Robert Bork’s Contributions to Antitrust Perspectives on Tying Behavior

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Abstract
Robert Bork was one of the key proponents of the traditional Chicago school view of tying and antitrust, which is that tying can never be used to extend or leverage market power from one market to another, so it should also never be an antitrust violation. In this paper, we review the traditional Chicago school perspective and, in particular, Bork’s arguments on the topic and then discuss how these arguments relate to the more recent theoretical literature on the subject, which takes a game-theoretic approach. We then discuss Bork’s later views on tying concerning the Microsoft case. We include a discussion of whether these later views of tying and antitrust were different from his earlier views or, instead, whether it was the nature of the cases that had changed.

1. Introduction
Robert Bork was one of the key proponents of the Chicago school perspective on antitrust, which argued that economic theory and, in particular, a deep understanding of how markets operate are crucial for figuring out how the antitrust laws should be enforced in order to improve rather than harm welfare. Over time, this perspective has had an enormous impact on how the courts have interpreted the antitrust laws, and in our opinion this evolution has substantially improved the effectiveness of these laws. In this paper we focus on one aspect of Bork’s contribution—his views on tying and antitrust.

In his landmark 1978 book, The Antitrust Paradox, Bork criticized a number of Supreme Court decisions concerning tying by arguing that these decisions were not based on a solid understanding of economic theory. He then proceeded to put forth a statement of the Chicago school perspective on tying and antitrust, which is that tying is never anticompetitive and thus should never constitute an
antitrust violation. This argument has had an enormous impact on subsequent
court decisions and has also served as the starting point for a more recent game
theory literature focused on the extent to which economic theory supports the
Chicago school perspective that tying can never be anticompetitive.

More recently, in the 1990s, Bork changed his views and argued that Micro-
soft employed tactics including tying Internet Explorer to Windows that were
anticompetitive and thus constituted an antitrust violation. Although one could
argue that his views concerning this case contradicted his earlier arguments, he
argued, we believe with considerable merit as we discuss in detail, that there actu-
ally was no contradiction.

In this paper, we review Bork's arguments concerning tying, compare and con-
trast them to the more recent game theory literature, and discuss what we view
as optimal antitrust policy concerning tying based on both Bork's arguments and
the more recent game theory literature. Our conclusion is that Bork was mostly,
although not fully, correct in his arguments. But more important, his arguments
concerning tying and antitrust have had enormous positive impact both on how
the courts have ruled in tying cases and on our overall understanding of the eco-
nomic theory of tying.

2. Early Bork and the Chicago School Argument

The main focus of many early tying cases is the idea that a monopolist of one
product can use tying to extend or leverage its monopoly position to the market
for a complementary good. Building on earlier analyses by authors such as Aaron
Director, Ward Bowman, and Bork himself, Bork criticizes these cases on two
grounds in his influential book *The Antitrust Paradox.* First, in some of the cases
there was no initial monopoly to extend. And in such cases, since there are many
efficiency justifications associated with tying concerning reduced production and
distribution costs, the courts should presume an efficiency justification that, in
turn, means that there should be no antitrust violation.

An example of this type of case according to Bork is the 1947 *International Salt
v. United States* case (332 U.S. 392 [1947]), which involved a defendant that had
leased patented salt-dispensing machines and required the lessees to purchase the
salt used in the machines from the lessor. The Supreme Court ruled against the

1 When we refer to "tying" in this paper, we mean a situation in which a firm that sells one product,
call it product A, refuses to sell product A to a consumer unless the consumer also purchases a
different product, call it product B, from the firm. There are two basic types of tying. In the first,
the goods are bundled or, equivalently, sold only in fixed proportions. The second is referred to
as a requirements tie. In this case, the seller of product A requires the consumer to make all of his
purchases of product B from the firm and products A and B are not consumed in fixed proportions.
Note that we are not including mixed bundling, that is, a situation in which a firm sells products
both individually and as a bundle, as a type of tying in our discussion since Bork did not give it
much attention. See Adams and Yellen (1976) for an early analysis of the mixed-bundling problem.

2 See Carlton and Waldman (2005, 2008) for more in-depth discussions of our views of optimal
antitrust policy for tying cases.

3 Bork specifically refers to Director and Levi (1956), Bowman (1957), Bork and Bowman (1965),
and Markovits (1970) as earlier papers on the topic. See also Posner (1976).
defendant; the Court majority argued that the tie was used to establish a monopoly position. But Bork correctly points out that tying the purchase of salt to the leasing of a machine will not create market power in the machine market, while using the tie to create market power in the salt market is clearly implausible. So likely the tie in this case was driven by efficiency, and thus the Supreme Court was incorrect in deciding that there was an antitrust violation on the basis of a monopolization argument.⁴

Second, Bork argued that even if there is market power in the tying product, the tying of a complementary product should not be an antitrust violation because the tie creates no additional market power in the tied-good market. For illustration purposes, Bork considers IBM's behavior in the well-known 1936 case *International Business Machines Corporation v. United States* (298 U.S. 131 [1936]), in which IBM leased tabulating machines whose use required punch cards and in which IBM required lessees to purchase their punch cards from IBM. No one argued that the effect of IBM's conduct was to increase its market power in the tabulating-machine market, but some argued that there was an antitrust violation because the tie allowed IBM to extend or leverage its monopoly into the punch card market.⁵ Bork's argument was that the tie clearly did not give IBM market power in the overall market for punch cards. Rather, it gave the firm market power in the market for punch cards used with IBM machines, and this market power is useful only for capturing more surplus from its market power in the machine market through more effective price discrimination. So if the monopoly in the machine market is by itself not an antitrust violation, and price discrimination is also not an antitrust violation, then the tie should also not be an antitrust violation.

To better understand this argument, it is useful to separate it into its two components. In the first component, we abstract away from the variable-proportions aspect of the IBM case by considering an analogous setting in which the number of units of the tied commodity consumed per unit of the monopolized good is fixed for each consumer and also does not vary across consumers. In particular, consider the profitability of a monopolist of shoes versus the profitability of a right-shoe monopolist when left shoes are sold competitively. As we demonstrate, the right-shoe monopolist earns the same overall profit as a monopolist of shoes and, more important, the right-shoe monopolist cannot increase its profitability by tying or bundling left shoes to the sale of right shoes.

To see the logic here, suppose that the demand for pairs of shoes is linear and is given by \( P = A - bX, A > 0, b > 0 \), where \( P \) is the price of a pair of shoes and \( X \) is the number of pairs sold. Also, suppose that there is a constant marginal cost.

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⁴ Note that if International Salt had market power in the machine market, then the tie may have served a price discrimination role along the lines of the next argument. But Bork argued using later statements made by Justice Hugo Black concerning the *International Salt* case (these statements appeared in Justice Black's opinion for the majority in the 1958 *Northern Pacific* case [*Northern Pacific Railway Co. v. United States*, 356 U.S. 1 (1958)]) that the machine market in the *International Salt* case was in fact competitive.

⁵ Bork specifically refers to an argument that appears in Kaysen and Turner (1959).
for producing shoes equal to $c, c < A$, and no fixed costs. Note that this means that there is a constant marginal cost for producing a pair of shoes given by $2c$. Consider first a monopolist of shoes. Let $P^*$ denote the monopoly price for a pair of shoes in this case and $\pi^*$ denote monopoly profitability. Solving for the monopoly solution by equating marginal revenue and marginal cost yields $P^* = (A + 2c)/2$ and $\pi^* = (A - 2c)^2/4b$.

Now consider a monopolist of right shoes where the left-shoe market is competitive. One option is that the monopolist ties or bundles a right shoe with a left shoe. Since everyone needs a right shoe, the fact that left shoes are sold competitively is irrelevant, and so with the tie, the right-shoe monopolist would behave as derived above; that is, it would set the price for a pair of shoes equal to $(A + 2c)/2$, and profits would equal $(A - 2c)^2/4b$.

Now suppose that the monopolist does not tie. Since the left-shoe market is competitive and the average and marginal costs for producing a left shoe both equal $c$, the competitive price for a left shoe is $c$. Given this, the right-shoe monopolist faces a demand curve for right shoes that is parallel shifted down by $c$. That is, the demand curve the monopolist faces for right shoes is given by $P' = (A - c) - bX$, where $P'$ is the price for right shoes and $X$ is now the quantity of right shoes. Let $P'^*$ denote the price the monopolist charges for right shoes and $\pi'^*$ denote the monopolist's profitability. Equating marginal revenue and marginal cost yields $P'^* = A/2$ and $\pi'^* = (A - 2c)^2/4b$; that is, the right-shoe monopolist without tying earns the same profit level as the monopolist of pairs of shoes or, equivalently, the same profit the right-shoe monopolist earns by tying.

The basic point here is that, in comparison with the monopolist of pairs of shoes, the right-shoe monopolist faces a demand curve that is parallel shifted down by $c$ and a marginal cost curve that is also parallel shifted down by $c$. The result is that quantity is unchanged, price falls by $c$, and profit is unchanged. In other words, the right-shoe monopolist without tying does just as well as the monopolist of pairs of shoes, so there is no return to tying in this case.

This example illustrates the first part of Bork's argument. If there are fixed proportions in consumption, then tying does not benefit the monopolist because the monopolist can obtain all potential monopoly profits across the two markets by appropriately setting the price for the monopolized good and not tying. Since everyone needs a right shoe, the right-shoe monopolist can extract all potential monopoly profits in the shoe market by setting a high price for right shoes—there is no return to tying unless there are efficiencies in production and/or distribution associated with the tie (which in reality there clearly are).

The second part of Bork's argument is that the situation is somewhat changed if there are variable proportions. The logic here can be understood by considering the IBM case, which is the example to which Bork referred in his discussion. Suppose that IBM faced two groups of consumers—high-valuation and low-valuation groups, where the high-valuation consumers are the more intensive users of the machine and have a high demand for punch cards. Further, suppose
that IBM is a monopolist in the tabulating-machine market, while punch cards can be produced both by IBM and by any number of competitive producers.

Now consider IBM’s behavior. It can choose not to tie, in which case it either sets a low price on the machine and sells to both groups or sets a high price, in which case it sells only to the high-valuation group. Alternatively, it can tie, reduce the price for the machine, and raise the price for cards above the competitive level. Since the high-valuation group uses more cards, tying in this way is a form of price discrimination in which the high-valuation group faces a high price for using the machine and cards and the low-valuation group faces a low price. In other words, the tie does not allow the monopolist to earn monopoly profits in the punch card market, but rather the tie allows the firm to more effectively extract surplus from its monopoly in the machine market.

Bork argues, we believe correctly, that this type of tying should not represent an antitrust violation. As just discussed, the tie does not extend or leverage the firm’s market power from the machine market to the punch card market. Rather, it allows the firm to more effectively exploit its existing market power in the machine market. If the machine-market monopoly does not by itself represent an antitrust violation, then the firm should be allowed to tie in order to better exploit its legal monopoly. On the other hand, if the machine-market monopoly is illegal because, for example, it was acquired through illegal means, then the authorities should challenge the existence of the monopoly as opposed to focusing on the tie.

It is also worth noting that in *The Antitrust Paradox* Bork argues that reciprocal dealing and tying “are the same economic phenomenon” (p. 365) and thus reciprocal dealing should also never be considered an antitrust violation. The term “reciprocal dealing” refers to a setting in which firm A purchases a product from firm B with the requirement that firm B purchase a different product from firm A. Bork does not put forth a detailed argument for his assertion that tying and reciprocal dealing are basically equivalent. Rather, he simply points out that the two practices are alike because in each case a transaction concerning one product is made conditional on the execution of a transaction concerning a different product.

Implicitly, Bork’s argument concerning reciprocal dealing is that the leverage theory is incorrect whether it is applied to tying or reciprocal dealing. In the tying case, as we discuss in detail above, the argument is that a firm with market power in the sale of one product cannot increase its profitability by tying and extending that market power to a second product that it sells since there is only a single monopoly profit. The reciprocal-dealing version of this argument is that a firm with market power in selling (purchasing) one product cannot increase its profitability by employing reciprocal dealing to extend its market power to a second product that it purchases (sells) since, again, there is only one monopoly profit.

In addition to discussing his views concerning whether tying is ever used for anticompetitive purposes and its possible use for price discrimination, Bork discusses different ways in which tying can be used to enhance efficiency. His main argument is that most products can be thought of as a bundle of characteristics
that are more easily assembled by the manufacturer than by consumers. For ex-
ample, as long as consumers all want to purchase cars with steering wheels in-
stalled because it is easier for a manufacturer to add a steering wheel rather than
for a consumer, then this is how cars will be produced. He argues that most tying
can be thought of in this way, and thus that most real-world examples of tying
improve the efficiency of production, marketing, or internal administrative costs.

Bork also mentions a couple of other ways in which tying can sometimes be
used to improve efficiency. He argues that in some circumstances, such as a firm
that finds it efficient to offer a bundle consisting of a machine and repairs, the
firm may find that a single price undercharges heavy users and overcharges light
users. By tying a complementary good used in variable proportions, the firm may
be able to undo this inefficient cross subsidization. The other possibility he men-
tions is the protection of goodwill, which is an argument that IBM made in the
1936 case to defend its practice of tying punch cards to the lease of its machines.
The argument is that if a complementary good such as punch cards does not con-
form to exact specifications, the tying product may not work properly, thus hurt-
ing the reputation of the seller. In such a case the tie is used to protect this rep-
utation. Bork argues that this rationale for tying may merit more respect that it
typically receives.

In summary, Bork argues that in many, if not most, cases, tying serves an ef-
ciciency role, and when there is no market power in the tying market the courts
should presume an efficiency rationale. Further, even in the few cases in which
it does not serve an efficiency rationale, Bork argues that it should still never be
an antitrust violation. The first reason is that the leverage theory of tying is incon-
sistent with economic theory. And the second is that tying can be used for price
discrimination, but tying used for price discrimination should also not constitute
an antitrust violation. Finally, Bork argues that tying and reciprocal dealing are
equivalent practices, and thus reciprocal dealing should also never be considered
an antitrust violation.

3. Early Bork and the Modern Game Theory Literature

Here we discuss what can be learned from the modern game theory literature
concerning Bork's arguments about tying discussed in the Section 2. The discus-
sion is divided into three parts that correspond to the three components of Bork's
argument: tying in the absence of market power, the leverage theory, and tying
used for price discrimination. We then briefly discuss Bork's arguments concern-
ing reciprocal dealing.

3.1. Can Tying Be an Antitrust Violation in the Absence of Market Power?

As discussed above, the first part of Bork's argument is that there cannot be an
antitrust violation if the tying firm does not have market power in the market for

\[\text{5 See Carlton and Perloff (2005) and Evans and Salinger (2005) for recent discussions of efficiency}
\text{justifications for tying.}\]
the tying good. In general, this claim is regarded as noncontroversial, so there is little recent research on the topic except in the literature on aftermarket monopolization. In the typical tying case, the firm ties two products that are purchased and consumed simultaneously or almost simultaneously. In aftermarket monopolization, the firm sells a primary product today and monopolizes an aftermarket product such as maintenance that is purchased and consumed at some later date.\(^7\) The monopolization can be achieved through a tie (for example, the firm leases machines and requires consumers to also purchase maintenance contracts) or sometimes through some other means.\(^8\)

There was little research prior to the early 1990s concerning tying and/or aftermarket monopolization in settings in which the seller had little or no market power in the primary or tying-good market. But in a 1992 decision in the case *Eastman Kodak v. Image Technical Services* (504 U.S. 451), the Supreme Court ruled that Kodak's behavior of monopolizing the maintenance aftermarket for its own machines by refusing to sell spare parts to alternative maintenance suppliers (thus implicitly tying the sale of maintenance to the purchase of machines) could be an antitrust violation even if Kodak had little or no market power in the machine market. This case and, in particular, the Supreme Court decision resulted in a series of papers investigating why a firm might monopolize an aftermarket in the absence of market power in the primary market and the associated welfare implications of the behavior.\(^9\)

There are three closely related theories based on the idea of consumer "lock-in," in which consumer lock-in refers to a setting in which a durable-goods producer that monopolizes an aftermarket product such as maintenance can raise the aftermarket price without causing consumers to scrap the good. Note that lock-in will arise even in competitive markets immediately after a new durable unit is purchased. The logic is that, since the purchase price is paid up front, the unit will not be scrapped even if the aftermarket or maintenance price is raised (not too much) above the level that the consumer anticipated when he or she purchased the durable unit.\(^10\)


\(^8\) The distinction concerning what should be regarded a case of aftermarket monopolization is not fully clear. For example, the 1936 IBM case concerning tabulating machines and punch cards is typically not referred to as aftermarket monopolization, while the 1992 Kodak case (discussed next) that concerns micrographic equipment and maintenance is almost always referred to as aftermarket monopolization. But since punch cards were to be purchased and used by the machine's consumers after the initial lease or purchase of the machine, much like in the case of maintenance, it is unclear what distinguishes the two cases.


\(^10\) The existence of secondhand markets does not change the argument. Even if the original
The surprise and costly-information theories, both of which are described in detail by Shapiro (1995), are very similar. In the surprise theory, consumers purchase new durable units, expecting the aftermarket product to be competitively priced. The monopolist then stops others from selling the aftermarket product and raises the aftermarket price. The welfare cost is that the monopoly price for the aftermarket product results in a standard deadweight loss. The costly-information theory is similar except that rather than consumers being surprised by the high aftermarket price, they simply ignore the cost of the aftermarket product in their initial choice of a durable unit to purchase.\footnote{11}

The last theory that depends on consumer lock-in is the lack-of-commitment theory developed by Borenstein, Mackie-Mason, and Netz (1995, 2000). In this theory, consumers correctly anticipate the aftermarket monopoly, which affects their willingness to pay for new durable units. As a result, durable-goods producers would like to commit to allow competition in the aftermarket, but there is monopolization because durable-goods producers are unable to commit. As with the first two theories based on lock-in, the welfare cost of the practice is the deadweight loss due to monopoly pricing in the aftermarket.\footnote{12}

Carlton and Waldman (2010), in contrast, present three related models in which competitive durable-goods producers monopolize an aftermarket but the result is improved efficiency and higher consumer and social welfare (see Morita and Waldman [2010] for a related analysis). In the main model, which is consistent with various elements of the 1992 Kodak case, there are consumer switching costs, and after purchasing a new unit, in each subsequent period a consumer must decide whether to maintain the used unit or replace it with a new unit.\footnote{13} In equilibrium, each durable-goods producer monopolizes the market for maintaining its own used units, and this improves efficiency. The logic is that the maintenance market monopolization avoids inefficient substitution that would occur if a firm's consumers purchased maintenance from the competitive maintenance market. This potentially inefficient substitution arises because, absent a maintenance tie, maintenance is priced competitively, while replacement units are

\footnotetext{11}{Some descriptions of the surprise theory argue that the surprise hurts consumers because of a lump-sum transfer between consumers and the firm. But competition between durable-goods producers for new units should eliminate the transfer, which is consistent with typical descriptions of the costly-information theory.}

\footnotetext{12}{Both Shapiro (1995) and Chen and Ross (1998) provide analyses that suggest that the deadweight loss is likely to be small.}

\footnotetext{13}{Although the main model in Carlton and Waldman (2010) concerns consumers who decide whether to maintain or replace used units, the logic of the argument can apply in other settings such as one in which consumers decide whether to upgrade or replace used units. The essential ingredients for the argument to apply are consumer switching costs, a decision concerning replacing a used unit versus continuing to consume the used unit, and an aftermarket product that must be purchased for the consumer to continue consuming the used unit.}
priced above marginal cost as a result of market power in the replacement-unit market due to consumer switching costs. Hence, consumers choose inefficiently between maintenance of existing units and replacement of those units. Note that Bork in his discussion of vertical mergers in *The Antitrust Paradox* argues that avoiding inefficiencies of input substitution can be important given variable proportions in production or consumption, but he does not recognize that the input-substitution argument can serve as an efficiency rationale for tying.\textsuperscript{14,15}

So, overall, the modern game theory literature concerning aftermarket monopolization provides examples consistent with Bork's position that tying in competitive markets is driven by efficiency considerations and examples in which tying reduces welfare, which is contrary to Bork's position. But we believe that the arguments in which tying reduces welfare do not match the facts of the relevant cases very well, so it is unclear how realistic or valid these arguments actually are. One problem is that in a number of the cases the durable-goods seller monopolized the maintenance market for its own product by refusing to sell spare parts to alternative maintenance suppliers. None of these theories explain why aftermarket monopolization is required since, at least in the original formulations of the theories, the durable-goods producers could have instead simply increased the prices for spare parts.\textsuperscript{16,17}

\textsuperscript{14} Bork's discussion of vertical integration and variable proportions builds on McGee and Bassett (1976).

\textsuperscript{15} Chen and Ross (1999) also provide an efficiency rationale for aftermarket monopolization in a competitive setting. In their analysis, firms bundle maintenance that is limited in duration with the sale of new durable units in a setting in which consumers vary in how heavily they use the durable good. They show that aftermarket monopolization eliminates consumer cross subsidization and moves maintenance choices toward efficient levels. This argument is related to one of Bork's arguments discussed in Section 2. Another well-known argument in the literature is Shapiro's (1995) reputation argument in which durable-goods sellers that practice aftermarket monopolization charge a competitive aftermarket price because of the long-run reputational costs of exceeding the competitive price. However, given the difficulties of modeling reputation formation in a perfectly competitive setting, it is unclear the extent to which this argument applies to the question under consideration, which is whether tying in a competitive market can create market power and thus be a possible candidate for an antitrust violation.

\textsuperscript{16} In the main efficiency argument for aftermarket monopolization in Carlton and Waldman (2010), the durable-goods producers would choose to practice aftermarket monopolization rather than increase the price for spare parts. The reason is that aftermarket monopolization allows durable-goods producers to more effectively price discriminate at the time that consumers choose whether to maintain or replace their used units, and this results in improved efficiency concerning these maintenance versus replacement decisions. Note that this result is shown formally in Mortan and Waldman (2010).

\textsuperscript{17} One could extend each of the theories so that the durable-goods producers prefer aftermarket monopolization to raising the price for spare parts by assuming that service and spare parts are substitutes in the maintenance production function. In this case, if a durable-goods producer raised the prices for spare parts rather than practiced aftermarket monopolization, consumers would respond by inefficiently substituting service for spare parts. So in equilibrium, firms would practice aftermarket monopolization rather than simply increase the prices of spare parts. Note that an aspect of this extension is that it suggests that the authorities should allow aftermarket monopolization because there will be a monopoly price for maintenance with or without the monopolization, while aftermarket monopolization avoids the inefficient substitution of service for spare parts that arises in the absence of monopolization. See Schmalensee (1974) and Klein (1993) for earlier related discussions.
A second way in which the anticompetitive theories of aftermarket monopolization fail to match the facts of the relevant cases is specific to the lack-of-commitment argument developed by Borenstein, Mackie-Mason, and Netz (1995, 2000). As indicated, in that argument durable-goods producers would like to commit not to monopolize the aftermarket because the resulting high aftermarket price reduces overall monopoly profitability. The problem with the argument is that long-term contracts are common in the industries of many of the relevant cases such as the Kodak case, which involved maintenance for photocopier and micrographic equipment, and a Honeywell case (PSI Repair Services, Inc. v. Honeywell, Inc., 104 F.3d 811 [1997]) concerning repair services for equipment used to control manufacturing processes at various refineries and factories. So the assumption that commitment is not feasible seems suspect.

In summary, some arguments have been put forth concerning how tying in (ex ante) competitive markets, at least in the case of aftermarket monopolization, can hurt welfare and thus according to the proponents of these theories should constitute an antitrust violation. We believe, however, that for various reasons these arguments do not have much relevance to the facts of actual cases and that Bork was thus correct in arguing that such tying should never be an antitrust violation.

3.2. Is the Leverage Theory Flawed?

The second part of Bork’s argument was that the leverage theory is flawed; that is, when there is market power in the tying market, there are no circumstances in which the firm can profitably extend or leverage the monopoly position into the tied-good market. Starting with Whinston (1990), there is an extensive literature that investigates this argument from a formal game-theoretic perspective.

Whinston (1990) first shows the conditions under which this argument is correct. He considers a 1-period setting characterized by a monopolized primary good, a complementary good that can be produced by the monopolist and a single rival, consumers who consume the good in fixed proportions, constant marginal costs for the production of both goods, and fixed costs for the production of the complementary good. He also assumes that ties are irreversible, which means that a consumer cannot add the rival’s complementary good to a bundle consisting of the monopolist’s primary and complementary goods. Consistent with Bork’s argument, Whinston shows that there is no return for the monopolist to tie in this setting in which a key assumption driving the result is that the monopolist’s primary good is essential for all uses of the complementary good; that is, there is no use for the complementary good that does not require the primary good.

The logic behind Whinston’s result is as follows. First, consider how the monopolist behaves in the absence of a rival producer of the complementary good. The monopolist can either tie or bundle the two goods together or sell them as individual products. Let $P^*$ be the optimal price if the monopolist chooses to tie and $\pi^*$ be monopoly profitability given this choice. Now suppose that the mo-
monopolist sells the goods individually instead of tying. Setting the price for the primary product at \( P^* \) minus the marginal cost of the complementary good and the complementary-good price at its marginal cost yields an aggregate price for the two goods together again equal to \( P^* \) and monopoly profitability is again \( \pi^* \).

Now consider how behavior changes when a rival complementary good is introduced. If the monopolist ties, then the rival is unable to sell its good, so the monopolist would again choose to set price equal to \( P^* \) and earn \( \pi^* \). Suppose that the monopolist does not tie. If the monopolist sets the same prices for the individual products as it did above in the absence of a rival, that is, \( P^* \) minus the marginal cost of the complementary good for the primary good and marginal cost for the complementary good, then it is guaranteed to earn profits at least equal to \( \pi^* \). So there is no benefit for the monopolist to tie even when there is a rival in the market for the complementary good, and, in fact, there can be equilibrium outcomes where monopoly profitability is higher when it sells individual products instead of tying, as could occur if the price of the rival’s complementary product is set below the monopolist’s marginal cost of the complementary product.

Notice that the model considered by Whinston (1990) is somewhat different from the shoe example given earlier in that in the shoe example the complementary good, that is, left shoes, is sold by a set of competitive producers rather than the single rival found in Whinston’s analysis. This tells us that changing Whinston’s model by allowing competition in the complementary-good market would not change the conclusion that there is no return to tying (another way to put this is that Whinston’s argument concerning why optimally pricing independent products must yield monopoly profits at least as high as tying profits can be applied to the shoe example). However, there are a number of other changes that will yield a return to tying. This is what we turn to next.

Whinston (1990) shows two related results in which Bork’s argument (the Chicago school argument) concerning tying and leverage breaks down. In each case, the assumption that is relaxed is that the monopolized or tying product is essential for all uses of the potentially tied good. In Whinston’s first setting, everything is the same as in his original model described above except that now there is a use for the complementary good that does not require the monopolized or tied good. Call this market \( B \).

If there was perfect competition among the rival producers of the complementary good, then tying would not affect the equilibrium price in market \( B \) and there would be no benefit to the monopolist of tying, just as in Whinston’s original analysis. But the conclusion is different with a single rival producer with fixed costs for producing the complementary good (the analysis easily extends to the case of a small number of rival complementary-good producers, each of which is characterized by fixed costs of production). When the monopolist ties, it stops the rival producer of the complementary good from selling units of the complementary good to consumers who want to use the goods in combination. If this reduced volume stops the rival from covering its fixed costs of producing the complementary good, then it exits and monopoly profits rise because it now earns
monopoly profits in market B. So, in contrast to Bork's argument, in this case tying can be used to increase profitability by extending or leveraging its monopoly position in the tying-good market into market B.

The second setting Whinston considers is one in which the monopolist sells independent products where it has a monopoly position in one market but there is a rival producer in the other. Independence here tells us that consumers can potentially consume either product without the other, so clearly this setting also satisfies the condition that the monopolized product is not essential for all uses of the other product. Whinston (1990) shows that tying causes the monopolist to become more aggressive in setting the price for the bundle than when the products are sold individually. The reason this occurs is that when the monopolist ties, lowering the price and increasing the quantity increase profits in each market, so the monopolist prices more aggressively when it ties than when it sells individual products. Thus, tying reduces the profits of the rival and, if the reduction is large enough that it cannot cover its fixed costs of production, then the rival does not enter, and monopoly profits rise.\footnote{Nalebuff (2004) also provides an analysis of tying for leverage purposes when goods are independent. There are some differences in the assumptions such as that Whinston (1990) assumes that the monopolist can commit to tie prior to the rival's entry decision, while Nalebuff does not assume this type of commitment. Also, in most of Nalebuff's analysis the monopolist's prices are determined prior to the entry decision, while in Whinston's analysis prices are determined after that decision. Despite these differences, however, the two analyses reach a similar conclusion: the monopolist sometimes ties in order to stop the rival from entering. The logic behind the two analyses is also similar. In Nalebuff's argument, similar to Whinston's, tying can deter entry because consumers of the monopolist's tied product do not purchase the rival's product, and thus market foreclosure can deprive the rival of the scale needed to succeed.}

Carlton and Waldman (2012a) relax a different assumption in Whinston's initial analysis and show another reason that Bork's argument (the Chicago school argument) can break down. In that analysis, the monopolized good is essential for all uses of the potential tied good, but instead Carlton and Waldman move away from a 1-period setting and show that the argument breaks down when all sales do not occur simultaneously. To be precise, a 2-period setting is considered in which there is a monopolist that sells a durable primary good, a complementary good that can be produced by the monopolist and a single rival, and upgrades for the complementary good. The assumption that there are upgrades for the complementary good means that at the beginning of the second period, each firm has the option of investing in research and development and then selling a higher-quality complementary good in the second period. Finally, Carlton and Waldman assume that the rival produces a higher-quality complementary good (and a higher-quality upgrade) and that upgrading is efficient. So the efficient outcome is that individuals consume the monopolist's primary good, the rival's basic complementary good in the first period, and the rival's upgraded complementary good in the second.

Carlton and Waldman (2012a) show two related results. First, if firms must sell as opposed to lease, then the monopolist may tie if the value that consumers place on the upgrade is sufficiently high. The logic is that the only way the monopolist
can capture all of the profits associated with the upgrade is by selling upgrades, and given that its upgraded complementary good is inferior, tying is employed because it ensures that the monopolist sells the upgrades. The study also shows, however, that if leasing is feasible, then tying is not required, since in that case the monopolist can capture the second-period upgrade profits through the second-period lease price for the primary good. Second, if consumer switching costs are added to the model, then the monopolist can have an incentive to tie even when leasing is possible. The logic is that leasing by itself does not guarantee that the monopolist will capture second-period profits associated with the switching costs. But tying does allow the monopolist to capture these switching-cost profits.

In summary, there is an extensive literature concerning whether tying can be used to extend or leverage a monopoly position from one market to another. Taken as a whole, this literature shows that Bork’s argument (the Chicago school argument) that tying cannot be used to leverage a monopoly position is correct in some but not all settings. If the monopolized good is essential for all uses of the other good and all purchases are made simultaneously, then there is no reason to tie since the monopolist can capture all potential monopoly profits by selling individual products and pricing optimally. However, if either the monopolized good is not essential for all uses of the other good or not all purchases are made simultaneously, then it is possible that tying can be used to leverage a monopoly position.

Note that this suggests that, in contrast to Bork’s position in *The Antitrust Paradox*, there are some cases of tying for leverage that could be considered candidates for an antitrust violation because they reduce welfare. But we also believe that the courts should impose a very high hurdle for finding an antitrust violation on the basis of the leverage argument. The reason is that tying is typically driven

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19 One question that arises is, why does Whinston’s logic not apply in this setting; that is, in this model the monopolist’s primary good is essential, so according to Whinston there should be no return to tying. Recall that Whinston’s analysis that yields this conclusion considers a 1-period model where, if the monopolist does not tie, then it has the option of pricing the monopolized primary product at the optimal bundle price minus the marginal cost of the complementary good and the complementary good at its marginal cost. Since this strategy yields the same profits as tying, in that setting the monopolist cannot increase profitability by tying. In our first analysis, which has no switching costs, we consider a 2-period setting in which each firm can upgrade its complementary good at a cost at the beginning of the second period and the rival’s complementary good is superior. Extending Whinston’s argument to this case yields that, if the monopolist sells rather than leases individual products, then to guarantee the same profits as tying the monopolist needs to upgrade its complementary good in the second period and then set a second-period price for the upgraded good at marginal cost. If the monopolist can commit to this behavior, then tying does not improve profitability. But this behavior is not time consistent, so tying arises when commitment is not possible because tying allows the monopolist to avoid this time-inconsistency problem. And in our second analysis we show that with switching costs added, a related time-inconsistency problem arises even when the monopolist can lease.

20 From an economic viewpoint, a prerequisite for conduct to be an antitrust violation is that it can sometimes harm competition. Another prerequisite is that the enforcement of a prohibition on such conduct would not lead to more harm than good because of the likelihood of making errors and thereby condemning efficient behavior.
by efficiency considerations, and it is difficult for the courts to accurately judge this. So if the courts have a low hurdle for finding an antitrust violation based on leverage, we believe that welfare will be reduced because in many of the cases ruled to be violations, the consequences of the tie would be improved efficiency.

In addition, one important consideration concerning whether the courts should rule any specific tie an antitrust violation involves whether the tie is a product design tie or a tie achieved through contracting. The traditional approach to antitrust places a high hurdle for finding a violation when the behavior concerns actions inside a firm as opposed to actions outside the firm. The basic idea is that intervening in actions inside a firm can cause problems because of effects on unspecified relationships and transactions not mediated by the price system. We believe that this logic is correct and that it should apply to tying. That is, the hurdle for finding an antitrust violation in cases based on the leverage theory (or in other cases based on solid economic theory described later) should be higher when the tie involves a product design decision that is an internal firm decision than when the tie is achieved through a contract across firms. Indeed, as a general rule, not subjecting product design ties to antitrust liability seems reasonable to us.

3.3. Tying Used for Price Discrimination

The last part of Bork's argument was that tying could be used for price discrimination but that the use of tying for this purpose should not be regarded as an antitrust violation. As discussed earlier, one way that a firm can use tying to practice price discrimination is through metered sales. This argument is analyzed and discussed in Chen and Ross (1993) and Klein (1993). The basic idea is that if consumers vary in terms of how much they value the monopolized product, and the higher-value consumers consume more units of the complementary good, then the monopolist can price discriminate by tying and charging a high price for the complementary good.21

The second way in which tying can be used to price discriminate is discussed initially in Stigler (1963).22 The argument is that tying can sometimes be used to increase profitability if bundle valuations exhibit less heterogeneity than product valuations exhibit when the products are sold separately. The logic is easiest to see in the type of example that Stigler considered in which valuations are negatively correlated. Consider a monopolist who sells products A and B, where to keep the example simple we assume that the firm has no marginal costs of production for each good. Suppose further that there are two consumers, each of whom consumes either zero or one unit of each good. Call the individuals consumers 1 and 2. The gross benefit to consumer 1 from consuming a unit of A equals $20, while his gross benefit from consuming a unit of B equals $12. The gross benefits

21 Klein argues that this type of price discrimination can arise in settings that are quite competitive, and thus this argument should not be ruled out as a possible explanation for tying in cases such as the 1992 Kodak case.

22 See Burstein (1960) and Adams and Yellen (1976) for other early analyses along these lines.
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To consumer 2 are reversed; that is, he receives a gross benefit of $12 from consuming a unit of A and $20 from consuming a unit of B. Finally, the firm cannot prevent resale and thus cannot directly price discriminate by varying the prices charged across the consumers.

Suppose that initially the monopolist sells individual products. For each product it can either set a price of $12 and sell to both consumers or set a price of $20 and sell to one consumer. Since $2($12) = $24 > $20, profit-maximizing behavior is to sell each good at a price of $12 and earn total profits equal to $2[2($12)] = $48. Now suppose that the monopolist ties. Each consumer's valuation for the bundle equals $20 + $12 = $32. So the profit-maximizing price for the bundle equals $32, and with this choice both consumers purchase the bundle and the monopolist earns 2($32) = $64 > $48. In other words, in this example, the bundle valuations exhibit no heterogeneity, and as a result tying increases monopoly profitability.

Note that in this example tying results in perfect price discrimination, reduces consumer welfare, and leaves social welfare unchanged. But these results are not fully general. For example, if the benefits from each good were $22 and $8 rather than $20 and $12, then the no-tying option would have the monopolist set a price of $22 for each product and only sell one unit of each good. So for this alternative example, the monopolist would still tie, and tying would still result in perfect price discrimination, but the tie would leave consumer welfare unchanged and increase social welfare.

It is also the case, however, that the result of perfect price discrimination is not fully general. An example that demonstrates this point is that consumer 1 has gross benefits of $20 and $12 for products A and B, respectively, as in the original example, but the gross benefits of consumer 2 are $12 and $22. Profit-maximizing behavior for the monopolist in this case is to tie and charge $32 for the tied product, but this no longer achieves perfect price discrimination since consumer 2 receives positive surplus equal to $2.

A final point concerning this class of models is that although Stigler initially emphasized the importance of consumer valuations being negatively correlated for this type of tying to arise, later papers, including Schmalensee (1984), McAfee, McMillan, and Whinston (1989), and Bakos and Brynjolfsson (1999) show that a negative correlation is not essential for the result (see also Burstein 1960). The basic idea is that as long as valuations are not strongly positively correlated, tying can serve to reduce heterogeneity in valuations, which, in turn, increases profitability.23

Now that we understand the ways in which tying can be used for price discrimination purposes, we can evaluate in more detail Bork's argument that tying used for price discrimination should not be regarded as an antitrust violation. As

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23 The following example illustrates the point. Suppose that a monopolist sells products A and B to a single consumer, where the consumer has a valuation of either $24 or $44 for each product and there is a probability of 1/4 for each potential pair of realized valuations. If the monopolist sells individual products, he sets a price of $24 for each product, sells each product with a probability of 1, and earns $48. If he ties, then he chooses a bundle price equal to $68, sells the bundle with a probability of 3/4, and earns $51 > $48.
mentioned earlier, we agree with this position. Notice first that Bork is correct when he argues that this type of tying is not used to increase market power in the market in which the firm lacks market power in the absence of tying, but rather it improves the monopolist’s ability to extract surplus in the market or markets in which the firm already has market power. For example, in the metered-sales argument, the tie is used to better price discriminate in the tying-good market where the firm is already a monopolist. And in Stigler’s (1963) argument and the literature that grew out of his original paper, the firm is a monopolist in both markets with or without tying.

Further, given that the firm is not extending or leveraging market power into new markets when tying is used for price discrimination, we believe that there is no reason to regard it as an antitrust violation. First, as is well known, price discrimination in general has ambiguous effects on social welfare. But given that perfect price discrimination maximizes social welfare, practices that improve a firm’s ability to price discriminate will tend to improve social welfare. Second, since the courts have not ruled price discrimination in general to be an antitrust violation, we do not see any logic in ruling a specific type of price discrimination to be illegal. This is especially the case since there is no reason to think that substitute modes of price discrimination that firms might practice instead are superior from a social welfare standpoint. Third, as discussed in Bowman (1973) and Hausman and Mackie-Mason (1988), in situations in which innovation is possible, price discrimination can increase innovation incentives, which is another reason that price discrimination can improve social welfare. And fourth, related to our second point, identifying the conditions in which price discrimination reduces rather than enhances welfare is in our view beyond what the courts or economists can reliably accomplish.

3.4. What about Reciprocal Dealing?

In contrast to the extensive game theory literature that has investigated Bork’s arguments concerning tying, there is almost no modern literature focused on arguments concerning reciprocal dealing. Here we offer some thoughts concerning

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24 Despite Bork’s enormous success in moving the interpretation of the antitrust laws toward his views, some ideas are hard to kill. For example, the notion that antitrust should intervene to prevent price discrimination, which arises in many guises including tying, has recently reappeared in the antitrust literature. See Elhauge (2009). For an opposing view, see Carlton and Heyer (2008).

25 See Carlton and Waldman (2012b) for an in-depth discussion of a recent case in which tying was employed to better price discriminate.

26 Other rationales for tying not considered by Bork are that tying is used as a product differentiation device as first argued by Carbajo, de Meza, and Seidman (1990) and Chen (1997) and that tying is used to shift surplus from either rivals or consumers to the tying firm by changing the outcome of the pricing game as explored by Carlton, Gans, and Waldman (2010). We believe that arguments similar to those above concerning why tying used for price discrimination should not be considered an antitrust violation yield that tying used for product differentiation should also not be regarded as an antitrust violation. Further, shifting surplus from rivals or consumers to the tying firm should also typically not be regarded as an antitrust violation for related reasons. See Carlton, Gans, and Waldman (2010) for more details.
Bork's arguments involving reciprocal dealing. But clearly systematic investigation of the arguments is warranted.

As discussed in Section 2, Bork argued that there is a close equivalence between tying and reciprocal dealing. It is true that the two practices are similar in that in each case a transaction concerning one product is made conditional on a transaction concerning a different product. But it is not clear to us that the practices are as similar as Bork suggests. In the case of tying, a single firm simply decides how to market two or more goods that the firm produces. That is, the decision to tie does not directly involve the actions of more than a single firm. Further, as discussed earlier, tying is pervasive in the economy because of various types of efficiencies, in particular, concerning production and distribution. Reciprocal dealing is a contractual arrangement that directly involves multiple firms, so in that sense it is distinctly different than tying. In addition, reciprocal dealing is less common than tying, although that does not mean that efficiencies are unimportant.

One possibility concerning efficiencies associated with reciprocal dealing is that the practice is used to avoid or at least reduce problems associated with the holdup problem originally discussed by Klein, Crawford, and Alchian (1978) and Williamson (1979). That is, along the lines of an argument in Williamson (1983), suppose that firm A purchases a product from firm B in which there are specific investments in the production of the product that introduce inefficiencies into the relationship because of the holdup problem. If there is a different product that firm B can purchase from firm A that is also characterized by specific investments, then reciprocal dealing can reduce inefficiencies associated with holdup by creating similar-sized specific investments on each side of the relationship.

Another possible efficiency explanation for the practice involves private information about product quality. Suppose that good 1 is an input in the production of good 2, where the quality of good 2 depends on the quality of good 1. Suppose further that the producer of good 1, firm A, can affect its quality through a choice of effort, while the producer of good 2, firm B, can directly observe neither this choice of effort nor the quality of good 1. Then there is a potential moral-hazard problem that can be avoided by having firm B, which buys good 1 from firm A, also sell good 2 to firm A, at which point firm A sells good 2 to consumers. Firm A will then internalize how its choice of effort concerning the quality of good 1 affects both the quality of good 2 and the subsequent effects on revenues derived from selling good 2 to consumers.

The other issue of interest is whether there are any plausible scenarios in which reciprocal dealing might be anticompetitive. One possibility may arise if one firm has market power as a buyer. Call the buyer with market power firm A and the firm it purchases from firm B, while the product that firm A purchases is good 1, the product it sells is good 2, and the two goods are independent from the standpoint of both production and consumption. Also, suppose that firm A faces rivals in the market for good 2. If firm B is a buyer of good 2 and the rival sellers of good 2 are characterized by economies of scale, then there may be a scenario in which
reciprocal dealing serves an anticompetitive role. That is, suppose that firm A in purchasing good 1 from firm B requires firm B to purchase good 2 from firm A. This requirement will deprive rival sellers of good 2 of scale and, because of the presence of economies of scale, the result can be the exit of one or more of these rival sellers. This, in turn, can increase firm A’s profit by increasing its market power in the market over buyers of good 2 (other than firm B).

Note that this argument is related to arguments in earlier papers such as Whinston (1990), Rasmussen, Ramseyer, and Wiley (1991), and Carlton and Waldman (2002), which show how tying and exclusive dealing can be anticompetitive by denying scale to a potential rival.

The above discussion suggests that reciprocal dealing could be a candidate for an antitrust violation under some limited set of circumstances. But our discussion is only speculative, and this theory should be worked out in detail before any antitrust cases are brought that argue an anticompetitive role for reciprocal dealing.

4. Late Bork: Tying Used to Defend a Monopoly Position

As discussed above, in his early writings concerning tying, Bork argued that tying is always or almost always motivated by efficiency or price discrimination and that neither should ever constitute an antitrust violation. In the 1990s, however, he represented Netscape in its discussions with the Department of Justice where he argued that Microsoft’s behavior concerning Windows and, in particular, its behavior of tying or bundling Internet Explorer to Windows, did constitute an antitrust violation. Many found this a surprising position for Bork to take, although Bork himself argued that this new position was in fact consistent with his earlier views concerning what constitutes an antitrust violation. Here we first discuss Bork’s argument concerning this case, briefly discuss the related game theory literature, and then provide an overview including whether his views concerning this case (see Bork 1998a, 1998b, 1998c) should be thought of as consistent or inconsistent with his earlier views.

The traditional argument concerning tying as an antitrust violation was that tying is used to extend or leverage a monopoly position in the tying market into the market for the tied good. As discussed earlier, in his early work Bork strongly argues against this possibility. In his work with Netscape against Microsoft, Bork’s argument was different. In that case (United States v. Microsoft Corporation, 253 F.3d 34 [2001]) he argued that the effect of Microsoft’s tying of Internet Explorer to Windows (along with various other tactics employed by Microsoft) was not

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27 There is also a related scenario in which the original market power involves a firm selling a product and reciprocal dealing is used to create market power in a market in which the same firm is a buyer.

28 See Klein (2001) and Whinston (2001) for detailed discussions of the Microsoft case. In particular, the focus of Klein’s paper is when defending a monopoly position can be an antitrust violation, which is at the core of Bork’s argument concerning this case. See also Elzinga and Mills (2014) for a related discussion concerning Bork’s views on the Microsoft case.
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the monopolization of the browser market but rather the preservation by Microsoft of its Windows monopoly. The argument was that Netscape's Web browser in combination with Sun Microsystem's Java language could develop into a substitute for Windows and thus constituted a threat to Microsoft's Windows monopoly. Thus, Microsoft's tying and other behaviors were attempts to preserve, not extend, a monopoly position. Such behavior, he went on to argue, was a straightforward attempt to maintain an existing monopoly position and thus illegal under section 2 of the Sherman Act. He relied on the *Lorain Journal* case (*Lorain Journal Co. v. United States*, 342 U.S. 143 [1951]) for precedent. In that case, a newspaper with market power made it difficult for its advertisers to also advertise on radio. Initially, radio and newspaper advertising could be viewed as complements, but eventually radio grew in importance to become a substitute to newspaper advertising. Bork reasoned that *Lorain Journal* was tying in order to preserve its market power in advertising.

Both Whinston (1990) and Carlton and Waldman (2002) provide formal game-theoretic analyses that show various ways in which tying can be used to preserve and/or enhance monopoly in the tying-good market rather than extend a monopoly position from the tying market to the tied market. In Whinston's analysis, there is a monopolist of a primary good that also produces a complementary good, where there is a single rival producer of the complementary good and economies of scale in the production of the complementary good. In addition, there is a competitively supplied inferior primary product that can serve as a constraint on monopoly pricing. If the monopolist sells individual products and the constraint is binding, then the presence of the rival producer of the complementary good hurts monopoly profitability. Tying in this case may cause the rival producer of the complementary good to exit since it is no longer able to achieve efficient scale. In this case, the monopolist ties in order to eliminate the constraint on its pricing created by the existence of the competitively supplied inferior primary product.

Carlton and Waldman (2002) consider two related analyses. The first focuses on entry costs, while the second focuses on network externalities. Here we describe the entry-cost analysis since that argument is more straightforward. In that analysis, there is a monopolist and a single potential rival in a 2-period setting, where the monopolist sells primary and complementary goods and the rival can enter the complementary-good market in either period but the primary-good market only in the second. Further, the rival has entry costs for entering each market, and its complementary product is superior, although the two primary products have the same quality.

If the monopolist sells individual products, then in many parameterizations the rival enters the complementary market in the first period and the primary market in the second. Further, the return to entering the primary market in the second period in these parameterizations is that the entry allows the rival to capture more of the surplus associated with its superior complementary product. By tying, the monopolist reduces the rival's sale of the complementary good if
it chooses to enter, and if the reduction is sufficiently large, it then chooses not to enter the complementary market. In turn, if the rival does not enter the complementary market, then it also does not enter the primary market, since in this model there is no return to entering the primary market if it does not enter the complementary market. The end result is that the monopolist sometimes ties because this stops entry into the primary market and thus enables the monopolist to preserve its monopoly position in the second period.

So, overall, the game theory literature supports Bork's later argument that tying can sometimes be used to preserve and/or enhance an existing monopoly position in the market for the tying good rather than leverage the monopoly into the tied-good market. The obvious next question is, what is optimal antitrust policy in cases in which this type of behavior is alleged? And our sense is that the optimal policy is one analogous to the policy that we described for the leverage argument in Section 3.2. That is, the courts should impose a very high hurdle for finding an antitrust violation based on the argument that the practice preserves and/or enhances the tying firm's market power in the tying market. As before, the logic is that tying is typically driven by efficiency and courts have difficulty judging the extent to which the tie has an efficiency justification, so anything but a high hurdle will likely hurt welfare because many of the cases ruled to be antitrust violations will actually be driven by efficiency.

The final issue we discuss here is whether Bork's views concerning the Microsoft case contradict his earlier stated position or, as Bork himself argued, there is in fact no contradiction. There are two ways to view this issue. On the one hand, in his early writings such as *The Antitrust Paradox*, Bork quite clearly states that tying should never be an antitrust violation. So the obvious interpretation is that his later views did contradict his earlier views since he argued late in his career that Microsoft's tying of Internet Explorer to Windows was an antitrust violation.

On the other hand, however, there is another reasonable perspective that we favor in which there is no contradiction. In *The Antitrust Paradox* and his other early writings, Bork was responding to court cases and arguments concerning tying that had been made up to that time. These cases and arguments did not include the possibility that tying could be used as a way to illegally preserve an existing monopoly position. There is nothing in Bork's early writings that would indicate that tying could not be an antitrust violation if solid economic reasoning indicated that it could be employed as a tactic to preserve a monopoly position that in tying's absence would not be sustained. Further, it seems unreasonable to us to claim a contradiction because his early writings did not correctly take into account an anticompetitive argument concerning tying that had as yet not been made. So our view is that Bork changed his views concerning whether tying could be an antitrust violation but that there was no contradiction.²⁹

²⁹ The following quote is relevant for our argument: "In our present state of knowledge, this means the law would accept the legality of all tying arrangements and all reciprocal dealing. The reason is that we have no acceptable theory of harm done by these phenomena, but a number of plausible theories of the good they may do" (Bork 1978, pp. 380–81). This quote is consistent with
5. Conclusion

Bork was one of the key proponents of the traditional Chicago school approach to antitrust, and one of the main recommendations of that approach that Bork helped to develop is that tying should never constitute an antitrust violation. In this paper we reviewed Bork's early arguments concerning tying, compared and contrasted those arguments with the modern game theory literature, and discussed our views of optimal antitrust policy that are based to a large extent on a synthesis of the traditional Chicago school argument and what we learn from the game theory literature. We also discussed Bork's later views on tying in the Microsoft case and briefly discussed his views concerning reciprocal dealing, which he argued is closely related to tying.

Our main conclusion is that viewing Bork's early and later arguments together yields that he was mostly, although not fully, correct concerning tying and antitrust. As he correctly argued, tying typically improves efficiency, so we believe that courts should have a high bar for ruling in a case that tying is anticompetitive and thus an antitrust violation. However, the more modern game theory literature does show that early Bork and the traditional Chicago school argument are not fully correct in their conclusion that tying should never be a candidate for an antitrust violation. In a classic paper on the subject Whinston (1990) shows that the Chicago school argument concerning leverage is correct in a wide range of circumstances, but Whinston (1990), Nalebuff (2004), and Carlton and Waldman (2012a) also show that there are realistic settings in which the argument breaks down. Consistent with Bork's later views, Whinston (1990) and Carlton and Waldman (2002) show that tying can sometimes be used to preserve and/or enhance an existing monopoly position.

But we believe that the importance of Bork's contributions concerning tying and antitrust is not primarily captured by the extent to which his arguments turned out to be fully correct. Rather, the importance of the contribution is shown both by the change in court decisions concerning tying with an increased focus on economic theory and by the increased emphasis in the academic literature on understanding the circumstances in which tying can and cannot be anticompetitive.

References


Our interpretation that Bork's early views on tying and antitrust were to a large extent a response to the arguments and cases that had arisen by that point in time and that he was potentially open to a different conclusion concerning whether tying could be anticompetitive as new theories and new cases arose.


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