

# DIGITAL CONVERGENCE, COMPETITION, AND ANTITRUST LAW

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Revised: June 18, 2000

## Abstract

The Telecommunication Act of 1996 revolutionized the entire information and entertainment media industries in that it allows cable companies to provide Internet services and phone companies to provide cable and Internet services. In economic terms, the major consequence of this radical policy change is that phone and cable companies can legally tie the sales of one information/entertainment service with others. The purpose of this paper is to analyze the effects of this policy reform on the degree of competition in the corresponding industries. I demonstrate that (i) if only one phone company is allowed to sell internet (or cable) services, it is possible for this phone company to foreclose on a competing phone company. However, foreclosure is unlikely to occur since it is not profitable. (ii) In contrast to (i), foreclosure is impossible if all phone companies are permitted to provide internet (or cable) services.

**Keywords:** Digital Convergence, Tying, Tying and Foreclosure

**JEL Classification Numbers:** L82, L86, L5

(Draft = digcon1.tex      2000/06/18 18:14)

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\*I thank the participants at the conference on “Bridging Digital Technologies and Regulatory Paradigms,” held at the Haas School of Business, University of California at Berkeley June 27–28, 1997 for valuable comments.

## 1. Introduction

The Telecommunication Act of 1996 revolutionized the entire information and entertaining media industries in that it allows cable companies to provide Internet services (hence video and audio communication) and phone companies to provide cable and Internet services. In economic terms, the major consequence of this radical policy change is that phone and cable companies can legally *tie* the sales of one information service with others, where we define *tying* as a marketing strategy where a firm or a service provider makes the sale of one of its services conditional upon the purchaser also buying some other service from it.

This reform was unavoidable considering the technological advances that have made it possible to transmit TV (compressed and uncompressed) digitally via fiber-optic lines. One reason for why this radical change occurred relatively late is that the regulating authorities (both the antitrust authorities and the FCC) feared that tying may lead to (i) an increase in dominant positions of dominant firms, and (ii) “leveraging” which is usually used to refer to the use of monopoly power in one market to gain an advantage or reduce competition in another market.

In this paper, I construct extremely simple examples in order to examine the whether tying of different information services leads to increase in dominance of one of the (say, phone-service) providers, and whether it is possible to have an extreme situation where one company is foreclosed by another which ties several services in one bundle sold to all consumers.

The reader will notice that the present paper ignores the issue of “bottlenecks” that seems to be a major issue of papers on telecommunication deregulation. The reason is that it is my opinion that whereas bottlenecks indeed existed prior to deregulation, they should *not* serve as benchmarks if deregulation is complete. That is, in my opinion bottlenecks existed precisely because free entry was restricted by the FCC in all forms of telecommunication. Therefore, it will be a mistake to assume that bottlenecks will continue to prevail once free entry is allowed in all forms.

In the literature, there is a large number of papers dealing with the profit gains and welfare aspects of tying by a *single monopoly* firm; see for example Adams and Yellen (1976), Schmalensee (1982), Lewbel (1985), McAfee, McMillan, and Whinston (1989), and more recently Bakos and Brynjolfsson (1996) in the context of information goods. However, these papers do not address the question how does tying affect competition. The later subject was addressed only in the context of the *leverage* theory in Carbajo, de Meza, and Seidmann (1990), Whinston (1990) and Seidmann (1991).

In this paper, following Shy (1996, Ch. 14), I analyze this controversial issue of how tying affects competition in a much simplified model. I show that permitting tying can lead to a foreclosure (the bad news). However, I show that foreclosure is not profitable (the good news) since the price reduction of the tied package needed to foreclose a rival firm reduces all the profit from tying.

In addition, this paper shows that despite the result that foreclosure is not profitable, if a firm can be forced out of business even when it makes a strictly positive (nonzero) amount of profit (say, because shareholders will not tolerate a low return), then permitting tying can lead to a profitable foreclosure via tying. I term this equilibrium as  $\epsilon$ -foreclosure.

On the legal side, in the United States, establishing a dominant-firm position via tying may be challenged under Section 2 of the Sherman Act of 1890. In the European Community, although article 86 of the Treaty of Rome does not define which acts amount to an abuse of a dominant position, it provides a list of certain examples. This list, not restrictive, includes the following: imposing unfair prices or other unfair trading conditions; limiting production, markets or technical development; discriminating between trading partners; and imposing tying arrangements. Thus, US courts harshly treated tying under the belief that tying provides a mechanism whereby a firm with monopoly power in one market can use the leverage provided by this power to foreclose sales in and thereby monopolize a second market.

Leverage via tying has been regarded as a potential violation of Section 2 since the Supreme Court's decision in *United States v. Griffith*, 334 U.S. 100, 108 (1948). In that

case, a movie theater chain refused to show films in its theaters which it had a monopoly power unless the distributor granted it with the right to screen the film in other towns. The leveraging concept has more recently been analyzed similarly to the notion of “tying” one product to another. In *Berkey Photo, Inc. v. Eastman Kodak Co.*, 603 F.2d 263, 275 (2d Cir. 1979), cert. denied, 444 U.S. 1093 (1980), the Second Circuit stated that leveraging “is linked to the prohibition against tying arrangements” under Section 1. In that case, Kodak was accused of designing its new film and camera in a format incompatible with other manufacturers. The *Berkey Photo* decision went on to hold that a “firm violates Section 2 by using its monopoly power in one market to gain a competitive advantage in another, albeit without an attempt to monopolize the second market.”

More recently, several authors have criticized the assumption that tying brings into foreclosure of competing firms, for example see Posner (1976). The critics argued that there could be lots of reasons why firms are engaged in tying, some of which can be socially beneficial. For example, economies of joint sales, reputation and goodwill.

The paper is organized as follows. Section 2 constructs a model with two phone companies and one internet provider. The model examines the market allocation and foreclosure possibilities under three regulatory regimes: Section 3 assumes that the regulatory body allows each firm to provide no more than one type of service. Section 4 assumes that only one phone company is allowed to provide internet services. Section 5 analyzes the case where one phone company takes over the only internet provider. I show that this is the only situation in which foreclosure is possible (however, not profitable). Section 6 analyzes maximum deregulation where all phone companies are permitted to bundle internet services. Section 7 concludes.

## 2. The Model

Consider an environment with two consumers (type 1 and type 2) and two telephone systems ( $X$  and  $Y$ ). Suppose that consumers desire to purchase a system that combines one unit of a phone service and one unit of an internet service. There are two providers of telephone

service, which we denote as  $X$  and  $Y$ , and one provider of internet service denoted by  $Z$ . To simplify our exposition, we assume that production of both, phone and internet, services is costless.

Let  $a, b > 0$  be given parameters, and assume that  $a > 2b$ . Then, consumers' preferences for telephone and internet services are given by

$$U^1 \stackrel{\text{def}}{=} \begin{cases} a - p_X - p_Z & \text{buys } X \text{ and } Z \\ b - p_Y - p_Z & \text{buys } Y \text{ and } Z \\ 0 & \text{Otherwise,} \end{cases} \quad (1)$$

$$U^2 \stackrel{\text{def}}{=} \begin{cases} b - p_X - p_Z & \text{buys } X \text{ and } Z \\ a - p_Y - p_Z & \text{buys } Y \text{ and } Z \\ 0 & \text{Otherwise.} \end{cases}$$

Thus, (1) assumes that consumer 1 is oriented towards phone company  $X$  whereas consumer 2 is oriented towards phone company  $Y$ . This assumption is motivated by the observation that some consumers do not switch among phone companies even when there is a change in the relative price of phone services. This behavior occurs when consumers develop loyalty towards one telephone company, or because one telephone company offers a bundling package that suits a particular preference of a particular consumer. Moreover, the assumption that  $a > 2b$  makes the two phone services sufficiently differentiated, which means that a consumer highly values his/her most preferred phone company compared to the competing company.

A second assumption imbedded in the utility function (1) is that phone and internet services are perfect complements. There are two justifications for this assumption. First, if we show that foreclosure of one phone company is unlikely to occur when phone and internet services are complements in the eye of consumers, then this result is even more likely to hold when these services are viewed as independent by consumers. Second, digital convergence indeed changes the characteristics of these services, so it is likely that in the future both services will be treated as complements.

Our analysis proceeds as follows. We analyze three regulatory regimes:

1. Pre-deregulation: firms  $X$  and  $Y$  are restricted to phone services; whereas firm  $Z$  is restricted to internet services only

2. Partial Deregulation: Phone company  $X$  is permitted to provide internet services. Here, we check whether foreclosure is possible and profitable.
3. Complete deregulation: all phone companies can provide internet services.

### 3. Pre-Deregulation: Three independent firms

Suppose now that the two telephone companies  $X$ ,  $Y$ , and the internet provider  $Z$  are independently owned, and suppose that the regulating authority limits the scope of operation of each firm to one type of service. That is, this regulatory regime mandates that a phone company cannot provide internet services and that an internet-service provider cannot sell phone services. We look for a Nash-Bertrand equilibrium in prices. Unfortunately, there is more than one equilibrium corresponding to a high internet-service price and low phone-service prices or a low internet price and high telephone service prices. Therefore,

#### Proposition 1

*When the industry is decomposed into three independent firms:*

1. *The following prices constitute a Nash-Bertrand equilibrium:  $p_X = p_Y = a - b$ ,  $p_Z = b$ . In this equilibrium the telephone-provider  $X$  sells one unit to consumer 1, phone-service provider  $Y$  sells one unit to consumer 2, and the internet provider  $Z$  sells two units (one unit to each consumer); the firms earn profit levels of  $\pi_X = \pi_Y = a - b$  and  $\pi_Z = 2b$ .*
2. *The above equilibrium is not unique.*

*Proof.* If firm  $Z$  raises its price no consumer would buy any system. Also, since all consumers already buy a unit of  $Z$ , firm  $Z$  cannot increase its profit by lowering its price. In order for phone company  $X$  to undercut phone company  $Y$  it must set  $p_x = b - p_Z = 0$ , and hence cannot increase its profit. Therefore, undercutting is not profitable for firms  $X$  and  $Y$ . This establishes part 1.

To establish part 2, observe that the following triplets are also equilibria:  $(p_X, p_Y, p_Z) = (b, b, a - b)$ ,  $(p_X, p_Y, p_Z) = (0, 0, a)$ , and  $(p_X, p_Y, p_Z) = (a, a, 0)$ . ■

Proposition 1 shows that there can be two types of price configurations: one with high telephone-service prices and a low internet price, and one low phone-service prices and a high internet price. To determine which equilibrium is more likely to observe we need to decide which service existed first. Thus, if phone services existed prior to the internet service, it is likely that most surplus is extracted by the phone-service provider. In this respect, the equilibrium prices stated in the proposition are more likely to occur.

#### 4. Partial Deregulation: Only one phone company is licensed to provide internet services

Suppose that the regulating authority grants a permission to phone-service provider  $X$  to sell internet services, but does not permit phone company  $Y$  to sell this service. In this case, consumers can buy phone-service  $X$  tied with internet service  $Z$  for the price of  $p_{XZ}$ , or phone-service  $Y$  and internet service  $Z$  separately.

##### Proposition 2

1. *The prices  $p_{XZ} = a$ , and all the prices satisfying  $p_Y + p_Z = a$  constitute a Nash equilibrium. In this equilibrium, consumer 1 buys a package of phone and internet services from phone company  $X$ , whereas consumer 2 buys phone service from phone company  $Y$  and internet service from company  $Z$ .*
2. *The phone company  $Y$  cannot be foreclosed.*

*Proof.* If firm  $XZ$  deviates and undercuts phone company  $Y$ , it has to reduce the price of its package to  $p'_{XZ} = b$ , thereby earning  $\pi'_{XZ} = 2b < a$ . Hence, this deviation is not profitable. For the same reason, neither phone company  $Y$  nor internet supplier  $Z$  can enhance its market share by reducing prices. To prove the second statement, note that the independent internet-service provider  $Z$  can always reduce its price so that the  $Y$ -oriented consumer will continue buying phone-service  $Y$  and internet-service provider  $Z$  separately. ■

Given that multiplicity of equilibria, it is not possible to state whether the phone company  $X$  gains or loses when it provides internet services. Thus, this ‘uneven’ licensing regime could be judged as either anti- or pro-competitive. However, the importance of this proposition is that it shows that licensing of one phone firm does not imply that this firm will be able to foreclose on the competing phone company.

## 5. Partial Deregulation Continued: Phone company $X$ takes over all internet services

As indicated above, a commonly stated consequence of permitting phone companies to provide other services is a foreclosure of competing firms via a merger or acquisition of firms supplying complementary services. We now demonstrate the possibility how phone company  $X$  can drive phone company  $Y$  out of business when it acquires (or merges with) the internet supplier  $Z$  and sells products  $X$  and  $Z$  tied in a single package. Suppose that the newly merged firm, denoted by  $XZ$ , offers the package containing phone service  $X$  with internet service  $Z$  for a price of  $p_{XZ}$ . We now state our main proposition:

### Proposition 3

**The bad news:** *By setting the package price to  $p_{XZ} = a$  (or lower), the firm selling the package  $XZ$  drives phone company  $Y$  out of business. Thus, tying can serve as a tool for foreclosing a competing firm. In this case, the  $Y$ -oriented consumer is not served, hence, a merger is socially inefficient.*

**The good news:** *Foreclosing is not profitable for the tying firm. The profit of the merged firm  $XZ$  when engaged in foreclosing firm  $Y$  is lower than the sum of the two premerged firms  $X$  and  $Z$ .*

*Proof.* Suppose that firm  $Y$  sets the lowest possible price  $p_Y = 0$ . When  $p_{XZ} = a$ , the utility of consumer 2 when buying system  $XZ$  and product  $Y$  for  $p_Y = 0$  is  $U^2 = a - p_{XZ} - 0 = 0$ . Hence, phone company  $Y$  will not produce, and consumer 2 will not be served. This proves



part 1. Under this foreclosure equilibrium,  $\pi_{XZ} = a$ . However, the sum of the profits of firms  $X$  and  $Z$  before the merger was larger than  $a$  (Propositions 1 and 2). ■

Proposition 3 shows that tying for the purpose of foreclosing a horizontally competing firm is too costly to the foreclosing firm and is therefore unlikely to be realized even when it eliminates the independent internet supplier. The proposition also showed that the act of foreclosing the market reduces aggregate industry profit, since the foreclosure causes one consumer not to be served. Thus, a foreclosed industry may be serving a reduced number of consumers, and hence earns a lower aggregate industry profit. Note that the “bad” news is not so bad considering the fact that the present model makes an extreme assumption that phone and internet services are perfect complements. The ‘bad news part’ of Proposition 3 need not hold when the two services are not complements. Thus, this part of the proposition presents the worst-possible extreme case.

In what follows, we show that when phone company  $X$  acquires/merges with internet supplier  $Z$ , it is profitable for the merged firm not to completely foreclose on the phone company  $Y$ , but to leave it a small market share.<sup>1</sup> We therefore define the concept of  $\epsilon$ -foreclosure.

#### DEFINITION 1

*Suppose that phone company  $X$  acquires internet supplier  $Z$ . Then, phone company  $X$  is said to be  $\epsilon$ -foreclosing phone company  $Y$ , if for any given small  $\epsilon$ ,  $\epsilon > 0$ , there exists a Nash equilibrium in prices  $p_{XZ}$  and  $p_Y$  that would leave firm  $Y$  with a profit of  $\pi_Y = \epsilon$ .*

Definition 1 states that  $\epsilon$ -foreclosure implies that firm  $Y$  can still profitably sell its phone service. However, the merged  $XZ$  firm could set  $p_{XZ}$  so that it can reduce the profit of firm  $Y$  to  $\epsilon$ .

#### Proposition 4

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<sup>1</sup>See Gelman and Salop (1983) for a similar result in the context of permitting entry of potential competitors.

1. Let  $\epsilon > 0$  be a small number. The prices  $p_{XZ} = a - \epsilon$  and  $p_Y = \epsilon$  constitute an  $\epsilon$ -foreclosure equilibrium. In this equilibrium phone company  $X$  sells its phone-internet package to two consumers whereas firm  $Y$  sells only phone service to one consumer.
2. An  $\epsilon$ -foreclosure equilibrium yields a higher profit level to the foreclosing firm than does the total foreclosure equilibrium given in Proposition 3.

*Proof.* Clearly, these prices constitute a Nash equilibrium. To demonstrate the profit advantage of this equilibrium over the total foreclosure equilibrium, let us observe that firm  $XZ$  sells to both consumers and therefore earns  $\pi_{XZ} = 2p_{XZ} = 2(a - \epsilon)$ . However, under the total-foreclosure equilibrium, firm  $XZ$  sells to only one consumer, thereby earning  $\pi_{XZ} = p_{XZ} = a < 2(a - \epsilon)$  for  $\epsilon < a/2$ . Thus, for a sufficiently small  $\epsilon$ , the  $\epsilon$ -foreclosure equilibrium is more profitable for the foreclosing firm. ■

The intuition behind the profitability of the  $\epsilon$ -foreclosure equilibrium is that the foreclosing firm manages to provide the  $Y$ -oriented consumer his or her most preferred combination of services. However, the merged firm  $XZ$  manages to extract most of the surplus leaving company  $Y$  with  $\epsilon$  profit. In contrast, under the total foreclosure equilibrium described in Proposition 3, consumer 2 does not get his most preferred system, and therefore, since his willingness to pay falls to  $b$ , consumer 2 does not buy any service.

## 6. Complete Deregulation: All phone companies are allowed to sell internet services

Suppose now that the telecommunication industry has reached the maximum degree of deregulation which means that all phone companies are allowed to tie phone service with internet service. In this case, the independent internet service provider goes out of business and

### Proposition 5

1. The unique equilibrium prices are  $p_{XZ} = p_{YZ} = a$ .
2. Foreclosure (of phone companies) cannot occur.

*Proof.* In this equilibrium each firm sells to one consumer and earns  $\pi_X = \pi_Y = a$ . If firm  $X$  attempts to undercut firm  $Y$ , the utility function (1) implies it must set  $p'_{XZ}$  to satisfy  $b - p'_{XZ} > a - p_{YZ}$ , hence  $p'_{XZ} < b + a - a = b$ , thereby earning  $\pi'_{XZ} \approx 2 \times b < a$ . Hence, undercutting is not profitable. ■

## 7. Conclusion

The simple examples developed in this paper show that foreclosure is an unlikely outcome of this deregulation. However, the only way to secure the continuation of competition is to ensure that all providers are permitted to provide the new services. More precisely, to it is important to ensure that all the telephone companies are allowed to offer internet or cable services.

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