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How Economics Can Improve Antitrust Doctrine towards Tie-In Sales:

Comment on Jean Tirole's "The Analysis of Tying Cases: A Primer"

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How Economics Can Improve Antitrust Doctrine towards Tie-In Sales

Dennis W. Carlton and Michael Waldman

Given the focus on tie-in sales in several recent antitrust cases, economists have turned their attention to the motivations and consequences of tying, significantly improving our understanding. Tirole has written an excellent primer focused on what we know about tying and what he believes is desirable antitrust policy concerning the practice. Although we agree with most of Tirole's arguments, there are two topics for which our perspective is somewhat different. First, we would add one situation to the ones identified by Tirole in which tying can harm competition and reduce welfare. Second, in his policy discussion Tirole stops short in some places of using theory to provide concrete guidance and restraint to antitrust enforcers. In other places his suggestions could lead to less rather than more clarity. We explain our reasons for preferring a more limited role for antitrust intervention than Tirole appears to recommend.

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I. Introduction

Tie-in sales have been the focus of recent major antitrust cases, especially in the United States and Europe. These cases against firms such as Microsoft and MasterCard and Visa have attracted widespread attention. As a result, academic economists have turned their attention to the motivations and consequences of tying. This has led to a significant improvement in our understanding of the practice. At least in the United States, the antitrust doctrines used to attack tie-in sales are often not based upon economic theory, but instead are based on such legal notions as "distinct products" and "forcing," concepts with ambiguous economic meaning. These considerations make a review of the economic theory underlying tie-in doctrines timely and valuable, especially if the economic insights can be used to focus antitrust doctrine on only those cases where anticompetitive harm is likely. Even if some cases remain difficult to evaluate, it would still be a major contribution to distinguish situations where economic theory indicates that an antitrust case has little or no merit from those where it might.

WE AGREE WITH TIROLE THAT, CONCERNING THE CIRCUMSTANCES WHERE TYING CAN REDUCE WELFARE, THE MAIN SET OF CIRCUMSTANCES ARE THOSE WHERE RIVALS IN EITHER THE TIED OR TYING GOOD ARE HARMED AND, AS A RESULT, EITHER EXIT THE MARKET OR INCUR HIGHER COSTS, CONSEQUENTIALLY INCREASING PRICES COMPARED TO THE NO-TYING SITUATION.

Tirole has written an excellent primer that focuses on what we know about tying behavior and what he believes is desirable antitrust policy concerning the practice.[1] His clarity of thought and insights reveal most of the features needed for antitrust harm to result from tie-in sales. Although we agree with most of what Tirole says in his article, there are two topics for which our perspective is somewhat different. First, based on our ongoing research, we would add one situation to the ones identified by Tirole in which tying can harm competition and thereby reduce welfare. Second, in his policy discussion Tirole stops short in some places of using theory to provide concrete guidance and restraint to antitrust enforcers, and in other places we believe his suggestions could lead to less rather than more clarity in antitrust cases. This comment focuses on these two topics.

We agree with Tirole that, concerning the circumstances where tying can reduce welfare, the main set of circumstances are those where rivals in either the tied or tying good are harmed and, as a result, either exit the market or incur higher costs, consequentially increasing prices compared to the no-tying situation.[2] Where we disagree with Tirole, however, is that we see a wider set of circumstances in which tying can result in this type of competitive harm. In partic-

1 Jean Tirole, *The Analysis of Tying Cases: A Primer*, 1 COMPETITION POL'Y INT'L 1-25 (Spring 2005).

2 We use welfare to mean total surplus (i.e. producer plus consumer surplus). For the reasons Tirole explains, total surplus, not consumer surplus, is the correct criterion to use.

ular, based on our recently completed working paper (Carlton and Waldman (2005)[3]), there is an important case in addition to the two cases identified by Tirole in which tying can be used to harm competition and reduce welfare.[4] This case is one where tying is used to foreclose competition in the presence of product upgrades and switching costs. Since much of the recent attention on tying concerns Microsoft's behavior, and Microsoft's products are characterized by both upgrades and switching costs, we believe this is an important category. Section II discusses the type of settings in which foreclosure that harms competition and welfare is possible and explains why markets characterized by upgrades and switching costs constitute an important new case.

The second topic we consider is that of optimal antitrust policy. In general, we agree with Tirole that a key question in determining the proper scope of antitrust doctrine is whether there exists an appropriate remedy. However, we would stress more the difficulty the courts (and economists) have in applying sophisticated economic theory and using it as a basis to measure harms and benefits. Given that the courts (and economists) are not able to reliably calculate harms and benefits, we would suggest a very cautious approach in antitrust cases involving tie-in sales, even in cases where harm is theoretically possible. We, therefore, recommend using existing economic theory to rule out many tie-in cases that lack a solid theoretical basis for generating anticompetitive harm (such as cases where there is competition for the tying product or price discrimination) and using a highly conservative approach for those cases where anticompetitive harm is possible. Section III discusses these issues.

II. Tying, Foreclosure, and Welfare Harm

Consistent with Tirole's discussion, our focus in this section will be on the circumstances in which tying is used by a monopolist or more generally a firm with market power to harm competition and reduce social welfare.[5] Tirole identifies

3 Dennis W. Carlton & Michael Waldman, *Tying, Switching Costs, and Upgrades*, University of Chicago (mimeograph, 2005).

4 Of course, given our discussion is based on our recently completed paper, we are not criticizing Tirole for not discussing it but rather only pointing out that our perspective is somewhat different based on this work.

5 Another way tying can reduce social welfare is when tying is used as a product differentiation device (see J. Carbajo, D. de Meza & D.J. Seidman, *A Strategic Motivation for Commodity Bundling*, 38 J. OF INDUS. ECON. 283, 283-298 (1990); Y. Chen, *Equilibrium Product Bundling*, 70 J. BUS. 85, 85-103 (1997)). In the main analysis of the Carbajo, de Meza, and Seidman paper, product A is produced by monopolist while B, an independent product, is produced by the monopolist of A and another firm. In the absence of tying, Bertrand competition forces the price of B down to marginal cost, while tying by the monopolist introduces the equivalent of product differentiation into B. The result is that tying allows the monopolist to capture some profits in the B market and can also cause a corresponding reduction in social welfare.

two cases: one in which the tie allows the creation of market power in the tied good, and the other in which the tie preserves market power in the tying good.

The classic paper on tie-ins was written by Michael Whinston and published in 1990 (Whinston (1990)[6]). A number of authors associated with the Chicago School had previously maintained that a monopolist of a primary good (i.e. the tying good), because it can capture all potential monopoly profits through its primary market monopoly, has no incentive to tie a complementary good (i.e. the tied good) in order to extend its primary market monopoly to the complementary good.[7] Whinston considers this reasoning and shows that it does not hold in all cases.

Whinston starts by showing that the Chicago School argument is correct when goods are used in fixed proportions and the monopolist's primary good is essential (i.e. when the monopolist's primary product is required for all uses of the complementary product). Consider a one-period model in which the monopolist's primary good is essential and in which there is an alternative producer with a superior complementary product. Let P^* denote the monopolist's optimal bundle price, c_c denote the constant marginal cost of the complementary good, and π^* denote monopoly profitability if the monopolist ties its products together. Now suppose that the monopolist does not tie, sets the price of the primary good at $P^* - c_c$, and sets the price of the complementary good at c_c. Doing so must result in monopoly profitability at least equal to π^*.[8] Hence, the monopolist has no incentive to tie since optimal pricing when the monopolist sells the products individually must yield profits that are at least equal to, if not greater than, the profits associated with tying.

But Whinston also shows that tying can be optimal when the monopolist's primary good is not essential, thus refuting the Chicago School argument. Tirole describes this argument in his discussion in Section IV.B(1), "Monopolizing the Competitive Segment."[9] In contrast to the discussion in the previous paragraph, suppose that there is a set of consumers who do not require the monopolist's pri-

6 Michael D. Whinston, *Tying, Foreclosure, and Exclusion*, 80 Am. Econ. Rev. 837, 837-859 (1990). *See also* J. A. Ordover, A.O. Sykes & R.D. Willig, *Nonprice Anticompetitive Behavior by Dominant Firms Toward the Producers of Complementary Products*, *in* Antitrust and Regulation: Essays in Memory of John J. Mcgowan (Franklin M. Fisher, ed., 1985); Barry Nalebuff, *Bundling as an Entry Barrier*, 119 Q. J. Econ. 159, 159-88 (2004).

7 *See* A. Director & E. Levi, *Law and the Future: Trade Regulation*, 51 Nw. L. Rev. 281, 281-296 (1956); W.S. Bowman, *Tying Arrangements and the Leverage Problem*, 67 Yale L.R. 19, 19-36 (1957); Richard A. Posner, Antitrust Law, An Economic Perspective (1976); Robert H. Bork, The Antitrust Paradox: A Policy at War with Itself (1978).

8 Profitability can rise without the tie because, if the monopolist sells individual products and at least some consumers purchase the alternative producer's superior complementary product, the monopolist may capture some of the value that consumers have for the extra quality associated with the alternative producer's product.

9 Tirole, *supra* note 1, at § IV.B(1).

mary good to consume a unit of the complementary good. Then the argument of the previous paragraph does not apply because that argument does not incorporate the profits associated with sales to this set of consumers, in which case tying may be optimal. For example, if there is a single alternative producer who has a fixed cost associated with producing the complementary good, then tying can result in the alternative producer being unable to cover its fixed costs, leading to his exit from the complementary good market. In turn, this reduces competition—by reducing the number of firms selling to consumers who demand only the complementary product—and can make the original tying strategy profit maximizing.

A second situation in which tying might be competitively harmful is when the tie is used to protect the monopolist's primary market monopoly. This reasoning, explained in our 2002 paper (Carlton and Waldman (2002)[10]), is outlined in Tirole's discussion in Section IV.B(2), "Protecting the Monopoly Segment."[11] Consider a two-period setting in which there is a monopolist of a primary product in the first period. In the first period, both the monopolist and an alternative producer can produce a complementary product whose use requires the primary product. In the second period, both firms can again produce the complementary product, but in addition the alternative producer can also enter the primary market. In our 2002 paper we show that tying can be profitable for the monopolist in such a setting, given that any of a variety of conditions are satisfied. For example, suppose that the alternative producer faces entry costs for both the primary and complementary markets.[12] By tying, the monopolist stops the alternative producer from selling any complementary units in the first period, which reduces the alternative producer's returns to entering the complementary market. This reduction, in turn, can stop the alternative producer from entering either the primary or complementary markets in the second period, allowing the monopolist to preserve its primary market monopoly.[13]

The use of tie-in sales to preserve monopoly in the tying product seems to be a prevalent strategy by firms in industries subject to rapid technological change

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, 194-220 (2002).

11 Tirole, *supra* note 1, at § IV.B(2).

12 We also show that tying can be optimal when there are network externalities for the complementary good rather than entry costs. In the network externalities analysis we also show how our approach can capture the U.S. Justice Department's argument in the Microsoft case concerning the applications barrier to entry.

13 Related analyses appear in Whinston, *supra* note 6; J. Choi & C. Stefanadis, *Tying, Investment, and the Dynamic Leverage Theory*, 32 RAND J. ECON. 52, 52-71 (2001). In Whinston's analysis, tying and inducing exit in the tied market are used to eliminate a competitively supplied inferior product as a substitute. Choi and Stefanidis show that tying can be profitable in a setting in which there is a single potential entrant for each of multiple complementary products. In their analysis tying reduces the incentive for each entrant to innovate because successful innovation in one market is only valuable when there is successful innovation in all markets. The conclusion is that tying helps preserve monopoly by lowering the probability of successful innovation in all of the markets.

such as IBM and Microsoft. We also explained how the monopolist's control of the complementary product could allow the monopolist to become the monopolist of a new primary product. In this way, the monopolist of A can use its control of the complementary product to become the monopolist of A′, which replaces A in the future. This allows the monopolist to shift his monopoly from A into B and then back into A′.

One important point of Carlton and Waldman (2002) which Tirole emphasizes is that tying can sometimes be achieved through pricing. We call this a virtual tie. The basic idea is that, rather than tying the product physically through product design or tying through contracting, the monopolist's goal can sometimes be achieved by simply reducing the price of the complementary good towards zero and raising the price of the primary product. In our 2002 paper, we show that in some cases a virtual tie is as effective at preserving monopoly of the primary product as a physical or contractual tie, but in other cases it is not.

WE HAVE IDENTIFIED A SETTING IN WHICH A MONOPOLIST MAY TIE AND HARM COMPETITION AND SOCIAL WELFARE EVEN WHEN THE MONOPOLIST'S PRIMARY PRODUCT IS ESSENTIAL FOR THE USE OF THE COMPLEMENTARY PRODUCT. WHINSTON'S ARGUMENT IS CORRECT IN ONE-PERIOD SETTINGS, BUT ONCE WE ALLOW FOR MULTIPLE PERIODS THE LOGIC OF THE ARGUMENT BREAKS DOWN.

We now turn our attention to a third setting in which tying may be used to harm competition. This is not a setting discussed by Tirole, and it violates Whinston's rule that tying can be used to harm competition only when the monopolist's primary good is not essential. The argument is based on an analysis we develop in Carlton and Waldman (2005). Consider a two-period setting in which there is a monopolist of a primary product. Both the monopolist and an alternative producer can produce the complementary product and the monopolist's primary product is essential for the use of the complementary product. But now add to the analysis both product upgrades and switching costs for the complementary product. Product upgrades mean that each firm has the option of producing a higher quality complementary product in the second period. Switching costs mean that an individual who switches suppliers for his upgraded complementary product in the second period incurs a cost.[14]

In this setting, even though the monopolist's primary product is essential in both periods, there is sometimes a return to the monopolist for tying its products,

14 Carlton and Waldman (2005) also analyze the case of no switching costs and find somewhat similar results. There is an extensive literature that investigates models characterized by consumer switching costs. For a survey, *see* P. Klemperer, *Competition When Consumers Have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade*, 62 REV. ECON. STUD. 515, 515-539 (1995). There is also a literature concerning the upgrade process. *See, e.g.,* Michael Waldman, *Planned Obsolescence and the R&D Decision*, 27 RAND J. ECON. 583, 583-595 (1996); Drew Fudenberg & Jean Tirole, *Upgrades, Tradeins, and Buybacks*, 29 RAND J. ECON. 235, 235-258 (1988).

contrary to Whinston's one-period analysis.[15] The logic is as follows.[16] In a one-period setting, when the monopolist's primary good is essential as in Whinston (1990), the monopolist can sell individual products and price the complementary good at cost, as described above. As a result, it cannot be hurt by the sale of the alternative producer's complementary product. But in the two-period setting just described, if the alternative producer's complementary product is superior, then one can show that selling individual products sometimes results in the alternative producer selling the complementary product in the first period and then capturing the second-period profits that are due to the upgrade. If, however, these upgrade profits are high, then the monopolist maximizes its overall profits by tying. This ensures that the monopolist—rather than the more efficient alternative producer—sells complementary units in the first period, and thus leads to a decline in welfare.[17] Note that this argument is similar to Whinston's argument discussed earlier in which tying allows the firm to monopolize the tied-good market. But instead of this action capturing profits associated with consumers who do not use the monopolist's primary good, it allows the firm to monopolize the market for the complementary product and capture second-period profits due to the upgrade. One reason we feel this is an interesting case is that Microsoft's products are characterized by upgrades and switching costs.

In summary, we have described three settings in which a monopolist might tie a complementary product in order to harm competition and in turn reduce social welfare, where the first two are the cases identified in Tirole's analysis. Also, in contrast to the argument in Whinston's classic paper, we have identified a setting in which a monopolist may tie and harm competition and social welfare even when the monopolist's primary product is essential for the use of the complementary product. Whinston's argument is correct in one-period settings, but once we allow for multiple periods the logic of the argument breaks down and tying can be used to reduce competition and hurt welfare even when the primary product is essential.

15 Technically, we do not allow the monopolist's pricing to depend on the purchase decision to upgrade to a rival's complementary product (i.e. we do not allow Microsoft to charge a consumer, using Windows, anything extra if the consumer uses another firm's upgraded word processing software). If we allowed such pricing, we would restore Whinston's results.

16 We describe here what happens when both firms sell their products. But the basic result also holds when firms lease rather than sell. In particular, upgrades are important for the tying result when the monopolist sells its products, while switching costs are important in the leasing case.

17 This result depends on the assumption that prices cannot be negative. Negative prices induce consumers to consume solely to obtain the subsidy, but without a mechanism to weed out consumers who will not upgrade in the future such pricing will not be optimal. If there is such a costless mechanism and if prices can be negative, then competition in the first period always allows the monopolist to capture the switching cost profits without actually tying its products.

III. Applying the Insights from Economic Theory to Antitrust Enforcement Policy

Economic theory can inform antitrust policy in two ways. First, it can tell us which cases to ignore. Since we know that tie-in sales are often motivated by efficiency, this elimination of cases is quite important so as not to deter efficient activity.[18] Second, economic theory can focus attention on the cases where the potential for harm to competition may exist, at which point one must decide whether economists and courts can weigh the costs and benefits of intervention with sufficient accuracy to justify intervention.

A. CASES IN WHICH ANTITRUST INTERVENTION IS NOT USUALLY JUSTIFIED

If no motivation other than efficiency exists for tie-in sales, then their use should not be attacked. As we discussed earlier, consistent with the Chicago School argument, the case of fixed proportions between a monopolized and complementary good where the monopolized good is essential is one example (ruling out upgrades and switching costs). Another example is when there is competition in the primary (tying) product. The logic here is straightforward. The theory of competition tells us that, as long as the market for the primary product is competitive, the producers of the primary product will market their products in a way that maximizes consumer welfare and social welfare. Hence, in such a case, we are likely to observe tying in exactly those circumstances in which tying improves welfare. In other words, there is no role for government intervention to improve efficiency in such circumstances—any improvement the government could make would already be in the best interest of the seller to make.

A good example of what we view as a mistaken decision along this line is the U.S. Supreme Court's decision in the 1992 *Kodak* case.[19] In that case the court ruled that, even if Kodak had no market power in the markets for new copiers and micrographic equipment, Kodak could still be guilty of having illegally monopolized the maintenance markets for these products. Our view is that the finding of competition for new copiers should have resulted in the court almost immediately declaring the practice legal. Instead the court relied on quite speculative theories concerning Kodak's motivation—some of which suggested social welfare harm. But, as we argue in our 2003 paper (Carlton and Waldman (2003)[20]), if Kodak's customers faced switching costs, as most descriptions of the

18 For a general discussion of efficiency rationales for tying, *see* Dennis W. Carlton & Jeffrey Perloff, Modern Industrial Organization (2005); David S. Evans & Michael Salinger, *Why do Firms Bundle and Tie? Evidence from Competitive Markets and Implications for Tying Law*, 21 Yale J. Reg. (2004).

19 Eastman Kodak Co. v. Image Technical Services, Inc., 112 S. Ct. 2091 (1992).

20 Dennis W. Carlton & Michael Waldman, *Competition, Monopoly, and Aftermarkets* (mimeograph, University of Chicago, 2003).

industry suggest, then the practice is not just benign but in fact increases consumer and social welfare.[21]

We now ask what situations—other than efficiency—motivate the use of tie-in sales, and which of those we should not attack under the antitrust laws. The first motivation for tying that we believe does not warrant antitrust intervention is that of price discrimination.[22] When the intensity of use of the tied product measures the value the consumer places on the tying product, then it is well-known that tie-in sales act as a form of price discrimination in which those that use the tied product most intensively pay the most. This tie need have no effect whatsoever on the ability of firms producing the tied good to survive and produce for others. The case of constant returns to scale in the tied product illustrates this well. This observation is the basis of the Chicago School criticism of the "foreclosure of competition" doctrine in some of the litigated cases.[23] It is well-known that the welfare effects of price discrimination are ambiguous—in general, the greater the extent that tying allows a firm to come closer to practicing perfect price discrimination, the more likely that social welfare is enhanced. Moreover, price discrimination is everywhere. Every time a firm uses coupons, quantity discounting (i.e. non-linear prices), or different prices for identical products, price discrimination may be involved. We think it would be very difficult to measure when price discrimination harms welfare, and see no reason to single out and condemn one method (e.g. tie-in sales) of price discrimination and not others. Indeed, condemnation of one method would just encourage development and use of other—and likely more costly—methods. Most importantly, we see no reason under the antitrust laws to attack price discrimination through tie-in sales when there is little or no effect on the firms producing the tied product.

A second motivation for tying that we believe does not typically warrant antitrust intervention is when the tie is used to address a problem of variable proportions.[24] Suppose there is a monopolist of product A, while B is supplied by a competitive industry. Further, suppose that A and B are substitutes and that

21 *See also* Hodaka Morita & Michael Waldman, *Competition, Monopoly Maintenance, and Consumer Switching Costs* (mimeograph, Cornell University, 2003). For more general discussions of aftermarket monopolization, *see* Carl Shapiro, *Aftermarkets and Consumer Welfare: Making Sense of Kodak*, 63 ANTITRUST L. J 148, 148-157 (1995); Dennis W. Carlton, *A General Analysis of Exclusionary Conduct and Refusal to Deal—Why Aspen and Kodak are Misguided*, 68 ANTITRUST L. J. 659, 659-683 (2001).

22 For a recent discussion, *see* Barry Nalebuff, *Bundling as a Way to Leverage Monopoly*, YALESOM WORKING PAPER No. ES-36 (Sep. 2004).

23 IBM Corporation v. United States, 298 U.S. 131 (1936); International Salt Company v. United States, 332 U.S. 392 (1947).

24 For a formal analysis, *see* P. Mallela & B. Nahata, *Theory of Vertical Control with Variable Proportions*, 88 J. POL. ECON. 1009, 1009-1025 (1980).

there are variable proportions so that consumers can choose how much of each product to consume. In the absence of tying, consumers will inefficiently substitute away from the monopolized product A and towards the competitive product B. By tying, the monopolist can avoid the inefficient substitution and this tends to increase welfare. On the other hand, the tying can increase the firm's market power, which tends to decrease welfare due to increased deadweight loss due to monopoly. Our feeling here is similar to that expressed above for the case of price discrimination. Theory does not allow us to unambiguously determine the net effect on welfare, and performing the empirical analysis necessary to calculate this net effect would be very difficult. Since we generally believe that efficiency gains often exceed deadweight losses, we are inclined to leave this case as one that should be immune from antitrust challenge.[25]

An interesting case along this line is that of a durable-goods seller with market power where the maintenance market is competitive. As pointed out by Richard Schmalensee in a paper[26] published in 1974, consumers in such a case face a problem similar to the variable proportions problem just described. That is, consumers respond to this situation by substituting away from purchasing new units that sell at a price above marginal cost and towards maintaining used units because maintenance is priced competitively. The durable goods producer can avoid this inefficiency and increase its profits—and frequently also social welfare—by tying new units and maintenance which avoids, or at least reduces, the distortion because then the durable-goods seller can price the two products such that the replacement decisions are made efficiently.[27]

B. CASES IN WHICH TIE-IN SALES CAN HAVE ANTICOMPETITIVE EFFECTS[28]

Tirole focuses on recent developments in economic theory that present a logical and consistent story of competitive harm to flow from tie-in sales. He observes correctly that these theories generally require the tying firm to give up profits in one market or at one point in time to acquire or preserve a monopoly in anoth-

25 In both this case and the previous discussion of price discrimination, we assume that the monopolist ties the same product that the consumer could purchase separately in the absence of the tie. If that is not so, then the social cost of the tie could rise (i.e. if an inferior product is tied), and the conclusions in the text might have to be modified.

26 Richard Schmalensee, *Market Structure, Durability, and Maintenance Effort*, 41 Rev. Econ. Stud. 277, 277-287 (1974). *See also* T. Su, *Durability of Consumption Goods Reconsidered*, 65 Am. Econ. Rev. 148, 148-157 (1975); J. Rust, *When Is It Optimal to Kill Off the Market for Used Durable Goods*, 54 Econometrica 65, 65-86 (1986).

27 *See* Jean Tirole, The Theory of Industrial Organization (1988), at 188; Dennis W. Carlton & Jeffrey Perloff, *supra* note 18, at 503.

28 This section draws heavily from the working paper version of our 2002 article. *See* Carlton and Waldman (2002), *supra* note 10.

er market or at a later point in time. He therefore suggests that tie-ins be treated like predation cases where one investigates whether the firm is forgoing short-run profits and whether recoupment is feasible once the rival has been eliminated. We agree that tie-ins should be treated as specific examples of strategic behavior, but have misgivings about the analogy to predation. Unlike the usual predation story, tie-in sales can lead to the exit of a rival even though there is no pricing below (marginal) cost. There does have to be recoupment however, but unlike the usual predation story, the recoupment can take place in some other market. As Tirole recognizes, one test for "predation" in this case is whether the short-run profits associated with the tie are below the short-run foregone profits associated with the case of no tie. Determining the extent of these foregone profits strikes us as complex and not often amenable to court proceedings. Instead, as we describe below, we recommend focusing more on the conditions that give rise to the possibility of harm and whether these conditions are met. but we recognize that sometimes complex tradeoffs are inescapable.

In the previous section, we discussed three settings in which tying product B to product A can harm competition and result in a subsequent reduction in social welfare. In the first setting, there are scale economies in B, and some consumers consume only B while others consume both A and B. By tying B to A, the remaining market for B shrinks, causing producers of B to be inefficiently small and eventually exit the business. After their exit, the firm imposing the tie can raise the price of B to consumers who demand only B. We think this possibility of harm is clear and based on economic theory, but the theory needs some actual examples in order to establish its empirical relevance.[29]

The second setting involves the foreclosure of competition for product A as a result of consumers not being able to purchase a rival's superior product B. By tying its product B to consumer purchases of A, the firm reduces the number of competitors producing B. Through various mechanisms, this reduces future entry into A and preserves the firm's future market power in A. This strategy seems to describe what occurs in some rapidly evolving high-technology industries, but works only under special conditions that can be reasonably well characterized. By understanding these conditions, one can focus application of the theory to avoid unnecessary cases. These conditions involve rapid technological change and large economies of scale (or network externalities). But even when the facts show the theory to be applicable, one must still exercise great caution, as we describe below, because the result on social welfare can be hard to figure out.

The third setting, similar to the first, involves harm to competition in product B. In contrast to the first, however, the driving force is not consumers who demand product B only, but rather that B is characterized by upgrades and switching costs. The presence of upgrades and switching costs means that in the

29 The recent tie of debit to credit cards by Visa and MasterCard may be an example. Carlton served as an expert adverse to Visa and MasterCard.

absence of tying the firm cannot necessarily capture later profits due to upgrades and switching costs through the initial sale or lease of A. Product upgrades and switching costs do seem empirically relevant in a number of markets.

So suppose the antitrust authorities have identified a setting consistent with one of the three cases of strategic tying we have discussed. The question then is whether to proceed with an antitrust challenge. The mere fact that product A and product B could be separately defined, produced, and consumed does not answer the question. Since the production of A and B into a combination product C (i.e. a package with the characteristics of A and B) can have properties that A and B separately do not have (e.g. convenience of use or added functionality) a difficult issue is evaluating the welfare consequences of product C. Specifically, do the benefits of C justify its introduction? Or is its introduction solely to allow the firm to engage in strategic tying? Or is it some combination of the two? To us, this is in general a horrendously complex trade-off to evaluate. Fear of antitrust scrutiny could easily prevent an innovator from introducing new desirable products. The flip side, of course, is that the failure of antitrust enforcers to act can turn an industry from competition to monopoly.

FOR THOSE CASES WHERE TIE-INS CAN HARM COMPETITION AND REDUCE WELFARE, THE DIFFICULTY OF USING COST-BENEFIT ANALYSES TO IDENTIFY TIE-INS THAT HARM COMPETITION LEADS US TO THE CONCLUSION THAT, OTHER THAN IN EXCEPTIONAL CASES, PLAUSIBLE EFFICIENCY JUSTIFICATIONS FOR A PHYSICAL TIE SHOULD DEFEAT AN ANTITRUST ATTACK ON TYING.

Our views on evaluating this complex trade-off are as follows. First, great weight should be given to any plausible efficiency from the tie. Efficiencies may be hard to quantify, but forgoing an efficiency can generate substantial welfare loss. Second, evidence on motivation can assist in exceptional cases when determining the reason for the tie and could provide a justification for intervention. For example, evidence that the sole purpose of a design change was to inhibit competition by creating an effective tie could be the type of evidence that allows one to avoid analyzing the technological benefits of the design change—a task which we predict will fail to lead to consensus. This type of evidence—memos, for example—is of the kind usually examined by lawyers not economists. Third, efficiencies achieved through physical integration (i.e. when A and B are produced together in a package C) should receive greater weight than efficiencies achieved through contract (i.e. when the combined use of A and B are mandated by contract). The antitrust laws have always shown greater deference for activities within the firm than for activities outside of the firm. For example, an antitrust court is much more apt to negate an exclusive dealing contract with distributors than it is to order divestiture of an internal division engaged in marketing. The logic, and in general it sounds correct to us, is that the cost of interfering inside a firm—where many unspecified relationships and transactions are not mediated by the price system—is likely to be higher than interfering in the contractual relations between two firms. If a tie

creates both significant efficiencies and anticompetitive harm, there is no escaping the need to use a rule of reason analysis to balance the benefit versus the harm, akin to what is done in exclusive dealing cases. This is typically not an easy calculation.

In recognizing that tying can be used to create or maintain a monopoly position, a particularly vexsome issue—and one wholly ignored by antitrust courts—is whether raising the rate of return is desirable in industries undergoing rapid technological change. The argument would be that strategic behavior that entrenches monopoly, or creates monopoly, in a complementary good, raises the return to being the first in the industry. By raising this return, more innovation is encouraged. If, as empirical studies appear to show,[30] the social rate of return from innovation exceeds the private rate of return, such an action would be desirable. However, despite its logic, we have never seen an antitrust court use the importance of innovation as a decision criteria for whether to allow monopolization.[31]

In summary, we would exempt several types of cases involving tie-ins from antitrust scrutiny. For those cases where tie-ins can harm competition and reduce welfare, the difficulty of using cost-benefit analyses to identify tie-ins that harm competition leads us to the conclusion that, other than in exceptional cases, plausible efficiency justifications for a physical tie should defeat an antitrust attack on tying. For contractual ties and virtual ties achieved through pricing, the standard can be lower and a rough balancing of costs versus benefits can be done much as is now done in exclusive-dealing cases—though we would use extreme caution and require convincing evidence before intervening.

IV. Conclusion

Tirole has written an excellent paper that overviews the theory of tie-in sales and puts forth his views on antitrust policy concerning this practice. Our comment has focused on three main points. First, based on our own recently completed paper, we discussed what we believe is an important new case in which tying can

30 *See, e.g.*, E. Mansfield, J. Rapoport, A. Romeo, S. Wagner & G. Beardsley, *Social and Private Rates of Return from Industrial Innovations*, 92 Q. J. Econ. 223, 223-240 (1977); J. Bernstein & M.I. Nadiri, *Interindustry R&D Spillovers, Rates of Return, and Production of High-Tech Industries*, 78 Am. Econ. Rev. 429, 429-434 (1988); E. Mansfield, *Social Returns from R&D: Findings, Methods, and Limitations*, 34 Res. Tech. Mgmt. 24, 24-27 (1991).

31 In dynamic models, the welfare consequences of encouraging innovation are even harder to analyze than in a simple model of a single patent race. The reason is that although at early stages of industry evolution strategic behavior could raise the rate of return and thereby encourage more innovation, the consequences of strategic behavior could be to dampen the incentives for subsequent innovations. Especially in a growing market, the value of subsequent innovations could easily exceed the value of the initial ones. *See* D. Carlton & R. Gertner, *Intellectual Property, Antitrust and Strategic Behavior*, *in* Innovation Policy and the Economy (A. Jaffe, J. Lerner & S. Stern, eds., MIT Press, 2003).

be used to harm competition and reduce welfare. Second, theory tells us that in many settings tie-ins either improve social welfare or have ambiguous effects, and we believe that in almost all such cases the antitrust authorities should refuse to intervene. Third, intervention should be limited to cases consistent with theories in which there is a clear possibility of competitive harm. Even in those cases, however, one should exercise great caution when attempting to balance potential efficiency benefits with the potential harm due to strategic tying.