Exclusionary Bundling[1]

by

Barry Nalebuff

Abstract: This paper introduces the concept of "exclusionary bundling." Under exclusionary bundling, a firm with market power in good A and facing actual (or potential) competition in good B prices an A-B bundle in a way that makes it impossible for equally-efficient one-good rivals selling B to compete. Exclusionary bundling has a foreclosure effect similar to that of predatory pricing, but the two practices have important differences. Unlike traditional predatory pricing, the exclusionary behavior need not be costly to the firm. The intuition is that under predation, the firm actually has to charge a price below cost and thus loses money that it later has to recoup. Under exclusionary bundling, the firm only has to threaten to raise its unbundled prices if the bundle is not bought. All customers are led to buy the bundle and so the threat never need be carried out. I show how this worked in practice using the case study of ACCC versus Baxter Healthcare in Australia.

Evidence from antitrust cases suggests that the practice of exclusionary bundling leads to other undesirable effects. When bundle discounts are offered, they are less likely to be passed on to consumers. This is because the bundle discount typically takes the form of a lump-sum price reduction and thus does not lead to lower prices on the margin. Second, buyers and rivals may find it difficult to compare a bundled price with à la carte offerings. This is especially true when the demand is uncertain. The reduction in pricing transparency can lead to inefficient choices and low-cost foreclosure, especially when the seller is better informed than the buyer about future demand. These issues are illustrated using the Baxter case, SmithKline versus Lilly and LePage's versus 3M.

[1] This paper has benefited enormously from conversations with Joseph Farrell, Joshua Gans, Jackie Gleeson, Al Klevorick, David Majerus, Ben Polak, Stephen Rushton, David Sibley, Joseph Stiglitz, John Thorne, Jean Tirole, Gary Zanfagna, and members of the ACCC. The author worked as an expert witness in the ACCC case against Baxter. The opinions expressed herein are those of the author. Author contact information: Barry Nalebuff, Milton Steinbach Professor, Yale School of Management, 135 Prospect St., New Haven, CT 06511, barry.nalebuff@yale.edu

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I. Introduction

This paper introduces the concept of "exclusionary bundling." Under exclusionary bundling, a firm with market power in good A and facing actual (or potential) competition in good B prices an A-B bundle in a way that makes it impossible for equally-efficient one-good rivals selling B to compete. Exclusionary bundling has a foreclosure effect similar to that of predatory pricing, but the two practices have important differences. Unlike traditional predatory pricing, the exclusionary behavior need not be costly to the firm. The intuition is that under predation, the firm actually has to charge a price below cost and thus loses money that it later has to recoup. Under exclusionary bundling, the firm only has to threaten to raise its unbundled price if the bundle is not bought. All customers are led to buy the bundle and so the threat never need be carried out.

The evidence from antitrust cases suggests that the practice of exclusionary bundling leads to other undesirable effects. When bundle discounts are offered, they are less likely to be passed on to consumers. This is because the bundle discount typically takes the form of a lump-sum price reduction and thus does not lead to lower prices on the margin. Second, buyers find it difficult to compare a bundled price with à la carte offerings. This is especially true when the buyer's demand is uncertain. The reduction in pricing transparency can lead to inefficient choices and low-cost foreclosure, especially when the seller is better informed than the buyer about future demand.

While the formalization of exclusionary bundling is new, the courts have adopted variants of this approach for several decades. After presenting the theory, the paper uses the lens of exclusionary bundling to reexamine the US antitrust cases of SmithKline versus Lilly, Ortho Diagnostic versus Abbott Lab, LePage's versus 3M, and the Australian case of ACCC versus Baxter Healthcare.

II. How Bundling and Tying Are Different From Predatory Pricing

The standard test for predatory pricing is a price below cost and the potential for recoupment. According to Laffont and Tirole (2000): "Predation corresponds to a sacrifice of short-term profits in order to boost long-term gains by forcing rivals out of the market. Predation can be profitable only if it leads competitors to exit the market enduringly." Bundling and tying provide an opportunity to get the gains from foreclosure

without suffering the losses.[2] In that sense, exclusionary bundling is part of the larger class of exclusionary behavior. But it is different from traditional exclusionary practices where rivals may be foreclosed as a byproduct of an otherwise profitable strategy. Here, foreclosure is not a byproduct, but rather the object of the pricing.[3]

To set the stage, consider a firm that has a monopoly in good A and faces a competitive market for good B. Customers sees the B goods as undifferentiated. For simplicity, I will assume the competitive price of B is sufficiently low that all A consumers buy some amount of B. I will refer to the B market as the adjacent market to A. The adjacency comes from having a common set of customers and a monopolist that is interested in connecting the two purchases.

These assumptions will be met if A and B are perfect complements so that A is only valuable when consumed along with B. Think here of hardware and software. Another possibility is that both A and B are essential inputs in some larger operation, for example, two drugs used in a hospital. Here it is possible that the two goods are substitutes, though not perfect substitutes.

In these scenarios, it is possible to foreclose competition in the B market via a naked tie. The monopolist could say: If you want to buy my A, you must also buy my B. As the B goods are perfect substitutes, the customers have no reason not to buy B from the monopolist. The naked tie results in the elimination of rivals in the B market at no cost.

Rarely do firms engage in tying with such a heavy hand. For a firm with market power, such a naked act of tying would be *per se* violation of US antitrust law.

Instead of refusing to sell A unless the customer buys its B good, the monopolist can achieve the same result via its pricing strategy. The monopolist could offer to sell A at an à la carte price that is so high no one would ever pay it. For example, the à la carte price of A could exceed the bundled price of A and B. While at extreme prices for A the effective naked tie would be obvious, at other prices, the exclusion would be more subtle. How can we tell if a bundle discount is simply a pro-competitive price cut or if it has, in effect, created a tied sale? Answering this question is what leads to the concept of exclusionary bundling.

Let the monopoly price of A be denoted by m and the competitive price of B by c. An economic tie can be accomplished in two distinct fashions:

1. Underpricing the competitive B good and overpricing the monopolized A good;

[2] Here I include bundling and tying together. Under pure bundling, two goods, A and B, are only sold together. Under tying, one of the goods, say A, is available on its own, but the other is only available when purchased with A. In this paper, I will emphasize the case where a discount on A is contingent on buying all of the customer's demand for B from the same firm. This requires monitoring customer purchases.

[3] Following Laffont and Tirole (2000): "We will define *exclusion* as the incumbent's denying access to rivals through nonprice methods... Exclusion is an instrument, not a goal, because it is not intended *per se* to hurt rivals, even though it actually does so. … Exclusion increases the operator's profit while it is practiced.

2. Threatening to raise the price of the monopolized A good price *unless* the competitive B good is also purchased from the firm.

We consider each of these tactics in turn.

Underpricing the Adjacent Good

This tactic is easiest to illustrate when A and B are bought in fixed proportions, for example, one to one. If the firm with a monopoly in A prices its B good at c-ε and A at m+ε, then all customers will be indifferent. The total package price is m+c in both cases.

While the monopolist is charging a price below cost in B, it is recouping that loss immediately in the A market and thus suffers no loss. Rivals are at a disadvantage in that they can't play the same game.

The problem is that the rival firms can't compete at any price below c. They don't have a way to recover the below-cost pricing by charging more for some other product—as they have no other product for which they can raise the price.

Note that in this example, no tie is required. The monopolist need not require that customers buy its A and B goods together. As the firm is the only source of the A good, it will capture the entire A market by default. As the firm has the lowest price of the B goods, it will capture this entire market, as well. The assumption that the goods are used in some fixed proportion ensures that there is no distortion caused by the mispricing in the components. Total demand depends on the combined price, m+c, and this maximizes the monopolist's profits.

For an example of this practice, consider the software market. Imagine that Microsoft's optimal monopoly price for A (Windows) is 100 and that there is some complementary B software package that has a competitive price of 5. (The price is above zero reflecting marginal costs of distribution and customer support.) All A customers also buy B and spend a total of 105. In this initial scenario, Microsoft is only one of several sellers in the B market.

Consider what would happen if Microsoft were to cut the price of B to 0 while raising the price of A to 105. Microsoft would earn the same profits as in the previous outcome. Anyone who was willing to buy Windows at 100 and B at 105 is also be willing to buy Windows at 105 when B is free. The only difference is that now Microsoft captures all of the B market.

Although rivals are excluded, there is no immediate harm to consumers, as they are paying the same price and do not have a value for product variety. By the same token, it might also appear that there is no gain for the monopolist from this foreclosure. While that is true in the short run, there changed market structure may confer long-run benefits. The elimination of B rivals may help protect the A monopoly. If potential entrants into

the A market need a good B to make their package whole, they will now be at a disadvantage as the competitive complements market will have disappeared. It might also be possible that the A monopolist will gain power in the B market, If entry is costly, then rivals may not reappear after exiting, especially if they anticipate that the A firm can drive them out via a costless cross-subsidy.

Making Threats

There is a second way that the firm with market power in A can engage in costless foreclosure. It can raise the price of A, unless the customer buys its B. Prior to the threat, the monopoly price of A was m and the competitive price of B was c. The firm can say to its customers: the new à la carte price of A is $m+\varepsilon$, unless you agree to buy all of your B demand from me at price c, in which case the price reverts back to m.[4] Note that for any value of ε, the customer is better off buying the B good from the monopolist. Even the smallest price increase for an à la carte purchase of A is enough to exclude rivals.

While the à la carte price of A is *above* the monopoly price, there is no loss to the firm, as it does not expect to make any sales at the inflated price. In equilibrium, all customers buy their B from the firm and thus are able to buy A at the profit-maximizing price of m. Rivals are excluded, as it would appear to the customer that buying the rival's B product is the *but for* cause of having to pay an extra ε for good A.[5]

In contrast, for the firm to engage in predatory pricing in the B market, it would have to charge $c-\varepsilon$, and lose ε on each sale. With the tied sale strategy, the monopolist suffers no losses. The increase in the à la carte price of A is a threat that does its job and thus never has to be carried out.

The assumption that all A consumers are indifferent about the rival B goods is a simplification. If this were not the case, then the firm might actually have to raise the price of A to some of its customers who reject the deal. Thus it is worth noting that for small ε, the threat is almost costless to carry out. If the à la carte price of A were raised to $m+\varepsilon$, the cost would almost entirely be borne by the consumer. The increase in the price of A imposes a first-order cost on the consumer (the cost is proportional to ε), but only a second-order cost to the firm, as m is the optimal price.

Unless single-product rivals have greater efficiencies that allow them to discount their B product to offset the threatened price increase in A, they will be foreclosed from the market. Once again, there is no immediate loss to consumers from this exclusion. But, as before, eliminating rivals in the B market can make subsequent entry harder in either A or

[4] Note that the customer might not have any demand for B and thus can still buy A at an à la carte price of m.

[5] The cost of buying both A and B from the monopolist is (m, c), while the cost of buying A from the monopolist and B from the competitive market is $(m+\varepsilon, c)$. How much of a discount rivals would have to offer in B to offset the increase in p_a depends on the ratio of consumption of the two goods and the loss from reduced consumption in response to higher prices.

B and thus prolong the incumbent's market power as well as create the potential to use market power in B.

The difference between tying and predation is that with predation the firm actually has to charge a price below cost and thus lose money. With tying, the firm can either recoup that cost immediately (by raising the price of A) or achieve the exclusion at no cost at the start by threatening to raise the à la carte price of A, while maintaining the optimal price if the customer accepts the tied sale.

III. Exclusionary Bundling

The two examples of foreclosure lead to a definition of when a bundle discount is exclusionary. A bundle discount leads to foreclosure if even the *monopolist* could not afford to sell B at a large enough discount to offset the loss of the bundle discount. More formally, I refer to this type of bundle pricing as **Exclusionary Bundling**:

> Exclusionary bundling arises when a firm has market power in product A and faces competition in product B. It engages in exclusionary bundling when the incremental price for an A--B bundle over A alone is less than the long-run average variable costs of B.

The A-B bundle discount is measured relative to the à la carte prices of A and B. The discount could be offered for buying A and B together in a bundle or in return for an agreement to purchase all of the customer's needs for B from the monopolist.[6]

Consider the first where the adjacent good is underpriced at $c-\varepsilon$ and A is at $m+\varepsilon$. The bundle is still priced at $m+c$ and so the incremental price for an A-B bundle over A alone is $c-\varepsilon$. This is an exclusionary bundle as even the monopolist cannot make a profit selling good B at a price of $c-\varepsilon$.

In the second case, the monopolist sells A at m if the customer agrees to also buy its B good and otherwise at a price of $m+\varepsilon$. Here, the incremental price for an A-B bundle over A alone is $c-\varepsilon$. This is again an exclusionary bundle as even the monopolist cannot make a profit selling good B at a price of $c-\varepsilon$.

The definition does not require that the starting price for B is marginal cost. Take as the starting point the price pair (m, p_b), where m is the monopoly price for A and p_b is the market price B (which may be above marginal cost, c). Consider what happens if the firm announces a price of $m+\varepsilon$ for its à la carte price of A and (m, p_b) if the buyer agrees to buy all of its B from the firm. Rivals will be able to compete only if their costs of supplying B allow them to sell B at a price below p_b. The price has to be sufficiently below p_b so that the buyer will save enough buying B to compensate for having to pay ε extra for A. For example, if the customer were to buy 2 units of B for each unit of A, then

[6] In some cases, the exclusivity agreements allow the buyer to obtain some small percentage of its B goods from other firms.

the rival would have to offer a $\varepsilon/2$ discount on B in order to make up for the ε surcharge on A.

The approach is similar, although more complicated, when A and B are not be consumed in fixed proportions. It is still straightforward to show that the bundle discount is not so large as to lead to exclusionary bundling. Assume that the à la carte price of A is ε more than the bundle price of A. Furthermore, assume that a single consumer purchases quantities q_a and q_b of A and B at the bundle prices. Define the discount δ by $\delta * q_b = \varepsilon * q_a$. If good B at discounted price $p_b - \delta$ is still above the monopolist's cost then we do not have a case of exclusionary bundling. The reason is that the customer would be able to afford his bundle consumption at the à la carte prices and hence would be at least as well off. This is an overstatement of the required discount and hence a finding that price $p_b - \delta$ is below cost does not establish exclusionary bundling.[7]

Variable demand can increase the attractiveness of bundled discounts to a monopolist. Imagine that m=50 and c=10. Let demand for good A be represented by Q = 100 – P and demand for good B be fixed at 20. For simplicity, we assume this demand comes from a single customer and that marginal costs for A are 0 and B are 10. If the monopolist offers to sell A at 49, demand increases to 51. Thus profits only fall by 1 (50*50 – 49*51), but the buyer is at least 50 better off. Hence, the monopolist could increase the price of B from 10 to 11 and not lose any demand. (The price reduction from 50 to 49 is conditional on the customer buying all of its B demand at a price of 11.) In order to match this offer, a rival would have to price B to leave the consumer with the same indirect utility where good A is back at 50. The implied price is below 9 and this is below cost.

What is particularly intriguing about this example is that the exclusion was accomplished with an increase in profits. The B good is used to achieve two-part tariff and this reduces the inefficiency of a monopoly. The potential to leverage monopoly power across markets via bundle pricing is explored in much greater depth in Mathewson and Winter (1997), Greenlee, Reitman, and Sibley (2004), and Nalebuff (2004b).

This example leads to a divergent recommendation between myself and Greenlee et. al. (2004). They propose an antitrust violation only if the monopolist achieves the exclusionary bundling via a threat to raise the à la carte price. I do not distinguish between the threat to raise the price of A and a promise to lower the price of A (where that promise is combined with a supracompetitive price on B). While the latter approach has the welfare gain of reducing the inefficiency of a monopolist, it also allows a firm to leverage its monopoly from one market to another. A monopolist can exclude an equally efficient competitor, where the rival has all of the same economies of scale and scope. To the extent that exclusionary bundling allows a monopolist to (profitably) disrupt competition in a large number of adjacent or even unrelated markets, this vastly increases the potential harm caused by a monopoly.

[7] The test could be further modified when consumer demand is heterogeneous. Order customers by their ratio q_a / q_b. If ratio r* covers say 75% of the market and discounted price $p_b - \varepsilon * r^*$ is still above the monopolist's cost then at least 75% of the market will not be foreclosed.

Exclusionary bundling is meant to be a necessary, but not a sufficient test, for an antitrust violation. To demonstrate a violation, two other elements should be demonstrated. First, there should be a finding that a significant fraction of the B market is subject to foreclosure. In our examples, this was not an issue as the entire B market was foreclosed in that we assumed all B customers also consumed A. If the customers for the two markets do not significantly overlap, then even an exclusionary bundle will not have a large impact on the B market. The second consideration is to establish the existence of a possible benefit or purpose to the activity.

The idea of a two-part test is similar to the approach taken with predatory pricing. First, one establishes the existence of price below cost. Second, one shows that there was a reasonable probability of recouping the losses.

The exclusionary bundling test is akin to the price below cost part of the predation test. The firm with market power uses its bundle to create a situation where a one-product rival would have to price below cost in order to compete. But as the incumbent need not actually charge a price below cost in the equilibrium of the game, there may not be any losses or even sacrificed profits to recoup. Thus the second part of the test is much weaker. The question is simply whether the foreclose has any impact on the market and whether the incumbent has anything to be gained from the foreclosure? Even if ex post the incumbent did not gain, could it have reasonably imagined that there was something to be gained in the future? Such gains might include protecting the monopoly in A against entry from B or the potential to monopolize the B market.

For an antitrust test to be practical, firms must have a bright line safe harbor. They need to know that if they follow certain pricing rules, they will not be guilty of an antitrust violation. The safe harbor is in the exclusionary bundling test. The monopolist in A only needs to establish that it could profitably sell B at the implied incremental price that allows the customer to purchase A and B à la carte rather than via the bundle or tied sale. If the bundle discount is so large that the monopolist could not sell B at a price that allows customers to choose the à la carte option, then the monopolist has no safe harbor. If foreclosure is relevant to a significant share of the market and any purpose (or even perceived purpose) is found, the company would be guilty of an antitrust violation.

With this test, a firm with market power needs to do three things to break the law. It must engage in exclusionary bundling that impacts a significant share of the B market. And, the firm must have some purpose or benefit from this activity. I will show how this test is applied in practice and possible defense strategies by looking at four antitrust cases: SmithKline versus Lilly, Ortho versus Abbott, 3M versus LePage's, and Baxter versus Australia.

IV. The Role of Expectations

In the discussion above, the calculations were simplified by the assumption that demand for A and B was known with certainty. The exclusionary bundling test becomes more complicated when demand for A and B are uncertain. Evaluating the true cost of the bundle versus the à la carte prices requires an expectation of demands for both A and B. This leads to a more complicated bid evaluation problem on at least three counts:

(i) A rival selling B has to make forecasts for good A sales, even though it may not have experience in the A market.

(ii) The proposed contracts may extend for several years and thus require a long-term understanding of the market evolution.

(iii) The foreclosure depends on the buyer's expectations, not the sellers' expectations.

For point of comparison, it is easy to determine if a rival has been foreclosed under predatory pricing: is the price above or below cost? While calculating the appropriate measure of cost is an empirical challenge, there is no need to look at demand forecasts. There is also much less room for mistaken foreclosure. When choosing between a price of $4 or a price of $5, the buyer doesn't have to do any fancy calculations to know that the $4 price is the better offer, even if demand is uncertain. And a rival seeing a bid of $4 knows if it can afford to match that bid or not.

Compare this to the evaluation process with uncertain demand. Imagine that the monopolist threatens to raise its A price from m to $m+\varepsilon$ if the buyer does not agree to purchase all of its B good demand from the firm at an inflated price of $c+\delta$. Can a rival in the B market still sell its product at a price of c?

Expectations come into play as the buyer compares the package price of $(m, c+\delta)$ to $(m+\varepsilon, c)$. Whether it is a good deal to save ε on good A while paying δ more for good B depends on how much good B the buyer will demand.

If the demand is fixed at one unit of A and one of B, then the calculation is simple: is $\varepsilon > \delta$ or not? The situation is only slightly more complicated if the demand for A and B are random but exogenously determined. (In the Baxter case, A and B were two healthcare products; demand was exogenously determined by the number of patients requiring treatment and was thus independent of price.)

To determine which is cheaper, the bundle at $(m, c+\delta)$ or the à la carte pricing of $(m+\varepsilon, c)$, denote the expected consumption of A by q_a and the expected consumption of B by q_b. The bundle will be cheaper if

$$q_a * m + q_b * (c+\delta) < q_a * (m+\varepsilon) + q_b * c \text{ or}$$

$$q_b * \delta < q_a * \varepsilon.$$

This calculation is simple once expectations are formed. The hard part is the formation of expected quantities, even if exogenously determined.[8] Forming expectations is complicated when the contracts extend over a long term. (In the case of Baxter, the contracts extended between three and five years.) The buyer has to forecast demand for many years ahead in order to determine which contract is less expensive.

If demand turns out differently than expected, the buyer could have chosen the wrong contract and the rival might be foreclosed by mistake. For example, if $\varepsilon = \delta = 1$ and the buyer thinks it will demand more A than B, then it will choose the bundle. But what if demand turns out to be 3 for A and 4 for B? At that point, the buyer regrets not having accepted the à la carte option. But it is too late to go back and accept the rival's B bid.

The situation gets more interesting when the monopolist has a different expectation about demand than the buyer. In cases where the seller is large compared to the buyer, it would not be surprising to find that the seller has better information about future demand. Furthermore, the seller will often be aware of the buyer's forecasts. In that event, it can identify buyer misconceptions and use those misconceptions to design an even more profitable bundle offering, directing the discounts to products for which the customer overestimates demand.

Buyers often make their forecasts public. In the Baxter case, as part of the request for tenders, the State Purchasing Authority provided guidance as to its expected purchase quantities for A and B. This was part of the normal course of business. Only the incumbent suppler (Baxter) had access to historical demand and without these forecasts other bidders would have been at a serious informational disadvantage when bidding.

To continue our example, imagine that that the monopolist expects demand for A to be 3 and demand for B to be 4, while the buyer believes the reverse, that demand for A would be 4 and demand for B would be 3. Furthermore, the buyer publishes these forecasts so that the monopolist is fully aware of the divergence.

The buyer thinks the bundled offer of (m, c+1) will be \$1 less expensive that the à la carte pricing of (m+1, c). A rival in the B market would have to price at c – 1/3 in order to win the competition based on the buyer's beliefs. Meanwhile, the seller has foreclosed a rival while increasing its expected profits by \$1.

Whether or not a rival firm is foreclosed from the market entirely depends on the *buyer's* expectations at the time the contract is decided. The seller's expectations regarding demand are irrelevant. The contract will result in exclusionary bundling if the incremental price for the A—B bundle over A alone (based on the buyer's expected purchase quantities of A and B) is less than the long-run average variable costs of B.

[8] If demands were not exogenous, the calculation would be significantly more complicated. The buyer would have to understand its price elasticity and then determine its indirect utility function to see which offer leads to higher utility.

This perspective suggests an advantage of the exclusionary bundling lens. It may be hard to demonstrate what a monopolist believed about demand at the time of its bundled bid. By contrast, it may be much easier to demonstrate what the buyer believed. One can look at the forecasted quantities provided in the request for tenders. One can also look at the calculations employed by the buyer at the time of contract selection. Using these two approaches, one can see if an equally efficient rival firm would have been able to sell its B product on an à la carte basis without going below long-run average variable cost.

It is, of course, possible that the monopolist will have engaged in exclusionary bundling by accident. It might believe that its à la carte contract would be less profitable, but the buyer mistakenly picks the bundled contract and thereby excludes rival B firms. One would not want an antitrust standard where a firm might unintentionally cross the line.

Exclusionary bundling is not meant to convey intent. Rather, it is a statement of when rival firms are excluded from the market, intentionally or otherwise. Thus, exclusionary bundling by itself is not sufficient to result in an antitrust action. Assuming that the foreclosure is significant, harm to the competitive process has occurred. All that is needed is that the monopolist might have reasonably anticipated such harm.

To consider intent or even anticipation, we should look at what the seller believes about the buyer's beliefs. Was it reasonable that the seller would forecast that the buyer would pick the bundled contract?

While one might at first be leery of making conclusions based on beliefs about beliefs, the issue is not as complicated as it might appear. First, the buyer typically provides indications about its beliefs, such as projected quantities given in a request for tender. In these circumstances, the seller can be presumed to have a reasonable understanding of what the buyer was expecting in terms of future demand.

If the seller thinks that the buyer forecasts are in error and provides no alternative forecasts, then the seller cannot claim ignorance in terms of how it anticipated the offers would be evaluated. In some cases, we can go further. In some of the Australian tenders, Baxter provided a cover letter along with its bid detailing the expected savings from the bundle. According to the projected savings, the result would be exclusionary bundling. Whether or not Baxter thought that these numbers were accurate, we should presume that Baxter believed that the buyer would use these forecasts in comparing bids. Thus it is possible to conclude that the seller understood the buyer's expectations.

V. Protecting the Monopoly

The way that the bundle discount works is subtler than it may at first appear. The subtlety arises when the bundle discount effectively comes as a lump sum savings and thus represents an inframarginal discount. As a result, the discount is less likely to be passed on to consumers and this may protect the monopoly in A from substitution by product B.

The cases of SmithKline versus Lilly and LePage's versus 3M illustrate this effect in practice. Before turning to these cases, I first explain the theory in more detail.

Return to that case where the buyer chooses between a bundle at prices (m, c+1) or à la carte pricing of (m+1, c). For ease of exposition, assume that demand is certain: q_a=100 and q_b=50. Thus the buyer believes it will save 50 by buying the bundle at (m, c+1) rather than paying à la carte prices of (m+1, c).

The question is how much does the buyer think it is paying for good B? The buyer would correctly attribute the savings of 100 on A to its decision to purchase B from the monopolist. Thus the buyer should book a cost of good B as (c+1)*50 – 100 = (c-1)*50. It is as if the buyer is only paying c-1 for good B. That is the price a rival firm would have to match in order to persuade the buyer to accept the à la carte contract.

On the other hand, the buyer should not price good B as if its cost is c-1. The reason is that on the margin, its cost is c+1. If demand for good B is unexpectedly high, the buyer will have to pay c+1 to get additional units. To the extent that prices in the consumer market reflect wholesale costs, the buyer should base its pricing on a wholesale cost of c+1, not c-1.

This suggests that the bundle savings may not be passed on to the consumer. The reason is that the discount is really a lump-sum savings. The buyer may amortize the savings over the expected purchase of good B, but that does not lead to the correct marginal cost of B.

The anticompetitive effect of the bundling is thus magnified when there is a possibility of substitution between goods A and B. When the buyer is thinking about whether to take more of good B and less of good A, the incremental cost of B is c+1, not c-1. The low average price of c-1 leads the buyer to take the monopolist's B good, but then the high marginal price discourages the buyer from expanding its use. What makes this effect unusual is that most bundling theory looks at bundles of complementary products; this effect arises for bundles of substitute products.

Mitigating the threat from substitutes was present, though not highlighted, in two well-known bundling antitrust cases. In the LePage's case, good A was the branded Scotch™ tape, while good B was generic transparent tape. In the case of SmithKline versus Lilly, Good A was a Keflin, a cephalosporin sold by Lilly under patent protection and good B was Lilly's Kefzol, a cephalosporin that was identical to SmithKline's Ancef product. While Keflin and Kefzol were not perfect substitutes, for some treatments, substitution was a possibility.

If Lilly (3M) were simply to have cut the price of their Keflin (transparent tape) to better compete against SmithKline (LePage's), this would have encouraged the buyer to take more of good B and less of good A. Indeed, Lilly initially followed this strategy with just these results. But, with the bundle discount, the buyer is deterred from taking the rival's

competing product. At the same time, the buyer does not have an incentive to expand the use of B, as the incremental cost of B has gone up, not down.

Imagine that 3M were to say to Staples:

> I know that LePage's will sell you their generic transparent tape for $1/roll. Our price is higher at $2/roll. Given that you expect to buy 1 million rolls, that puts us at a $1 million price premium. We will make that up to you in the following fashion. You expect to buy 2 million rolls of our branded Scotch tape. We will give you a 60-cent a roll discount on the branded tape if you also buy our generic tape.[9] With the 60-cents a roll rebate, you can expect to save $200,000 by taking our package. You will pay a million more for the generic tape but you will get $1.2 million back on the premium tape.

This bundle offer will be successful in undercutting the generic rival. At the same time, it will not lead the store to sell generic tape at a bigger discount and thereby reduce sales of branded tape in favor of generics. Were the store to cut the price of generic tape, it would have to buy more tape and the incremental price is $2/roll, not $0.80/roll (taking into account the $200,000 rebate) or even $1/roll. This allows the monopolist to "undercut" the rival while at the same time not get into a price war in B that could reverberate into A. In contrast, with predation, the price of B falls on the margin, even to a level below cost, and this exacerbates the potential threat to A when there is some substitutability between the two goods.

In summary, we have shown three differences between exclusionary bundling and predation. The first is that exclusionary bundling only requires the seller to threaten to raise the price on A. If the threat is believed, then exclusion can occur without the seller paying any cost. In contrast, with predation, the seller loses money that it must later recoup in that it actually sells a good below cost. A second difference is that exclusionary bundling relies entirely on buyer expectations. The third difference in that exclusionary bundling may be accomplished via an inframarginal discount and not simply lower prices. This reduces the buyer's incentives to pass on the savings or to substitute B for A when this would otherwise be attractive.

We turn now to look at some of the antitrust cases on bundling in more detail.

VI. The Case of Australian Competition and Consumer Commission versus Baxter Healthcare[10]

[9] Equivalently, 3M could say that they won't raise the price of their Scotch™ tape by 60 cents if you also buy their generic tape.

[10] Federal Court of Australia, New South Wales, No. N 1153 of 2002. The author served as an expert witness for the ACCC in this case. At the time of writing, the case had not yet been decided.

Baxter is a multinational medical products and services company. In Australia, it is the only firm with local production of sterile fluids used for patients undergoing peritoneal dialysis. As a result, it had nearly 100% market share during most of the 1990s. (A rival producer, Abbott, closed its plant in the early 1990s.)

The products sold by Baxter can be broken down into four distinct categories, LVP, IS, PN, and PD. LVP are large volume products, such as saline bags. IS are irrigating solutions. PN are peritoneal nutrition solutions. PD are peritoneal dialysis products. For ease of notation, I will often refer to the first three product groups as Sterile Fluids. (This is somewhat an abuse of terms as PD products are also sterile.) The reason to make this distinction between the first three products and the latter is that while Baxter had a dominant position in all four products, it faced potential competition in PD products and did not face any real threat of competition in the first three.

Based on the Australian heath care system, all peritoneal patients are covered by the national health care and thus nearly all purchases of these products are made by the State Purchasing Authorities (SPAs) for the public hospitals.[11] Thus, to the extent that there was foreclosure, it would cover the vast majority of the relevant market.

The purchases were done via a tender process. While the specific offers differed in each State, the general natures of the contracts offered were similar. Baxter offered a substantial discount if the State Purchasing Authority would agree to buy a bundle of four products from Baxter (LVP, IS, PN, and PD) rather than just the three products for which Baxter had market power (LVP, IS, and PN). The lack of competition meant that the buyer would have to buy Baxter's LVP, IS, and PN products in any case.[12] Thus in deciding whether or not to buy PD products from Baxter, the buyer was led to calculate the incremental cost of Baxter's bundle over the undiscounted price of its three products.

The discount for buying the bundle was sufficiently large so that all customers were led to buy the bundle. Even a competitor as efficient as Baxter would have had to price its PD products below cost in order to make a sale. In some cases, giving away the PD products for free would not have been enough to get the business. Thus Baxter's success was due to the nature of its bundle discount and was not a consequence of its having superior products or lower costs.[13]

It is worth noting that the bundle discount was primarily relative to the à la carte price and not to the price paid in the prior contract. Most of the bundle discount came from preventing a significant price hike for LVP, PN and IS fluids. For example, Baxter threatened to increase the status quo pricing on LVP, PN and IS fluids by more than 50% in New South Wales if the buyer did not accept the bundle. But if the buyer did take the bundle, all was forgiven. Thus this exclusionary bundle would also pass the Greenlee, Reitman, and Sibley (2004) test.

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[11] A tiny amount of these products is purchased by private hospitals for use by tourists.

[12] Here I am only assuming that Baxter does not charge a price so far above import substitution so as to induce the State purchasing authorities to search for an alternative supply.

[13] To be clear, Baxter did have some cost advantages that resulted from its local production (lower transportation costs and not having its bid marked up as an imported product). But, it did not engage in a fair contest where its local production would have given it an advantage, but not a guaranteed victory.

In South Australia, the discount offered for buying the bundle over the à la carte pricing was so large that it was actually cheaper to buy all four products than just three. If this seems counterintuitive, it is because the incremental cost of buying PD products from Baxter was *negative*—the hospitals were *paid* to take these products. Faced with these prices, customers had no choice in terms of buying all four products from Baxter.

Even in other States where the discount was smaller, the end result was still that the incremental price was always below Baxter's own production and sales costs. Thus it is not surprising that Baxter was able to foreclose rivals and capture the market with their package-pricing discount.

The prices presented in South Australia offer the starkest case and provide the simplest illustration of the anticompetitive effect. The pricing for LVP, IS, and PN when bought on an à la carte basis was determined using Offer 1. Baxter provided individual pricing for several hundred items. The question then arises as to how one goes about evaluating such a multi-dimensional offer. The calculation below is based on the projected usage figures provided with the tender offer. This approach corresponds with how the State Purchasing Authorities evaluated the bids.

If the SPA were to have purchased all of its PD requirements from Baxter under the à la carte pricing of Offer 1, it would have projected an expected payment of $5.916 million. Assuming that Baxter did have a monopoly in LVP, IS, and PN products, the SPA would have had to spend at least $4.714 million with Baxter.[14]

Thus, it is remarkable that Baxter offered a bundled price discount that led to an expected cost of $4.329 million if the SPA bought (essentially) all of its PD requirements for Baxter.[15] What makes this remarkable is that the effective price of PD fluids in the bundle is a negative $385,731. It was cheaper buying the four-product bundle from Baxter than just its three monopolized products.

Table 1: South Australia

	Offer 1 price	Offer 2 price	Savings
LVP, IS, and PN products	$4,714,867		
PD products	$1,201,611		
Total	$5,916,478	$4,329,136	$1,587,342

[14] These figures are taken from the public opening statement of Mr Stephen Rushton, pages 93—95 of ACCC and Baxter Healthcare Pty Ltd. & Others, Sydney, 10:00 AM, Wednesday, 19 May, 2004.

[15] Offer 2 allowed the hospitals to purchase a small percentage of their requirements from rival firms.

While Baxter did provide a breakdown of prices under offer 2, those prices were not available on an à la carte basis. They were only available if the entire package was taken. Thus, I think it appropriate to allocate the cost of the bundle into two parts, the amount that had to be purchased from Baxter (namely, the LVP, IS, and PN products) and the competitive PD products. This is done in Table 1b.

Table 1b: South Australia

	Offer 1 price	Offer 2 price	Savings
LVP, IS, and PN products	$4,714,867	$4,714,867	
PD products	$1,201,611	($385,731)	
Total	$5,916,478	$4,329,136	$1,587,342

The resulting discount on PD products for taking the bundle was 132%. While there is often a dispute over whether prices are above or below long-run average variable cost, there was little dispute in this case as a *negative* price is always below cost.

From the competitors' perspective, this effective discount on PD is the price they would have to offer in order for the buyer to find it worthwhile to buy their PD product instead of Baxter's. In the case of South Australia, Fresenius (or other competitors) would have had to have paid the SA purchasing authority $385,731 to take its products in order for its price to be competitive with the bundle discount offered by Baxter. Fresenius would not only have lost the $385,731 payment but also all of the production, overhead, and sales and distribution costs associated with supplying the product.

To state the obvious, even if Fresenius (or other competitors) were as efficient as Baxter, they could not have competed with Baxter's implied negative price for PD fluids. It is in that sense in which competitors were foreclosed from the South Australia PD market and that we have a clear-cut case of exclusionary bundling.

Two further questions should be asked? Was it rational for Baxter to give away money by charging a negative price for PD? What was the purpose of their foreclosure?

When first presented with this example, it is not uncommon for readers to respond with the view that Baxter must have been confused in its pricing and that a negative price would be direct evidence of irrational or non-profit-maximizing behavior.

As a general matter, Baxter did not defend its pricing on the grounds of irrationality. But in the case of South Australia, where the finding of exclusionary bundling was uncontroversial, Baxter's economic expert, Henry Ergas, did make the defense that the observed pricing was not profit maximizing. His view was that the South Australia market was too small to matter in regard to the entire Australian market and thus even if

foreclosure took place, it would not harm competition. Thus, the only people hurt by Baxter's pricing were its shareholders. Mr. Ergas did not, however, provide any explanation for why Baxter would have sacrificed profits in this manner.

While one might venture this was a simple mistake, I note that the South Australian State Purchasing Authority was very much concerned with allowing potential entrants access to the PD market. Thus it asked Baxter to provide two separate bundled prices as part of its tender offer. The first bundled price was for a bundle of Baxter's three monopoly products (LVP, IS, and PN). The second was for a bundle of LVP, IS, PN, and PD products. Baxter's responded with a LVP, IS, and PN bundle that was priced *identically* to its à la carte option for those three products.[16] This shows that the bundle discount was not accidental and that the entire discount is properly applied to the PD products.[17]

I do not believe that this pricing anomaly is evidence that Baxter was not profit maximizing. Although it may appear that Baxter is charging a negative price, Baxter did not expect its à la carte offer to be accepted. Baxter can be quite confident that rivals will not come in with a negative price. Thus the à la carte prices will never be chosen in any equilibrium.

One could say that the à la carte price of sterile fluids is too high rather than the price of PD is too low. This perspective becomes clearer if we take the à la carte prices to an extreme. Consider the following variation of Table 1a:

Table 1c: South Australia

	Offer 1 price	Offer 2 price	Savings
LVP, IS, and PN products	$34,714,867		
PD products	$11,201,611		
Total	$45,916,478	$4,329,136	$41,587,342

In this example, I have left Offer 2 prices unchanged, but have added $10 million to the price of each of LVP, IS, PN, and PD products when sold à la carte. These prices are so clearly ridiculous that they might as well be infinity. It is as if the only legitimate offer on the table is the bundled Offer 2.

There is no sense in which Baxter would be sacrificing $41 million in revenue by making Offer 2. That conclusion only follows if the SPA would have been willing to pay $45.9

[16] See public opening statement of Mr Stephen Rushton, page 93 of ACCC and Baxter Healthcare Pty Ltd. & Others, Sydney, 10:00 AM, Wednesday, 19 May, 2004.

[17] It also demonstrates that the discount cannot be attributed to obtaining security of supply via a long-term contract. Most of the volume and hence most of the security gains would have been present in the three-good bundle.

million—and that assumption is false. Baxter's monopoly power is not infinite. At some sufficiently high price, the SPA would do better to rely on imports. In the specific case at hand, the Offer 1 prices may or may not have been so high as to have led the SPA to consider imports. The buyers took the prices as being a serious offer and based on that view concentrated their attention on Offer 2.

As soon as we see an example where the Offer 2 price is less than the LVP, IS, and PN component of the Offer 1 price, we can conclude that the Offer 1 price will never be chosen in equilibrium. Baxter may have taken an action that was suboptimal off the equilibrium path, but as its Offer 1 prices will never be chosen in the game, there is no sense in which Baxter has sacrificed profits.

Rather than conclude that Baxter was throwing away money by selling PD products at a negative price, I think it is more appropriate to conclude that it employed a threat that was bigger than necessary. Rivals would have been excluded at any incremental price below cost, so that it was not necessary to pick a negative price.

Think of the robber who says: Give me your money or I'll kick you and I'll shoot you. Shooting you would be sufficient to induce you to hand over the money. Given that you comply, there is no cost to having made the extra threat to kick you.

I have shown that rivals were foreclosed and that the foreclosure was not prima facia costly. Indeed, it is possible that the prices in Offer 2 were the long-run profit-maximizing prices for the long run. The Offer 2 prices were similar to historical prices in the market. Baxter provided no evidence that their long-run interests would have been better served by charging a higher (or lower) bundled price.

Even if the foreclosure is costless, what is the motive or purpose to it? Given that demand for the different medical goods is essentially exogenous, Baxter could have extracted all of its monopoly profits in the LVP, IS, and PN markets. The Chicago School argument (Bork, 1995) would apply to the facts of this case. Baxter can't make more money via a bundle pricing strategy.

Although there are no gains in the present, there are potential gains in the future. Here two possibilities arise. The foreclosure could help Baxter obtain market power in the PD market and protect its existing market power in the LVP, IS, and PN markets. If a rival were to enter the PD market, that would facilitate subsequent entry into the other sterile fluids market. Recall that Microsoft was worried that Netscape would use the browser as an entry point into the operating system market.

Baxter's exclusionary bundling was not limited to South Australia. Most importantly, it extended to New South Wales, the largest of the four State Purchasing Authorities in Australia. Foreclosure of this market could deny an entrant the minimum necessary scale to enter the Australian market.

The determination of exclusionary bundling in New South Wales is instructive in that the numbers were less extreme. The incremental price of PD products under Offer 2 was positive, but sufficiently small that it was below cost.

Table 2: New South Wales[18]

	Offer 1 price	Offer 2 price	Savings
LVP, IS, and PN products	$14,651,595	$8,874,883	$5,776,712
PD products	10,961,136	$7,957,238	$3,003,898
Total	$25,612,731	$16,832,121	$8,780,610

Baxter was the incumbent supplier. Its bid came in several parts. If the NSW purchasing authority decided to go with à la carte pricing, the $14.6 million expected cost would represent 72% increase over the status quo pricing on the monopolized products. If the bundled bid was accepted, the State would save a small amount over the status quo.

Recognizing that the buyer had no alternatives regarding the LVP, IS, and PN products, I apply the full discount to PD products. The implied discount was just over 80%. Even taking account of all the scale and scope economies and even without allocating any capital costs to PD products, Baxter would not be able to cover its incremental costs at that discount.[19]

Table 2b: New South Wales

	Offer 1 price	Offer 2 price	Savings
LVP, IS, and PN products	$14,651,595	$14,651,595	$0
PD products	10,961,136	$2,180,526	$8,780,610 or 80.1%
Total	$25,612,731	$16,832,121	$8,780,610

[18] These figures are taken from the public opening statement of Mr Stephen Rushton, page 74 of ACCC and Baxter Healthcare Pty Ltd. & Others, Sydney, 10:00 AM, Wednesday, 19 May, 2004.

[19] During the course of the trial, the numbers in Table 2b were revised. The basic finding of exclusionary bundling remained, even using cost data provided by the defense. As Baxter was the incumbent, one cost basis was average avoidable cost—how much Baxter would have saved by not supplying PD products to New South Wales (see Baumol, 1996). Note that this was a long-term contract, and thus one has to recognize that investments need to be made in order to continue participating in this business. Following Elhauge (2003), the appropriate measure of costs are those of an equally efficient rival producing over the same time period.

Finally, I note that these calculations were done on an *ex ante* perspective at the time the contract was signed. They are almost identical to those employed by the State Purchasing Authority in evaluating the bids. Furthermore, they are concordant with the projected savings provided by Baxter in a cover letter accompanying their bid.[20]

VII. The Case of SmithKline Corp. versus Eli Lilly & Co.[21]

One response the theory of bundling it is so new and unsettled that it would be premature for the Supreme Court to rule on this practice. Indeed, this was this was the argument presented by the Solicitor General to the Supreme Court in an amicus petition proposing that the Court deny *certiorari* in the LePage's case.[22] A review of the SmithKline versus Lilly case shows that as far back as 30 years ago, the Court correctly understood the issue of exclusionary bundling. As I discuss below, one can argue with the Court's measurement of cost, but the basic theory was sound.[23]

Both the facts and the theory of bundling for the case against Baxter are remarkably similar to the case brought against Eli Lilly. Lilly was found to have violated Section 2 of the Sherman Act for monopolization of the non-profit hospital market for cephalosporins. Lilly leveraged its market power in its propriety cephalosporin products to prevent SmithKline from gaining access to the hospital market with a competing cephalosporin compound.

The particular anticompetitive act was the use of a package purchase rebate. In addition to traditional volume discounts, hospitals received an additional 3% back if they hit volume targets on three (or more) Lilly cephalosporins. This marketing plan was referred to as the Revised CSP (Revised Cephalosporins Savings Plan).

At the time of the case, 1975, Lilly manufactured five different cephalosporin products:

Keflin
Keeled
Loridine
Kafocin
Kefzol

This was an important business to Lilly. Its cumulative sales exceeded $500 million. The first four products were unique to Lilly and covered by patents. The fifth product was the compound cefazolin, sold by Lilly under the name Kefzol. The *identical* compound was

[20] Information provided in annexure "R" to Mr Kemp's affidavit and Baxter letter of 30 October, 1997 (Exhibit "BRK32" to Mr Kemp's affidavit).

[21] *SmithKline Corp. v. Eli Lilly & Co.*, 575 F.2d 1056; 1978.

[22] Brief for the United States as Amicus Curiae, 3M Company v. LePage's Inc., No. 02-1865 at 12-14 and 18, available at http://www.usdoj.gov/osg/briefs/2003/2pet/6invit/2002-1865.pet.ami.inv.html.

[23] Indeed, Greenlee, Reitman, and Sibley (2004) refer to exclusionary bundling as the Lilly test.

also sold by SmithKline under the name Ancef.[24] As Kefzol and Ancef were identical products, most hospitals did not stock both products.

SmithKline was first to enter the market with Ancef in October 1973. It positioned Ancef as a substitute for Keflin and priced it at a 5% discount on a recommended daily dose basis. Lilly entered the market with Kefzol in November 1973. Lilly priced Kefzol at 2% below Ancef and SmithKline matched this discount, which created a 7% spread with respect to Keflin.

By the end of 1974, SmithKline had captured more than 40% of the cefazolin market and had annual sales in excess of $10 million. Lilly found that cefazolin was being used in place of Keflin more than 60% of the time and that Lilly was far short of achieving its goal of attaining 75% share of the cefazolin market. As the replacement rate increased to 80%, Lilly commissioned a task force to develop a response to the threat from Ancef. They came up with the Revised CSP, which was implemented on April 1,1975.

The Revised CSP was designed to persuade hospitals to purchase Kefzol rather than Ancef. While Lilly sold five different cephalosporin products, in order to reach the required volume target on three (and thus get the 3% back), the hospital would, in practice, have to purchase Lilly's Kefzol. The way the volume targets were set, hospitals would reach the minimum in Keflin and Keflex and would not typically be able to hit the volume in Kafocin and Loridine. Only if they purchased Lilly's Kefzol over SmithKline's equivalent Ancef, would the three-product target be achieved.

The key anticompetitive element of the Revised CSP was that buying one good led to an additional 3% discount across all the purchases. Looking at market volumes in 1975, Lilly's market dollar volumes on Keflin, Keflex, and Kefzol were:

Keflin:	$33.97 million[25]
Keflex:	$13.834 million
Kefzol:	$8.355 million

The other two cephalosporins accounted for $1.45 million in annual sales.

As a first approximation, it is reasonable to assume that a typical hospital purchase of cephalosporins would be in the same proportion as the overall market. Thus, I assume that the representative hospital is 1% of the entire market.

Consider the marginal cost of buying Kefzol. The hospital knows that it has to spend $331,000 buying Keflin and $138,000 buying Keflex ($478,000 in total), as these are only supplied by Lilly. If the hospital goes ahead and buys Kefzol, it will spend an additional $83,500, but then save 3% on its entire purchase, or $16,800.[26] Thus the

[24] Both Lilly and SmithKline made cefazolin under license from Fujisawa.

[25] Note that this combines sales of Keflin and Keflin Neutral. The market breakdown of these two products is $30.63 million for Keflin and $3.34 for Keflin Neutral. See *SmithKline Corp. v. Eli Lilly & Co.*, 575 F.2d 1056; 1978, p. 1060.

[26] The discount would be slightly larger if I also take into account the purchases of Kafocin and Loridine. The value of this discount would be 3% on $14,500 or $430. This would add another 1% to the effective discount on Kefzol, bringing it from 20% to 21%.

effective cost of Kefzol is $83,500 - $16,800 = $66,700. The 3% discount on the package translates into an effective 20% discount on Kefzol.

The court record confirms this conclusion. Lilly supplied its sales force with calculations showing SmithKline would have to offer discounts of more than 20% to be price competitive. Of course, not all hospitals used the same mix of products. The range of the effective discount was found to be between 16% and 35%.

The Lilly Revised CSP was effective in stopping SmithKline's advances. At the end of 1974, SmithKline had 40% of the Kefzol/Ancef market and sales exceeding $10 million. After the onset of the plan, SmithKline's sales fell by $1.5 million.

Prior to the introduction of the Revised CSP, Lilly's pretax return on sales for Kefzol was 17.6%. (SmithKline had higher costs and its return on sales was 4.6%.) Even if SmithKline had been able to achieve Lilly's lower cost structure, it would not have been able to compete with Lilly's Revised CSP.[27] Factoring in the cost of a 20% discount on Kefzol leads to a negative return on sales for Lilly.[28]

The anticompetitive behaviour seems remarkably similar to Baxter's practices in the Australian market. Lilly was a company with a legal monopoly in a category of pharmaceutical products. It had a market share of 89.8% prior to the onset of its package pricing. The setting is also familiar. These healthcare products are all purchased by non-profit hospitals.

Just as the case with Baxter, Lilly used a package discount to leverage its protected market position to gain an advantage in a product where it faced competition. The 20% effective discount it offered on Kefzol for buying its cephalosporin package was more than enough to eliminate any profits on this product and thus made it impossible for SmithKline to compete.

There is one aspect in which this case differs from the issues in the Australian PD market. The drug on which there was competition, Kefzol, was also a substitute for Keflin.[29] This was a significant concern for Lilly, as Keflin not only represented the lion's share of sales, it also had lower production costs than Kefzol.

Thus it was especially important for Lilly to prevent competition between SmithKline's Ancef and Lilly's Kefzol from damaging the golden goose of Keflin. This helps explain why Lilly didn't just lower the price of Kefzol by 20%. While that would have been equally effective at keeping SmithKline out of the market, it would have led to more substitution of Kefzol for Keflin.[30]

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[27] As the District Court wrote "A 4.6% return on sales does not warrant continued marketing of [Ancef] by SmithKline without the potential for significant improvement in profitability." 427 F. Supp. 1089; 1976, p. 1108.

[28] Note that the Court was using return on sales figures, which are based on average costs, not avoidable costs.

[29] PD is not a substitute for LVP, IS, and PN products.

[30] I note that a truly sophisticated hospital buyer would recognize that the package discount of 20% on Kefzol would decline to a 3% discount (in the extreme) if Kefzol replaced all the other cephalosporins. In that case, SmithKline would have been able to compete. I suspect that hospital buying agents had a hard enough time understanding the discount program at the status quo purchases. (This package discount was

This is where the package discount strategy was effective at keeping SmithKline out of the market while also preserving Keflin's monopoly. The 3% rebate on Keflin and Keflex contributed 17% of the 20% effective rebate on Kefzol. But that rebate came as a lump-sum amount. If the hospital were to expand its use of Kefzol, it would only get a 3% savings. If the hospital were to replace $100 of Keflin with $50 of Kefzol, it would lose a 3% rebate on $50. Thus, under the Revised CSP, there was a reduced incentive to substitute Kefzol for Keflin.

While the Court found a Section 2 violation, it did not find that the package discount was an illegal tie-in sale. I disagree with the Court's finding that this was not an illegal tie-in. The numbers suggest that for the vast majority of consumers, it was not rational to buy Keflin without buying the bundle.

VIII. The Case of Ortho Diagnostic Systems versus Abbott Lab[31]

In order to evaluate the Exclusionary Bundling test, one should compare cases where the test is passed to those where it failed to ensure that the results are different. The violation in Lilly follows from the demonstration of exclusionary bundling. The case of Ortho versus Abbott demonstrates the contrapositive: the evidence did not support exclusionary bundling and no violation was found.

This case was the result of a complaint by Ortho Diagnostic in response to bundle discounting by Abbott Lab in the sale of test products for screening blood. The primary consumers for these blood tests were blood donation centres, such as the Red Cross and members of the Council of Community Blood Centres ("CCBC").

There were five different tests. One of these tests screened for HIV (HIV-1/2), two were for Hepatitis B (HbsAg and Anti-core), one for Hepatitis C (HCV), and one for a virus connected with Leukemia (HTLV).

Abbott offered CCBC members advantageous pricing if they purchased a package of four tests from Abbott and an even greater discount if all five were purchased from Abbott.[32]

Ortho argued that Abbott used its monopoly position in HTLV and HIV-1/2 (and possibly HbsAg) blood tests to create a package price contract that made it impossible for Ortho to sell its competing tests on the market.

While Abbott was the only company that produced all five blood assays, there were competitive products for each of these products manufactured by third party.[33] Still Abbott enjoyed substantial market power in at least two out of the five products:

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viewed as highly novel at the time.) It is harder to imagine that buying agents would forecast the value of the discount under the scenario where Ancef was able to replace much of Keflin. That substitution was difficult to forecast. This point illustrates the further subtleties of package discount pricing.

[31] *Ortho Diagnostic Sys. v. Abbott Lab.*, F. Supp. 145; 1993.

[32] The court also considered the question of whether the lower prices offered in the bundle would have led to an increase in demand. Blood testing is primarily dictated by the level of blood donations of blood and hence the demand for these tests is unlikely to be affected by lower priced blood tests.

Market shares

Test	Unit Market Share[34]
HTLV	91%
HIV –1/2	86%
HbsAg	75%
Anti-core	70%
HCV	21%

The bundled pricing offered by Abbott was as follows:

Test (DMS inc)	Five Tests (DMS inc.)[35]	Four Tests (DMS inc.)	Four Tests (No DMS)	Three (or fewer) Tests
HCV	$2.90	$2.90	$2.90	$3.43
Anti core	$0.85	$1.14	$1.05	$1.25
HTLV	$1.03	$1.18	$1.09	$1.57
HIV-1/2	$1.93	$2.08	$1.99	$2.47
HbsAg	$0.66	$0.81	$0.72	$1.20
TOTAL	$7.37	$8.11	$7.75	$10.02

If we accept Ortho's argument that Abbott had a monopoly position in HTLV and HIV-1/2, then consider the customer's options:

> Option A. Buy HTLV, HIV-1/2 and HCV from Abbott and Anti-core and HbsAg from Ortho.

As Ortho pointed out, the à la carte price of these three tests from Abbott was $7.57. That is more than the cost of buying all five tests and the DMS hardware. Since that implies a negative incremental price for Anti-core and HbsAg, this would appear to be a clear-cut case of exclusionary bundling. By definition, a negative price is below cost, however measured. But, unlike the Baxter case, this was not the only option.

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[33] Ortho sold HbsAg, Anti-core, and HCV (which it also licensed to Abbott). Ortho had an HTLV test, but it was not yet accepted in the market.

[34] Dollar market share numbers were similar as were Ortho's market share at plasma centers (although the HCV share was higher at 35%).

[35] The price included computer hardware and software for a data management system (DMS).

> Option B. Buy HTLV, HIV-1/2 and HbsAg from Abbott; buy Anti-core and HCV from Ortho.

Buying these three tests from Abbott would cost $5.24. That leaves a total of $2.13 to purchase DMS hardware, Anti-core and HCV. If we take the market price of the DMS equipment to be the difference between the four-test price with and without DMS, that implies $0.36 should be attributed to DMS hardware. This leaves $1.77 to sell Anti-core and HCV.[36] Thus, the critical question is whether $1.77 is a price below which either Abbott or Ortho could earn a profit.

Ortho's economic expert, Janusz Ordover, evaluated Abbott's costs. He concluded that Abbott's combined marginal cost for HCV and Anti-core was $1.49. This suggests that Abbott was not engaging in Exclusionary Bundling.[37] It is worth emphasizing that this cost data comes from the plaintiff. The plaintiff found that Abbott would have been able to sell HCV and Anti-Core at $1.49 without losing money. Thus, if Ortho were equally efficient as Abbott, it would have been able to compete against the Abbott bundle, while selling only HCV and Anti-Core. Hence, this is not a case of exclusionary bundling.

In fact, there is evidence to suggest that Ortho was more efficient that Abbott. As reported by the court, "one Ortho witness acknowledged that Ortho would make money on HCV at $1.75 per test (Goergen Dep. 105-06), and others noted that Ortho's cost of producing HCV is lower than Abbott's, as Abbott pays Ortho a per test royalty on that assay (Bryant Decl. P 14 n.2; Goldstein Dep. 402-03)."[38]

I have considered the case where Abbott sells three products. If one concludes that Abbott only had a monopoly in two products, HTLV and HIV-1/2, then footnote 25 of the decision is especially revealing. The court notes that the unbundled price of HTLV and HIV-1/2 is $4.04. That leaves a price of $3.33 for Ortho to sell its other three tests. Ortho did not dispute that $3.33 exceeds its costs for these three tests.

> Ortho's tying claim sounds especially hollow. The combined unbundled price of Abbott's HIV-1/2 and HTLV is $4.04. As its package price for all five tests is $7.37, Ortho could sell its three competitive assays competitively with the Abbott package at a combined price of $3.33, which admittedly is above its cost. Hence, Ortho in substance seeks relief under the antitrust laws for business lost as a result of its own refusal to lower its prices sufficiently to meet the competition.[39]

The Ortho versus Abbott case shows that the exclusionary bundling test will provide a defense as well as an indictment. The hurdle was not passed in the Ortho case. Even if exclusionary bundling had been demonstrated, the extent of foreclosure was questionable. The contract with CCBCs covered less than half the market. There were also substantial unbundled sales. Abbott sold nearly $10 million of HIV-1/2 and HTLV blood tests (17% of its sales) at prices above those offered in the three or fewer contract. Finally, the CCBC contract was not imposed on all of its members.

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[36] The Abbott price for those two drugs in their five-test offering was $3.75.
[37] *Ortho Diagnostic Sys. v. Abbott Lab*., 920 F. Supp. 455; 1996, footnote 21.
[38] *Ortho Diagnostic Sys. v. Abbott Lab*., 920 F. Supp. 455; 1996, p. 462.
[39] *Ortho Diagnostic Sys. v. Abbott Lab*., 920 F. Supp. 455; 1996, See footnote 25.

The case was also noteworthy in that the court demonstrated an understanding of how package pricing could lead to foreclosure even though the bundle as a whole is priced above the bundle's cost.

> Assume for the sake of simplicity that the case involved the sale of two hair products, shampoo and conditioner, the latter made only by A and the former by both A and B. Assume as well that both must be used to wash one's hair. Assume further that A's average variable cost for conditioner is $2.50, that its average variable cost for shampoo is $1.50, and that B's average variable cost for shampoo is $1.25. B therefore is the more efficient producer of shampoo. Finally, assume that A prices conditioner and shampoo at $5 and $3, respectively, if bought separately but at $3 and $2.25 if bought as part of a package. Absent the package pricing, A's price for both products is $8. B therefore must price its shampoo at or below $3 in order to compete effectively with A, given that the customer will be paying A $5 for conditioner irrespective of which shampoo supplier it chooses. With the package pricing, the customer can purchase both products from A for $5.25, a price above the sum of A's average variable cost for both products. In order for B to compete, however, it must persuade the customer to buy B's shampoo while purchasing its conditioner from A for $5. In order to do that, B cannot charge more than $0.25 for shampoo, as the customer otherwise will find A's package cheaper than buying conditioner from A and shampoo from B. On these assumptions, A would force B out of the shampoo market, notwithstanding that B is the more efficient producer of shampoo, without pricing either of A's products below average variable cost.[40]

This example is useful in that it demonstrates the logic of incremental pricing and the potential to leverage market power. Indeed, the court shows just how the proposed pricing would be a case of exclusionary bundling. The incremental price of the bundle over the à la carte price of A alone is $0.25, which is less than the monopolist's costs.[41]

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[40] *Ortho Diagnostic Sys. v. Abbott Lab*., 920 F. Supp. 455; 1996, p. 467.

[41] This conclusion is not without controversy; for an opposing view, see Areeda and Hovenkamp (2001, P 749, at 509). They provide two arguments to justify an bundle where the overall price exceeds cost. First, they interpret an exclusionary bundle as like a discount on A. This is illustrated by reference to Multistate Legal Service v. Harcourt Brace Jovanovich, 63 F. 3d 1540 (10th Cir. 1995). Here, HBJL had 80% of the full service bar exam prep market and then added a supplemental MBE course for free. Since the incremental price of B was zero, I classify this as exclusionary bundling. Areeda and Hovenkamp see this as a quality improvement (or price discount) on the original A product. I would agree *if* HBJL had continued to offer the original full service course at a discounted price relative to the "improved" bundle. But, they didn't. They only offered the monopoly product as part of a package deal. Areeda and Hovenkamp's second point is that the lower price can lead to increased sales and profits that more than offset the subsidy. In their example, HBJL adds a $15 supplemental test (for free) to its original $500 full course and thereby increases its sales from 100 units to 150 units. If this were indeed profitable, then they could equally well have discounted their regular course without the supplemental test to $485 while keeping the bundled offering at $500. This should lead to at least 150 sales of the regular course (as the bundle at $500 is still available and thus all customers who bought the bundle should now buy either the

This example is *not*, however, a case of no-cost exclusion. Charging bundle prices of $3 for the conditioner and $2.25 for the shampoo leads to profits of $1.25. If, instead, the conditioner monopolist charged $1.50 for the shampoo, $3.75 for the conditioner and made these prices available on an à la carte basis, profits would remain at $1.25, but the competitor would no longer be excluded. Going further, the monopolist could charge $1.40 for the shampoo (10 cents below cost) and $3.85 for the conditioner (for the same total price of $5.25) and still make $1.25. The more efficient rival could sell its shampoo at $1.40 (or even $1.39), leaving the monopolist to sell only the conditioner at $3.85. The result leads to increased profits of $1.35. Because the two goods are perfect complements and are consumed in fixed proportions, exclusion of a more efficient rival will lead to lower profits.

IX. The Case of LePage's Inc. versus 3M[42]

3M was found to have violated Section 2 of the Sherman Act based on its bundle discount offers. The decision has generated controversy and uncertainty about the legal standard. One reason for the legal uncertainty is that neither the courts nor the parties applied the exclusionary bundle test. LePage's did not attempt to show that exclusionary bundling occurred. In its defense, 3M argued (and LePage's did not dispute) that price of the bundle was well above the bundle cost. But, as discussed just above in the shampoo example of Ortho, that fact is irrelevant. 3M's rivals did not have a competing bundle. Whether or not a collection of goods is sold at a profit does not reveal whether one-good rivals were foreclosed. 3M did not establish that the incremental price of its transparent tape was above its incremental cost.

3M had an undisputed monopoly position in the market for brand-name tape with a 90% market share. Its branded Scotch™ tape faced competition primarily from private label brands, of which LePage's was the primary supplier with an 88% market share.

3M was able to reduce LePage's share of the private label business to 67%.[43] It did this by using a package or bundle price discount to some of the largest buyers. For example, the office supply superstore Staples got an extra 1% bonus rebate on all of its 3M purchases by purchasing private label tape from 3M rather than LePage's.[44] 3M's purpose was clear. Even the dissenting opinion recognized that 3M's intent was "to eliminate the private-label category of transparent tape."[45]

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bundle or the regular course on an à la carte basis). But, now, equally efficient rivals can sell the supplemental course at $15 and are no longer foreclosed from the market.

[42] *LePage's Inc. v 3M (Minnesota Mining and Manufacturing Co.)* 324 F.3d 141 (2003). For a similar perspective on LePage's, see Zanfagna (2004).

[43] Another troubling aspect of the LePage's decision is whether the foreclosure was significant. Even assuming that exclusionary bundling occurred, LePage's still had over two-thirds of the private label business. Is excluding a rival from one-third of the market sufficient to cause foreclosure?

[44] *LePage's Inc. v 3M* 324 F.3d 141 (2003), p. 157.

[45] *LePage's Inc. v 3M* 324 F.3d 141 (2003), p. 181.

One of the key issues under dispute was whether 3M's bundle discounts needed to foreclose an equally efficient competitor in order to violate Section 2. As Judge Greenberg wrote in the dissent, "LePage's did not even attempt to show that it could not compete by calculating the discount that it would have had to provide in order to match the discounts offered by 3M through its bundled rebates."[46] He contrasts this with the evidence in the Eli Lilly versus SmithKline case where just such evidence was presented to the court.

But 3M never showed the opposite—that its costs were so low, it could profitably sell generic tape at incremental price implied by bundle discount. 3M's *certiorari* brief touched on this issue:

> 3M argues its conduct was legal as a matter of law because it never priced its transparent tape below its cost.[5] [Footnote 5 text: 3M states that its pricing was above its costs, however costs are calculated, and LePage's has not contested 3M's assertion.][47]

Here the central issue of the case is presented in a single line in a footnote. It is not clear whether transparent tape refers to only private label or to both private label and Scotch™ tape (which is also transparent). If the claim concerns both tapes, then it is irrelevant to foreclosure. If the claim is only about private label, the argument is fundamentally incomplete. 3M didn't ever calculate the implied incremental price of its private label tape.[48]

To put the size of 3M's discounts in context, the record showed that 3M paid a rebate of over $666,000 to Sam's clubs for buying its full line of products. If Sam's had not bought the 3M private label tape, its discount would have been $264,000 smaller. This is the relevant number. This discount was applied to a market where LePage's prior year sales were $1,078,484.

We do not know what price 3M offered before taking the discount into account. If, for example, 3M had simply matched LePage's price, then it would have been offering almost a 25% discount. But we do not know whether a 25% discount would have led to pricing below cost, either for 3M or LePage's.[49] It is also possible that 3M started from a higher list price and thus offered less than a 25% discount. The absence of this detail and any corresponding claim that 3M was pricing below cost was the main thrust of the dissenting opinion.

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[46] *LePage's Inc. v 3M* 324 F.3d 141 (2003), p. 175.

[47] 3M Petition for a Writ of Certiorari, p. 7a.

[48] At first reading, I would not have interpreted the 3M claim to refer to the implied incremental price of its generic tape. However, this interpretation is central to the *Amici Curiae* Brief filed by Bell South and eight other firms in support of 3M's Petition for a Writ of Certiorari; see page 8.

[49] We know that the effective discount to Kmart was more than $450,000 and to Staples it was an extra 1%. But, in neither case do we know how this translates into the price LePage's would have had to offer and whether this would have been profitable assuming it was equally efficient as 3M. We are told that in response to the 3M discounting, LePage's earnings as a percent of sales became negative. But this is not a measure of avoidable costs and may be a result of other factors; furthermore, as LePage's was less efficient than 3M, even losses by LePage's do not indicate below-cost pricing by 3M.

As discussed earlier, the lump-sum nature of 3M's bundle pricing helped prevent substitution of LePage's tape for 3M's Scotch branded tape. Simply undercutting LePage's price might have yielded 3M the private label tape business but it would have led to even lower price for private label tape and thus even more substitution. The bundle discount enabled 3M to displace LePage's while maintaining the price of private label tape.

Consider the case of the Staples contract. Staples was promised an extra 1% discount on all its 3M purchases if it would take 3M private label tape over LePage's. Even assuming this 1% discount translated to a 25% discount when applied to the private label purchases, any incremental purchases of private label tape would be at only a 1% discount. The nature of the bundle discount was not of the type that would be passed on to consumers and hence it would not threaten 3M's Scotch tape business.

3M spent most of its effort to showing that the total bundle price was above its cost. While LePage's failed to show that the incremental price was below its cost, 3M (assuming it were true) should have demonstrated that the incremental price of generic tape was above its cost. Such a demonstration would have shown that an equally efficient competitor would not have been foreclosed. The fact that 3M did not provide such a demonstration is either evidence of a failed legal strategy or that the facts would have shown the implied price to be below variable costs.

By not applying the exclusionary bundling test, the court relied on the fact that a firm with substantial market power can abuse that power without pricing below cost. Such behavior, for example, might include refusing to deal or conspiring to raise rival's cost by denying them access to supply.[50]

The US courts in the Aspen Ski case concluded:[51]

> A monopolist wilfully acquires or maintains monopoly power when it competes on some basis other than the merits.

In the Grinnell case, the US courts laid down a two-part test for Section 2 of the Sherman Act:[52]

1) Possession of monopoly power in the relevant market and
2) The wilful acquisition or maintenance of that power as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident.

As the court found in the LePage's decision:

> 3M is a monopolist; a monopolist is not free to take certain actions that a company in a competitive market (or even oligopolistic)

[50] US tobacco companies engaged in this latter behavior by acquiring and then not using less expensive supplies of tobacco so as to deprive rivals of this source; see American Tobacco Co. v. United States, 328 U.S. 781 (1946).
[51] *Aspen Skiing Co. v. Aspen Highlands Skiing Corp*., 472 U.S. 585, 605, n.32 (1985).
[52] *United States v. Grinnell Corp* 384, U.S. 563 (1966) 570—71.

> market may take, because there is no market constraint on a monopolist's behavior.[53]

But just what actions are proscribed is not clear.

Conclusions

The practice of bundle discounts is prevalent, but their effects on competition are not well understood. The early economics literature emphasized price discrimination (McAfee, McMillan, and Whinston, 1989). This is one of several potential efficiency advantages. More recent work has suggested the potential for bundle discounts to leverage monopoly (Whinston, 1991, Nalebuff 2004a,b, Greenlee, Patrick, Reitman, David, and David Sibley, 2004).

This paper has provided a framework for testing whether a bundle discount is sufficiently large to foreclose competition. The test has been examined in the context of several antitrust cases. The proposed exclusionary bundling test has much of the flavor of predatory pricing. The primary difference is that there is no need to establish recoupment. This is because the bundle discount can be based on a threat that is never carried out and hence imposes no cost. If foreclosure can be accomplished without pricing below cost, this makes exclusionary bundling a potentially more dangerous tool for anticompetitive conduct and thus emphasizes the importance of having an appropriate antitrust test.

[53] *LePage's Inc. v 3M* 324 F.3d 141 (2003), p. 151.

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