. Some common examples are smartphones with essential apps pre-installed or cars with tires included.

Competitive concerns, however, arise when the producer has significant market power in market A (the tying product market) such that it may be able to foreclose competition in market B (the tied product market). According to the "leverage" theory, tying practices are inherently anti-competitive and allow a monopolist in market A to also obtain a monopoly in market B.

To understand new issues that arise for tying in platform markets, I first illustrate the influential Chicago School criticism of the leverage theory. The Chicago School argument illuminates a flaw in the leverage theory. For complementary products, for instance, the monopolistic supplier of A could price aggressively its B product to drive down the competitor's price so that consumers have high surplus when they buy the rival product. This enables the monopolist to charge a correspondingly high price for A to extract the surplus. This tactic of "price squeeze," which allows the (more efficient) rival firm to sell B, would yield a higher profit to the monopolist than the one under tying which extends its monopoly to market B.

2 Facebook, Amazon, Apple, Netflix, Alphabet (Google).

3 Alphabet (Google), Amazon, Facebook, Apple, Microsoft.

4 Other practices include self-preferencing and data collection of third-party vendors they host.

5 Press Release, European Commission, Antitrust: Commission fines Google €4.34 billion for illegal practices regarding Android mobile devices to strengthen dominance of Google's search engine (July 18, 2018). For a detailed discussion of the key aspects of Google's practices and their potentially exclusionary effects in the mobile phone industry from a legal perspective, see Benjamin G. Edelman & Damien Geradin, *Efficiencies and Regulatory Shortcuts: How Should We Regulate Companies Like Airbnb and Uber?*, 19 STAN.TECH. L.REV. 293 (2016) and Federico Etro & Cristina Caffarra, *On the Economics of the Android Case*, 13 EUR. COMPETITION J. 282 (2017).

6 *Epic Proposed Findings of Fact and Conclusions of Law*, May 28, 2021, https://cdn2.unrealengine.com/epic-proposed-findings-of-fact-and-conclusions-of-law-redacted-bafb520e1d4b.pdf.

To illustrate this idea more formally, consider the following numerical example. For the sake of argument, suppose that there are two independent products, A and B, in that the consumers' valuation for each product is independent of the consumption of the other. Market A is served by Firm 1, a monopolist, and entry to market A is not possible. In contrast, Firm 1 competes with Firm 2 in market B; Firm 1 sells product B1 and Firm 2 sells product B2. Firms' production costs are zero in all markets.

In market A, each consumer's willingness to pay for product A is $v_A = \$10$. In market B, each consumer's willingness to pay for each firm's product is given by $v_{B1} = \$10$ and $v_{B2} = \$11$, respectively, which means firm 2's product is superior to firm 1's.

If these products are sold independently without tying, firm 1 will charge $p_A = v_A = \$10$ in its monopolized market A. In market B, both firms compete on price and the equilibrium prices are given by $p_{B1} = \$0$ and $p_{B2} = \$1$.[7] Firm 1 is willing to drive down its price to its marginal cost of zero, while Firm 2 will choose the highest price it can while still ensuring that consumers are equally better off buying from Firm 2 (paying $1 for product B2, which they value at $11) as buying from Firm 1 (paying $0 for product B1, which they value at $10). All consumers buy from firm 2 in market B, and this is an efficient market outcome. Each firm's profits are given by

$$\pi_1 = p_A = \$10$$
$$\pi_2 = p_{B2} = \$1$$

Now suppose that firm 1 ties its monopolized product A with product B1. Consumers now have two choices: buy the bundle of A and B1, which they value at $v_A + v_{B1} = \$10 + \$10 + \$20$, or buy B2 only, which they value at $v_{B2} = \$11$. As firm 2 is willing to drive down its price to its marginal cost of zero, the tying firm needs to charge a price of $9 for consumers to choose the bundle over buying only B2. Thus, even if tying provides a mechanism to capture the tied good market, it is self-defeating as it reduces firm 1's profits from $10 in the first scenario to $9 in the tying scenario.[8]

$$\tilde{\pi}_1 = p_{Bundle} = \$9 \ (<\$10 = \pi_1)$$

Note that the $1 loss of profits for the tying firm is due to the need to compensate consumers for purchasing its inferior product B1, instead of a better product B2 (whose value is higher by $1). Thus, the monopoly firm has no incentives to tie to extend its market power to the other market. This is the essence of the Chicago school's criticism of the leverage theory of tying.

In fact, if we consider *complementary* products, the Chicago School logic is strengthened. For the complementary products case, a monopolistic supplier of one complementary product can automatically exclude competitors by tying. However, there are no incentives to foreclose the complementary market, because it is more profitable to maintain competition; the Chicago School critique correctly points out that the ability to exclude does not mean incentives to exclude. By choosing to compete in the complementary market rather than tie, the monopolist can drive down the price of the complementary good of the more efficient rival firm while extracting more surplus by charging a higher price for the monopolistic product. This strategy of "price squeeze" is more profitable than monopolizing the otherwise competitive complementary market by tying.

Whinston (1990), however, resurrects the leverage theory by showing that a sensible modification of the model with the introduction of scale economies and oligopolistic competition can provide a coherent theory of leverage with anticompetitive effects.[9] Even though the theory was developed for one-sided markets, many of the insights can still apply to digital platform markets. In particular, models developed by Carlton & Waldman (2002)[10] and Choi & Stefanadis (2001)[11] show that dynamic considerations can make tying a profitable entry-deterring strategy, which may be more relevant for evolving and innovative industries. For instance, Carlton & Waldman consider a two-step entry process in which entry into the secondary (tied) market can facilitate entry to the primary (tying) market. In such a context, the monopolist in the primary tying market may have incentives to engage in tying, which sacrifices short-term profits by deterring the more efficient firm's entry into the secondary market, as posited by the Chicago School critique, but in the long-run it can be profitable because it *preserves* market power in the primary market.

7 I assume that consumers buy from the firm that can potentially provide more surplus when they are indifferent. Alternatively, without this tie-breaking assumption, firm 2 can charge a price of $p_{B2} = \$0.99$ to ensure that consumers are better off buying from it.

8 I denote firm 1's profit under tying with a tilde.

9 Michael Whinston, *Tying, Foreclosure, and Exclusion*, 80 AM. ECON. REV. 837 (1990).

10 Dennis W. Carlton & Michael Waldman, *The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries*, 33 RAND J. ECON. 194 (2002).

11 Jay Pil Choi & Christodoulos Stefanadis, *Tying, Investment and the Dynamic Leverage Theory*, 32 RAND J. ECON 52 (2001).

III. TYING IN PLATFORM MARKETS WITH "FREE" PRODUCTS

Zero prices are often seen in two-sided platform market. Two-sided platforms are organizations that create value by enabling interactions between two distinct groups of customers. Uber, OpenTable, credit card networks, and mobile operating systems are a few examples of two-sided platforms. Uber connects drivers and riders, OpenTable connects diners and restaurants, credit card networks connect merchants and buyers, and mobile OSes connect app developers and mobile device users. Two-sided platforms are characterized by their indirect network effects, which are present when greater participation by one group increases the value of the platform to the other group. The need for all sides of the market to engage, combined with these indirect network effects, creates a "chicken and egg" problem (Caillaud & Jullien, 2003) in that members of each group are willing to participate in the market only if they expect many members from the other side to participate. For example, OpenTable diners prefer to have a greater selection of restaurants on the platform, and restaurants also benefit from having access to a greater number of potential diners, and neither side would participate if the other side were not present on the platform.

The literature on two-sided markets has analyzed the optimal pricing structure to coordinate the demands of distinct groups of customers and shows that oftentimes below-cost pricing naturally arises on one side in order to enhance participation, because the loss from the below-cost pricing can be recouped on the other side of the market (see Armstrong (2006) and Rochet & Tirole (2006)). In particular, if there are competing platforms in the two-sided market, and one side of the market single-homes (i.e. uses only one platform) while the other side of the market multi-homes (i.e. uses multiple competing platforms), the single-homing side of the market constitutes the competitive bottleneck. The platforms will compete for the single-homing side of the market, and the resulting price structure will subsidize the single-homing side while charging the multihoming side.[12]

When the marginal cost is low as in digital markets, the optimal pricing strategy may entail negative prices. However, we can imagine situations in which negative prices may be impractical due to adverse selection and opportunistic behaviors by consumers.[13] It is therefore not uncommon for the business model of a two-sided platform to charge one group of customers a zero price in order to induce participation by that side, which then encourages participation by the other side, and so on.

Note that the Chicago School theory hinges upon both the tying and tied product being sold at a positive price. The logic breaks down if either product is offered at a zero price. Without the price mechanism, there is no response in prices that would harm consumers and no price from which to "squeeze out" additional profits from more efficient rival firms.

A recent paper by Choi & Jeon (2021) analyzes a model of tying in platform markets that has two key features: (i) the two-sided nature of platform markets and (ii) the presence of price constraints (in particular, the non-negative price constraint with zero pricing).[14] It shows that tying provides a mechanism to circumvent the non-negative price constraint in the tied product market without inviting an aggressive response by the rival firm, if the rival firm's price response to tying faces the non-negative constraint.

To illustrate the idea, let us change the previous example by explicitly considering two-sidedness in platform markets. More specifically, let us consider an ad-financed business model of platform markets where both products are provided for "free" to consumers and revenues are generated from the other side of the platform. Assume that in each market, an additional consumer brings in $a_A = a_B = \$2$ of revenue (imagine, for example, advertising revenues a search engine can generate by selling sponsored search results, revenues from the sale of consumer data to third parties or future in-app purchases).[15] Otherwise, we retain the same assumptions about consumers' valuations and marginal costs as in the previous section.

As the price constraint plays a crucial role in the theory of Choi & Jeon (2021), it is worth commenting on various reasons for "free" goods. In Market A, where the monopolist does not face any competition, the monopolist may have made a prior commitment to a "free" price in Product A's nascent stage. For instance, Google has made a strategic decision to make its Android system available for "free" without any charges as an "open source" mobile operating system when it was first introduced in 2007. The decision may have been necessary for market penetration and building an installed base of consumers to compete against alternatives such as Symbian and Windows Mobile. In Market B with competition,

12 Mark Armstrong, *Competition in Two-Sided Markets*, 37 RAND J. ECON. 668 (2006).

13 Andrea Amelio & Bruno Jullien, *Tying and Freebies in Two-Sided Markets*, 30 INT'L J. INDUS. ORG. 436 (2012).

14 Jay Pil Choi & Doh-Shin Jeon, *A Leverage Theory of Tying in Two-Sided Markets with Non-Negative Price Constraints*, 13 AM ECON J-MICROECON. 283 (2021).

15 This setup is called a situation of "competitive bottleneck" in the literature where consumers who single-home constitutes the bottleneck side and receive a better deal.

firms may want to charge negative prices (i.e., provide subsidies to attract customers), but such pricing may be infeasible due to various adverse selection and moral hazard reasons. In such a scenario, the price constraint takes the form of the non-negative price constraint with zero pricing.

In this modified setup that reflects some of the key elements of platform markets, if firm 1 does not tie its products, then all consumers use product A and product B2 for free because B2 provides a higher quality than B1. Consumers receive a surplus of $10 in market A and $11 in market B because the products are provided for free, and each firm's profits are simply their advertising revenues.

$$\pi_1 = p_A + a_A = \$0 + \$2 = \$2$$
$$\pi_2 = p_B + a_B = \$0 + \$2 = \$2$$

Suppose firm 1 decides to tie product A and product B1. Consumers value the bundle at $20 and product B2 at $11, so consumers will purchase the bundle when all products including the bundle are offered for free.[16] The monopolist's (firm 1's) profit after tying now becomes

$$\tilde{\pi}_1 = p_{Bundle} + a_A + a_B = \$0 + \$2 + \$2 = \$4\ (>\$2 = \pi_1)$$

Thus, tying is profitable as it is used to steal the advertising revenues from the rival firm in market B. However, it is inefficient because consumers use product B1, rather than better product B2.[17]

In this example, it is noteworthy to understand the role of price constraints. Imagine that there is no price constraint and any prices (including a negative price) can be charged. In such a scenario, firm 1 will charge a price of $10 in market A and each firm is now willing to drive its price down to -$2 because its loss can be recouped with advertising revenues from the other side. Without tying, firm 2 will charge a negative price of -$1 for B2 (that is, provide a subsidy of $1 to consumers given firm 1's price of -$2 for B1) and receives a profit of 1 whereas firm 1 receives a profit of $12.

$$\pi_1 = p_A + a_A = \$10 + \$2 = \$12$$
$$\pi_2 = p_{B2} + a_B = \text{-}\$1 + \$2 = \$1$$

After tying, the tying firm needs to charge a price of $7 to sell the bundled product because firm 2 will be willing to offer its product of value $11 at the price of -$2 and provides a total surplus of $13 to consumers. This implies that firm 1's total profit will be $11 (< $12).

$$\tilde{\pi}_1 = p_{Bundle} + a_A + a_B = \$7 + \$2 + \$2 = \$11\ (<\$12 = \pi_1)$$

This is the same qualitative result as in the previous example where tying reduces firm 1's profit by 1, highlighting the importance of price constraints (or "free" products) for the new theory.

In the model of Choi & Jeon (2021), the non-negative price constraint plays two roles: 1) it limits competition in the tied good market, which creates additional potential surplus to extract through tying, and 2) it limits the rival firm's response to tying. In addition, tying in their model is credible without any commitment mechanism and forecloses the rival in the tied product market regardless of whether the two products tied together are independent or complementary. The credibility of tying can explain the use of contractual tying for the leverage purpose.[18]

16 For the sake of argument, we implicitly assume that tying cannot be used as a mechanism to circumvent the prior price commitment or price constraint for product A.

17 Etro & Caffarra (2017) use this theory of harm to assess the Android case. See Federico Etro & Cristina Caffarra, *On the Economics of the Android Case*, 13 EUR. COMPETITION J. 282 (2017).

18 The tying literature distinguishes contractual tying from technical tying: the former can be undone ex post with a relatively low cost while the latter can be undone only with a significant cost. Therefore, technical tying can be used as a device to pre-commit to tying when tying is not ex post credible. See Michael Whinston, *Tying, Foreclosure, and Exclusion*, 80 AM. ECON. REV. 837 (1990).

IV. PRACTICAL ISSUES WITH ANTITRUST ENFORCEMENT

I have discussed the potential anticompetitive effects of tying in platform markets. We expect more tying-related cases in platform markets as dominant players in their respective markets continue expanding their product offerings to adjacent markets to build their platform ecosystems. Merger assessments in digital markets may also pay increased attention to the possibility that related products will be tied after the merger. However, there are many practical challenges in implementing sensible competition policy against anticompetitive tying in digital platform markets, because actual antitrust cases are fact-intensive and market-specific. I discuss some of the issues below.

A. Potential Procompetitive Effects

There can be substantial precompetitive and efficiency-enhancing effects of tying which should be carefully balanced against any potential harm. Tying or seamless integration of different services may confer consumer benefits with the convenience of "one-stop shopping." In addition, tying can serve as a mechanism to introduce implicit subsidies on one side of the market in order to solve the coordination failure in two-sided markets. As a result, tying can raise participation on both sides and can benefit consumers.[19] Tying in digital platform markets thus should be submitted to a rule of reason standard because "applying per se analysis … creates undue risks of error and of deterring welfare-enhancing innovation,"[20] as set by the *Microsoft* case.[21]

B. Multi-Homing

Choi (2010) shows that tying in two-sided markets can have very different competitive effects depending on whether or not multi-homing is allowed.[22] Multi-homing can counteract the tendency towards tipping and the lock-in effects in industries with network effects. His model was developed partly to analyze one of the first tying cases in the digital media market, which concerned Microsoft's practice of requiring Windows operating system users to accept its Windows Media Player software. The model shows that tying induces more consumers to multi-home and makes platform-specific exclusive content available to more consumers, which is beneficial to content providers. As a result, tying can be welfare-enhancing if multi-homing is allowed, even in cases where its welfare impacts are negative in the absence of multi-homing. This implies that the assessment of multi-homing possibility should be a key consideration in antitrust cases with digital platforms.

C. Market Definition

Tying claims require the burden of proof on the plaintiff side to establish that the two products are in different markets and that there is separate demand for each product. A market definition analysis is therefore considered a prerequisite in actual cases. However, traditional methods for defining single-sided markets cannot be applied in the same manner to two-sided markets, and the rapidly evolving, fluid nature of platform markets can lead market shares to dissipate quickly and unexpectedly. As the market boundaries of various services become blurry, the SSNIP test in two-sided market can be much more complex. In addition, a product complementary at one point can easily turn into a substitute product, and vice versa, and the nature of competition can change. As a result, the main battleground in actual cases is expected to be in market definition rather than the evaluation of economic harm. Too much reliance on market definition in the court case, however, can be counterproductive and divert attention from more important economic effects of tying.[23] It would be advisable to move away from too much emphasis on market definition and towards more direct inferences concerning competitive effects of tying, if such evidence is available, with economic substance over legal form.

19 See Andrea Amelio & Bruno Jullien, *Tying and Freebies in Two-Sided Markets*, 30 INT'L J. INDUS. ORG. 436 (2012).

20 *United States v. Microsoft Corp.*, 253 F.3d 34 (D.C. Cir. 2001).

21 There have been gradual movements away from the *per se* rule since *Jefferson Parish Hospital District No. 2 v. Hyde*, 466 U.S. 2 (1984) established the "modified *per se*" rule. In *United States v. Microsoft Corp.*, the rule of reason was established. See Christian Ahlborn, David S Evans & A Jorge Padilla, *The antitrust economics of tying: a farewell to per se illegality*, 49 ANTITRUST BULL. 287 (2004).

22 Jay Pil Choi, *Tying in Two-Sided Markets with Multi-Homing*, 58 J. INDUS. ECON. 607 (2010). See also Susan Athey & F. Scott Morton, *Platform Annexation* (Working Paper, 2021) for the importance of "tools" that enable multi-homing of platforms in maintain competition in the market.

23 For a radical proposal to abandon the practice of delineating the relevant market, see Louis Kaplow, *Why (Ever) Define Markets?*, 124 HARVARD L. REV. 437 (2010).

D. Technological Incompatibility as Tying

When products are complementary and require interoperability between them for proper functioning, technological incompatibility with different vendors' products is tantamount to tying of products. For instance, a monopolistic producer of an essential component can engage in *de facto* tying by making its product incompatible with any other complementary products of rival firms and making its interface proprietary with intellectual property ("IP") rights. When IP is involved, antitrust authorities face the difficult task of balancing ex post competition against ex ante incentives to develop innovative products. Intervening in the form of compulsory licensing to ensure interoperability and open access to "essential facilities" raises a host of thorny issues in its implementation.[24] In the digital market, interoperability can be achieved through the exposure of the Application Programming Interface ("API") information. However, there may be cases where it may be technically difficult to expose the API without revealing proprietary information about the inner working of the so-called implementation of the information of the "essential facility." In addition, there can be difficulty restricting the use of disclosed information in the digital market, in contrast to physical facilities, due to special properties of information.

E. Assessment of Non-Price Effects with "Free" Services

When tying involves services that are free to consumers, consumer harm from anticompetitive tying is likely to manifest in terms of lower quality of service, more intrusive advertisements, and less privacy protection and cybersecurity, rather than a higher price. Thus, the assessment of the "but-for world" in the evaluation of pro- vs. anticompetitive effects of tying becomes more difficult because they are more difficult to measure. Several recent cases around tying in platform markets have grappled with the issue of zero prices. For instance, in the recent suits against Facebook brought by the FTC and attorneys general from 46 states, Facebook argued that the regulators had failed to prove how the Facebook services, which are free, harmed consumers.[25]

F. Cumulative Effects with Ancillary Restraints

We have focused on tying as one of the possible exclusionary practices that can be deployed by a dominant digital platform. In isolation, anticompetitive effects may not be considered materially important. However, there may be many other exclusionary practices employed by the dominant firm, along with tying, which once again may not raise substantial anticompetitive concerns in isolation. Nonetheless, they may have substantial anticompetitive effects in combination by amplifying individual effects. Thus, a comprehensive approach may be necessary to assess their cumulative effects.[26]

V. CONCLUSION

As dominant platforms offer related services and expand into adjacent markets, there are serious concerns for anticompetitive tying that may serve to extend their market power to other markets. I have reviewed recent theoretical developments in the leverage theory of tying in relation to platform markets. In particular, when products are provided for "free," the monopolist of the primary good may be unable to appropriate a rival firm's efficiencies through the pricing of the primary product and therefore have an incentive to resort to tying to foreclose the rival firm and expropriate any rents associated in the tied product market. In addition, I have briefly discussed practical issues that may pose challenges in putting theory into practice. In particular, given potential precompetitive and efficiency-enhancing effects of tying, a rule of reason approach that carefully balances pro- vs. anticompetitive effects would be advisable.

24 See Jay Pil Choi, *Compulsory Licensing as an Antitrust Remedy*, 2 WIPO J. 74 (2010).

25 See Cecilia Kang, *Judge Throws Out 2 Antitrust Cases Against Facebook*, THE NEW YORK TIMES, June 28, 2021.

26 In the *Android* case, for instance, the European Commission proposed a theory of harm that shows how Google's tying of its search engine to its app store Google Play through the Mobile Application Distribution Agreements can foreclose rival search engines in combination with the Anti-Fragmentation Agreements.

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