

# POST-MERGER BUNDLING IN THE CABLE INDUSTRY: THE CASE OF TIME WARNER AND TURNER BROADCASTING

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The cable industry consists of both upstream and downstream firms: the Cable Television Programming Service Providers (CTPSPs) and the Multichannel Service Operators (MSOs). The CTPSPs create and provide basic cable programming to MSOs in exchange for monthly per-subscriber fees; they also receive funding from advertisers (JRank Encyclopedia). MSOs purchase franchise rights to operate in specific regions, where they act as monopoly providers of cable,\* providing subscribers with their choice of programming bundle for a monthly fee. In this paper, I look at the effects upstream bundling may have on subscribers. Gregory Crawford shows that downstream bundling of highly sought-after programming lowers subscriber surplus but raises profits for the cable providers (Crawford 2006). However, a model allowing for differentiated consumer preferences reveals that the price-discriminatory effects of bundling† may in fact raise consumer surplus. Indeed, while Michael Whinston emphasizes that bundling independent goods is an effective and profitable means for deterring entry (Whinston 1990), my model points to a somewhat counterintuitive outcome: product bundling can, at times, facilitate market entry by competitors and improve the welfare of consumers. My approach supports

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\* In a 2005 interview for the Hauser Oral and Video History Collection, former TCI employee Darlene Payne recounts that franchise renewals were not complicated by competition because over-building was costly and ineffective. While many debate whether cable systems should be treated as natural monopolies (see, for example, Bolick 1984), franchise agreements have effectively provided exclusive regional monopolies (Cui et al. 2005).

† The use of bundling to allow for price discrimination between consumers has been widely discussed (Stigler 1968; Adams and Yellen 1976; McAfee et al. 1989). More recently, Gregory Crawford concluded that bundling may provide a way for monopolists to reduce heterogeneity in consumer preferences for various goods and to capture higher profits than they could without bundling (Crawford 2005).

previous research conducted by Whinston that models heterogeneous preferences for one monopoly good that is tied to another monopoly good in a market that faces entry. My contribution is an evaluation of the effect of bundling on entry deterrence in light of heterogeneous preferences for both goods. My model also applies the theoretical aspects of bundling to a specific case in the cable industry; the Time Warner-Turner merger finalized in September of 1996 (FTC v. Time Warner et al., Complaint, 1997) serves as both an illustration and inspiration for my model.

One recurring debate in the literature on **bundling** goods focuses on the intersection of leverage theory and tying strategies. The Chicago School did not view tying as a viable strategy for a firm producing both a monopolized and a competitively supplied good. Its main argument was that the monopoly would have no apparent motivation for leveraging its market power over a bundled good when it could extract the same monopoly profit from selling the unbundled components (see Posner 1976 or Bork 1978). Whinston later changes this argument by saying that a similar firm may find tying to be a profitable strategy, as precommitments to tying could allow the firm to monopolize the market in which it currently produces the competitively supplied good (Whinston 1990). In addition to showing that bundling can be used to profitably deter entry, Whinston finds that heterogeneous consumer preferences eliminate the need for precommitment, as bundling may also act as a profitable strategy post-entry. Thus, in many cases, bundling may lead the other entrants to exit the market through strategic foreclosure. In his argument that a precommitment to tying is not necessary, Barry Nalebuff concludes that tying can actually mitigate profit losses in the case of entry (2004); this only holds under certain conditions in my model. For the purposes of my model, the precommitment discussion is not particularly relevant, as I will be assessing the value of a particular court agreement. I assume that Time Warner's bundling decision always holds. If there were a chance that Time

Warner could change its bundling decision post-entry, then the ban on bundling would be trivial. Assuming that some form of precommitment can be made, results that show that bundling does not always deter entry become interesting.

The model used in this paper is a variation on the Whinston model for the pure bundling\* of two independent goods. In section one, I give a brief historical introduction to the merger. In section two, I present the model, the results and limitations of which I describe in section three. In section four, I conclude.

## I. CASE BACKGROUND

In 1995, the three largest multichannel system operators, Telecommunications, Inc. (TCI), Time Warner (TW), and Comcast, served approximately 20, 16, and 6 percent of cable subscribers, respectively.† TCI and TW acted as both MSOs and CTPSPs, producing their own programming and providing it to other MSOs (FTC v. Time Warner et al.; Complaint, 1997). Despite high levels of concentration in the cable industry, limitations on anticompetitive behavior, especially among vertically integrated firms, were enforced in the early 1990s. In particular, the 1992 Cable Act prevented MSOs from entering into exclusive contracts with CTPSPs, in which they had a financial interest, and forbade CTPSP price discrimination against the competitors of its own downstream MSO, among other restrictions.

By 1995, rapidly rising cable rates led to a series of attempts to encourage competition in the industry through deregulation; however, the Telecommunications Act of 1996 failed to foster effective competition for the cable firms.‡ Instead, the

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\* Pure bundling means that only the bundle is provided, whereas mixed bundling offers both the bundle and its components independently. When I refer to bundling in this paper, I am referring to "pure bundling" only; I make no distinction between bundling and tying.

† Data compiled from the *Encyclopedia for Business* ("Cable and other pay television services") and the NCTA website ("Industry Data").

‡ Neither telephone nor satellite companies were able to provide effective competition for cable until much later; the mid-1990s saw cable prices continue to rise, largely uninhibited

newly deregulated cable industry saw even more acquisitions and higher levels of concentration (Encyclopedia for Business) as prices continued to rise (Consumer Federation of America 2001). It was in this atmosphere that Time Warner announced its decision to merge with Turner Broadcasting.

The Federal Trade Commission (FTC) reacted immediately to the merger, as it posed anticompetitive threats in both horizontal and vertical integration aspects; not only would the TW CTPSP's incentives be aligned with those of the Turner CTPSP, but the Turner CTPSP would also be vertically joined to the TW MSO. These relationships were further complicated by TCI's partial ownership (24 percent) of Turner prior to the merger, which translated to an approximately 9 percent non-voting share in new Time Warner.\* Additionally, TCI could continue to purchase shares until a poison pill<sup>†</sup> would finally dilute its ownership after it passed 18 percent (still a silent, or non-voting, share). Nonetheless, the FTC was afraid that the close alignment of the three firms, strengthened by agreements that forced TCI to carry certain Turner programming on its MSOs, would leave TCI with little incentive to compete with Turner broadcasting. This fear, when compounded with the potential for high prices through horizontal integration and the potential for foreclosures induced by vertical integration, led to extensive FTC scrutiny of the merger.<sup>‡</sup> Ultimately, a consent agreement was formed that temporarily ended the TCI-Turner carriage agreements, limited TCI's partial ownership share to 9.2 percent of Time Warner's fully diluted equity, and placed further stipulations on Time Warner's business decisions, one of which will

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by rate regulation after the Telecommunications Act (Consumer Relations of America 2001).

\* The facts I cite in my discussion of the historical background of the merger come from a case study by the consultants to TCI's attorneys in the FTC proceedings (Besen, Murdoch, O'Brien, Salop, and Woodbury 1999).

† A poison pill is a strategy used by a company to make itself less attractive to an acquirer considering a hostile takeover.

‡ Chipty finds that vertically integrated MSOs often refuse to carry the networks of CTPSPs that compete with their own CTPSPs, e.g., Comcast cable in Philadelphia does not offer the commonly offered network, Fox Sports, but instead offers its own sports program, Comcast SportsNet (Chipty 2001).

be discussed in detail in this paper (FTC v. Time Warner et al., Consent Agreement, 1997).

This paper focuses on part five of the consent agreement, which forbade Time Warner from bundling TW premium cable broadcasts with Turner-affiliated basic programming; specifically, the consent agreement included Time Warner's Home Box Office (HBO) and Turner's Cable News Network (CNN) in the bundling restriction (FTC v. Time Warner et al., Consent Agreement, 1997). At the time of the merger, HBO received the largest amount of subscription revenues of all U.S. programming and was considered by MSOs to be a "marquee" service necessary for acquiring a significant subscriber base (FTC v. Time Warner et al., Complaint, 1997). Although CNN operated as a monopoly in the twenty-four hour news market prior to the Time Warner-Turner merger, the announcement of the merger coincided with a declaration from FOX, a competing CTPSP that it intended to enter the market by creating the FOX News Channel (Besen et al. 1999). One may interpret the consent agreement's restriction of HBO-CNN bundling as an attempt by the FTC to protect the entry of FOX News. However, my model will explore the possibility that HBO-CNN bundling may, in some cases, have made FOX entry easier than it was under the non-bundling policy. My model also provides some insight into the effect of bundling on consumer surplus.

## II. THE MODEL

The following model seeks to reconstruct the relationship between CPTSPs and cable subscribers. Because each MSO operates as a regional monopoly, pays a monthly per-subscriber fee to the CPTSPs, and receives a monthly fee from subscribers, the relationship between firms can be greatly simplified with a few assumptions. First, I look at only those MSOs with no financial investment in either Time Warner or FOX. While these MSOs must pay fixed franchise fees to operate in their

regions,\* they are able to pass these fees along to all subscribers (Pioneer Communications 2008). I assume that cable subscribers have already paid these fixed fees and they do not, therefore, enter into the subscribers' preferences for additional cable programming. To simplify the model further, I do not address any other fixed costs that may be encountered by the MSOs. I assume that the MSOs have already paid upfront fees to both Time Warner and FOX, permitting them to purchase any additional programming from either company at the monthly per-subscriber costs.

To assess the effect of upstream bundling on consumer surplus, I assume that the MSOs add a constant markup to the monthly per-subscriber fees that they are charged by the CPTSPs. The MSOs then charge their subscribers this monthly amount (the sum of the markup and the fee which the MSOs must pay the CTPSPs). To simplify the model, I set the markup equal to zero, so that the subscribers' monthly payments are equal to the MSO monthly payments. In other words, the consumers must pay a monthly fee to the MSOs, who then pass this payment directly along to the CPTSP. Thus, as consumer preferences are reflected directly in the MSO's purchase decisions, the MSO's intermediary role is taken out of the model.

For simplicity, I also assume that consumers cannot purchase both FOX News and CNN. Of course, if consumers' willingness to pay for both channels is greater than the price charged by the MSO, there would be no reason to prevent them from purchasing both channels. However, this simplification suggests a more conservative approach to the model. If consumers could choose both FOX and CNN, bundling would be an even less effective entry deterrent. Therefore, if the model's results show that bundling can, in some cases, facilitate FOX's entry, this result is only made more robust by the fact that the model limits consumer choices in this way.

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\* After the fixed fees of entry have been paid, additional fixed fees do not present major hindrances for the MSOs, as monthly per-subscriber programming fees constitute their greatest expenses (JRANK Encyclopedia).

The model is based on the Whinston model, in which a first firm (TW) operates as a monopoly in two markets (the market for premier movie channels and the twenty-four hour news market), and a second firm (FOX) plans to enter one of these markets (the twenty-four hour news market). The timeline of the model is as follows:

1. Time Warner chooses whether or not to bundle HBO with CNN.
2. FOX chooses whether or not to launch FOX News.
3. Dependent on FOX's entry decision, either TW or both firms set prices.

My analysis builds upon the Whinston model with two important adjustments that make it more applicable to the Time Warner-Turner case. First, I allow for heterogeneous preferences among consumers for the goods in both markets. Second, I assume that in the twenty-four hour news market, all consumers derive a constant additional utility,  $\delta$ , for purchasing FOX News instead of CNN. Marginal costs of production are zero for both firms. Consumers' preferences,  $\alpha$ , for HBO are uniformly distributed from zero to one. Consumers' preferences,  $\beta$ , for CNN are also uniformly distributed from zero to one. Thus, consumers' preferences for FOX News are uniformly distributed from  $\delta$  to  $1 + \delta$ . If the price of the channel is set lower than a particular consumer's valuation of it, that consumer will purchase the channel, subject to the assumption that no consumer purchases both CNN and FOX News.

### Time Warner chooses not to bundle

*FOX does not enter*

By using backward induction, I can see what the optimal prices for each firm would vary according to TW's bundling decision and FOX's entry decision. If TW chooses not to bundle

HBO and CNN and FOX chooses not to enter the twenty-four hour news market, then TW will set monopoly prices for both HBO and CNN because it faces no competition in either market. Thus, TW's profits in both markets as a function of price will be

$$p \int_p^1 1 dp$$

Quantity can be written directly as a function of price because

$$\int_p^1 1 dp$$

captures the number of consumers whose valuation of the channel is higher than the price and who are therefore willing to purchase it. The optimal price in each market is simple to obtain. The first-order condition is given by:

$$\frac{d[p \int_p^1 1 dp]}{dp} = \frac{d[p(1-p)]}{dp} = 1 - 2p = 0$$

Thus,

$$p = 0.5.$$

Consumer surplus in each market is the value that participating consumers derive from their purchase ( $v$ ) minus the price that they pay. Consumer surplus over both markets is simply two times the consumer surplus in each, due to identical prices and preference probability distributions in each market:

$$2 \int_{0.5}^1 (v - 0.5) dv = 0.25$$

*FOX does enter*

If TW chooses not to bundle and FOX decides to enter the twenty-four hour news market, TW still faces no competition in the premium movie channel market and thus continues to sell HBO at the monopoly price, 0.5. In the twenty-four

hour news market, TW and FOX engage in price competition. If FOX News and CNN were non-differentiated goods, they would compete according to Bertrand competition until prices reached zero, the marginal cost of each firm.\* However, because consumers all prefer FOX News to CNN by  $\delta$ , the consumer with zero valuation for CNN would be indifferent between paying zero (the marginal cost) for CNN and paying  $\delta$  for FOX News. In FOX's attempt to capture the market, the additional marginal utility gained from purchasing FOX News mirrors the effect that a lower marginal cost of production for FOX News would have. Instead of FOX and TW both lowering prices until they reach zero, FOX can set its price  $P_{2B}$  equal to  $\delta$  and capture the entire market.

The profit that FOX News makes for capturing the market is:

$$\delta \int_0^1 d\beta = \delta$$

Consumer surplus is given by:

$$\int_{P_{2B}-\delta}^1 [\beta + \delta - P_{2B}]d\beta + \int_{0.5}^1 [\alpha - 0.5]d\alpha =$$

$$\int_0^1 [\beta]d\beta + \int_{0.5}^1 [\alpha - 0.5]d\alpha = 5/8$$

By backwards reasoning, if Time Warner chooses not to bundle, FOX will enter the market only if  $\delta > F$ , in which case consumer surplus will be  $5/8$ . If  $\delta < F$ , FOX will not enter, and consumer surplus will be  $0.25$ . Table 1 summarizes the results of the no-bundling case.

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\* Under Bertrand competition for two non-differentiated goods, firms set prices at the higher of the two marginal costs of production, and the firm with the lower marginal cost steals the market.

## Time Warner chooses to bundle

*FOX does not enter*

If TW bundles and FOX does not enter the news market, TW will set its bundle price to maximize profits. To determine what that price will be, I find the probability distribution function of consumer preferences for the CNN-HBO bundle. Thus, I carry out a convolution of the probability distribution functions of consumer preferences for each individual good in the bundle. Since preferences  $\alpha$  and  $\beta$  are uniformly distributed from 0 to 1, the distribution of the sum of these preferences will range from 0 to 2. The optimal price for the bundle,  $P_{AB}$ , is equal to  $\sqrt{2}/3$ . TW's profits are  $\Pi_{TW} = 2/3\sqrt{2}/3$ . Consumer surplus is  $1 - 8/9\sqrt{2}/3$ . The calculations for these results can be found in Appendix A.

*FOX does enter*

If TW bundles and FOX enters the news market, TW sets its bundle price and FOX simultaneously sets the price of FOX News. To compete with FOX for consumers, the price TW sets for its bundle must be lower than the price it would set without competition. Thus,  $0 \leq P_{AB} \leq 1$ . TW's consumers will consist of those who value the bundle more than  $P_{AB}$  and who obtain greater surplus from purchasing the CNN-HBO bundle than they do from purchasing FOX News alone. In other words, those who purchase the bundle will have preferences such that  $\alpha + \beta \geq P_{AB}$  and  $\beta + \alpha - P_{AB} \geq \beta + \delta - P_{B2}$ . Those who purchase FOX News instead of the bundle have preferences such that  $\beta \geq P_{B2}$  and  $\beta + \alpha - P_{AB} \leq \beta + \delta - P_{B2}$ . The profit functions for TW and FOX are written in Appendix B, where  $f_z(z)$  is the probability distribution function for consumers' valuations of the bundle (derived in Appendix A). Using the best reaction functions for both firms, each firm's optimal prices can be found for different values of  $\delta$ .

Furthermore, for each set of optimal prices, consumer surplus can be derived. The functions for consumer surplus and each firm's profits are derived in Appendix B.

If, for example,  $\delta = 0$ , four possible price sets satisfy the best response functions. However, only one of these price sets satisfies the necessary conditions for it to be an optimal price set for both profit-seeking firms. Because  $0 \leq P_{AB}^* \leq 1$  and because FOX would not set its price such that  $\Pi_{FOX} < 0$ , only one equilibrium price set remains, and it yields a profit for FOX of  $\cong 0.0487$  and a consumer surplus of  $\cong 0.458$ . This result is illustrated in Table 2 for the case when  $\delta = 0$ .

Using Microsoft Excel's Solver add-in, I found optimal prices, profits, and consumer surplus at different values of  $\delta$  and compiled this information into two graphs. The graph in Appendix C compares FOX's post-entry profits in the bundling and non-bundling cases. FOX will only choose to enter if  $\delta$  is high enough that expected profits under entry are greater than the fixed cost of entry. Thus, the graph in Appendix C can be interpreted as showing the maximum fixed cost,  $F$ , at which FOX would be willing to enter at different values of  $\delta$ . The graph in Appendix D shows consumer surplus under each of the four bundling and entry combinations. Table 3 also summarizes the effect of Time Warner's decision to bundle.

## Analysis of the Model

### Results

The intent of the model analysis is two-fold. First, it is meant to discuss the circumstances under which bundling may facilitate, rather than deter, entry from FOX News. Second, it should explore how bundling can act as an effective price discrimination tool.

## Entry Deterrence

The graph in Appendix C makes it clear that for values of  $\delta$  below 0.06, FOX would prefer Time Warner to bundle. For low levels of differentiation between FOX News and CNN, entry by FOX can occur at higher fixed entry costs under TW bundling than it can without TW bundling. In the model, heterogeneous valuations mean that TW is not able to price the bundle so that every consumer prefers to purchase it over FOX News. As  $\delta$  goes to zero, the extra amount consumers are willing to pay for FOX over CNN in the non-bundling case goes to zero, so FOX profits disappear. Thus, allowing for heterogeneous preferences leads to the result that bundling facilitates entry at very low levels of  $\delta$ . This conclusion supports Whinston's findings that bundling can facilitate entry when differentiation between the common goods (in this case, the news channels) is small and preferences for the unique good (in this case, HBO) differ widely across consumers (Whinston 1990). Graphically, the  $y$ -intercept for the profit curves in the nonbundling case is zero: if CNN and FOX News are completely identical (i.e.,  $\delta = 0$ ), FOX's entry will lead to Bertrand competition until prices are pushed down to the marginal cost of zero, at which point neither firm makes a profit. On the other hand, the  $y$ -intercept for the profit curve under bundling is greater than zero: even if CNN and FOX News are completely identical, some consumers will place such little value in HBO that they prefer to purchase FOX News alone rather than purchase the bundle. However, as  $\delta$  increases, FOX's profit under nonbundling catches up to and quickly surpasses its profit under bundling. Prices under bundling grow more slowly in  $\delta$ , as shown in the best response functions (from Appendix B):

$$P_{AB} = \frac{2P_{B2} - \delta - 3P_{B2}^2 + 4\delta P_{B2} - \delta^2}{1 - 2P_{B2} + \delta}$$

$$P_{2B} = \frac{-1 + 2P_{AB} + \delta + 3/2P_{AB}^2 + 2P_{AB}^3 - 3/2P_{AB}^2}{1 - 3/2P_{AB}^2}$$

While an increase in  $\delta$  has the direct effect of increasing  $P_{2B}$ , it also has the direct effect of decreasing  $P_{AB}$ .  $P_{AB}$  has a positive relationship with  $P_{2B}$ . Thus, an increase in  $\delta$  has a direct, positive effect on  $P_{2B}$  and an indirect, negative effect on  $P_{2B}$  through  $P_{AB}$ . While  $P_{2B}$  still grows in  $\delta$ , these two effects counteract each other to some extent, so the price rises at a rate slower than  $\delta$  under bundling. Similarly, an increase in  $\delta$  means that consumers derive greater utility from purchasing FOX but also pay a higher price. Thus, though FOX's profit under bundling increases in  $\delta$ , it rises slower than the linear rate at which FOX's profit grows in  $\delta$  in the nonbundling case.

For  $\delta > 0.06$ , FOX News can enter at higher fixed costs under non-bundling than under bundling. However, this does not mean that bundling necessarily deters entry at these levels of  $\delta$ . Whether or not FOX will enter ultimately depends on the fixed cost,  $F$ , as well as the bundling decision.

### Consumer Surplus

With heterogeneous consumer preferences, bundling can also act as an effective price discrimination tool with important implications for consumer surplus. The simplest way to see this effect is to compare consumer surplus without bundling to consumer surplus with bundling if FOX chooses not to enter in either case. In the no bundling and no entry setting, TW sets monopoly prices, which leads to the lowest possible consumer surplus, as is apparent in the graph in Appendix D. In the bundling and no entry setting, TW is able to maximize its profits at a bundle price that is lower than the sum of the monopoly prices for each good. Nalebuff calls this the "bundling discount" (2004). It is a consequence of the price discriminatory effect of

bundling, which allows TW to capture a greater percentage of both markets at a lower price. This effect increases consumer surplus, as shown in the graph in Appendix D.

To see why this effect exists, consider a consumer who values HBO at  $\alpha = 0.4999$  and CNN at  $\beta = 1$ . Recall that I am comparing the two simplest cases, in which FOX does not enter no matter what TW's bundling decision is. If TW decides not to bundle, the consumer will purchase CNN at the monopoly price of 0.5 and receive a surplus of 0.5. If TW bundles, the consumer will purchase the bundle at the optimal bundle price of  $\sqrt{2}/3$  and receive a surplus of approximately 0.68. In this case, bundling means that the consumer's surplus rises and that HBO gains an additional subscriber.

Of course, the price discriminatory effect of bundling does not have positive implications for every consumer. Perhaps a different consumer would purchase CNN in the non-bundling case, but does not purchase anything if CNN is bundled with HBO (if for example, this consumer's valuation of CNN is  $0.5 \leq \beta < \sqrt{2}/3$  and valuation of HBO is  $\alpha \leq \beta - \sqrt{2}/3$ ). Yet, when TW faces no competition in either market, this "negative" effect of price discrimination on consumer surplus is not as powerful as the "positive" effect. A consumer willing to purchase either CNN or HBO independently in the non-bundling case is more likely to purchase them both in the bundle at the "bundling discount" than to purchase nothing at all. This result is briefly explained in a more quantitative manner in Appendix E.

If FOX does choose to enter the market, consumer surplus increases no matter which bundling decision TW has made. Competition depresses prices and prevents TW from setting either monopoly prices in both markets or the monopoly bundling price. In the case of entry and no bundling, consumer surplus is constant, as TW sets the monopoly price on HBO, and FOX sets the price  $\delta$  on FOX News. As  $\delta$  increases, the price on FOX rises, but the value consumers derive from purchasing FOX rises equivalently, so consumer surplus is constant in  $\delta$ .

In contrast, if TW chooses to bundle and FOX decides

to enter, consumer surplus rises in  $\delta$ . As  $\delta$  grows larger, the bundle price offered by TW is suppressed by competition from the increasingly attractive FOX News network. Similarly, as  $\delta$  increases, the price of FOX does not increase by the same amount because of the threat posed by competition with the bundle price (which has been further repressed by the increase in  $\delta$ ). Thus, as  $\delta$  rises, the consumers who purchase FOX receive higher levels of surplus caused by increased utility at a price that is held back by competition. Furthermore, when compared to FOX entry without TW bundling, entry with bundling allows consumers to benefit from the bundling discount without suffering the same drawbacks of price discrimination. Those consumers who would purchase CNN independently but purchase nothing at all if it is bundled would enjoy an additional option: instead of an "all or nothing" choice under bundling, entry means that consumers may purchase FOX instead of the bundle.

A summary of the effect of bundling on FOX's entry decision and consumer surplus is given in Table 4. If the differentiation of FOX and CNN is at either extreme (either very high or very low), the bundling strategy that facilitates FOX's entry is not the bundling strategy that maximizes consumer surplus if entry occurs. If, for example, CNN and FOX are nearly identical programs (e.g.,  $\delta = 0.05$ ), bundling facilitates FOX entry. Yet, if TW chooses not to bundle, consumer surplus is maximized only if FOX enters. If FOX does not enter, then consumer surplus without bundling is lower than consumer surplus with bundling because a no-bundling policy gets rid of the price discriminatory effects. This result reinforces earlier findings by O'Brien and Shaffer: "a policy of prohibiting bundled discounts may lead to ... lower welfare if it fails to induce additional entry" (O'Brien and Shaffer 2005, 575). The decision to bundle eliminates the risk of observing the lowest possible level of consumer surplus. From a comparison of both graphs, it is clear that for the extreme values of  $\delta$ , a trade-off exists between facilitating entry and maximizing surplus if entry occurs. Thus, the FTC should take into

account that bundling may not necessarily deter entry, and that even in the cases where it makes entry more difficult, bundling may still lead to higher consumer surplus. For the intermediate range of  $\delta$ , a trade-off exists between the benefits of the non-bundling policy, i.e., facilitating FOX entry and maximizing consumer surplus in the case of entry, and the benefit of the bundling policy, i.e., eliminating the risk of observing the lowest possible level of consumer surplus if entry does not occur.

### III. LIMITATIONS

In my presentation of the model, I discuss several simplifications employed to make the model more mathematically viable. In this section, I point out additional assumptions made for the model that limit its realism and applicability. In order to compare the bundling of TW and CNN to the Whinston model for bundling independent goods, the assumption that HBO and CNN are monopolies in their respective markets prior to FOX entry must hold. In the twenty-four hour news market, CNN indeed acted as a monopoly when FOX announced its intention to enter. However, just months prior to FOX's final entry decision, MSNBC entered the twenty-four hour news market. In the premium movie channel market, HBO's role as a monopoly can be debated on the grounds of market definition. While it served a particular niche of consumers in the early 1990s, it is possible to redefine HBO's market such that it has a few small competitors. An interesting extension to the model would be to see how the effects of bundling change if CNN and HBO operate in oligopolies with differentiated goods. Nonetheless, for the purposes of this paper, modeling TW as an oligopoly would only strengthen my hypothesis that bundling does not always deter FOX entry. Without full market power, TW's decision to bundle would act as an even less potent entry deterrent than is found in the model. Thus, the assumption that TW operates as a monopoly in both markets indicates a more conservative approach to the

model. The assumptions made for consumer preferences in the model are more troublesome. Clearly, consumer preferences for HBO and CNN are unlikely to be uniformly distributed. Yet, the assumption that preferences are uniformly distributed and calibrated from zero to one is mathematically clean and provides a nice structure for analysis. Similarly, the assumption that every consumer prefers FOX to CNN by a constant value works as a way of simplifying the model to provide clear intuition but does not hold true in reality. Certain regions within the U.S. may prefer FOX to CNN for sociopolitical reasons, but it is not likely that every consumer would prefer FOX to CNN. It is even less believable that each would prefer FOX to CNN by the same amount. However, because marginal costs are zero (an accurate assumption for the extra cost CTPSPs incur in order to provide programming to one additional region), the model must include some type of differentiation between FOX and CNN in order for the effect of Whinston's results to be assessed and developed. Otherwise, FOX would never enter in the non-bundling case. Thus, the simplest form of differentiation, in which FOX is always preferred by a constant amount to CNN, is used. While it would be more realistic to incorporate preferences between differentiated goods according to the Hotelling model, a Hotelling model of preferences for differentiated news programs would be much more complex when combined with heterogeneous valuations for HBO under bundling.

Another aspect of consumer surplus that our model does not discuss is content variety. Consider a consumer who is indifferent between purchasing the CNN-HBO bundle and purchasing FOX News alone (at a certain level of  $\delta$ ). A more accurate model may describe consumers as deriving an additional utility from purchasing the bundle rather than purchasing FOX alone because the bundle provides the subscriber with more content variety. However, if the model allowed consumers to purchase both FOX News and the bundle, the extra utility derived from content variety would be highest if the consumer purchased content from both FOX and TW. Thus, ignoring the

content variety of utility has ambiguous implications for the entry-deterrent effect of bundling. Perhaps modeling an extra utility from content variety would make bundles more attractive to consumers, but it would also imply that some consumers want to purchase from both FOX and TW, which my model does not allow. Nonetheless, if a consumer does not value an additional channel enough to purchase it without the content variety utility, it seems unlikely that the consumer would purchase it in order to receive the additional utility of having an extra channel. The relationship between content variety and consumer surplus is central to the current debate over à la carte channel pricing.\*

#### IV. CONCLUSION

Though many of the model's assumptions limit its use, it provides insight into the FTC's decision to forbid Time Warner from bundling CNN and HBO. In particular, the model reveals that bundling can facilitate entry when differentiation between the tied goods (those in the market that faces entry) is very low. Of course, it is unlikely that FOX News and CNN would be nearly identical programs, as news programs could be differentiated by a focus on international or local news or by an alignment with conservative or liberal politics. The implication of the model is that bundling becomes more helpful for entry as FOX News and CNN become less differentiated. Furthermore, the model reveals a trade-off between facilitating entry and maximizing consumer surplus. Under the fixed cost and  $\delta$  values at which bundling makes entry more difficult, bundling may also maximize consumer surplus if entry occurs. If entry by FOX is deterred independently of TW's actions, bundling also maximizes consumer surplus. Thus, if the entry costs faced by FOX appear too high to overcome no matter which bun-

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\* For example, the Besen case study groups HBO together with Showtime and other movie channels in a premium network market, though none of HBO's competitors in this market have nearly as large a subscription base as HBO (Besen et al., 1999).

dling decision TW makes, the decision to bundle leads to price discriminatory effects that ultimately benefit consumers. It is important to note that advertising benefits, lower marketing costs, and lower administrative fees usually accompany a decision to bundle (Crawford 2005, 42), which is another incentive for bundling not discussed in the model.

These results imply that while the FTC's decision to forbid Time Warner from bundling CNN and HBO may be *prima facie* pro-competitive, a policy that forbids bundling may not be the best thing for consumers. Levels of entry costs and differentiation between FOX News and CNN must be assessed alongside TW's bundling decision to evaluate both the likelihood of entry and the consequences entry has for consumer surplus. If the FTC fears that bundling HBO with CNN would deter FOX's entry, then, by virtue of the fact that the FTC's regulations are meant primarily to protect consumers, this fear should be rooted in the belief that entry increases consumer surplus. Yet, both the price discriminatory effect of bundling and the fact that bundling may facilitate entry under certain conditions must be taken into account when considering the effect of bundling on consumer surplus.

Shortly after the FTC's decision to forbid the newly merged Time Warner-Turner enterprise from bundling, Time Warner's CNN faced another important turn of events. On October 7, 1996, just weeks after the consent agreement for the Time Warner-Turner merger was publicized, FOX News launched (Besen et al. 1999). It is unclear how foreknowledge that TW would not be allowed to bundle CNN with HBO factored into FOX's decision to launch FOX News. The effectiveness of the consent agreement must be viewed in light of the fact that another CTPSP, the National Broadcasting Company, launched its own twenty-four hour news program (MSNBC) in the summer of 1996. When the consent agreement was finalized, Time Warner no longer had monopoly power in the twenty-four hour news market because MSNBC had already entered. Thus, CNN-HBO bundling would not have discour-

aged FOX entry as much as it would have if MSNBC had not already entered the market. Even ignoring the effect of MSNBC's entrance on FOX's decision to enter the market, it is far from certain that forbidding bundling will always aid the consumer. Although the model itself cannot be used to accurately predict differences in consumer surplus, it has shown that bundling has the potential to increase consumer surplus. Thus, insofar as the FTC regulates the cable industry to protect consumer's interests, these results cast doubt on the merit of the FTC's interference in TW's bundling decision.\*

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\*As a final thought, FOX's reaction to another stipulation set forth by the consent agreement adds an interesting layer to the case. In addition to barring TW from bundling CNN with HBO, the consent agreement decreed that TW would be forced to offer one other, independently produced twenty-four hour news network to its subscribers by 2001 (FTC v. Time Warner et al., Consent Agreement, 1997). When TW chose to carry MSNBC, FOX sued, stating that it would not be able to survive if it did not receive carriage from TW MSOs in particular regions of the United States (especially the densely populated and lucrative region of New York City). Although TW successfully blocked the suit from going to court, both companies decided to settle. After accepting what was reported to be a very profitable deal from FOX, Time Warner began to offer FOX News to its subscribers. Rennhoff and Serfes provide a good summary of the literature on bundling in oligopolistic markets, where bundling policies tend to lower firms' profits (Rennhoff and Serfes 2008, 551). However, Stole finds that bundling in an oligopoly setting may still capture price discriminatory effects that make it profitable and may lead to foreclosure of entrants (Stole 2003).

Table 1: TW chooses not to bundle

	$\delta < \mathbf{F}$	$\delta > \mathbf{F}$
FOX's entry decision	No entry	Entry
FOX's profits	0	$\delta - \mathbf{F}$
Time Warner's profits	1/2	1/4
Consumer surplus	1/4	5/8

Table 2: Finding optimal prices from reaction functions

$P_{2B}^*$	<b>0.212</b>	0.384	0.582	0.833
$P_{AB}^*$	<b>0.503</b>	1.40	-0.900	0.624
$\Pi_{2B}^*$	<b>0.0487</b>	$P_{AB}^*$ should be $\leq 1$	$P_{AB}^*$ should be $\geq 0$	-0.0291
$\Pi_{AB}^*$	<b>0.312</b>			$\Pi_{2B}$ should be $\geq 0$
Consumer Surplus	<b>0.458</b>			
$P_{2B}^* =$	Optimal FOX price			
$P_{AB}^* =$	Optimal bundle price			

Table 3: TW chooses to bundle

	$[\Pi_{2B}^*(\delta) \mid entry] < \mathbf{F}$	$[\Pi_{2B}^*(\delta) \mid entry] \geq \mathbf{F}$
FOX's entry decision	No entry	Entry
FOX's profits	0	$\Pi_{2B}^*(\delta) \mid entry$
Time Warner's profits	$2/3\sqrt{2/3}$	$\Pi_{AB}^*(\delta) \mid FOX \text{ entry}$
Consumer surplus	$1 - 8/9\sqrt{2/3}$	$CS(\delta) \mid entry$

Table 4: Effect of bundling on entry and consumer surplus

Which outcome...	$0 \leq \delta \leq 0.06$	$0.06 \leq \delta \leq 0.5$	$0.5 \leq \delta \leq 1$
...facilitates FOX entry?	Bundling	No bundling	No bundling
...maximizes consumer surplus?	No bundling, entry	No bundling, entry	Bundling, entry
...minimizes consumer surplus?	No bundling, no entry	No bundling, no entry	No bundling, no entry

## Appendix A: Bundling Without Entry

Calculations for finding the probability distribution of consumer preferences for the bundle and thereby finding the optimal bundle price:

$$f_{\alpha}(x) = f_{\beta}(x) = \left\{ \begin{array}{l} 1 \text{ if } 0 \leq x \leq 1, \\ 0 \text{ otherwise} \end{array} \right\},$$

where  $x$  is a particular value of  $\alpha$  or  $\beta$ .

$$f_Z(z) = \int_{-\infty}^{+\infty} f_{\alpha}(z-y)f_{\beta}(y)dy,$$

where  $y$  is a particular value of  $\beta$  and  $z$  is a particular value of  $\alpha + \beta$ .

$f_Z(z)$  is zero unless  $0 \leq z - y \leq 1$ , in which case it is one.

Since  $0 \leq y \leq 1$ , if  $z < 0$  or  $z > 2$ ,  $f_Z(z) = 0$ .

If  $0 \leq z \leq 1$ ,

$$f_{\alpha}(z-y) = \left\{ \begin{array}{l} 1 \text{ where } y \leq z \\ 0 \text{ otherwise} \end{array} \right\},$$

thus,

$$f_Z(z) = \int_0^z dy = z$$

If  $1 \leq z \leq 2$ ,

$$f_{\alpha}(z-y) = \left\{ \begin{array}{l} 1 \text{ where } z-1 \leq y \leq 1 \\ 0 \text{ otherwise} \end{array} \right\},$$

thus,

$$f_Z(z) = \int_{z-1}^1 dy = 2 - z$$

$$f_Z(z) = \left\{ \begin{array}{l} z, \quad \text{if } 0 \leq z \leq 1 \\ 2 - z, \quad \text{if } 1 < z \leq 2 \end{array} \right\} \text{ and } 0 \text{ otherwise}$$

Time Warner will set the price of its bundle to maximize profits:

$$\Pi_1 = P_{AB} \int_{P_{AB}}^2 f_Z(z) dz$$

If  $P_{AB} < 1$ ,

$$\begin{aligned} \Pi_1 &= P_{AB} \int_{P_{AB}}^1 (z) dz + P_{AB} \int_1^2 (2 - z) dz \\ &= P_{AB} \left[ \frac{1}{2} - \frac{P_{AB}^2}{2} + \frac{1}{2} \right] \end{aligned}$$

To find  $P_{AB}^*$

$$\begin{aligned} \frac{d\Pi_1}{dP_{AB}} &= 0 = 1 - \frac{3}{2} P_{AB} \\ P_{AB}^* &= \sqrt{2/3} \\ \Pi_1 &= 2/3 \sqrt{2/3} \end{aligned}$$

If  $P_{AB} > 1$ ,

$$\begin{aligned} \Pi_1 &= P_{AB} \int_{P_{AB}}^2 (2 - z) dz \\ &= P_{AB} \left[ 2 - 2P_{AB} + \frac{1}{2} P_{AB}^2 \right] \end{aligned}$$

In this case,

$$\begin{aligned} \frac{d\Pi_1}{dP_{AB}} &= 0 = 2 - 4P_{AB} + \frac{3}{2} P_{AB} \\ P_{AB}^* &= 2/3 \\ \Pi_1 &< 2/3 \sqrt{2/3} \end{aligned}$$

$P_{AB}^* = \sqrt{2/3}$  maximizes profits and is therefore the optimal bun-

dling price.

Consumer surplus in this case would be:

$$\begin{aligned} & \int_{\sqrt{2/3}}^2 (z - \sqrt{2/3}) f_z(z) dz \\ &= \int_{\sqrt{2/3}}^1 (z - \sqrt{2/3}) z dz + \int_1^2 (z - \sqrt{2/3})(2 - z) dz \\ &= 1 - 8/9\sqrt{2/3} \end{aligned}$$

### Appendix B: Bundling with Entry

$$\begin{aligned} \Pi_{TW} &= P_{AB} \int_{P_{AB}+\delta-P_{B2}}^2 \int_{P_{AB}}^2 f_Z(z) dz d\alpha \\ \Pi_{TW} &= P_{AB} \int_{P_{AB}+\delta-P_{B2}}^1 \int_{P_{AB}}^1 (z) dz d\alpha + P_{AB} \int_{P_{AB}+\delta-P_{B2}}^2 \int_1^2 (2 - z) dz d\alpha \\ \Pi_{FOX} &= P_{B2} \int_0^{P_{AB}+\delta-P_{2B}} \int_{P_{B2}-\delta}^1 (z) d\beta d\alpha \end{aligned}$$

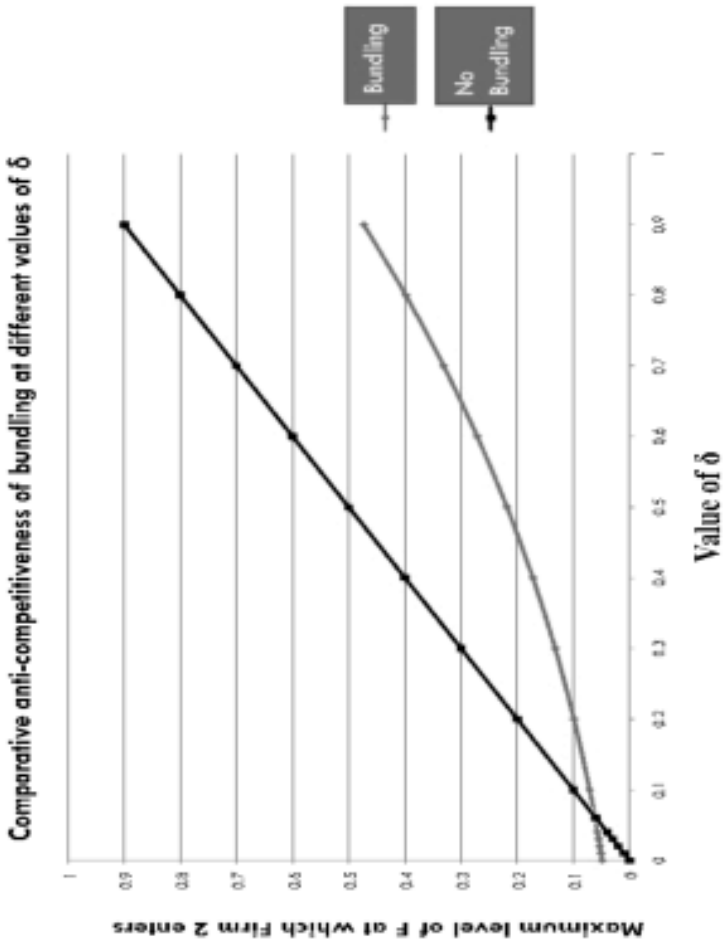
By differentiating the above functions with respect to  $P_{AB}$  and  $P_{B2}$ , respectively, and setting the resulting functions equal to zero, the following best response functions are found:

$$\begin{aligned} P_{AB} &= \frac{2P_{B2} - \delta - 2P_{B2}^2 + 4\delta P_{B2} - \delta^2}{1 - 2P_{B2} + \delta} \\ P_{B2} &= \frac{-1 + 2P_{AB} + \delta + 3/2P_{AB}^2 + 2P_{AB}^3 - 3/2P_{AB}^2}{1 - 3/2P_{AB}^2} \end{aligned}$$

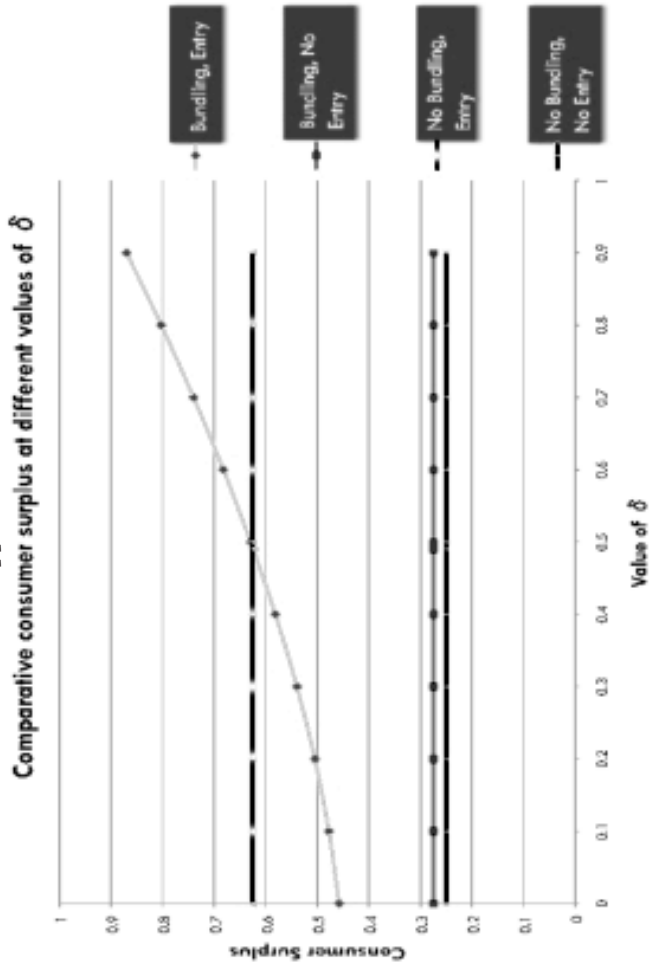
Consumer surplus is the sum of the surplus of consumers who purchase the bundle and the surplus of consumers who purchase FOX News alone:

$$\begin{aligned} & \int_{P_{AB}-P_{2B}+\delta}^1 \int_{P_{AB}}^2 (z - P_{AB}) f_z(z) dz d\alpha + \int_0^{P_{AB}-P_{2B}+\delta} \int_{MAX(P_{2B}-\delta,0)}^1 (\beta + \delta - P_{2B}) d\beta d\alpha \\ &= \int_{P_{AB}-P_{2B}+\delta}^1 \int_{P_{AB}}^1 (z - P_{AB})(z) dz d\alpha + \int_{P_{AB}-P_{2B}+\delta}^2 \int_1^2 (z - P_{AB})(2 - z) dz d\alpha \\ & \quad + \int_0^{P_{AB}-P_{2B}+\delta} \int_{MAX(P_{2B}-\delta,0)}^1 (\beta + \delta - P_{2B}) d\beta d\alpha \end{aligned}$$

Appendix C



Appendix D



Appendix E

The price discriminatory effect of bundling does not have positive implications for every consumer. Consider a consumer who would purchase CNN in the non-bundling case, but does not purchase anything if CNN is bundled with HBO. This consumer's valuation of CNN is  $0.5 \leq \beta < \sqrt{2/3}$  and valuation of HBO is  $\alpha \leq \beta - \sqrt{2/3}$ .

Although bundling lowers this particular consumer's surplus, the overall price discriminatory effect of bundling is an increase in total consumer surplus. When TW does not face any competition, a consumer is only hurt by bundling if this consumer's preferences are such that purchasing one independent good at the monopoly price is valued more than purchasing nothing, which is in turn valued more than purchasing the bundle. Mathematically this consumer's preferences would only satisfy:

$$\alpha - P_{HBO}^M > 0 > \alpha + \beta - P_{AB},$$

$$P_{AB} - P_{HBO}^M > \beta, \text{ or, } 0.5 - \sqrt{2/3} > \beta$$

which is approximated by

$$0.3 \gtrapprox \beta > 0$$

Analogously, the consumer's preferences would only satisfy:

$$\beta - P_{1B}^M > 0 > \alpha + \beta - P_{AB}$$

$$0.5 - \sqrt{2/3} > \alpha$$

which is approximated by

$$0.3 \gtrapprox \alpha > 0$$

In contrast, a consumer would have preferences

when 
$$\alpha + \beta - P_{AB} > \alpha - P_{1A}^M$$

$$1 > \beta \gtrapprox 0.3$$

(with the analogue for  $\alpha$ ). Due to the uniform distribution of preferences,  $1 > \beta \gtrapprox 0.3$  occurs more frequently than  $0.3 > \beta \gtrapprox 0$ , and  $1 > \alpha \gtrapprox 0.3$  occurs more frequently than  $0.3 \gtrapprox \alpha > 0$ . Thus, a consumer willing to purchase either CNN or HBO independently in the non-bundling case is more likely to purchase them both in the bundle at the "bundling discount" than to purchase nothing at all.

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